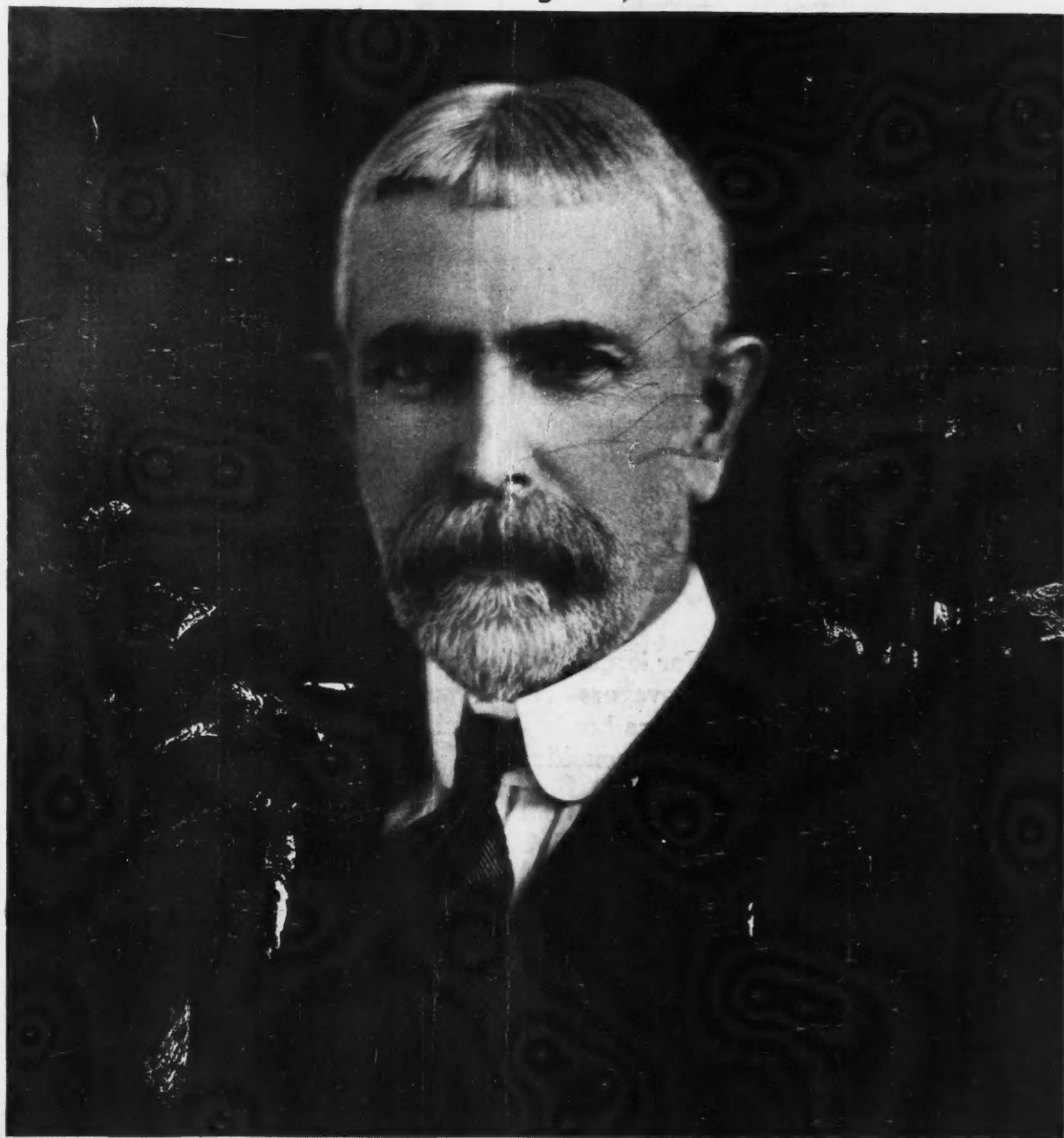


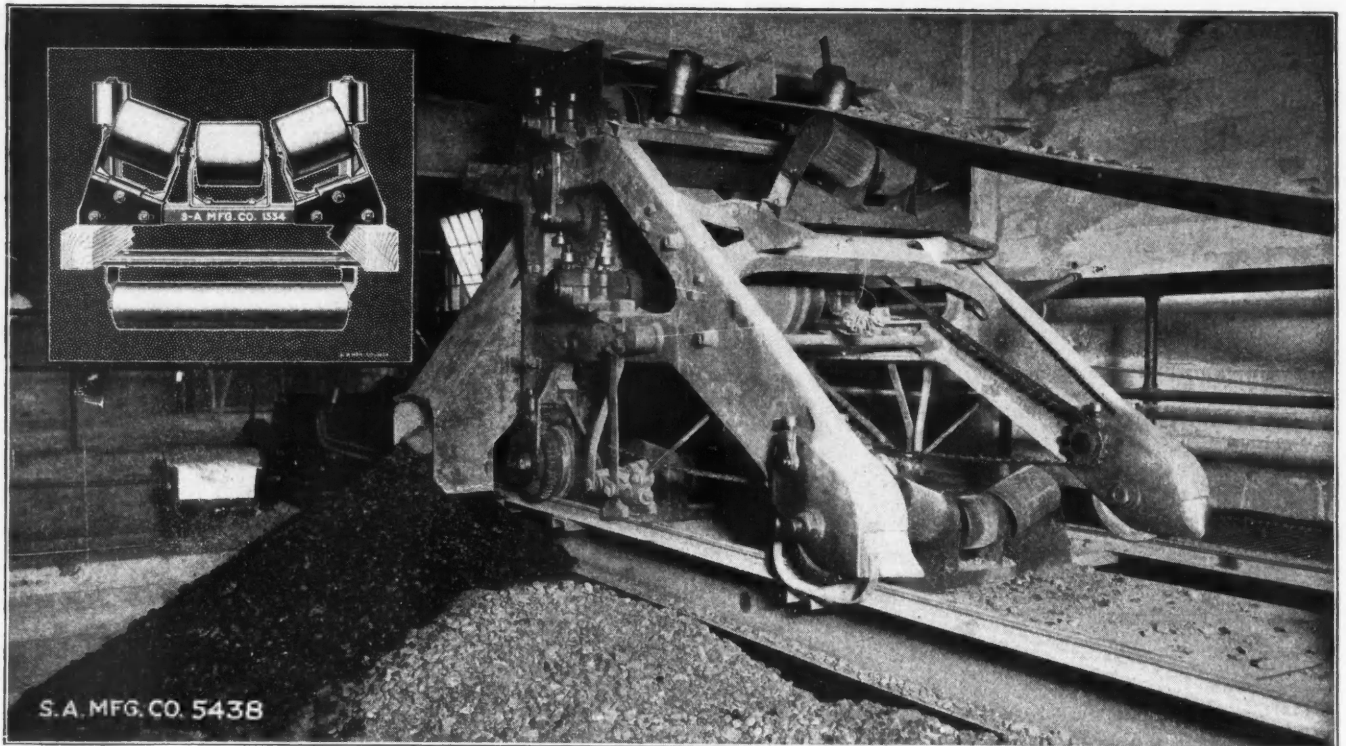
ENGINEERING AND MINING JOURNAL

• February 19, 1921 •



EDWIN LUDLOW
Newly Elected President of the Institute

Report of the New York Meeting of the American
Institute of Mining and Metallurgical Engineers



This S-A Tripper is distributing to the big storage bunker just below the conveyor. Trippers of this type may be furnished for conveyor belts ranging in width up to 60 inches.

S-A Belt Conveyors

For large capacities and for heavy, continuous duty, S-A belt conveyors are the most desirable. They are built to stand severe hardships and render satisfactory service under adverse conditions.

In all parts of the world and in many industries under varied conditions S-A belt conveyors are standing the test.

Write for data on conveying problems.

A copy of our General Catalog should be on your engineer's desk.

We Also Build

Feeders
Pan Conveyors
Bucket Elevators
Screens
Skip Hoists
Car Pullers
Friction Hoists
Coal Crushers
Portable Conveyors

SEND FOR
CATALOG



STEPHENS-ADAMSON

MFG. CO.

AURORA,

ILLINOIS

J. E. SPURR
Editor
G. J. YOUNG
Western Editor
D. E. A. CHARLTON
Managing Editor
A. H. HUBBELL
News Editor
E. H. ROBIE
Metallurgical Editor

Engineering and Mining Journal

A Weekly Journal of the Mining and Mineral Industries

METALS NON-METALS PETROLEUM

F. E. WORMSER
W. N. P. REED
CLEVELAND ABBE, Jr.
Assistant Editors
BENJAMIN L. MILLER
J. VOLNEY LEWIS
Special
Consulting Editors

Volume 111

New York, February 19, 1921

Number 8

Assisting Deflation

WITH THE FALLING OF PRICES and the long-wished-for tendency to return to normal costs of living, we should and do look with disfavor upon any item which seems to be stemming the tide, like the salmon swimming upstream. And the weight of this popular sentiment hastens the shading of profits and the declining course of charges.

With the deflation of business and of currency, it occurs to us that there might well go along a deflation of sentiment and mode of living. The inflated sentiment and manner of life we should define as that which pins its faith on money—and ever more money. Whereas in former years there were campaigns for religious or philosophical or political converts and for higher modes of living, in our modern times these have been entirely replaced by drives for cash. It is true that this money represents tangibly the belief in good causes, is the potent factor in carrying them out, and is more effectual than a mere show of hands: but this faith in the power and necessity of the dollar, and the practice of gathering it in, has been overdone and inflated.

Our living standards also have become puffed up. "No more," recently wrote a woman newspaper contributor, "do we look for the workingman in the slums: we seek for him in the evening in the good hotels, wearing his evening clothes with as good a grace as the rest." Extreme as this is, it is symbolic of the real inflation: even the conventional attire of the white-collar class has been modified by subtle sartorial suggestion many times since we can remember, to the ultimate profit of the manufacturer, the greater consumption of goods, and the more feverish and exhausting struggling of the wage- or salary-worker to fulfill all the set standards.

To these higher standards of luxury the white-collar class has sacrificed its posterity: in a vast number of cases the self-pampering, the nattier dress, larger house, and more costly food appropriately coincide with the termination of the race—the inflated standard is too high for a family to live by.

A deflation of the money-psychology might well promote those more genuine things in life, like character and the art of gentle living, in which modernity is not conspicuous. And this brings us to wonder whether it is really more money that is needed in many of the cases where the demands for it are made, or an increase of organization and efficiency, a return to Puritan simplicity, the study of the promotion of quality rather than quantity, and the fostering of simple worth. And we wonder whether the colleges and Government institutions that clamor ever for more money—even our own Geological Survey and the Bureau of Mines—need nothing else but money. And whether our mining societies like the American Institute of Mining and Metallurgical Engineers, and the Mining and Metal-

lurgical Society, both of which are raising their dues this year, are properly deflating, or are expanding against the tide. It is true that the wave of deflation has not yet struck the New York printers, and this is one of the principal costs that both of these societies have to bear: but could not the quantity of the printed matter be at least somewhat reduced and the result be a net improvement?

From our own experience, having tried our remedy upon ourselves, we should say so. Our annual review number this year had 76 pages of text, against 130 pages of last year: and in our own opinion, and that of many subscribers who have commented, this year's issue was a great literary and technical improvement on that of last year. We did not have, as the societies have, any power of assessment against our subscribers or advertisers to continue our money-extravagance and quality-poverty course; we had no government from which to ask for more appropriation, and so we were forced to reform.

We believe that the societies could do the same. The Institute publishes many pages of printed matter that the protesting member receives, whether he will or no. The monthly bulletin of the Mining and Metallurgical Society is surely a modest affair: but the casual remarks of Tom, Dick, and Harry usually occupy some pages unnecessarily. Both societies make the economic mistake of forcing on the member bound volumes, with the bill therefore also peremptorily presented. Here there is a great and irritating waste. By all means do no binding unless for a member who wants it done. A simple inquiry sent to each member would determine how many copies are to be bound and who want them sufficiently to pay for them. Yesterday we pitched a beautifully bound volume of one of these societies, acquired in this involuntary way, into the waste basket; it was of no use to us.

The theory that the members of an engineering society will stand indefinitely for increases in its dues is one that, from certain signs we note, is likely to be exploded. Let us all reconsider and study, not expansion, but the beauties of deflation and simplicity. There is far too much printed stuff already; and the most meritorious present-day literary service is that of boiling it down to essentials.

The Dangers of Organization

LAST WEEK we pointed out the beauties of organization, and cited the aluminum industry as an example, in contrast to our debilitated copper industry. This week we are moved to point out the obvious fact that there are dangers in strength and efficiency; dangers that the strong, well-organized industry may not use its smooth-running power for you and me, but

against us, and for itself alone. We do not know that the aluminum industry in America (which, as we observed last week, is a monopoly) does so use its power, but the temptation is always great, and at least one of its opponents has presented a very strong statement to that effect.

We publish on p. 336 a letter from a firm dealing with raw aluminum, presumably importers. The Aluminum Company of America has asked for an increase of tariff on raw aluminum. In reply, the writers of this letter have presented a counter-argument to Congress, in behalf, as they state, of a large number of independent aluminum founders and manufacturers. The writers profess themselves in sympathy with the policy of protecting home industry by the principle of the tariff, but they claim that the tariff demanded would, in this case, crush the whole aluminum industry except that controlled by the Aluminum Company of America; and that the Aluminum Company of America does not need any further protection. In support of this last statement, they cite the published earnings of this company for 1920, which totaled \$10,000,000, or 60 per cent on the capitalization. They also cite the circumstance that "aluminum is the only non-ferrous metal produced in America on which the price is higher today than its normal price, or higher than the average price for ten years previous to the European war. The Aluminum Company of America has religiously endeavored to maintain a price of 33c., a price 60 per cent higher than the normal price."

The result of the tariff, these opposing importers believe, would be to put out of business those founders and manufacturers who may choose in their purchases of raw aluminum between European producers and the American monopoly, and enable the latter to fix their profits at any rate they desire. This American company, as they point out, owns the mines, furnaces, rolling mills, and factories to turn out the salable aluminum utensil from the ore; controls also Canadian aluminum, and not only the American bauxite mines, but the principal South American mines, those in British and Dutch Guiana. Also the American company obtains its coal from its own coal mines. A very neat and efficient combination, the business man will judge; and the only question which one might naturally ask is, "What are they going to do with it?"

There is doubtless another side to this particular tariff argument from that which our correspondent gives us: but, so far, we confess that we cannot feel that any tariff is necessary. On general principles, this is no time for discriminating against importation of goods from Europe; on the contrary, that is exactly what we must encourage to the utmost. In no other way—for she has little gold—can Europe repay us the vast debt she owes us; in no other way can she rehabilitate herself so that she can buy anew. Also, we have an instinctive faith that such a model combination as the Aluminum Company can maintain itself with the existing tariff. If it is the low exchange which enables European competition, in the company's opinion, to be threatening, that situation will adjust itself naturally, provided we put up no strong tariff walls.

What to do in the case of a great organization which becomes possessed of preponderating power in its industry is our present-day problem. The old remedy of smashing it, popular a decade ago, has no longer any

firm adherents. Current thought and theory trend more naturally toward public regulation, in the interests of all. Yet public regulation that goes too far is destructive of that efficiency that inheres in great private organizations, as the Government's experience in handling the railroads shows. Politics is a more expensive burden for the public to bear than even monopolistic over-reaching. We have progressed far in diverse experiments, toward reaching the right solution, but we are not there yet.

Big Business at Home and Abroad

IT IS AN INTERESTING LIGHT upon our theories of economics and the proper control of business to note that the American people are coming to judge with different standards a company that operates at home and one that operates abroad. A striking illustration of that was the Webb Act, which authorized monopolistic business combinations, for the purposes of foreign trade, of exactly the same kind that legislation had been stern in making illegal within the boundaries of the Republic. Were the legislators who so plainly indicated that there was one principle for home and another for abroad interrogated as to their reasons for their theory, they would doubtless reply that it was "a condition, and not a theory, that confronts us." It was, in other words, clear to them that the only way for American business to compete abroad with the highly organized and centralized business of other countries was to adopt the same methods of close organization; and this in itself carries an acknowledgment of the increased efficiency of a high degree of organization, an acknowledgment which must perforce apply also to domestic business.

The same principle is coming up now in taxation: The Dyer bill provides for the Federal incorporation of American companies in China, and exempts them from excess-profits taxation on business done in China. This bill has been approved by the Ways and Means Committee of the House of Representatives, which insures its presentation to the House. The argument, we believe, is that the competitors of American companies in China do not have to sustain excess-profits taxes, which makes it difficult for American companies to compete; in that the "condition, not theory," again confronts us. If Congress decides this principle as before, it will be interesting to observe the further workings of it in the future.

Fallacious Gold Bonus Criticisms

RECENTLY our attention was called to a statement made in criticism of the McFadden Bill which read, "We are fully aware that, under the proposed plan, the mint would still pay the long-established price for gold; but if gold used in the arts costs a higher price, gold coin would become token money." If this be a popular conception of the effect of the McFadden Bill there is little wonder that opposition is being created to prevent its passage. The effect of the bill in no way alters our existing monetary system. The monetary function of gold is entirely dissociated from its use in the arts, and the bill is so constructed that the mints, banks, and financial agencies can obtain all the gold they care to and at the long-established price of \$20.67 per troy ounce. We hasten to correct this impression and can assure our readers

that if the proposed legislation interfered with our existing currency and made the gold eagle a token coin we, and no doubt the sponsors of the bill, would be vehemently opposed to it.

The working of the McFadden Bill would not only stimulate and restore the mining industry to a healthy condition, but would also increase the gold reserve of the country. This dual consequence is brought about by taxing the finished gold article—be it a gold cup, gold watch or a wedding ring—imposing the tax where it is least likely to be felt—on luxuries—and distributing the proceeds to the gold miner so that he may be compensated for the greatly increased cost of producing his gold. The miner's product is sold to the mint, and the standard price plus a \$10 bonus per oz. is received. Consumers pay the standard price for their supply of gold. How can such a system possibly reduce gold coinage to a token basis?

Some statements appearing in the press exhibit either a surprising lack of study of the principles and operation of the gold bonus or draw conclusions that are illogical and unwarranted. The *Evening Post* recently stated, "The bounty would enormously stimulate the production of gold, thereby increasing prices and, incidentally, the cost of producing gold. As prices continued to advance, the cost of producing gold would mount, and the bounty would eventually defeat its own purpose." Does the gold producer realize his importance? Does he realize that, according to the *Evening Post*, the increase in his \$50,000,000 production to whatever it may become will so profoundly affect our \$2,750,000,000 in gold in the Treasury as seriously to disturb prices? We wish we could believe that the power of the gold miner is so tremendous.

The gold miner is undoubtedly finding a ray of hope in the recent decline in commodity prices. However, his most important items, labor, iron and steel products, powder and fuel, have shown little alteration, and until they change gold mining will remain in large degree unprofitable and hazardous. There is a possibility that a decrease in copper production may release labor for the gold mines and that the decline in farm products may not make agricultural pursuits so much more attractive to labor than mining. But that is all conjectural. What the industry needs is immediate relief, and it can get it through the McFadden Bill.

Export Trade With Mexico

A RECENT announcement by the American Chamber of Commerce of the City of Mexico to the effect that a second trade conference of American commercial interests will be held in April in the City of Mexico is of interest. The determination to hold the meeting is the result of the success attending the first conference, which was held last February, and at which time definite steps to promote trade relations between this country and Mexico were taken. The American Chamber of Commerce points out that the United States has established itself as the foremost exporter to Mexico, and that to maintain this position it will be necessary to compete with the tactics and buying inducements offered by European merchants.

Upon the withdrawal of trade competition in Mexico during the war, it was possible for American business houses to demand that their transactions be carried on a cash basis, and this was to a large extent desirable

on account of the unsettled condition in Mexico, which made the extension of credits wholly undesirable. But, fortunately, there has been a change for the better in the affairs of Mexico, and business conditions have become so stabilized as to make possible the extension of liberal credit to responsible houses without risk. European merchants are now eager to make offers of liberal credit, and it is, therefore, quite necessary that American sellers should adopt a liberal policy in this regard. Recently Alberto U. Pani, the Mexican Minister of Foreign Relations, in an official statement, said that the government had invited prominent United States bankers to assist in certain financial readjustments of the country and expressed a willingness to fulfill all obligations.

The mining industry in Mexico is undergoing a period of inactivity and retrenchment similar in a way to that which now affects our domestic mines; but this is, of course, temporary. With the return of a healthy demand and normal prices for the various metals, Mexico will again take her place as a large producer of metals, and many of the undeveloped deposits will receive attention. The development of new properties and the continuation of the older mines will require capital. Much of this capital will be obtained in the form of extension of credits for the purchase of American mining machinery, the desirability of which is admitted the world over.

Radium in the Grand Canyon

MME. CURIE, the discoverer of radium, is to pay her first visit to this country in May. "Her express purpose is that while here she be taken to Pittsburgh, where radium is extracted from ore, and to the Grand Canyon, where the ore is found." This we note in the *New York Tribune*, which, take it from the *Tribune*, publishes "First to Last—the Truth." No doubt the reporter has erred in the present case, however, for it is safe to say that Mme. Curie knows better than this. We thought that myth of rare minerals in the Grand Canyon had been pretty well exploded by this time—at least as to the occurrence there of any rare ore in commercial quantities or qualities. Anyway, it was platinum that was supposed to be there, and not radium.

Evidently the State of Colorado has been confused with the Colorado River, along which the one and only really Grand Canyon is situated. The Colorado River, of course, flows through Arizona, and the Arkansas River is in Colorado. Strange that one cannot keep these simple things straight!

We hope that Mme. Curie will visit the Grand Canyon, but, as she rides down the Bright Angel Trail on the back of a mule, she need have no fear that he will stumble into the shafts of any radium mines or even into prospect holes. To see these she will not need to journey far from Denver, though if she feels equal to a little wilder trip, the fields along the Dolores River, in the southwestern part of the state, should prove interesting.

E. & M. J. Index

THE INDEX for Vol. 110 of the *Engineering and Mining Journal* is now ready for distribution and will be mailed only to those who request it. Those who wish a copy of the Index, are requested to send for it promptly. A postcard will do.

WHAT OTHERS THINK

The Proposed Aluminum Tariff

In the preliminary discussion before the Ways and Means Committee of the House of Representatives on the tariff, no proposal from any industry seeking an increase above the present import duty rates met with more opposition or created greater interest among the trade than the proposal of Arthur V. Davis, president of the Aluminum Company of America, that the duty on aluminum ingots, pigs, etc., should be increased from the present rate of 2c. per lb. to 7c. per lb., and the present rate of duty on aluminum sheets from 3½c. per lb. to 11c. per lb.

The request was made on behalf of the Aluminum Company of America, the sole producer of aluminum in the United States, and the only absolute monopoly in the production of metals in the United States. This corporation absolutely controls the entire production of aluminum in the United States and also half of the production of aluminum of the entire world. It not only produces aluminum, but actually competes in aluminum finished articles, like cooking utensils, stampings, novelties, etc., and also competes in the manufacture and sale of aluminum castings and automobile parts. It may further be stated that this corporation, practically controlling the entire aluminum industry in the United States, both the production of the metal itself and the manufacture from the raw material into finished aluminum products, seeks to further extend this absolute monopoly by preventing what little competition there is from abroad, by high and prohibitive rate of duty, thereby practically turning over to this Aluminum Company of America the entire aluminum industry of the United States.

Forty or more independent cooking-utensil manufacturers and several hundred independent aluminum founders of the country, in whose business hundreds of thousands of dollars are invested, and hundreds of thousands of men employed, are absolutely powerless to come to the forefront and defend themselves against this outrageous attempt on the part of the American producer, for they fear the antagonism of this monopoly, which would be in position to hamper or absolutely prevent their manufacturing if they opposed the will of the only producer of aluminum in America, and this would be especially true if a prohibitory tariff on aluminum is established.

If this prohibitory tariff on aluminum is established, the housewives of America will undoubtedly want to know why they have to pay an increased and unwarranted price for aluminum cooking utensils, vacuum cleaners and other household utilities, made in part or in whole of aluminum, which will undoubtedly be the case if the Aluminum Company of America succeeds in gaining an absolute control of the production and marketing of aluminum in this country.

Every owner of automobiles in America will be affected, because a turning over of this aluminum industry into the hands of the Aluminum Company of America, by preventing foreign competition, will mean either high-priced automobiles because of the higher

cost of aluminum, or it will mean a lessening of the use of aluminum parts, thereby decreasing the efficiency and quality of the automobiles in America. The automobile industry, through the National Automobile Chamber of Commerce and the Independent Aluminum Founders' Association, strongly presented these facts to the House Ways and Means Committee.

L. M. BRILE.
New York City.

Further Tests of Low-Grade Cyanide at Tonopah Confirm Earlier Results

On p. 104 in your issue of Jan. 15, 1921, I note the following in Mr. Alfred James' article entitled "Side-lights on the Cyanide Process":

"The shortage of cyanide has induced large operators to purchase a low-grade cyanide produced from cyanamide. J. G. Kirchen states his experience with this material (see *Engineering and Mining Journal*, Sept. 25, 1920) on a month's run. I hope Mr. Kirchen will follow by giving his experience on at least a year's run. Faced at the outset with low-grade cyanide, works were erected, patents purchased, chemists of world fame employed, and ultimately an almost chemically pure article was produced. The proper remedy for a shortage of high-grade cyanide is surely greater production rather than the substitution of a low-grade compound, introducing much undesirable material."

I have had our metallurgist, Mr. Hugh A. Burk, collect the data requested by Mr. James, which covers a period of thirty-one months' mill-run at the Tonopah Extension mill, using 97 per cent NaCN product and treating 276,509 tons of ore; also eleven months' run using a low-grade cyanide product containing 36.3 per cent NaCN, during which time 74,433 tons of ore was treated.

COMPARISON OF RESULTS WITH HIGH- AND LOW-GRADE CYANIDE

Grade of Cyanide Product, per Cent NaCN	Assay of Ore in Oz., Ag	Assay of Tailings, Oz. Ag	Extraction Percentage	Consumption in Lb. 100 per Cent NaCN Per Ton of Ore	Per Oz. Ag Recovered
97.0	12.38	1.01	91.84	1.939	0.171
36.3	13.28	1.12	91.59	2.033	0.167

This record shows that approximately the same extraction was obtained with high- as with low-grade cyanide product. The difference in extraction, which is 0.25 per cent, can be attributed to a small tonnage of ore treated with the lower-grade cyanide product, which ore contained a small percentage of copper, the silver extraction of which was slightly less than our regular run-of-mine ore.

The difference of 0.004 lb. of NaCN consumed per ounce of silver produced is small, and may be attributed to difference in mechanical losses of cyanide rather than in chemical consumption.

Our practice for the last five years has been to feed oxidized lead ore to our tube mill instead of adding lead acetate to our cyanide solutions. The consumption of

oxidized lead ore per ton of ore cyanided has been the same when using high as when using the lower-grade cyanide product.

One infers from the foregoing paragraph of Mr. James' article that the manufacture of the low-grade cyanide product was undertaken on account of shortage of the high-grade product. In this I believe he is mistaken, for I know that its manufacture was considered years before the late war, and its object was to produce a cyanide product the NaCN content of which could be sold at a less cost than the higher-grade product.

Our experience, with such cyanide products as we have used, indicates that the value of the product for our metallurgical work is determined solely by the amount of NaCN which it contains.

Tonopah, Nev. JOHN G. KIRCHEN,
General Manager Tonopah, Ltd., Extension Mining Co.

Straightening a Crooked Boundary

I was much interested in the solution of the problem of straightening a crooked boundary given by Alex. Richardson in *Engineering and Mining Journal* of Nov. 13, 1920. As a check or alternative solution to this problem I submit the following:

Using the same example and figure as on p. 953:

(a) Assume a trial line from A to E, then	
Area MAEQ =	120,450
Compare with area MABCDEQ =	111,350
<hr/>	
Showing area MAEQ in excess by	9,100
(b) Assume another trial line A to D	
Then area MADP =	78,300
and area MABCDP =	96,350
<hr/>	

Showing area MADP to be deficient by 18,050

As the trial line to E gives an excess and the trial line to D a deficit, the correct position of the end of the new line from A (i.e., the point T) should be somewhere between D and E and the departure D-U in this example would be obtained by the simple proportion:

$$DU : DW :: 18,050 : (18,050 + 9,100)$$

$$\text{or } DU = \frac{150 \times 18,050}{27,150} = 99.72$$

The general equation is:

$$\frac{DV}{DW} = \frac{\text{excess (+)} \text{ at } D}{\text{deficit (-)} \text{ at } D \text{ and } E} \text{ difference between } \left\{ \begin{array}{l} \text{excess (+)} \\ \text{deficit (-)} \end{array} \right\} \text{ at } D \text{ and } E$$

taking note of signs.

London.

A. O. DOLAN.

For the Very Wealthy Only

I noticed with interest your reference two or three weeks ago to copper as a luxury. Lead, zinc, and copper in manufactured form are luxuries here, beyond the reach of any but the very wealthy.

No sort of copper screen can be had here for less than \$1 per sq.ft., and if a mill man wants a piece of copper screen for a trommel, it will cost from \$2 to \$5 per sq.ft. The prices of most of the articles made out of zinc are even more unreasonable than those of copper articles. Lead, manufactured, costs from 50c. to \$2.50 and up a pound.

I wish you would touch this subject up a little

stronger, for it is as certain as death that the high price of nearly everything into which lead, zinc, or copper enters is hurting the market very greatly—probably more so than any other one thing.

Park City, Utah.

CHARLES MOORE.

Paternalism and Rio Tinto

In your issue of Jan. 1 you state that the miners at Rio Tinto live in a row of gardenless cottages for which they pay a rent which, if capitalized, would purchase the house annually, and that family events, such as births, deaths and weddings, have to be notified to the company. (The statement referred to was quoted from the *New York Sun*.—EDITOR.)

As one who formerly lived for many years at Rio Tinto, I would like to say that although the houses are built on rocky soil, where gardens cannot be easily developed, I am informed that the miners now receive allotments from the company at nominal prices. The statement with regard to house rent is grossly exaggerated. With reference to notification of numbers of persons in a household, this may be to some extent explained where sanitation is dealt with by carts, and distribution of drinking water is, or was, by kegs. Any one who has visited Spain knows that paternalism is found in places other than Rio Tinto as far as the question of visitors is concerned.

It was evident in this strike that after concessions were offered the men by the company the economic aspect of the strike was ignored by the strike leaders. There seems to have been a Bolshevik element in the latter phase of the strike, which is now being repudiated by the men.

R. D. MACKECHNIE.

London.

The Non-Metallic Mining Number

The non-metallic number of *Engineering and Mining Journal*, which appeared Jan. 29, is an interesting innovation, the continuance of which will meet the hearty approval of operators in the non-metallic field. Although considerable information concerning this industry is published, the greater part consists of statistics and matter descriptive of the preparation of the various non-metallics for the markets and not the actual production of the raw material. The non-metallic miner faces many problems, which include almost as great a variety as those met with in metal mining; therefore he is interested in the activities and operations of others who are producing non-metallic ores.

The extension of the weekly market pages to include non-metallic mineral quotations was a valuable addition, and one which increased the already wide scope of service rendered by *Engineering and Mining Journal*. The issuance of the non-metallic mining number is a further step in that direction.

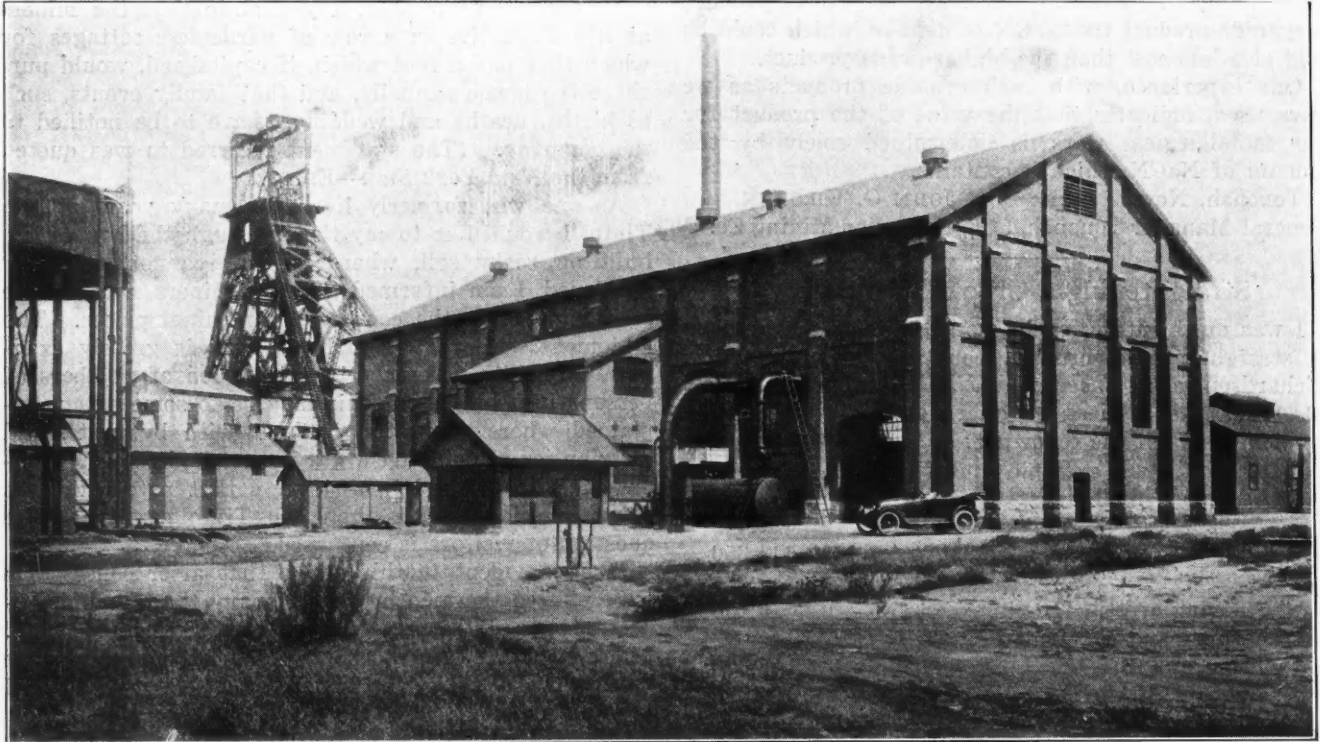
If suggestions are not entirely out of order, I might mention that the non-metallic field is an extensive one, employing about 18 per cent of the number employed in metal mining. I believe readers of *Engineering and Mining Journal* will be interested in articles dealing with the mining of barytes, mica, phosphate, talc, and the other non-metallics that are not frequently mentioned in the technical press.

We like what we are getting, but let's have more of it.

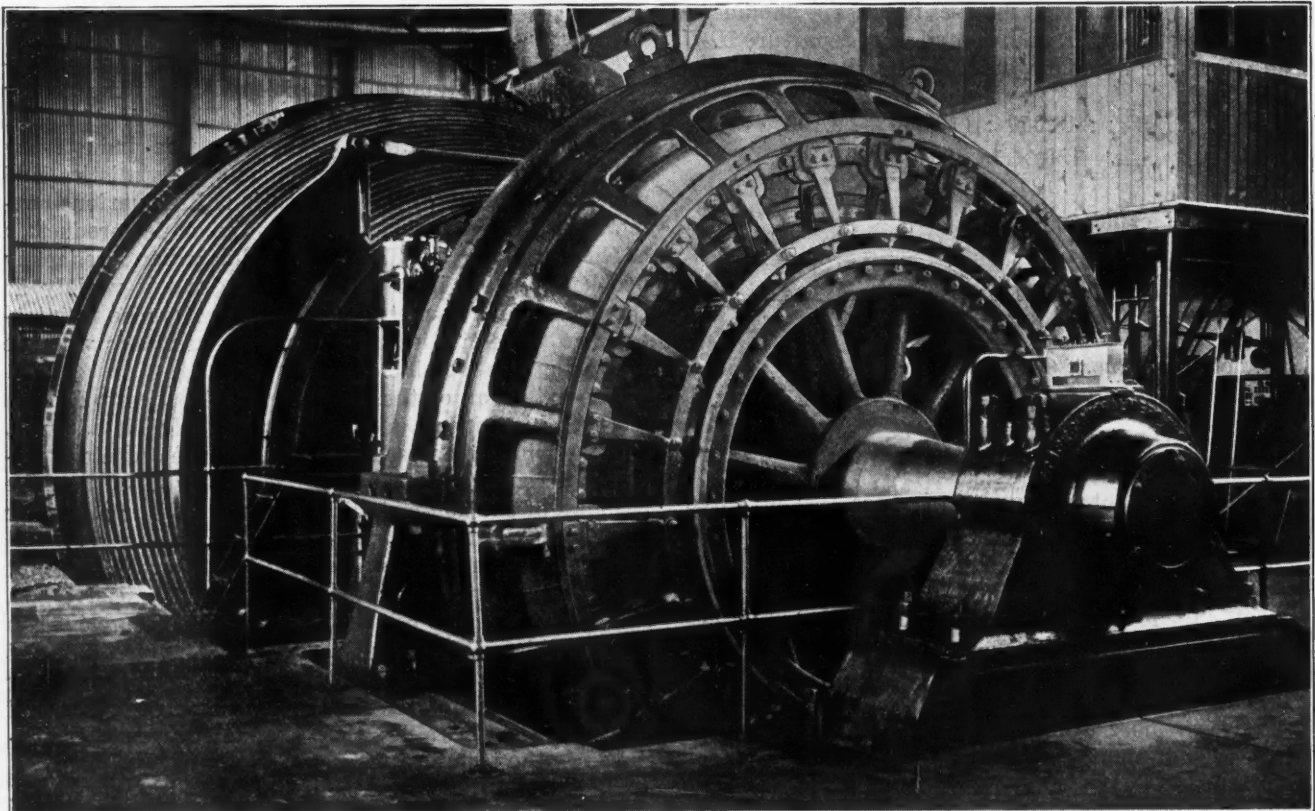
New York City.

EDWARD THOMPSON.

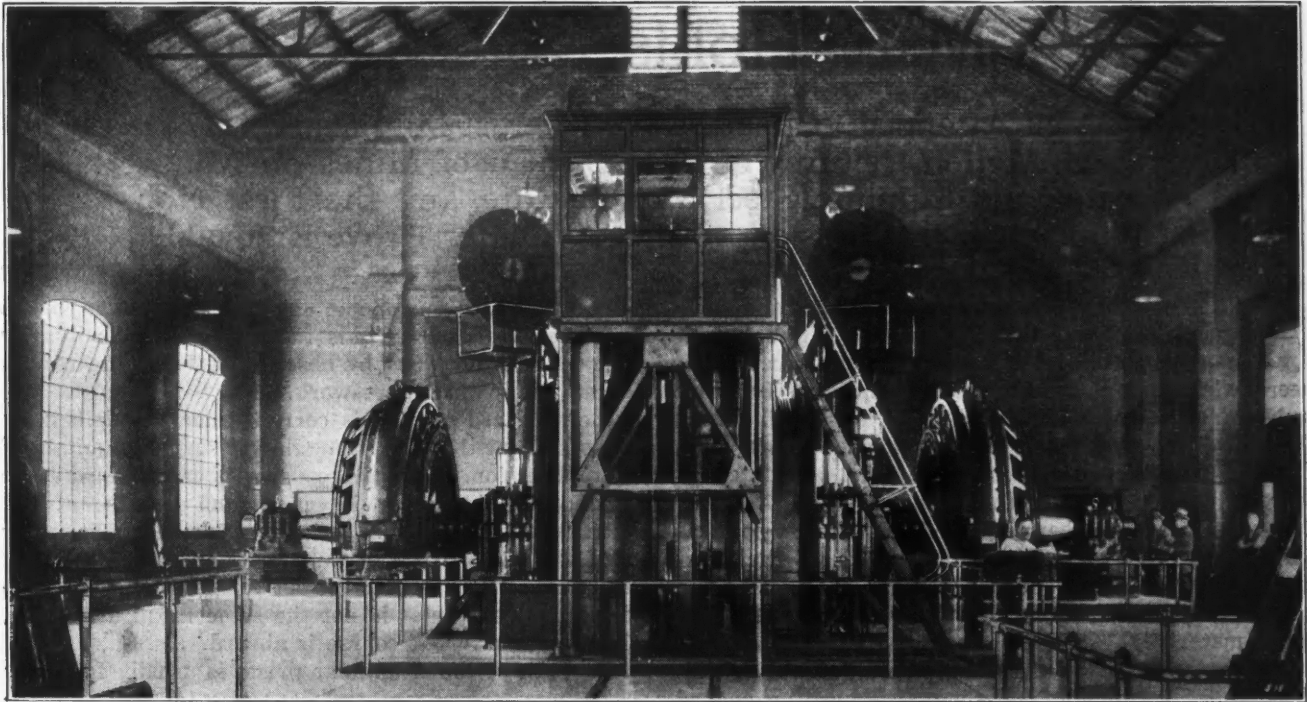
Electrically Operated Mine Hoists on the Rand



HOIST HOUSE AND HEADFRAME OF NEW MODDERFONTEIN GOLD MINING CO.



AN ELECTRIC HOIST AT THE CROWN MINES, JOHANNESBURG.

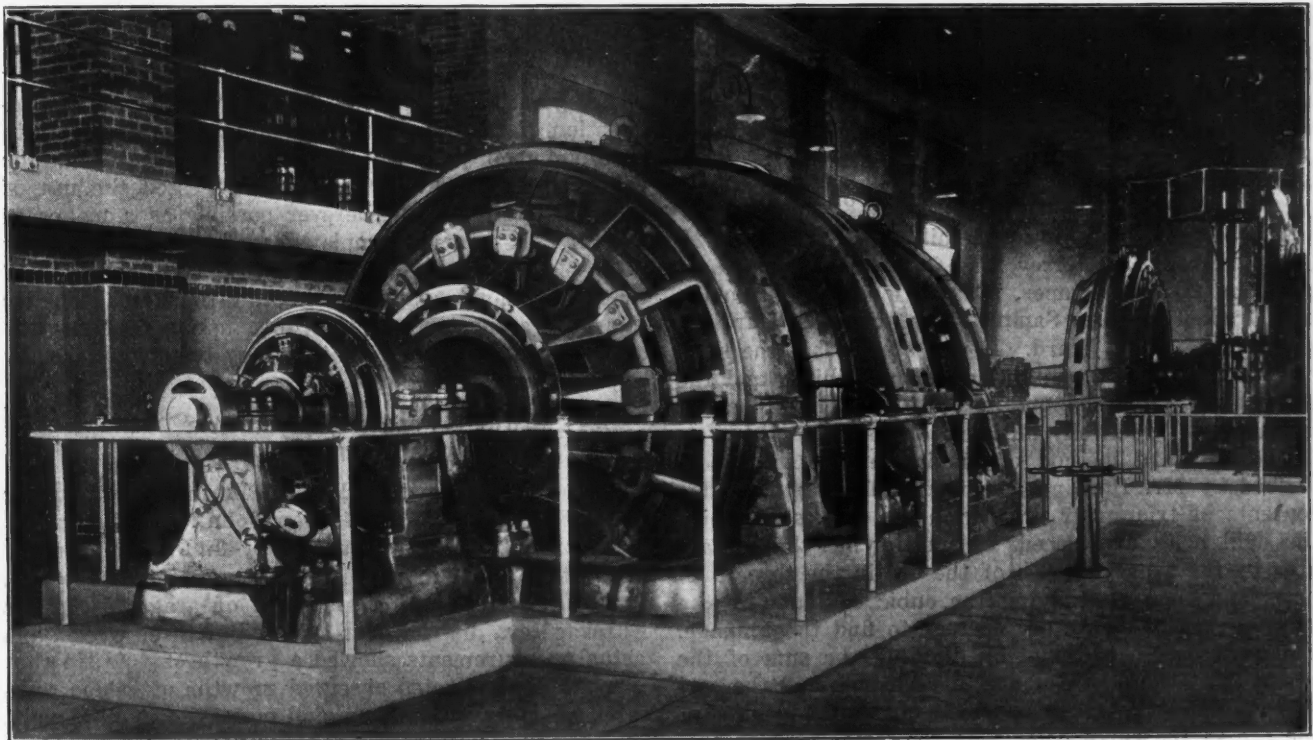


REAR VIEW OF MODDERFONTEIN HOIST, SHOWING ENGINEER'S PLATFORM AND CONTROL GEAR

THE New Modderfontein hoist consists of a single cylindro-conical drum carried by a continuous steel shaft 24 in. in diameter and coupled at either end to the motor shafts. The smaller cylindrical portions of the drum are 15 ft. in diameter and are made of cast iron. The large cylindrical and conical portions are made up of two parts each consisting of four cast-steel segments securely bolted together, the diameter of the former being 24 ft. The total weight of the drum shaft and bearings is approximately 180 tons. To the drum shaft

are coupled, one at either end, two 2,000-hp. 53½ r.p.m. direct-current motors, which are connected in series. These motors receive power from a motor generator set consisting of two 1,650-kw. generators driven by a 5,000-hp. induction motor. The speed and direction of rotation of the hoist motors are controlled by the Ward Leonard system. The control gear itself is mounted on an elevated platform sufficiently high to enable the driver to obtain a clear view of the drums, ropes and cages as they come to the surface. Below this platform are mounted

retarding and overwinding devices consisting of large, slowly revolving cams driven from the main shaft by substantial gear and shafting, which regulate the movement of the driver's lever and, consequently, the controller. The New Modderfontein gold mines are on the far East Rand, which is about twenty-five miles from Johannesburg. Mines are now being started thirty-five to forty miles away, thus making a chain of gold mines about eighty miles in length. The development of electrical hoisting on the Witwatersrand has been notable.



WARD LEONARD MOTOR GENERATOR SET AT NEW MODDERFONTEIN HOIST

A. I. M. E. Holds 123d Meeting

Convention Well Attended—Considerable Interest Manifested in Breakage of Drill Steel, Motion Pictures of U. S. Bureau of Mines on Mining of Asbestos and Sulphur, Steel Manufacture, and the First Non-Metallic Mineral Session—Social Activities Prove Enjoyable

ALTHOUGH the registration of members and their guests attending the 123d meeting of the American Institute of Mining and Metallurgical Engineers, which met at the Engineering Societies Building in New York City, on Monday, Feb. 14, was small during the first day, out-of-town visitors continued to arrive on Tuesday and Wednesday, and the total amounted to over eight hundred when the final rolls were made up. The absence of members west of the Mississippi was quite noticeable and reflected to some extent the effect of present business conditions; more specifically the existing railroad rates, which just now are effecting travel materially.

Always an occasion for the renewal of old friendships and a forming of new ones, the meeting opened most auspiciously, and there was abundant evidence that this annual meeting as well as the other annual get-togethers of the A. I. M. E. forms a real part in the lives of mining and metallurgical engineers.

The creation of an opportunity of combining business with pleasure and securing open discussion on different problems that are met in operation and practice is eminently desirable in any profession, and the committees in charge of the various activities, as in years past, spared no effort to make the 1921 meeting of the Institute a noteworthy success.

Registration began at 9 o'clock on Monday, Feb. 14. The members of the reception committee were on hand at all times, and every effort was made to meet the convenience of the guests. There were no scheduled meetings during the morning of the first day, and the initial general gathering occurred at noon, when an excellent luncheon was served in the assembly room on the fifth floor. This much-appreciated custom was continued throughout the remaining days of the meeting.

CALCULATION OF ORE TONNAGES CONSIDERED

The session on mining and milling, of which R. M. Catlin, of the New Jersey Zinc Co., was the chairman, opened at 2 p.m. A paper, "Calculation of Ore Tonnage and Grade From Ore Samples," by James E. Harding, was read by A. T. Ward. It was stated that the sampling of mineral deposits is done by drilling, and the assay results thereby obtained are used in preparing estimates in practically all large orebodies.

The standard method of making estimates, as described by Mr. Harding, consists of finding the cubic contents of triangular prisms, in the apexes of which the drill holes are placed, by multiplying the surface area by the average depth of the ore in the three drill holes and then multiplying the cubic contents by the specific gravity of the ore or rock to find the tonnage. The assay value is found by dividing the sum of the products of the depth of ore in each hole and the corresponding assay value by the sum of the depths of the ore in the three holes. As the latter part of this method is subject to many mathematical errors, it should

not be depended on. Some engineers, therefore, use a discount factor, but as this factor is either arbitrarily selected or is obtained by obscure methods, the results are no better than guesswork.

The standard method is correct when the drill holes are so laid out that the triangular prisms are equilateral in cross-section. But as ore deposits cannot always be drilled into at regular intervals, and because of the human factor, if many holes are drilled, triangular prisms of all degrees of angularity are produced. In such cases it is necessary to assume that the influence of the different holes is not the same in all directions, which assumption of course is absurd.

The area of the triangular prism is usually found by scaling; an orebody of sufficient size to justify churn drilling is too large to be handled conveniently on maps having a scale larger than from 1,000 to 1 to 1,500 to 1, and maps of such scales cannot be accurately measured. A variable is thus introduced in the first operation. In addition, the scaling is frequently done from blueprints, which sometimes shrink as much as 4 per cent between printing, washing, and drying.

The error due to scaling may be eliminated by surveying the location of each hole and calculating its co-ordinates; then from these co-ordinates calculating the length of each line connecting two drill holes. The application of the formula in the method introduces certain discrepancies, so that it is necessary to devise a method that will give results that will check more closely, and the manner in which this is done was described.

In the discussion following the reading of the paper, W. Y. Westervelt stated that he questioned the efficacy of using exclusively mathematical calculations in the estimation of orebodies and said that it was necessary to combine good judgment to get results that could be depended upon. R. S. Botsford suggested the use of intermediate samples wherever possible as a means of checking the general sample average, and that this was desirable was also the opinion of Mr. Catlin, who stated that, "the more samples the better the average." He also gave a short description of sampling reef deposits on the Rand, but said that this system would hardly apply in large orebodies.

STALACTITE FORMATIONS AND AIR DRILLING PROVE INTERESTING TOPICS

A short paper on the "Rate of Formation of Copper Sulphate Stalactites," by Graham John Mitchell, brought out some interesting discussion by J. F. Kemp on the precipitation of minerals. Prof. Kemp stated that J. S. Curtis had measured a stalactite of aragonite in the Eureka, Nev., district over a period of three weeks, and actual measurements showed a growth of $\frac{3}{8}$ in. in that time. He also quoted observed growths of galena crystals in northeast Oklahoma and marcasite in Wisconsin.

E. K. Judd presented a paper, "Relation of Air Pressure to Drilling Speeds of Hammer Drills," by H. W.

Seamon. The data in this paper were obtained by 1,500 tests made by the United Verde Copper Co. to determine the most economical air pressure for the operation of hammer drills under the varying conditions of use, and to investigate the variation in drilling speed at different air pressures. Twelve models of drills were used at gage pressures ranging from 40 to 130 lb. No effort was made to harmonize theory and practice; rather the purpose was to formulate empiric rules that would cover the average variation of the results obtained. These rules on the performance of hammer drills, based on the air pressure as the main variable, however, are not necessarily of universal application, but they apparently satisfy the results obtained in this series of tests. Tests were made on the following machines: Ingersoll-Rand—No. 248 Leyner-Ingersoll, No. 18 Leyner-Ingersoll, No. 26 Baby Leyner, BCRW430 Jackhammer, and CCW11 Stopehammer; Sullivan—DR6, DX61, DP33 Rotator, and DT44 Stoper; Waugh—No. 66 Super-Dreadnaught, No. 60 Dreadnaught, and No. 21V Turbo.

The shop tests to determine the power of the drills were made on a Paynter rock drill tester. The higher air pressures were obtained by filling a receiver, of approximately 200 cu.ft. (5.6 cu.m.) capacity, with air at the pressure of the mains, usually 90 lb. (40 kg.) and then pumping water into the receiver until the required pressure was reached. The duration of the runs of the Paynter tester was five seconds, with no appreciable drop in pressure; in the drilling tests, the time ranged from ten seconds at the highest pressure to thirty seconds at 100 lb. These short runs were necessary to avoid too great a pressure drop while the test was being made and to eliminate errors caused by the rapid dulling of the steel, particularly at pressures above 100 lb. The consumption was measured with a New Jersey "Drillometer," which records the rate of flow. Special effort was made to have all the conditions uniform; the only variables were the air pressure, with the corresponding change in the number and strength of blows, and the air consumption.

The conclusions reached as the result of the tests are as follows:

There is little or no increase in mechanical efficiency of the drills above 90 lb. pressure; the distance drilled per air indicated horsepower is greatest for the jackhammer type at 90 lb., and increases at a slow rate for the other machines at the higher pressures; the average thermal efficiency is greatest at about 95 lb.; the factor of desirability, while increasing as the pressure, shows a comparatively slow rate of increase for pressures

above 100 lb.; the average drill is made to be used at a pressure of 80 lb., or less; using pressures much exceeding this will invalidate the present replacement agreements with the manufacturers, thereby increasing the upkeep cost; the increased breakage at the higher pressures, with the consequent greater loss of time of the drill runner in changing or repairing the machine, would tend to reduce the factor of desirability, and the increased breakage of drill steel would tend to limit the pressure; although there are not sufficient data on this point to determine the maximum.

In the discussion following, B. F. Tillson spoke in commendation of Mr. Seamon's paper and heartily indorsed the steps that were being taken in the direction of scientific application to work in the field. He also explained the function of the New Jersey "Drillometer" as that of measuring the air flow with multiple orifices.

John W. Roberts presented a paper, "The Time Factor in Depletion of Mines," which brought out several points wherein the situation of the mine owner differs from the ordinary property holder in the matter of tax assessments. The tax regulations fail to carry out the intent of the law that the cost of the ore in the ground shall be considered as part of the cost of the same ore when removed and sold, because of the unwarranted assumption that all the ore in the mine cost the same amount per ton. In the nature of its operations a mining company mines and sells first the most accessible ore—the ore that really cost most—and is then asked to carry the less accessible ore on its balance sheet at average cost. The law permits a reasonable allowance for depletion, and any mining company that makes a reasonable and fair apportionment of the cost of its mineral deposits should be accorded the same fair treatment that is accorded other tax payers. Mr. Catlin, in characterizing a mine as "a wasting asset," said that the tendency was to tax mines on what someone figures they might produce, and also quoted an instance where a tax had been placed on a theoretical profit, whereas an actual loss had been incurred. G. A. Packard mentioned an instance in connection with the income tax whereby he had been assessed on certain dividends received, the reason given being that the commission did not regard such as returned capital inasmuch as the company paying the dividends was solvent. R. E. Davis, in defense of the Treasury Department, stated that he had found a willingness on the part of those in charge to consider the various facts entering into such matters, and that efforts had been made to give the mining companies a fair deal.

Electrolytic Zinc

Discussion of the Work Done at Anaconda Brings Out Some of the Features of the New Tainton and Treng Process Being Developed at Martinez, Cal., Which Promises To Revolutionize the Industry

BY FAR the most important paper that was read before those interested in non-ferrous metallurgy at the New York meeting of the A. I. M. E. this week was that of Messrs. Laist, Frick, Elton, and Caples, entitled "Electrolytic Zinc Plant of the Anaconda Copper Mining Co., at Great Falls, Mont." It was not only the most comprehensive paper, but it provoked the most discussion. In reading the abstract, Percy E.

Barbour spoke of the difficulty in compressing such a detailed treatment of the subject into a few words, and those who are interested in the matter were advised to secure the complete paper. Only those facts will be mentioned here which were commented on in the ensuing discussion.

Following the reading of the abstract, E. P. Mathewson, who presided over the meeting, read a letter from

Stanley C. Bullock, of London, who contrasted English practice with that which had been developed at Anaconda. No radical differences seem to exist with regard to the roasting. In England, 97 per cent of the zinc is made soluble and anything below 90 per cent is considered bad practice. This corresponds to the Australian work. Mr. Bullock had only the abstract of the Anaconda paper to refer to, so inquired as to what percentage of zinc was there made soluble. The authors state that it is not difficult to make a calcine containing 82 per cent of its zinc in soluble form in 2 per cent H_2SO_4 from a concentrate that contains 33 per cent zinc to 20 per cent iron, and they hope to increase the percentage of soluble zinc to 85 per cent. A concentrate containing 50 per cent zinc and under 5 per cent iron will yield a concentrate containing about 94 per cent of its zinc in soluble form.

Leaching in England is done, according to Mr. Bullock, with hot solution in a manner described in considerable detail. At Anaconda the leaching, which is continuous, is done in two steps: (1) a neutral leach where all the calcine and approximately one-half of the total acid is added; (2) an acid leach where no calcine and the remainder of the acid is added.

For precipitation, English practice adds calcium carbonate to the hot solution, and the problem is apparently worked out more elaborately than is done at Anaconda. Nickel and cobalt have to be removed, which are apparently not present at the Great Falls plant. Cell-house practice seems to be similar in each case.

Following the reading of Mr. Bullock's letter, Mr. Mathewson introduced Walter C. Smith, who spent a part of last November and December in Martinez, Cal., investigating the electrolytic zinc process which has been successfully developed at the small plant there owned by the Central Mining Company of London. The method employed is that of Tainton and Treng. Some years ago U. C. Tainton made use of exceptionally high-current densities in his electrolytic work, but an attempt at commercial application of his ideas had not been made until this plant in California was built. Although of a maximum capacity of only six tons a day, the facts brought out show that pioneer work of the utmost importance is being done, and the process there being developed promises to be a long step in advance of the method used at Anaconda or elsewhere. Mr. Smith gave many details of the work as he saw it during his visit, and his remarks aroused more interest than any other feature of the afternoon session.

The principal features which distinguish the work at Martinez are the use of a high current density and strong acid. A very high current efficiency results, and a minimum amount of trouble from impurities.

Mr. Smith stated that from 22 to 27 per cent of free sulphuric acid is used in the electrolyte, and a current density of 100 amperes per sq.ft., about 1.77 kw.-hr. being consumed per pound of zinc produced. Before passing to the cells, the electrolyte contains about 70 g. of zinc per liter, and after leaving, 30 g. Antimony gives more trouble than any of the other impurities, as is generally the case. Up to 30 mg. per liter of cobalt or arsenic have been run without losing current efficiency, which averages about 89 per cent of the theoretical. The electrical potential averages about four volts per cell.

Mr. Mathewson then pointed out the high value of the Martinez discoveries, which will mean a much lower-cost plant and the use of solutions much higher in

impurities than has hitherto been possible. He even went so far as to say that the furnace production of zinc is likely soon to be obsolete, except in cases where power is extremely costly.

In the test which took place during Mr. Smith's visit, which was made on Nabob and Federal ore and Federal slime, a recovery of zinc of 87.6 per cent, based on the cathode sheets produced, was accomplished, on ore averaging 39 per cent ZnO . Samples of the cathodes were passed among those present; these samples were nearly half an inch thick, very smooth, and of excellent quality.

Further questioning of Mr. Smith brought out the following facts: Silica is precipitated from the colloidal to the granular form by an exceedingly neat method, which has not yet been patented and which therefore could not be divulged. About 3 lb. of glue is used in the electrolyte per ton of zinc produced. This makes the bubbles very fine, thereby keeping down the acid mist and making the use of respirators unnecessary in the cell room.

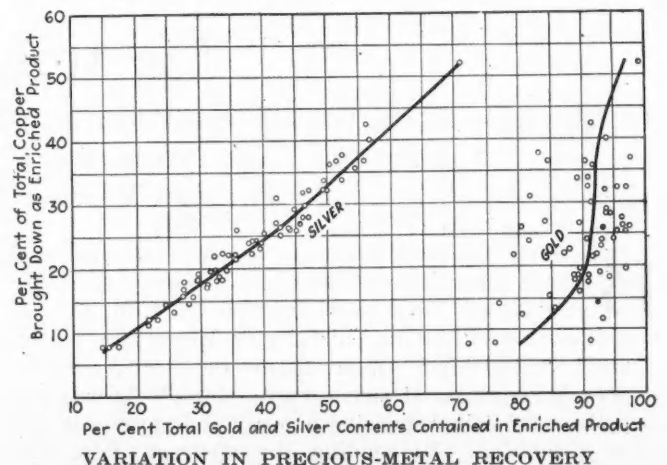
When it was made known that the temperature of the electrolyte was only about 85 deg. F., an inquiry was made as to how the temperature was kept so low with so high a current density. Mr. Smith replied that the system of cooling the electrolyte was one of the features of the installation, and that this subject caused much trouble until finally solved by flowing the solution over lead troughs in which lead pipes containing circulating sea water were imbedded. The electrolyte is cooled after each pass through a cell.

Mr. Hixon inquired whether the use of glue was considered particularly novel, to which Mr. Smith replied that it had been used in copper refining, then in lead refining, and the natural thing to do was to try it in zinc refining.

In the informal discussion following adjournment it was brought out that manganese dioxide causes no trouble whatever and falls from the anodes as sludge as fast as it collects, so that they never require cleaning. The impurities in the cathode zinc produced are too small to determine by ordinary means, and the metal averages about 99.9 per cent in purity.

Selective Converting at Clifton, Ariz.

In our issue of Feb. 5 an unfortunate error was made in the cut accompanying Mr. Ambler's article under the above title. The recovery of precious metals shown was uniformly 10 per cent less than should have been the case. The illustration as it should have appeared is shown herewith.



Steel Chimneys and Their Linings In Copper-Smelting Plants

Discussion of A. G. McGregor's Paper Brings Out
Some of the Reasons Why One Stack Will Stand
Some Years and Another Rapidly Corrode

IN A PAPER prepared for the February meeting of the American Institute of Mining and Metallurgical Engineers, in New York, by A. G. McGregor, an abstract of which was read by Forest Rutherford, the lining of steel chimneys in copper-smelting plants is discussed. Mr. McGregor refers first to a steel stack used for roaster gases at the Calumet & Arizona smelter at Douglas. This was lined to the top of the bell, 40 ft. from the base, with common brick, using lime and cement mortar. Above this, the stack was lined with building tile 4 in. thick. Six years after the chimney was erected, most of the tile lining for 125 ft. from the top had fallen out and the steel shell was badly corroded. Where the lining remained in place, however, the shell was undamaged. Many of the tiles which had fallen out of place had become soft or flaky and crumbly; others were as hard as when placed. These tiles were of a fire-clay mixture and were used instead of common brick on account of lower cost. The stack was repaired by using new steel in the upper 125 ft., and a 4½-in. lining of fire brick was laid from the bell to the top of the chimney. Thin mortar—water, sodium silicate, and finely ground silica—was worked into the joints.

At the same plant a steel chimney lined with hollow building tile has been in use for seven years with no signs of deterioration, but in this case the gases handled are from the blast furnaces and reverberatories, which are hotter than the gases from the roasting furnaces.

At Cananea a steel chimney lined with common brick has been used in connection with the blast furnaces for seventeen years. The chimney has been cold a number of times for periods of from several days to a year's duration, but there is no apparent deterioration.

The steel stack at the smelter of the United Verde Copper Co. at Clarkdale, Ariz., has been in use for six years, with no signs of deterioration. This stack is lined with common brick 4½ in. thick and handles gases from the blast, roaster, and reverberatory furnaces as well as the converters.

An unlined steel chimney at the Calumet & Arizona plant at Douglas has given good results for fourteen years, handling gases from the blast furnaces and converters. Another steel stack which is unlined is at the smelter of the International Smelting Co. at Miami. This is used on gases from the converter department and is still in excellent condition after six years' use. Other stacks are also mentioned in which no lining seems to be necessary when handling blast furnace and converter gas.

Based on the examples which Mr. McGregor cites in his paper, the following conclusions are drawn:

Unlined steel chimneys have given satisfactory service for long periods when used for blast furnace and converter gases.

Building tile have proved unsatisfactory for chimney linings or for the construction of walls for flues and dust chambers where exposed to roaster furnace gases or cool reverberatory furnace gases.

These conclusions apply to the ordinary conditions in copper-smelting plants, where waste-heat boilers are used in connection with reverberatory furnaces, and

where no particular effort is made to maintain the gases at a high temperature in the flues, dust chambers, and stacks.

In a written discussion of Mr. McGregor's paper, C. R. Kuzell emphasized the fact that the presence of zinc must be considered, as zinc oxide in the gases would neutralize acid fumes and make them harmless, whereas in treating ores containing no zinc, the fumes might be very corrosive. He cited the Clarkdale stack as an example and stated that if the roaster gases (which contain no ZnO) alone were sent up the stack, corrosion would undoubtedly take place.

This phase of the subject was also considered very important by E. E. Thum, who stated his belief that the kind of smoke and the atmospheric conditions were the controlling factors. He could not understand why the reverberatory stack mentioned by Mr. McGregor should give way in one part and not in another. The corrosiveness of converter gases as well as roaster gases was also emphasized. Mr. Thum then dwelt on the importance of considering the amount of the fuming constituents of ores and requested that some one give more data as to the fundamental causes rather than a bare statement of results as had been made in the paper read.

The Copper Queen stack at Douglas was then further discussed by Mr. Rutherford, who was formerly in charge of that plant. This stack, said Mr. Rutherford, had been kept hot for fourteen years, and he felt that this was the secret of its long life. In case of a strike or close-down, arrangements had been made to build a fire in the base of the stack to keep it warm. The use of a lime mortar, with cement, in building a tile dust chamber was described. This was not at all successful, for the CaSO₄ formed by the action of the SO₂ in the gas on the lime swelled to about twice the original volume of the mortar and broke down the lining. The Calumet & Arizona company had had the same trouble.

The importance of relative humidity and stack temperatures was pointed out by H. Hixon. The temperature must at all times be kept above the condensation point. Following out this reasoning, he explained the corrosion of a stack in spots by the presence of eddy currents in certain places which became cooler than the main volume of gas, thus allowing condensation to take place, from which corrosion of the stack resulted.

That some other factors entered into the question was pointed out by E. H. Robie, who spoke of a roaster stack which had apparently remained in excellent condition for about five years, whereas the steel flue leading from the roasters to the stack was almost totally eaten away. The same gases were present in each, and the temperature of course was as high in the flue as in the stack. The possibility of the kind of steel used having something to do with the question was mentioned.

Cottrell Treater at Tooele

A Cottrell treater of a radically new design has been installed at the Tooele plant of the International Smelting Co. and formed the subject of an interesting paper read in abstract at the New York meeting of the A. I. M. E. by A. A. Heimrod, the author, A. B. Young, being absent.

Fundamentally, the treater is simply a flue containing rows of vertical plates, forming the grounded electrode, alternated with rows of small horizontal pipes, forming the negative electrode, with proper provision underneath for taking away collected dust. There are

advantages in construction over the more cumbersome types, both the vertical-tube and the vertical-box, particularly in the elimination of heavy supporting columns and massive foundations, giving a much lower first cost. There are no right-angle turns to interfere with gas distribution; consequently there is greater efficiency, or, in other words, a greater volume of gas per minute can be effectively treated. Another advantage of the horizontal installation over the vertical is that the principle of the selective precipitation of the various components of the dust and fume as they pass along the electric field may be utilized. Since the treater has been placed in operation, the results have been quite satisfactory, and, in many ways, particularly in regard to the volume of gas that may be treated, have greatly exceeded expectations.

Following the reading of the abstract of Mr. Young's

paper, Mr. Heimrod gave some figures to show the simplicity of the flue-type of treater as described, compared with the complex towering structures of the vertical type needed to treat an equivalent amount of gas. The ordinary form of treater built to handle about 20,000 cu.ft. of gas per minute at 1,000 deg. F. would require about thirty tons of steel, 120,000 bricks for lining, and fifteen tons of interior parts for the collecting and discharging electrode system.

The Tooele treater handles dust with practically no fume, and whether this type would be successful with a large amount of fume to separate remains to be proved. Fume requires a much larger power input: where 3 kw. would be required for treating dust alone, from 3.5 to 10 would be necessary where fume was to be separated, the same treater being used in either case. No further discussion was offered.

Non-Metallic Minerals Section Holds First Session

Important Factors in Talc Milling, Quality of Portland Cement, and Waste in the Non-Metallic Industries Considered—Importance of Conservation of Waste Products And Economic Control of Byproducts

ILLUSTRATING the growing importance attached to the development of the non-metallic mineral industries, the Non-Metallic Minerals Section of the A. I. M. E. held its first session in the afternoon of Feb. 14 under the chairmanship of Prof. H. Ries.

The first paper was presented by Raymond B. Ladoo, and was entitled "Important Factors in Talc Milling Efficiency," a résumé of some of the factors which should be taken into account in the designing of a new talc-grinding mill or in improving an old one. The author pointed out that the designing of talc-grinding plants based on a scientific study of the properties of the talc to be ground is rarely practiced, but the value of such study can hardly be over-emphasized. An example of this type of work was afforded by a grinding test made a few weeks ago on a talc (really pyrophyllite) from North Carolina, at Langley, S. C. The object of the test was to find out if this type of talc could be successfully ground on a Raymond roller mill equipped with air separation. A secondary problem was to discover if the fine-grained grit (mostly quartz) found in the talc could be eliminated by air separation. Several tests were run with different adjustments of the mill and samples taken from each test. Screen tests were made on each sample, using screens at close intervals, from the coarsest particle down to 300 mesh, and a microscopic examination was made of the product retained on each screen.

In addition, analyses are being made for total silica in each product, and elutriation tests run to show the amount of colloidal talc present. From the data obtained in this way it will be possible to get a very accurate idea of the distribution of the silica, the distribution of the talc, and the size and shape of the silica and talc grains in each screen product from each test. With this information and with data as to the range of performance of grinding, screening and air separation machinery of various types, it will be possible to lay out intelligently a flow sheet and to predict with fair accuracy the efficiency which may be expected. Had

similar methods of study been used in the design of talc mills in the past, much money would have been saved and the general efficiency of talc mills would be much higher.

The paper pointed out the lack of adequate technical consideration for the talc industries' milling problems, and in the course of supplementary remarks the author stated that talc-milling machinery was formerly usually designed by machinery salesmen, but that nowadays considerable experimentation is being performed before the machinery is selected.

Chairman Ries asked Mr. Ladoo if there were any standard specifications for talc, to which the reply was made that there were no definite tests or specifications for talc; consumers usually tried a carload of talc, and, finding it suitable, continued to use it. Frequently one carload would be rejected and the next from the same shipper accepted. Chairman Ries deplored the lack of market standardization in the industry.

Mr. Huntoon and Mr. Ladoo next discussed the advantages and disadvantages of fibrous talc in paper manufacture, the latter contending that the paper industry's impression regarding the fibrous talc variety essential was a myth and that granular talc was more suitable.

Mr. Frechette called attention to the lack of proper specifications for the non-metallics in Canada, and Mr. Ladoo remarked that talc producers have not properly educated the consumers as to their requirements and that the method of dealing in small unstandardized lots through brokers had much to do with some consumers' unsatisfactory results with talc. Mr. Dolbear made inquiry regarding experimentations designed to remove grit in grinding and Mr. Huntoon indicated the importance of a consideration of flotation in non-metallic milling.

SUPPLEMENTING STANDARD PORTLAND CEMENT TESTS

Instead of reading his paper, "Judging the Quality of Portland Cement," the author, R. J. Colony, instructor in geology, Columbia University, emphasized certain

statements in his paper and furnished lantern slides to illustrate various microscopical petrographic features of portland cement. Prof. Berkey, of Columbia, in the discussion of Mr. Colony's article, stated that the paper endeavored to solve the problem of determining whether a cement will work or last for an extended period before using it. He pointed out how valuable it would be to tell beforehand if a structure built of portland cement would hold up, and that this was one of the few instances where "recasting"—the application of chemical analyses to determine molecular composition—was put to practical use. It is essentially an expert method, combining the principles and use of petrography and chemistry. Prof. Berkey's conclusions coincided with those of Mr. Colony.

THE UTILIZATION OF WASTE IN NON-METALLIC INDUSTRIES

In presenting his paper for discussion Oliver Bowles, of the U. S. Bureau of Mines, stated that the purpose of the paper on "Byproduct Expansion in Non-Metallic Mineral Industries" was to point out the great need of such development and some of the more important lines which it may follow. Americans have the reputation of being wasteful, and wastefulness not only depletes resources but greatly increases the cost of products to the consumer. The non-metallic resources of the country are great, but in many lines they are by no means inexhaustible. Americans are resourceful, and when one commodity is exhausted doubtless some other will be found or manufactured to take its place, but resourcefulness is no excuse for needlessly wasting products that now serve a useful purpose. National resourcefulness might better be employed in finding ways in which much of the waste from non-metallic mines may be put to useful service.

In approaching the subject of byproduct expansion an outlook beyond the confines of a single mining industry is essential. Though competition demands that every miner and manufacturer devote his time and energy to the successful promotion of his own enterprise, it is unwise to attempt to force the byproducts of certain minerals into uses for which other minerals are better adapted. The disposal of waste material in a way that will bring some profit to the producer is in itself no justification for such an enterprise if at the same time it floods the market with inferior products that are of no benefit and may even work injury to the general public. All problems of waste utilization should have in view the establishment of industries that are of some real benefit to the consuming public, and should not aim merely to give one mining industry a boost at the expense of another. For example, an attempt is being made in Great Britain to find a market for toilet preparations made from pulverized slate obtained from the waste heaps in Wales. It is difficult to see in what respect slate may have properties superior to talc for such a purpose, and if the slate preparation is in reality inferior to products now sold, and its introduction promises to open up no new and useful field for an inferior product, the enterprise has no solid economic basis to justify its existence.

Some examples of possible or actual byproduct industries were referred to in the paper. Brief reference may be made to a clay plant in Minnesota that washes glacial drift and sells screened and washed gravel as a byproduct of a brick plant. Reference may also be made to the plant of the Eastern Potash Corporation at New

Brunswick, N. J., now nearing completion. This plant is designed to recover potash from greensand, and to utilize the residue for the manufacture of high-grade brick.

THE CAUSES OF WASTE

Mr. Ladoo in a discussion of Mr. Bowles' paper analyzed the causes of waste in the non-metallics. His remarks follow:

"In order to attack this problem of byproduct expansion and waste elimination, it is essential to consider first some of the fundamental causes of waste. Waste may result from careless or improper methods of mining or subsequent treatment; from inherent imperfections or impurities in the rock or ore; from low market value of finished products or high cost of proper treatment, resulting in a low margin of profit; from a mistaken idea of inexhaustibility of ore reserves, or from a demand for only the highest grade of product by the consumer.

"This last cause is one beyond the control of the producer, but it is so fundamental that it deserves special attention. For example, until recently the pottery trade has accepted only the highest grade of feldspar. The feldspar producers have selected this grade of spar and thrown the lower grades mixed with waste on the dump in such a condition that it cannot be recovered, and the workings have been left in such a condition that reopening would be difficult. Now many of our deposits of high-grade spar are exhausted, and the pottery industry is learning to use lower grades. This typical case illustrates the necessity, first, to educate the consumer to study his industry and establish standard grades and tests specifically adapted to various uses, rather than to demand the highest grades of raw material for all uses; second, to educate the producer to separate and save all grades of material, even though of no present commercial value. Poorer grades of product should be stockpiled, separately from waste, in such a condition that they may be ultimately recovered if a demand develops."

The great importance of transportation in the byproduct expansion of the non-metallics was brought out by W. C. Phalen in a written communication in which he stressed the point that whereas centralization of industries was practised before the increases in rail rates, decentralization of industry was now taking place. As the non-metallic products are practically all of great bulk, the element of transportation costs was very important and efforts should be made to utilize cheaper methods of transportation, such as inland waterways, canals, and the like.

Mr. Metz gave an example of limestone operations, where various grades of products were efficiently used, and C. Q. Payne called attention to the importance of fine grinding, which was also emphasized by Mr. Bowles, who said there was a large field for experimentation in such fine grinding. The fact that often the utilization of byproducts depends upon finding a proper market was pointed out by Mr. Blossom, who said that in the manufacture of sand-lime brick from greensand residues he knew of a case in which no outlet could be found for the sand-lime brick in New York City. Chairman Ries thought the disfavor of sand-lime brick was due partly to its color and weakness.

The meeting was well attended, and the discussion interesting. It is hoped that an even greater interest will be manifested at the next session.

Smoker Program Includes Variety of Stunts

Gold Dust Twins Entertain With Original Number—
Moving Pictures Show Recent Athletic Event

E. P. MATHEWSON, the w. k. master of ceremonies, gave the ball its initial roll at the smoker held on Monday evening, and remained, for the rest of the evening, the life of the party. This year this affair was held in the auditorium of the Engineering Societies Building, and the place was packed. Following Mr. Mathewson's introduction of the "Gold Dust Twins," Institute members were given an opportunity to demonstrate their vocal abilities, in which particular they acquitted themselves with considerable credit. Some of the members, with the assistance of a bona fide professor of the black arts, performed several feats of legerdemain. It may be remarked, in passing, that there were few present who expressed themselves as anxious to engage in the great American indoor sport with the aforesaid gentleman as an opponent. He was clever at cards. The program possessed sufficient variety to please—shall we say the most fastidious—for directly preceding a light lunch the entertainment committee staged a particularly effective and original number. With the present trend of custom no affair is complete without at least 2,000 ft. of "movies." The smoker was no exception, and by special arrangement a showing of the Dempsey-Brennan fight pictures, secured particularly for the occasion, was given.

Ludlow Elected at Annual Business Meeting

Sessions Held on Iron and Steel and Special Addresses
Made by Rice and Winchell

THE annual business meeting of the Institute was held Tuesday morning at 10 o'clock, with Herbert Hoover, president, in the chair. The minutes of the 1920 meeting were read and approved, following which Mr. Hoover made a brief report on the activities of the Institute during the last year. The report of Secretary Stoughton, and also the reports of the membership, library, and auditors committees, were read and accepted. The tellers reported the proposed slate of officers for 1921 as elected. These are as follows:

President, Edwin Ludlow; vice-presidents, E. L. DeGoyler and Albert Burch. These three, together with R. V. Norris, W. G. Mather, George Otis Smith, W. E. Wrather, and J. C. Greenway, were elected directors.

It was announced that Walter Lewisohn has offered a prize of \$1,000 for the best paper by an Institute member on the uses of platinum. This offer was accepted and a vote of thanks tendered to Mr. Lewisohn.

GEORGE S. RICE DESCRIBES DEVASTATED FRENCH COAL REGIONS

Before a large attendance of Institute members at a session in the morning of Feb. 15, presided over by Herbert Hoover, George S. Rice, chief engineer of the U. S. Bureau of Mines, gave an illustrated lecture covering his observations of the devastated coal mines of France and their rehabilitation. First sketching the geographical and geological relation of the numerous

European coal fields, Mr. Rice then illustrated by means of lantern slides the statistical position of European nations prior to and after the war. Subsequent slides vividly brought out the tremendous and utter destruction of magnificent French coal mining plants, much of it being the result of deliberate and wanton destructive calculations as well as the effect of battle fire. Elaborate coal plants were shown in photographs as they appeared before the war and at the conclusion of hostilities.

The lantern slides indicated the great task that must be faced in rehabilitating the destroyed areas, and in unwatering the flooded mines, erecting new surface equipment, and supplying adequate housing facilities for the workmen. Mr. Rice also pointed out how, through a cementation process, some of the partly destroyed shafts were being repaired. There was no discussion of the lecture.

H. V. Winchell next read a paper entitled "Geology of Pachuca and El Oro," in which he outlined his views on the origin of the mineral deposits of this important Mexican mining district. There was no oral discussion of his paper.

Simultaneously were held the Iron and Steel session, with J. W. Richards as chairman, and the Institute of Metals division, over which William H. Bassett presided. At the former the following papers were presented: "Measurement of Blast-Furnace Gas," by D. L. Ward and R. S. Reed; "Importance of Hardness of Blast-Furnace Coke," by Owen R. Rice; "Manufacture of Ferromanganese in the Electric Furnace," by R. M. Keeney and Jay Lonergan, and "Electric Furnace in the Iron Foundry," by Richard Moldenke. The Institute of Metals division meeting included two papers: "Effect of Temperature, Deformation, Grain Size, and Rate of Loading on the Mechanical Properties of Metals," by W. P. Sykes, and "Artillery Cartridge Cases," by J. Burns Reed and S. Tour.

TUESDAY AFTERNOON MEETING

At the session on Coal held Tuesday afternoon, with R. V. Norris presiding, several papers which were of interest were presented, and these were followed by discussions. The papers were as follows:

Alaskan Coal Fields. By George Watkin Evans.

Mine Water Neutralizing Plant at Calumet Mine. By L. D. Tracy.

Run-off and Mine Drainage. By Howard N. Eavenson. Skip Hoisting for Coal Mines. By Andrews Allen and J. A. Garcia.

Coal Pillar Drawing Methods in Europe. By George S. Rice.

Report and Suggestions of Committee on Standard System of Accounting and Analysis of Cost of Production, National Coal Association.

Pillar Drawing in Thick Coal Seams. By G. B. Pryde and R. A. Magraw.

A simultaneous session was held on Iron and Steel, with A. A. Stevenson presiding, the papers being as follows:

Nitrogen in Steel and Erosion of Guns. By H. E. Wheeler.

Static and Dynamic Tension Tests on Nickel Steel. By J. J. Thomas and J. H. Nead.

Surface Changes of Carbon Steels Heated in Vacuo. By E. H. Hemingway and G. R. Ensminger.

Chemical Equilibrium Between Iron, Carbon and Oxygen. By A. Matsubara.

Molybdenum Steels. By John A. Mathews.

These two meetings concluded the afternoon sessions, the meeting on Industrial Relations having been postponed until the following day.

In the evening an entertainment, followed by dancing, was given at headquarters.

Heat Treatment of Drill Steel of Absorbing Interest

Session Approves Resolution To Urge Research Work
in Drill Steel by Engineering Societies

THE comparatively large attendance at the metallurgical session on the morning of Feb. 16, at which heat treatment of drill steel was discussed gave evidence of the importance of the subject. B. F. Tilton, of the New Jersey Zinc Co., presided. An effort was made to consider the various phases of the subject in a systematic manner, questions being taken up under the following heads: (1) Study of steels which give the greatest service before failure by breakage of drill steel; (2) maximum service which might be expected; (3) mechanics of failure; (4) methods of machine development for accelerated tests; (5) correlation of field tests with accelerated laboratory tests; and (6) reclamation of depreciated drill steels. The first four subdivisions cited were covered by the papers presented at the morning session.

Francis B. Foley, of the U. S. Bureau of Mines, attempted to show the causes of the breakage of drill steel by means of data and charts covering tests made at the New Jersey Zinc Co. Mr. Foley was followed by W. Hoffman, metallurgist of the Colonial Steel Co., who said, in the course of his remarks, that in buying steel more attention was usually paid to price than to quality. He emphasized the need for selecting the proper grade of steel. This is the age of highly specialized steels and complex alloys, said Mr. Hoffman.

Charles M. Brown, vice-president of the Colonial Steel Co., was the next speaker. In discussing steels that give the greatest service before failure, Mr. Brown said that the cruciform section so commonly used is the poorest of all, owing to the comparatively small amount of metal in it and to the injury that the bit undergoes in the process of forging. Many companies, he said, have substituted the quarter octagon section. He expressed the opinion that mining companies would largely abandon the cruciform section within the next few years. Chemical analysis must not be relied upon too far, said Mr. Brown. Good material and experienced workmen are required in the making of good steel. The speaker concluded by outlining the points that it is necessary to observe to obtain the maximum service of steel.

The essentials of an ideal drill steel were defined by Frank Kingdon, of the Sullivan Machinery Co., in his paper. He said that all is not being done by steel manufacturers that could be done, but that it is useless to attempt to do more when heat treatment is not properly practiced.

Before the discussion started, Van. H. Manning, research director of the American Petroleum Institute, asked that the session approve a resolution that he read. This urged that the directors of the A. I. M. E. appoint a board to engage in research work in drill

steel, and that this research be participated in by all societies interested, the societies being enumerated. The resolution was approved unanimously.

The discussion that followed was brief and was engaged in by Dr. Burgess, of the U. S. Bureau of Standards; Prof. J. W. Richards, of Lehigh University; Dorsey A. Lyon, of the U. S. Bureau of Mines; Prof. Moore, of the University of Illinois; Mr. Hoffman, J. H. Parker, and C. E. Julihn.

Prof. Richards pointed out that cleavage planes in minerals are developed by pressure and suggested that possibly the so-called crystallization was similarly caused by impact. Dr. Lyon said that the Bureau's interest in the subject was that it seeks to prevent waste, and in lowering mining costs it is, directly or indirectly, preventing waste.

Prof. Moore discussed the fatigue of metals. He said that he felt that it has been conclusively shown that steel subjected to prolonged stress of a certain kind will fail at some point that bears no relation to the elastic limit. He gave three definitions of fatigue: First, the old theory that it is due to crystallization; second, that under repeated stress some inherent property of the mineral changes its elastic limit; and third, that it is the gradual spread of damage from some point of previous injury or overstrain. Prof. Moore said he had come across no case that could not be so explained.

Women's Auxiliary Reports Excellent Progress

New Sections Organized and Increased Membership
Shown—Announcement Made of First
Scholarship To Be Awarded

THE Women's Auxiliary of the Institute held its fifth annual meeting in the Directors' Room on Wednesday morning at 10.30. This meeting followed a short session of the New York Section of the Women's Auxiliary, of which Mrs. W. Y. Westervelt has been director for the last year, at which the announcement was made of the result of the elections in the New York Section for the coming year. The program included the minutes of last annual meeting; reports of the president, treasurer, educational committee, and those from the Anaconda, Butte, California, Denver, New York, St. Louis, Utah, and Canadian sections.

The reports were most interesting and showed excellent work on the part of all the sections. Mrs. Tyrrell, of Toronto, reports the organization of a branch of the Women's Auxiliary in Toronto. The New York Section reported the growth of a large increase in its membership, due to splendid work by its committees, and the Women's Auxiliary as a whole finds its increase in membership this year more than 36 per cent.

Mrs. Hoover in accepting the appointment as chairman of the new Membership Committee spoke with convincing interest. The meeting closed with an address by Prof. James F. Kemp, who spoke of the fundamental needs in education in the profession of mining engineers, a subject of peculiar interest at this time, owing to the fact that the work of the Women's Auxiliary is to raise a fund for scholarships in schools of engineering. The first scholarship, announced at this meeting, goes to James Chrystie of Anaconda, Mont. The meeting was largely attended.

Moving Pictures Shown of Sulphur and Asbestos Mining and Steel Manufacture

On the afternoon of Feb. 16, before several hundred Institute members, motion pictures covering the production of sulphur, the mining and preparation of asbestos and the manufacture of steel were shown. Director Bain of the U. S. Bureau of Mines made a few introductory remarks and stated that the pictures had been prepared with the co-operation of companies interested in the production of each of these minerals and metals, and that they were for public distribution, being prepared with the purpose of correctly presenting authentic pictorial information about the recovery of minerals and metals from their ores and their transformation into the finished article. All of the films were prepared under the direct supervision of M. F. Leopold.

The first set of motion pictures shown was taken in co-operation with the Texas-Gulf Sulphur Co. in its Louisiana sulphur fields.

The American Rolling Mill Co., of Middletown, Ohio, co-operated in the next picture, which presented the making of openhearth steel and its subsequent manufacture into rolled sheets.

Asbestos mining and the manufacture of asbestos goods was the next subject, in which the H. W. Johns-Manville Co. co-operated. The Arizona asbestos property of the company at Chrysotile was pictured and disclosed the comparatively primitive methods of mining and transportation by burros that still have to be used. The Quebec properties of the company, which were next shown, furnished a decided contrast with their extensive and up-to-date open-pit mining operation.

Origin of Gulf Salt Domes Considered

The session on Petroleum and Gas was well attended. Valentin R. Garfias gave an abstract of an excellent paper, "Principles Governing Mexican Taxation of Petroleum," but, for some reason or other, there was no discussion, although Ralph Arnold, the chairman of the meeting, called particular attention to the fact that the paper warranted such. Arthur Knapp's paper, "Modified Oil-Well Depletion," occasioned some slight discussion from R. H. Johnson, who stated that data in tabular form are of value if the executive is not interested in curves.

"Barrel-Day Values," a paper by G. H. Alvey and A. W. Foster, was read by Mr. Alvey. In a discussion of this paper R. H. Johnson expressed the opinion that the barrel-day value was open to objections and was dangerous with business men, who failed to appreciate the value of the variables that should be considered. Mr. Arnold spoke briefly in favor of the efforts to place the oil business on an exact basis. W. G. Matteson "started something" with his paper, "Secondary Intrusive Origin of Gulf Coastal Plain Salt Domes," which he delivered in abstract.

E. Coste took exception to the opinion regarding Mr. Matteson's theory of the origin of the salt brines and said that it seemed impossible to conclude that there was a leaching of the hydrocarbons. Kirby Thomas advanced the opinion that sufficient attention had not been paid to the investigations of the sulphur companies in the Texas fields in consideration of the origin of the salt domes.

Frederick G. Clapp stated that several theories should

be advanced before the acceptance of such a one as that presented by Mr. Matteson. E. L. DeGolyer stated that Mr. Matteson's paper was too positive. It is his belief that the Gulf Coast district is a poor region in which to study salt domes and that the sulphur mines offer better opportunity.

H. Hixon spoke briefly on the increase of temperature with depth, and offered the theory that intense pressures produced a condition whereby the crust or dome floated on a gaseous core. Frederick G. Clapp read an abstract of the paper "Isostatic Adjustments on a Minor Scale in Their Relation to Oil Domes," by M. Albertson.

David B. Reger gave an abstract of his paper, "Carbon Ratios of Coals in West Virginia Oil Fields," in which he draws attention to the use of isocarbs in determining the boundaries of possible oil deposits, the isocarb being a line showing an equal fixed-carbon percentage.

By invitation, a special paper by Mowry Bates and Bernard H. Lasky was given in abstract by Mr. Lasky and illustrated with slides. This paper covered a complete record from 1912 to 1920 of the production, consumption, prices, costs, and wells drilled in the mid-continent field.

A continuation of the morning session on "Breakage and Heat Treatment of Drill Steel," was held in the afternoon, with B. F. Tillson presiding. Papers were presented by Messrs. Sturtevant and Gilman, and by Dr. Burrows. Mr. Gilman's paper was particularly enlightening, inasmuch as he presented actual specimens of heat-treated steel and explained in detail the conditions under which they had been considered.

Efficiency of Workmen Discussed in Industrial Session

The session on Industrial Relations, originally scheduled for Tuesday afternoon, was presided over by Robert Linton. Two papers, "The Health of the Underground Worker," by A. J. Lanza, and "Dust Ventilation Studies in Metal Mines," by Daniel Harrington, were presented, following which a symposium on employment problems was held. J. Parke Channing read a paper by J. N. Houser, of the Service Department of the Tennessee Copper Co., and a paper was also presented by S. R. Rectanus, both of these dealing with the hiring and placing of men. It was stated in a communication by S. Rolle that in 1917 the hiring and firing of men at North Butte by the bosses was discontinued and the same placed in the hands of the labor department. Another letter from E. A. Hewitt, superintendent of the Consolidated Coppermines Co., stated that the labor cost was the largest item of the total expense and yet many metal mining companies are unwilling to spend anything in this direction. The discussion following was opened by Mr. Channing, who stated that two employment bureaus with which he was familiar had been very successful. It was a question in his mind whether mining school graduates or practical men made the best foremen. Another speaker urged that it was essential to teach the foremen the policies of the company and that time spent in their education was well worth while. A letter was read by Mr. Rolle on open-shop conditions in the Joplin district. This stated that no colored labor was employed and very little foreign; the men were free at all times to consult the foremen, and operators preferred a shortage of labor to the complexities of foreign help.

Annual Banquet at Waldorf A Success

Herbert Hoover and Edwin Ludlow Only Speakers
—W. L. Saunders, Toastmaster—Dinner
Followed by Dance

THE annual banquet at the Waldorf-Astoria on Wednesday evening was most successful from every point of view. It is estimated that fully 500 people were present. A most pleasing feature was that the toastmaster, W. L. Saunders, introduced but two speakers, the retiring president, Mr. Hoover, and his successor, Mr. Ludlow. This program, so thoughtfully prepared by the dinner committee, won for the latter kinder thoughts than any other procedure on their part could have done. As is well known, Mr. Saunders is a modern Joe Miller, and he drew liberally on his fund of jests and stories in introducing Mr. Hoover, though, as for that matter, the latter needed no introduction.

Mr. Hoover's address was short. He outlined the growth of the Institute and pointed out that it had gained more new members in the past year than ever before in its history. He drew attention to the financial position of the society and deprecatingly referred to recent criticism in San Francisco to the effect that the officers were not pursuing the right financial course.

An increase in dues to an amount comparable with that charged by some of the other great national societies had been contemplated. It had also been proposed, said he, to make the dues higher in the New York district than elsewhere, in view of the greater advantages enjoyed by members here. This, however, had been considered inadvisable.

The work of the Near East Relief was touched upon briefly, at the request of some of Mr. Hoover's friends. The entire \$33,000,000 needed for European relief would be subscribed by the end of February, he stated, saying, "I know that you will be glad to hear that twenty-eight states have already oversubscribed their quota."

A ballad lauding the achievements of Mr. Ludlow, reminiscent of the adventures of Phoebe Snow on the Road of Anthracite, was recited by Mr. Saunders in introducing the incoming president. The toastmaster's efforts were rewarded with liberal applause.

Among the distinguished guests at the head table was Dr. Henry S. Drinker, the retiring president of Lehigh University and one of the founders of the Institute. Dr. Drinker received an ovation when his presence was alluded to by the toastmaster.

Following the dinner a dance was given, which was attended by the majority of those present. Altogether, the evening was one of which those who were present will have many pleasant recollections.

Address of President Edwin Ludlow at the Dinner Of the A. I. M. E. on Feb. 16, 1921

I DEEPLY APPRECIATE the honor which has been conferred upon me by my election to the presidency of this Institute, as I feel that it is the highest honor any engineer can receive; and I also feel that I am especially fortunate in being called to take the presidency in the year following Mr. Hoover, as I may be enabled in that way to carry on the work which he has initiated.

The constructive work that Mr. Hoover has inaugurated during the last year has been of inestimable benefit in bringing not only this Institute but the entire engineering profession into a place in the public esteem to a degree which it had never before occupied. This work Mr. Hoover will now carry on in the broader field of the Federated Engineering Societies, of which he is president. Through that organization the engineers of this country, in all branches of the profession, will be welded into one compact body reaching from the Atlantic to the Pacific, making the united engineering profession a power for maintaining American ideals and standards throughout the land.

The engineering profession has never as a whole occupied its proper place in civic life, but through this organization the engineers will have the opportunity to take a greater interest and a more authoritative position, not only in the affairs of the nation but in the civic affairs of the communities within which they reside. Through the territorial grouping proposed by the Federated Engineering Societies, and the central control vested in the American Engineering Council, with its headquarters in Washington, they will have an opportunity of making their power felt as a unit.

There has never been a time in all our history when sane, conservative influences were more needed than the present, to advise the legislative branch of the Government, and, if this opportunity is not met, the engineers will not fulfill their high duty as citizens for which their education and experience have fitted them.

During the Great War it became essential that the Government should practically be under a dictatorship, and the power of the Executive had to be used in that way, but the results of the November election showed that the people were absolutely determined that there should be no continuation of that executive control. The great lesson of that election was the insistence of the people that representative government should once more prevail.

And another lesson which that election taught was that the autocratic rules and regulations of some of the labor unions, with the dictatorial powers that have been assumed by men who have worked themselves into leadership in these unions, would no longer be submitted to. What the labor situation has been leading to is described by Walt Mason in the following lines that contain more truth than poetry:

I hired some honest working men—
(To find such men long leagues I chased)
To come around and fix my den,
Which time and weather had defaced.

The carpenter arrived in state;
He was attired in raiment glad;
His touring car was simply great,
Eight cylinders the blame thing had.

The plasterer, a stalwart man,
Gave evidence that he was flush,
For he rode in a fine sedan
Upholstered in the richest plush.

The painter came, as he agreed—
A man of rather haughty mien;
He used to drive an old bay steed,
But now he tools a limousine.

The tinsmith came, an able cuss,
Who labors through a six-hour day,
And I admired his handsome bus—
A Model 21 coupé.

And there was one who came to delve
A ditch where concrete would be poured.
His wagon was a Super-Twelve
Whose powerful engine chugged and roared.

They parked their cars around my shack
Until the street both ways was blocked,
And of the toiler's burdened back
Throughout the day they warmly talked.

They spoke of capital that sat
In gilded ease and wore a grin,
And on ill-gotten gains grew fat
While honest toil grew lank and thin.

They talked all day of tying cans
To plutocrats and men of means,
And then drove 'way in rich sedans,
Touring cars and limousines.

This situation, the truth of which can be recognized in spite of the exaggeration, is the direct cause of the demand which has become insistent from the Atlantic to the Pacific for an open shop, which will allow labor to be paid for the work it accomplishes, and be more representative of American ideals and American organization.

To the closed shop can be directly traced the ability of men of the Brindell type to become the powerful factors in the control of labor, and to use that power to demand a heavy toll on all construction, as has been so distinctly brought out in the recent investigations in this city. Corresponding investigations in other cities will undoubtedly develop more Brindells.

The country demands not the elimination of all unions, but the restoration to labor of the right to receive wages based on ability and industry, and not a minimum of work for a maximum of pay. The union rules, putting the good and the poor workmen on an equality, violate all the principles that have built up this nation. To restore the efficiency and ambition of labor it is necessary for the employer to be able to deal directly with his employees, and not through some outsider who knows nothing of the local conditions and who has a direct interest in keeping employer and employee as far apart as possible, to preserve his own power.

Some of the largest organizations, such as the Bethlehem Steel Co., have adopted a representative form of government in their shops by which there is one delegate elected for each 300 employees, who sits on a board and is able to voice any complaints of the men in his division. In such plants the employee does not need to call in the help of outsiders.

In the anthracite industry the operators and the miners went into a joint meeting for the arranging of

a new contract on the ninth of March, last year, and were almost continuously in session for the following six months. There was hardly a time during that period when a new scale could not have been arranged, if the operators had been willing to grant the demand for a closed shop, but it is to their credit—and speaks well for their tact and patience—that they were able to carry on those negotiations and bring them to a successful conclusion without a general strike and without granting the closed shop.

A clear definition of the open shop was given by the Anthracite Commission appointed by President Roosevelt in 1902, in the following words:

"The commission adjudges and awards: That no person shall be refused employment, or in any way discriminated against on account of membership or non-membership in any labor organization; and that there shall be no discrimination against or interference with any employee who is not a member of any labor organization by members of such organization."

This clause has been repeated in every contract made between the anthracite miners and the operators since 1902, and during that time there has been no protracted strike. This is in sharp contrast with the bituminous field and its closed shop, where strikes have been called, in violation of contracts and irrespective of agreements, at seasons when it was thought coal was so necessary that the extortionate demands would have to be granted.

The greatest problem of the reconstruction which is now going on is the adjustment of wages and working conditions. The country cannot be brought back to a normal productive basis until labor is once more as efficient as before the war, and the point of view of the producers must once more be turned to their cost and efficiency sheets instead of to their balance sheets.

The brunt of this work falls on you engineers, who are on the firing line, with the demand of your board of directors, on one hand, to reduce costs, and, on the other hand, the threat of your labor that if there is any reduction in wages a strike will be called. On your tact and good judgment to tide over this period and to effect such adjustments as are necessary to restore output and reduce costs to a normal figure, and to do this without the disorganization which would come from long and protracted strikes, the prosperity of the country depends. Your problem is a hard one, and the united engineering profession, as well as the business men of the whole country, wish you the best of success.

Edwin Ludlow

EDWIN LUDLOW, the incoming president of the Institute, has a reputation in mining commensurate with that which his eminent brothers, Admiral Ludlow and General Ludlow, had in their spheres of engineering activity," said R. V. Norris the other day.

"Affectionately known as the 'baby superintendent' in Shamokin, Pa., shortly after his graduation from the Columbia School of Mines, in the class of 1879, he has spent a life time in coal mining, generally as operating executive, his experience beginning and ending in anthracite work, but being largely in the then Indian Territory, Mexico, and West Virginia.

"As to his ability as an engineer, his mine workings and plants were of the highest grade, the work of a

leader in engineering practice. As an organizer and executive he has ably and successfully filled great positions. In these, and as first vice-president of the Institute, he has demonstrated his capacity for the titular leadership of his profession.

"I predict an administration notable for constructive progress attained by wise consideration of his associates and unselfish devotion to the duties of his office."

No one in the Institute or without is better qualified to speak of its new president and what he has accomplished than Mr. Norris. The mining engineer engaged in coal work has much in common with his brother who is concerned with the winning of the metals and the various non-metals other than coal, but the two do not often meet except through the medium of the A. I. M. E. Mr. Ludlow needs no introduction to the profession at large, which has come to feel on familiar terms with him as an officer of the Institute, and the organization is to be congratulated that in picking a coal-mining engineer to lead it during the coming year its choice fell on him.

Mr. Ludlow was born at Oakdale, N. Y., on Long Island, in 1858, and upon his graduation from Columbia took service as a civilian with the United States Engineering Corps under General William Ludlow, his brother. His first work included river and harbor surveying on the New Jersey coast, and within two years he had acquired sufficient experience to take charge of the department's hydrographic work, which was the highest position in the service that was then open to civilians. In 1881 he gave this up for something more adventurous in Mexico, and with two other engineers engaged on the reconnaissance of the Mexican National R. R. from Laredo, Tex., to Mexico City. The party, which had one servant and one pack animal, took eight months to cover the eight hundred miles, and its members reached their destination only to find the company in such financial straits that their work was discontinued.

This seeming misfortune resulted in Mr. Ludlow entering the coal-mining industry. Returning to the United States, he took a position with the Mineral Railroad & Mining Co., an anthracite subsidiary of the Pennsylvania R. R., with headquarters at Shamokin, Pa. Two years later he was appointed superintendent of the Union Coal Co., which had just leased two of the mineral company's collieries, and in 1885 he became superintendent of the latter company. In the course of the four years during which he held the last position he installed the first water-tube boilers and chain conveyors used in the anthracite regions.

In 1889 Mr. Ludlow was called to supervise the development of a virgin coal field in Indian Territory, now Oklahoma. Preliminary geological studies of this district had been made by H. M. Chance, and Ludlow's instructions were to extend the known areas of workable coals, so that the line of the Choctaw Coal & Ry. Co., which was then under construction, should be most advantageously located for working them, and to develop mines to produce a large tonnage for the road. The field was about eighty miles long. The importance of this district today demonstrates the effective way in which Mr. Ludlow performed his task.

Pioneer work again summoned him after ten years in Oklahoma, and he went to Mexico, where as the head

of an American company he became the first operator in the now well-known Sabinas field in northern Coahuila. Here as general manager of the Mexican Coal & Coke Co. at Las Esperanzas, it is said, he transformed the desert into a flourishing mining camp within the space of three years. As the new industry thrived, competition increased, and to meet this and at the same time provide funds for sinking a 900-ft. shaft, the deepest coal shaft in Mexico, he installed what was then the most modern battery of Koppers waste-gas ovens on the continent.

Finally, Mr. Ludlow was called to the large mining districts of the East. In 1911 he became vice-president and general manager of the New River Collieries Co., and a year later was chosen vice-president of the Lehigh Coal & Navigation Co. and placed in charge of its mines. At this time W. A. Lathrop said of him: "Mr. Ludlow brings to his new position a long experience with mining problems and management, and the company is to be congratulated upon having secured his services." He remained with the Lehigh company until July 1, 1919, when he resigned to enter into practice as a consulting engineer in New York.

Of his new office as president of the A. I. M. E., Mr. Ludlow has said: "I regard it as the highest honor that can be paid to an engineer—one that has to be taken seriously and one that carries with it the responsibilities that are vested in the presidency of a very large and growing organization."

Last Day of Meeting Includes Only Social Sessions

There were no technical sessions scheduled for Thursday, the last day of the Institute meeting, but a number of the visitors availed themselves of the opportunity to take in the visits which had been planned by the Entertainment Committee. The Museum of the American Indian, Heye Foundation, was opened for the first time for a private view for members of the Institute. In the same vicinity, the Museums of the Hispanic Society of America, the American Numismatic Society, and the American Geographical Society of New York were visited. At noon, a luncheon was served at the May Flower restaurant, and during this time President Ludlow introduced some of the prominent men connected with the management of the museums visited. The party then proceeded to New York University. Later in the afternoon a tea was tendered to the visiting ladies by Mrs. Herbert Hoover at the Cosmopolitan Club.

A recital of the various programs would be incomplete without a mention of the special arrangements which were made for the entertainment of the ladies during the various sessions of the meeting. On Monday afternoon there were several auto parties made up for the purpose of visiting different points in the city. In the evening, a performance of "Good Times" at the Hippodrome was attended. On Tuesday afternoon a visit was made to the art galleries of Senator William A. Clark, and this was followed by a reception. Wednesday afternoon there was a fashion show at Lucile's, to which the men were also invited. It may be remarked that there was a good attendance of the latter.

HANDY KNOWLEDGE

Blowing Engines With Plate Valves

BY N. L. STEWART

Written for *Engineering and Mining Journal*

During 1918, a new converter blowing engine with air cylinders of 64-in. diameter by 60-in. stroke, and with plate valves, was put into service at the Garfield smelter, at Garfield, Utah. Up to that time all the piston-type blowing engines in use had been equipped with mechanically operated valves. It was found, however, that the new engine could be obtained at a lower cost if equipped with plate valves. The machine was guaranteed to give satisfactory results with these plate valves, and for this reason the order for the new engine specified that it would be so equipped. The plates are about 7½ in. in diameter, and there are 232 on the two cylinders. This includes both inlet and discharge valves. The plates are made of hardened steel about ½ in. thick, and are therefore quite flexible. Each plate is held in place by three studs, each stud having a light coil spring.

The plate valves have been entirely satisfactory in every respect. They are simple and accessible, and can therefore be cheaply and quickly renewed. The operators in the power house now prefer them to the mechanically operated valve.

Plate valves are much used in ordinary air compressors, but I do not think, up to date, that they have been used extensively in blowing engines for copper plants. The particular engine mentioned above was built by the Allis-Chalmers Manufacturing Co.

Changing Skips and Man Cars In Incline Shafts

BY GEORGE J. YOUNG

Written for *Engineering and Mining Journal*

Changing skips and man cars when the angle of the shaft or slope is comparatively flat is easily effected by placing a switch on the skip track and connecting it to curved tracks leading off to the side and terminat-

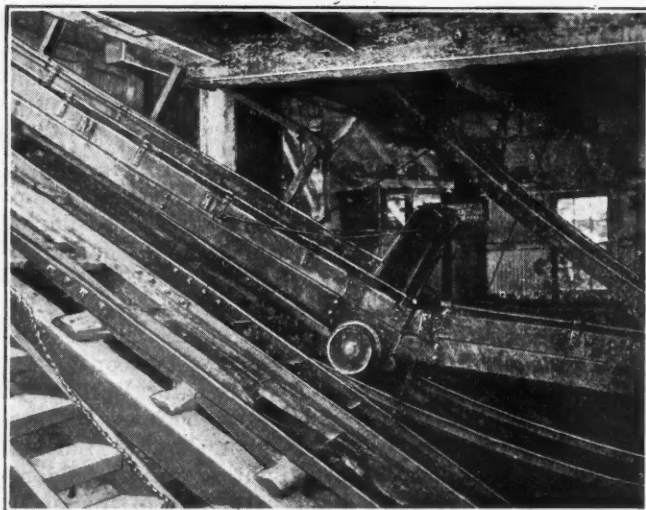


FIG. 1. SKIP CHANGING ON INCLINED SHAFTS

ing in a pocket or else in a horizontal plane. For steeper angles, the simple method shown in Fig. 1 is satisfactory. In this example, one or more receiving decks are constructed above the principal landing level. The decks are overhung, but have clearance when either skips or man cars are in regular operation. Hinged to the edge of the deck is a pair of curved rails which connect with a short length of track upon the landing

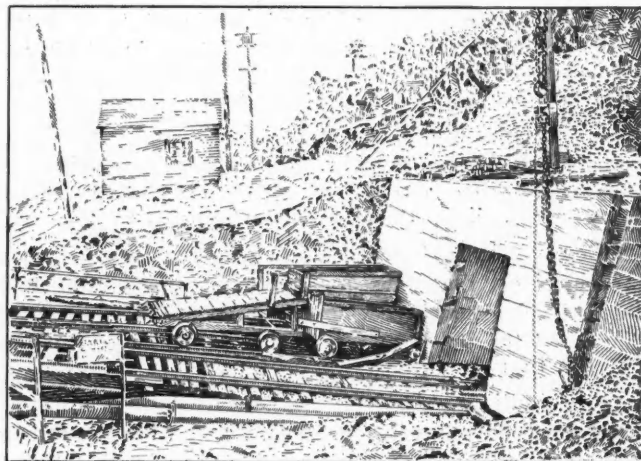


FIG. 2. SKIP CHANGING ON MINE SLOPES

deck. The ends of the rails are scarfed, and the flanges of the rails a short distance back from the points are forged out and curved down so as to clasp the head of the skip tracks. A cross bar connects both curved tracks below the point of meeting. It is riveted to the flanges of the curved rails and contains an I-bolt on either end, to which are attached wire ropes. The ropes pass over small sheaves above, and the ends are either attached to a hand-operated winch or to counterbalance weights.

The method of operation is obvious. At underground stations a similar arrangement can be used for unloading mine cars. In Fig. 1 a man car is shown just as it is being removed. The photograph was taken at the Empire mine, Grass Valley. Fig 2 shows the method for removing skips employed in the Birmingham district, Alabama. The incline shaft shown is the No. 1 slope of the Raimund mine, of the Republic Iron & Steel Co.

Use of Railroad Tie in Replacing Derailed Truck

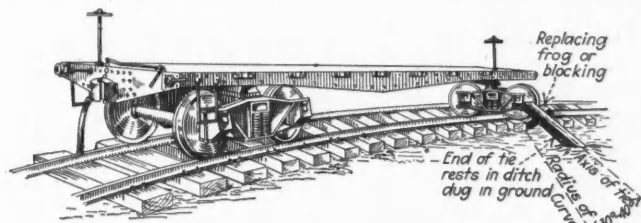
BY H. H. HUNNER

Written for *Engineering and Mining Journal*

A railroad tie may be used to advantage when a truck becomes derailed on a sharp curve that has considerable super elevation, the wheels being off, having dropped on the lower side. With a loaded car there is a strong thrust toward the inside of the curve as the wheels leave the frogs or blocking used in replacing and drop onto

the rails. If the flange on the inside wheel lands on the tread of the inside rail, which frequently happens under the conditions mentioned, the inward thrust of the tilted load will again derail the pair of wheels.

A simple but effective means to counteract this side-ward thrust on the truck wheels as they leave the frogs will be found in the use of a railroad tie or equally stout pole or timber. When the frogs are placed ready for the shove ahead, one end of the tie or pole should be placed against the truck frame where it will take hold in the push without injuring the journal box. The



RAILROAD TIE USED TO COUNTER INWARD THRUST WHEN ATTEMPTING TO REPLACE DERAILED TRUCK

outer end is swung toward the frogs to make an angle of 30 to 40 deg. with the radius of the curve and lowered to the ground.

A hitch is then dug a foot or more deep to give the lower end of the tie a full bearing when dropped into the hole. Flat rocks or blocking may be used to crowd between the lower end of the tie and the side of the hitch when the tie is placed in position for the trial. A man can safely stand on the lower end of the tie to keep it from pushing up. The earth gives enough to avoid breaking any parts of the truck, and by the time the wheels drop to the rails the tie is exerting a strong crowding effect counter to the inward thrust on the truck.

I have replaced trucks in this manner without the use of frogs by blocking up to clear the rail and crowding over. I have also used the same method on a four-wheel ten-ton industrial derrick. If two wheels of the derrick miss the rails in dropping from the frogs on a sharp curve, the other two are very likely to join them. In using the tie shover on the derrick, I braced the tie against the lower frame of the derrick.

Novel Use of Air Lift for Regular Mine Drainage

BY AVERY H. REED

Written for *Engineering and Mining Journal*.

Almost everyone connected with mining is familiar with the air lift as a pumping device for occasional use under special conditions, such as preliminary pumping operations and as an aid in dewatering old mines and flooded mines; but it may be unusual to find in use an air lift installed for daily mine drainage practice, such as that at the Big Four fluorspar mine, situated at Marion, Ky.

The ordinary practical result attained with the air lift is that of pumping out water to one-half the depth of a shaft or mine. For example, if the shaft is 100 ft. deep vertically and an ordinary air lift is installed at the bottom, it can be used practically until the water level stands within 50 ft. of the bottom. Further operation of such an air lift may continue for a while to bring out water and lower the water level somewhat, but finally, and before all of the water can be pumped

out, the air lift will cease to function. It is impossible to dewater a shaft or mine completely with an ordinary air-lift installation. The reason is that the mathematical principles involved prescribe so much submergence of the air lift below the level to be drained for its successful operation; and as much as 50 per cent submergence is essential for efficient results.

Of course, if shaft sinking could be kept ahead of mining operations by a distance equal to the vertical height of the latter, there would be the 50 per cent submergence necessary for practical use of the air lift; but such practice is out of the question for obvious reasons.

At the Big Four mine we have installed a novel air lift. We have a vertical shaft 110 ft. deep with a cross-cut to the vein at 100 ft., leaving 10 ft. for a sump. With the shaft full of water to within 10 ft. of the top of collar, we dropped 110 ft. of 8-in. standard pipe in one corner of the ladderway. The bottom joint of the pipe, resting on shaft bottom, had been punched full of $\frac{1}{4}$ -in. holes, thus forming a strainer. The shaft was floored over, and a heavy churn drill was centered over the 8-in. pipe, and an 8-in. hole drilled 140 ft. in rock. After the drilling was completed, we added 14 ft. of 8-in. pipe, extended above the shaft collar, upon which was fastened the casing-head that supported the 4-in. standard Sullivan air lift, with umbrella discharge. This we installed in the 8-in. pipe and 8-in. drill hole. A suitable discharge box was provided under the umbrella for the water to flow through 5-in. pipe to an elevated tank which is used for storing the mill water supply.

The innovation is the manner in which we provided by means of the drill hole for sufficient submergence of the air lift, to give us practical use of the lift for regular mine drainage. As stated, the water is discharged 14 ft. above the shaft collar. This makes a total depth of 264 ft. to the bottom of the drill hole. The foot-piece of the air lift, with 9 ft. of 1-in. tail pipe attached, was set 16 ft. off bottom, or 248 ft. below the level of discharge, thus establishing 50 per cent submergence below the bottom of the sump, whence the mine water drains into the drill hole through the provided strainer.

The mine was closed down to install the air lift. On resuming operations, we began to work only a single day shift, letting the mine water accumulate over night. Type Y Fairbanks-Morse crude-oil engines are used as prime movers, for all motive power. One engine attendant, who works twelve hours, starting early in the morning, is able to pump out before the day crew comes on shift. During the day, one or both of the two compressors are kept running, primarily to furnish compressed air for the drills. The air valve on the air lift is left "cracked" a little, which suffices to keep the lift running and in this way constantly serves to drain the mine.

The normal flow of water in the mine is about 100 gal. per minute. Before the air lift was installed, constant operation of two No. 6 regular pattern Cameron pumps, actuated by compressed air, was required night and day to keep the mine drained. Pump trouble was frequently experienced, with consequent loss of time. Now we operate practically a "fool-proof" pumping device, and after several months' running have never been down on account of pump troubles. This use of the air lift is especially applicable to the drainage of shallow mines.

THE PETROLEUM INDUSTRY

Petroleum and Asphalt in Venezuela*

Oil Formation in Cretaceous Sandstones and Limestones and Tertiary "Coal Series"—Extent of Productive Region Large—Record of Commercial Activities And Output Since 1915 Indicate Country To Be an Important Source of Supply

BY ARTHUR H. REDFIELD

Foreign Minerals Section, U. S. Geological Survey

Written for *Engineering and Mining Journal*

TWO distinct oil-bearing districts may be recognized in Venezuela. One includes the basin of that arm of the sea known as Lake Maracaibo, in the northwest of the republic. The second comprises the shores of the Gulf of Paria from the northern part of the Orinoco delta to the Promontory of Paria. The total area of the Maracaibo district is 27,500 square miles; that of the Paria region equals 2,100 square miles. Only a small part of the oil fields about Lake Maracaibo has been proved by drilling. The Paria district has been celebrated for years for the production of asphalt, but no oil in commercial quantities has yet been extracted there.

The geology of the Maracaibo oil region, as far as it is known, presents similarities of stratigraphy and structure to the Colombian oil fields, particularly those of the Magdalena-Santander district, to which it is geographically contiguous. The mountains of the Maracaibo district are apparently a topographic and a geologic continuation of the Colombian Andes. Though there is some lack of agreement in the assignment of the respective formations to their places in the geologic column, there is a lithological similarity which all recognize. As in Colombia, the manifestations of oil are most abundant in the Cretaceous sandstones and limestones and in the Tertiary, especially in a "coal series," the Cerro de Oro terrane, ascribed to the Miocene, though its Colombian counterpart has been considered Oligocene.

STRUCTURAL CONTINUITY WITH TRINIDAD FORMATIONS

An equally striking similarity of stratigraphy can be traced between the formation of the Maracaibo and Paria districts of Venezuela, and also between the formations of the Paria district of Venezuela and those of Trinidad. As in the former instance there is no question as to the lithological similarity of the strata on the two sides of the Gulf of Paria, the disagreement is only with regard to the geologic horizons to which they are ascribed.

A continuity of structure is apparent throughout the three regions. In the Magdalena-Santander district of Colombia the trend of the principal anticline of the De Mares concession is northeast-southwest. The minor anticline folds with which the geosynclinal basin of Lake Maracaibo is wrinkled bear about N. 61 deg. E. In the Paria region the prevailing structure is one of minor folds and faults with a general bearing of N. 75 deg. E.

*Published by permission of the Director of the U. S. Geological Survey.

The Venezuelan oil is prevailing asphaltic. Discoveries of paraffine-base oils have been reported, but the petroleum obtained from the wells so far drilled has revealed on analysis an asphalt base. So too, though reports of light-gravity oils have been published, the oils actually extracted in recent years have ranged from 0.928 to 1.02 specific gravity. Not more than 3 per cent of gasoline or 7 per cent of kerosene has been obtained from Venezuelan petroleum in refinery practice.

The commercial production of petroleum in Venezuela began in 1917. Table I gives the production, amount refined, and exports of crude oil:

TABLE I. PRODUCTION, REFINING, AND EXPORTS OF VENEZUELAN OIL, 1917-1919

	Production		Refined at San Lorenzo		Exports to Curacao		Exports to Other Destinations	
	Metric Tons	Barrels	Metric Tons	Barrels	Metric Tons	Barrels	Metric Tons	Barrels
1917....	18,255	119,734	8,871	58,185	9,383	61,541	1	6
1918....	50,710	332,607	24,648	161,666	25,298	172,489	764	5,012
1919....	64,628	423,895	54,000a	354,000a	10,600a	60,522a	(b)	(b)

(a) Estimated. (b) No data.

In 1919, 686 metric tons (4,499 bbl.) of crude oil was used as fuel at the wells.

No phenomenal yields of petroleum have been obtained from any of the seven wells that were in active production in 1919. The highest known output of the Zumbador well, in the Mene Grande field, was 229.86 bbl. a day. The Zumacaya well in 1919 produced 342.7 bbl. a day. The Zuba well in 1919 had a daily production of 118.46 bbl. In the first half of 1920, the Zumbador well gave 837 bbl. a day; the Zumba well 131.6 bbl. a day; and the Zumaya well 30.5 bbl. a day.

Commercial production in Venezuela has been attained only by the Caribbean Petroleum Co. It is true that the Compañía Petrolia del Táchira, a Venezuelan company, under a title granted Sept. 3, 1878, produced and sold locally for many years small quantities of kerosene refined by crude methods from oil won in shallow wells in the municipality of Rubio, District of Junín, State of Táchira, but little is known of its activities, which have been conducted on a small scale. Its production from 1905 to 1907 averaged 50 metric tons a year. No later statistics of its output are at hand.

The production of asphalt in Venezuela by companies in recent years is shown in Table II.

TABLE II. ASPHALT PRODUCED IN VENEZUELA, 1917-1919.

Company	1917			1918			1919		
	Metric Tons	Metric Tons	Metric Tons	Metric Tons	Metric Tons	Metric Tons	Metric Tons	Metric Tons	
New York & Bermudez Co. Guanoco, State of Sucre..	52,991	46,453	45,932						
South American Company Gen. Urdaneta and of Lagunillas, State of Zulia	72	50	....					
Cía. Anónima Minerales Rio Pauji, State of Trujillo	1,009	....	....				
Petrolíferos Riopauji....	....	....	....			
Total.....	54,072	46,503	45,932						

Drilling, in the main, has been carried on by the cable-tool system. In the Pedernales field, however, difficulties with soft formations led the Bermudez Co. to adopt the rotary system, which has also been tried in the western Buchivacoa field.

At first the larger part of the Venezuelan crude oil was shipped in barges to the Royal Dutch refinery on the Island of Curaçao, Dutch West Indies, but in 1919 the Venezuelan plant at San Lorenzo took over four-fifths of the output of the Mene Grande wells. The San Lorenzo refinery is designed to supply only the Venezuelan trade. Exports to foreign markets are made from Curaçao refinery.

The Curaçao Refinery—Near Willemstad, on the Island of Curaçao, Dutch West Indies, a modern refinery on the Trumble system was completed in 1917 by the Curaçaosche Petroleum Maatschappij (Curaçao Petroleum Co.), a subsidiary of the Royal Dutch-Shell group. Its capacity is stated at 1,000 tons daily. So far, however, no great amount of petroleum has passed through the refinery.

Shipments to Curaçao from the Venezuelan fields are made in tank barges towed by slow tugboats, a trip of several days. These have not been altogether satisfactory. Late in 1919 a number of monitors were purchased from the British government by the Shell Transport & Trading Co., to be converted into tankers for conveying the oil from Venezuela to the Curaçao refinery. At that time, however, only one barge of 800 tons was engaged in this service.

The San Lorenzo Refinery.—The San Lorenzo refinery, built at a cost of over \$300,000, has a daily capacity of 400 tons (2,624 bbl.) of crude oil. It began operations on Aug. 16, 1917, and received 8,871 metric tons (58,185 bbl.) of crude oil in that year; 24,678 tons (161,666 bbl.) in 1918; and 54,000 tons (354,000 bbl.) in 1919. Its sales of refined products in 1918 and 1919 are shown in Table III.

TABLE III. SALES OF REFINED OILS FROM THE SAN LORENZO REFINERY, 1918 AND 1919

	1918		1919	
	Liters	Barrels	Liters	Barrels
Kerosene.....	2,142,962	13,479	3,323,086	20,902
Gasoline.....	914,130	5,750	2,186,271	13,751
Mineral turpentine.....	.....	.....	1,350	8.5
Benzine.....	.....	.....	306	2

OIL AND ASPHALT RESERVES

Various large estimates have been made of the reserves of petroleum in Venezuela. These range from 150,000,000 to 250,000,000 metric tons, based on estimates of the probable oil-bearing territory and the richness of the oil sands. These estimates will undoubtedly have to be revised in the light of the experiences of the producing companies. Of the 1,028 areas of 500 hectares (1,234.5 acres) each, selected by the Caribbean Petroleum Co. in 1913 for exploration and possible development, 767 areas had been renounced to the Venezuelan government by Dec. 31, 1919, after examination or drilling. It was expected that more would be renounced in 1920 after detailed geologic examinations. On this basis the estimated reserves of available petroleum may have to be reduced to 40,000,000 or 60,000,000 metric tons. Altogether, Venezuela has not lived up to expectations.

No estimates are available as to reserves of asphalt. The deposits of Bermudez Lake give evidence of constant renewal, and other asphalt lakes exist also, both in the east and in the west, which, however, have not been commercially developed.

The Maracaibo district includes the lowlands and eastern slope of the Sierra de Perijá on the Colombian border, to the shores of Lake Maracaibo, an area about 200 miles long from north to south and 75 miles wide; the lowlands and northern slope of the Cordillera de Mérida south of Lake Maracaibo, to the shores of the lake, a belt roughly 150 miles long from southwest to northeast and 50 miles wide; the lowlands and hills east of Lake Maracaibo to a width of about 50 miles and a length of about 100 miles, and the coastal belt of the State of Falcón, south of the Peninsula of Paraguaná, roughly 150 miles long from east to west and 50 miles wide. The district comprises practically all of the State of Zulia, the western half of the State of Falcón, as well as portions of the states of Trujillo and Lara.

At the base of the sedimentary formations of the Maracaibo district is a complex of crystalline gneisses, schists, and igneous rocks, undoubtedly as old as the Paleozoic and probably pre-Cambrian, and metamorphic Paleozoic shales. Overlying these unconformably is the pre-Cretaceous (?) series of Lagunillas conglomerates and breccias, followed by the alternating coarse red micaceous sandstones and coarse yellow to white sandstones (Lower Cretaceous) which outcrop in the Cordillera de Mérida. These are overlain by 500 ft. of limestones, in three divisions, the lower dark bituminous San Cristóbal limestones, the succeeding blue limestones of Táchira and Barbacoas (Lower Cretaceous), and the higher crystalline Capacho limestones (Upper Cretaceous?).

The Eocene has been recognized in the Maracaibo district, consisting of a dark-gray shale with a few intercalations of sandstone. The Capacho limestones are overlain unconformably in places, however, by Oligocene black carbonaceous shales, to a thickness of 3,000 ft. Unconformably above the shale is the Cerro de Oro terrane (probably Miocene), correlated by Sievers with the Lower Caroni series of Trinidad and with the Guaduas formation of Colombia. It is 2,500 ft. thick, composed of shales, thin sandstones, and intercalated coal seams. An Upper Tertiary series, apparently corresponding to the Upper Caroni series of Trinidad, and consisting of interbedded sandstones and clays, rests unconformably on the preceding.

Unconformably overlying the Upper Caroni series is the Maracaibo series of loosely consolidated silt and gravel belonging either to the late Tertiary or the early Quaternary. The Maracaibo series is covered by recent gravels and loam.

The present repository of petroleum in western Venezuela is found in the Cretaceous limestones. Not only these, but later formations, especially the Cerro de Oro terrane, have become impregnated with oil. It has been suggested that the Oligocene black shale is the parent oil rock.

STRUCTURE OF THE MARACAIBO DISTRICT

The Lake Maracaibo oil region lies in a great geosyncline, in which minor folds are in evidence on both sides of Lake Maracaibo. Most of these folds are sharp, pronounced anticlines with marked recurring dome structures somewhat similar to those of California. The axis of the Maracaibo geosyncline and of the minor folds which parallel it bears about N. 61 deg. E.

Along the navigable rivers which empty into Lake Maracaibo from the south and southwest evidences of oil are numerous. A score of small streams descending from elevations of 100 to 200 ft. above the level of the

rivers are constantly covered with oil scum. Petroleum exudes from fissures in the banks of the streams. At one point a hole dug three feet deep and two feet square filled with petroleum in about six hours. Well-known oil springs occur near Betijoque. Indications of petroleum are found on the north branch of the Tocuyo River. A heavy oil exudes in the Miranda district. Asphalt seeps, running 94 per cent pure, are found near Fort San Carlos on the Limón River. Seepages of petroleum are found near Santa Cruz de Mara, where the "coal series" (Cerro de Oro terrane) outcrops. The Flores Asphalt Lake, about twenty-five miles west of Maracaibo, points to the existence of a petroliferous formation.

COMPANY ACTIVITIES

The Caribbean Petroleum Co.—The only active producer of petroleum in Venezuela previous to 1919 was the Caribbean Petroleum Co., of Camden, N. J. The company after a thorough exploration by a party of thirty-five geologists, headed by Ralph Arnold, selected in 1913, for preliminary work of development, 1,028 areas of 500 hectares (1,235.5 acres) each, situated on both sides of Lake Maracaibo.

The principal holdings of the Caribbean Petroleum Co. are in the Mene Grande field, seventy miles east of Maracaibo and sixteen miles inland from San Lorenzo; in the Miranda district, east of Lake Maracaibo; at Perijá, fifty miles west of the city of Maracaibo; and in the Santa Cruz de Mara district.

Drilling by the Caribbean Petroleum Co. in the Mene Grande field began in January, 1914. The first well drilled struck oil at a depth of 390 ft. and produced about 10 bbl. a day. In the next two years, five other wells were sunk ranging from 600 to 1,700 ft. in depth. Oil was found in all; most of the wells had to be capped. The Zo. No. 1 well drilled in 1918 gave oil at 797 ft. A second well was abandoned at 227 ft. Of the two wells completed in 1919 one was abandoned at 1,359 ft. and the other had reached 1,078 ft. at the end of the year. More wells were authorized for 1920.

The following statement shows the condition of the productive wells in the Mene Grande field in the fall of 1920:

CONDITION OF PRODUCTIVE WELLS IN MENE GRANDE FIELD IN FALL OF 1920

Well	Drilled	(Feet)	Initial Production, Metric Tons		Present Conditions
			1915	1918	
Zumacaya No. 1	1915	583	40	40	Capped
Zumaque No. 1...	1914	390	40	40	Capped
Zumaya No. 1...	1914	1,667	400	400	Producing
Zumba No. 1...	1915	882	250	250	Choked with sand
Zumbador No. 1.	1915	869	300	300	Producing
Zumbel No. 1...	1915	552	400	400	Choked with sand
Zo. No. 1.....	1918	797	40	40	Dammed with cement to exclude water
Zumaque No. 2..	1919	903	100	100	Dammed with clay and cement to exclude water

Commercial production has been attained so far only in the Mene Grande field. The output by wells in this field has been as follows:

PETROLEUM PRODUCED IN THE MENE GRANDE FIELD 1917-1919 AND SIX MONTHS OF 1920

	1917		1918		1919		Jan.-June, 1920	
	Metric Tons	Barrels	Metric Tons	Barrels	Metric Tons	Barrels	Metric Tons	Barrels
Zumbador No. 1....	10,240	67,164	26,103	236,800	36,862	241,775	23,102	151,526
Zumba No. 1....	8,015	52,570	11,548	75,743	6,592	43,236	4,522	29,660
Zumbel No. 1....	.....	.....	.....	.....	336	2,202	652	4,276
Zumaque No. 2....	.....	.....	.....	.....	102	670	15	98
Zumacaya No. 1....	.....	.....	.....	.....	528	3,463	76	498
Zumaya No. 1....	.....	.....	.....	.....	19,068	125,066	842	5,523
Zo. No. 1....	.....	.....	3,059	20,064	1,141	7,483	76	498
Totals...	18,255	119,734	50,710	332,607	64,628	423,895	29,285	192,079

For storing the oil, three steel tanks holding 55,000 bbl. each have been built at the wells. A 6-in. pipe line leads from the wells to the company's refinery at San Lorenzo, a distance of fifteen miles.

Work was started by this company in 1917 in the Santa Isabel field in district of Miranda, State of Zulia, adjoining the Bolívar holdings of the Venezuelan Oil Concessions, Ltd. A road twenty-six miles long was built from Altigracia to Santa Isabel, the field headquarters. Drilling in this field was continued throughout 1920.

In the Perijá field the first well, of the Caribbean Petroleum Co., drilled in 1915, showed oil in considerable quantities at 1,227 ft., and was shut in. Two more wells started in 1916 were completed in 1917 and 1918 respectively, without satisfactory results. In 1919 one well was drilled to a depth of 2,235 ft. without success. This final failure induced the company to renounce many of its holdings in the Perijá field.

Development of the Mara fields (Iniciarte and Cachirí de Palmarejo) in the Municipality of Ricaurte, State of Zulia, was begun in 1917. A wagon road completed by the company in 1915 leads from Lake Maracaibo to the Iniciarte field, a distance of forty miles; a branch of the road leads to the Cachirí de Palmarejo field, forty-five miles from the lake. Three wells were drilled in 1917 near Iniciarte, to depths respectively of 900 ft., 811 ft., and 2,018 ft. Shows of oil were obtained, but not in commercial quantity. When a well begun in May, 1918, was carried to 1,980 ft. without a commercial yield of oil, the company renounced its concession to a number of areas in this field.

Three wells in the Cachirí field were drilled in 1917 down to basalt, to depths of 1,950 ft., 430 ft. and 736 ft. respectively. No commercial quantities of oil were found. A well drilled in 1918 encountered igneous rock at 745 ft., and was abandoned.

DRILLING IN LA SIERRITA FIELD CONTINUED IN 1920

In the La Sierrita field, district of Mara, State of Zulia, a well was started in October, 1919. Despite delay occasioned by a lack of water, requiring the laying of a pipe line to the Ciénega de Sinamaica, twelve miles distant, the well had been carried by the end of the year to 1,146 ft. through clay, shale, and sand. Drilling was continued during 1920.

There remained to the Caribbean Petroleum Co. at the end of 1919 in both the Maracaibo and the Paria districts 261 areas, comprising about 322,466 acres. Some additional areas were probably surrendered during 1920 after intensive geologic study.

The Venezuelan Oil Concessions, Ltd.—The Venezuelan Oil Concessions, Ltd., of London, holds a concession covering 8,128 acres in the district of Maracaibo, on the west side of Lake Maracaibo, and in the district of Bolívar, on the east side of the lake. Development of the Bolívar area began late in 1913, with the drilling of wells at La Rosa and Santa Rita. The Santa Rita well was drilled to a depth of 1,600 ft. without striking oil, and was then abandoned. In the La Roca well, oil sand was met at a depth of 800 ft.; and at a depth of 1,500 ft. a sand giving oil of 30 deg. Bé. was struck. A great quantity was given at first; but after ten days the output had decreased to 10 bbl. a day. No attempt was made to pump the well, which was abandoned.

The Venezuelan Oil Concessions, Ltd., fought a losing

fight with the mosquitos, which decimated its workers with malarial diseases. The drilling system originally adopted proved unsatisfactory, and new equipment was ordered in the United States. The outbreak of the Great War prevented the delivery of this equipment. Nevertheless in the next three years five more wells were drilled, ranging in depth from 600 ft. to 1,800 ft., and spread over a wide area. Oil is said to have been found in five of the seven wells, of which those near Santa Barbara are believed to be of commercial value. Particulars concerning two of these wells are given in the following table:

DATA ON WELLS OF VENEZUELAN OIL CONCESSIONS, LTD.

Well	Year Drilled	Dep'th, Feet	Initial Production, Metric Tons	Present Condition
No. 1.....	1918	1,424	16	Capped
No. 4.....	1919	1,697	18	Capped

Drilling in the Barroso field was started in June, 1918; but the well was discontinued after an accident to the casing. A second well begun in the latter half of that year was abandoned at 536 ft. In the spring of 1920 there was practically no activity in the Bolivar holdings of the Venezuelan Oil Concessions, Ltd.

The Colon Development Co.—The principal holdings of the Colon Development Co., of London, are in the Colon district, State of Zulia, especially in the vicinity of El Cubo, near the Colombian border, 100 miles southwest of Encontrados, and are contiguous to the Barco concession in the State of Santander del Norte, Colombia.

GUARD AGAINST INDIANS NECESSARY

The geologic exploration and the subsequent development of the Colon field were considerably hindered by the depredations of the Motilones Indians, necessitating an armed guard about the field camps and drilling machinery day and night. Drilling began early in 1914. The first well was abandoned at a depth of 700 ft. The second well, on the Rio Oro, reached over 1,000 ft., giving an initial output of 200 bbl. a day of light-gravity oil. Three wells were drilled along the Rio Tarra, the deepest to 2,362 ft. A sixth well was carried to 328 ft. during 1919.

The Colon Development Co. had drilled up to May 1, 1920, six wells, as described. Three of these were found productive and capped, as is shown in the following statement:

DATA ON PRODUCTIVE WELLS OF COLON DEVELOPMENT CO.

Well	Year Drilled	Depth Feet	Initial Production, Metric Tons	Present Condition
Orden No. 2.....	.....	1,045	39	Capped
Toldo No. 1.....	.....	830	117	Capped
Tabla No. 3.....	1918	1,909	21	Capped

British Controlled Oilfields, Ltd.—The British Controlled Oilfields, Ltd., is operating the Buchivacoa concession of 3,000 square miles in the State of Falcón, acquired from the Venezuelan-Falcón Oil Syndicate, Ltd. The property is said to contain a sharp, narrow anticline traceable for fifty miles from northeast to southwest. Toward the west, the anticline pitches southwest and shows recurring dome structures. Seepages of a light oil are numerous.

Development is taking place in two main divisions. In the western division, of which the field headquarters are at Altigracia, two wells have been drilled. Both the rotary and the cable systems of drilling have been used. The first well gave a small quantity of oil at a depth of

1,800 ft.; the second showed oil at a depth of 1,000 ft. Supplies are hauled to the camp forty-five miles east of Altigracia by tractors, over a wagon road built by the company. Water is brought by a pipe line. Oil, when met in commercial quantities, will be transported by a pipe line to be built to Altigracia or to the Caribbean coast, fifty miles to the north.

The field headquarters of the eastern division are at Dabajuro, eight miles south of the Caribbean coast; and the drilling camp is twenty-four miles to the southeast. Three standard drill rigs were under construction at the end of August, 1920. Supplies for the camp are taken from Maracaibo by schooner to a small port near Punta Zazarida, where a small pier is being built. A wagon road to the camp is under construction.

The Riopaují Co.—The Compañía Anónima Minerales Petrolíferos Riopaují was formed in Maracaibo, with Venezuelan capital, to exploit deposits along the River Paují, thirty miles east of Lake Maracaibo. A large working capital was named; but only \$50,000 was raised at the outset for actual development. Exploration work was carried on by the Riopaují company in 1915 and 1916. The company drilled one well in 1917 to a depth of 1,417 ft., finding evidences of oil, but no commercial quantities. No activity in oil-drilling was reported during 1918 or 1919. The Riopaují company mined 1,009 metric tons of asphalt in 1917.

The South American Co.—The South American Co., organized in the United States, owns asphalt deposits in the municipality of Lagunillas, district of Bolívar, State of Zulia, and has an interest in the deposits in the municipality of General Urdaneta, district of Sucre, State of Zulia. The South American Co. produced seventy-two metric tons of asphalt in 1917; fifty tons in 1918; and none in 1919. Its ownership of certain asphalt deposits is disputed by the Caribbean Petroleum Co.

AMERICAN COMPANIES DEVELOPING

The Maracaibo Oil Exploration Co.—The Maracaibo Oil Exploration Co., of New York, organized in the fall of 1919, has made four locations covering 700,000 acres in the State of Zulia and has formed four exploration companies. Camps have been established, and drilling material has been shipped via Maracaibo. The principal locations of the Maracaibo Oil Exploration Co. are at Los Barrosos, in the district of Perijá, adjoining the properties of the Caribbean Petroleum Co., and at a point south of Lake Maracaibo.

Sun Company—The Sun Co., of Philadelphia, is reported to have secured concessions in the State of Falcón.

The Venezuelan Oilfields, Ltd.—Five concessions in the State of Falcón have been acquired by the Venezuelan Oilfields, Ltd., organized under the laws of the State of Delaware. The territory has been thoroughly explored by geologists with a view of development. The company plans, in the event of obtaining oil, to lay a pipe line and run a small railroad to the coast. This company is also reported to be examining areas in the southern end of Lake Maracaibo.

The North Venezuelan Petroleum Co., Ltd.—The acquisition of a concession to 100 hectares (247.1 acres) in the districts of Acosta, Zamora, and Silva, State of Falcón, by the North Venezuelan Petroleum Co., Ltd., of London, was reported in September, 1920. The principal deposits lie in the vicinity of Piritu.

To Be Continued

ECHOES FROM THE FRATERNITY

SOCIETIES, ADDRESSES, AND REPORTS

American Engineering Council Studying Weaknesses in Our Producing Systems

Herbert Hoover Addresses Engineers
at Syracuse—Points Out Advantages
of Maximum Production—Efforts
Made to Attain It

The executive board of the American Engineering Council of F. A. E. S. met with the convention of engineers at Syracuse, N. Y., beginning Feb. 14. Herbert Hoover, president of the council, opened the session with an address, from which extracts are here given:

"American Engineering Council has organized a preliminary survey of some of the weaknesses in our production system. This survey will attempt to visualize the nation as a single industrial organism and to examine its efficiency toward its only real objective—the maximum production. In a general way this inquiry will bear upon the whole question of deficiency in production—industrial waste in a broad sense.

"The waste in our production is measured by the unemployment, the lost time due to labor conflict, the losses in labor turnover, the failure to secure maximum production from the individual, due either to misfit or lack of interest. Beyond this again is a wide area of waste in the poor co-ordination of great industries, the failures in transportation, coal and power supplies which re-echo daily to interrupt the steady operation of industry. There are again such other wastes due to lack of standardization, to speculation, to mismanagement, to inefficient national equipment, and a hundred other causes. There is a certain proof of deficient production by comparisons of our intense results in 1918, when, with 20 per cent of our man-power withdrawn into the army, we yet produced 20 per cent more commodities than we are doing today.

"The whole basis of national progress, of an increased standard of living, of better human relations, indeed of the advancement of civilization, depends on the continuous improvement in productivity. The greater field for increasing standards of living lies in the steady elimination of the wastes. The primary duty of organized society is to enlarge the lives and increase the standards of living of all the people—not of any special class whatever. We are therefore proposing to make a preliminary examination of the volume of waste in certain industries, the proportions that lie in each field.

"The assumption of positive limits to production due to oversupply has no proper foundation in the broad view of industry as a whole. There is no such

thing as the nation overproducing, if it produces the right commodities. The commodities or services produced by the whole nation can be absorbed by the whole nation if they are of the right character. An increasing production would mean a directly increasing standard of living. When one hundred million men divide their united output they can have twice the amount to divide when they double their output. The problem is to direct the effort to commodities or services that they can use. There is no limit to the increase of living standards except the limitations of human strain, scientific discovery, mechanical invention, and natural resources.

"The absorption of increased productivity lies in the conversion of luxuries of today into necessities of tomorrow, and to spread these through the whole population by stimulation of habit and education.

"Today we have also capacity for the production of some commodities even beyond export demand under present financial conditions. As a matter of practical remedy, we must either reorganize these financial relations or abandon some part of this kind of production and turn our idle men to making things with which we are not yet fully supplied. I am not suggesting that the forces of production can be shifted by imperial direction. The practical thing that can be done is to eliminate some of the wastes and misfits in our production, and depend on the normal processes of business and human desires to absorb them.

"The largest area of waste lies in the large periods of slack production and unemployment. Our studies of industries show that we usually expand our equipment just at the periods of maximum demand for their products, instead of doing our plant expansion during periods of slack consumption. We thus make double demands on labor, and we doubly increase unemployment in periods of reduced consumption. All industry could not be so stabilized as to do its capital construction in periods of depression in commodity demand. Nevertheless, there are some industries that could, by the co-operation of the Government and by co-operation among themselves, be led in this direction.

"Another variety of intermittent employment, and thus great waste, characterizes certain industries now operating with unnecessarily wide seasonal fluctuations, as for instance the bituminous coal industry. Mining engineers have already pointed out the directions in which remedy lies; through storage, through railway rate differen-

tials, and other remedies. Through constructive action, an army of men could be released from this industry of necessity, to convert some luxury into a necessity of tomorrow. This is no plan to control prices or profits, although through it both the producer and consumer in coal could be placed upon a sounder basis than today. The interest of the consumer and producer, is, however, even less important than relief from the intermittent employment and unemployment within this industry.

"The second largest area of waste in productivity is the eternal labor strikes and lockouts. The varied social and economic forces involved in this problem need no repetition here. Fundamentally, this is not alone a struggle for division of the results of production between capital and labor. Strikes and lockouts cause an even greater loss due to the element of purely human friction, a loss outside the area of dispute on wages and hours. We shall yet have to reorganize the whole employment relationship to find its solution. We are studying the progress made in this line.

"Yet another variety of loss lies in the unnecessarily faulty distribution of our labor supply due to seasonal and to shifting demands. An adequate employment service is indeed the first need in effecting the reduction of these wastes. Probably the next largest fraction of waste in productivity lies in a too high degree of individualism in certain basic products and tools. A standardization of certain national utensils would make for economy in distribution, operation, and repairs. This does not mean that we stamp out individuality; it means basic sizes to common and everyday things.

"Another type of waste lies in our failure to advance our industrial equipment. The Super-Power Board will demonstrate the saving of 25,000,000 to 50,000,000 tons of coal annually by the electrification of our eastern power supply. The St. Lawrence Waterway Commission will demonstrate the saving of 5c. to 10c. a bushel to the farmers of fifteen states, by unlocking the Lakes to ocean-going vessels. Nor will this injure our present systems of canals and waterways, for we have ever found that prosperity in one industry blesses all.

"We do not believe it is necessary to effect these things by the Government. The spirit of co-operation has already solved many things; it has standardized some things and is ripe for initiative toward co-operation of a widespread character. The leadership of our Federal Government in bringing together the forces is needed.

MEN YOU SHOULD KNOW ABOUT

M. W. von Bernewitz has severed his connection with the Mines Handbook at Tuckahoe, N. Y.

H. H. Hunner, of Cornwall Ore Bank Co., is spending two weeks in the Lake Superior iron districts.

Frederic R. Weekes, of New York, N. Y., has gone to Nevada and California on professional business.

Glenville A. Collins, consulting mining engineer, has moved his offices from Seattle, Wash., to Vancouver, B. C.

Dorsey A. Lyon, supervisor of experiment stations, U. S. Bureau of Mines, has returned to Washington, D. C., after an extended Western trip.

John M. Fox, superintendent of the Belmont Wagner Mining Co., at Telluride, Col., has resigned that position and is now in San Francisco, Cal.

M. M. Duncan, vice-president and general manager of the Cleveland-Cliffs Iron Co., will leave soon for Europe, where he will make observations on mining conditions.

Walter L. Maxson has left Canon City, Col., on account of the closing down of the operations of the New Jersey Zinc Co. at that place, and is temporarily in Butte, Mont.

Sir David Paulin and Young J. Pentland, of Edinburgh, Scotland, directors of the Arizona Copper Co., Ltd., are in Clifton, Ariz., on a tour of inspection of the company's properties.

M. Y. Williams, geologist on the staff of the Geologic Survey of Canada, and a petroleum geologist, has resigned to become professor of paleontology at the University of British Columbia, Vancouver.

T. Wayland Vaughn, of the U. S. Geological Survey, is on his way to Haiti, to inspect geologic surveys being made there by the U. S. Geological Survey in co-operation with the local government.

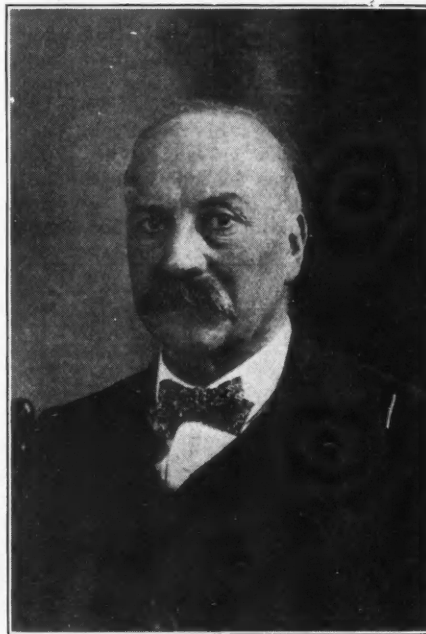
Blandford C. Burgess has resigned his position with the Iron Cap Copper Co., Globe, Ariz., to take charge of the development of promising silver-lead claims in the Saddle Mountain district, Pinal Co., Ariz.

G. B. Dennis, of Spokane, Wash., founder and for many years president of the Northwest Mining Association, was given the first honorary presidency and life membership, by a resolution passed at the recent meeting of the association.

W. Earl Greenough, mining engineer of Spokane, Wash., who has been occupied since early in 1920 on behalf of the Hecla Mining Co., in work relating to its recent apex litigation, is spending two weeks examining mining properties in California. He will visit Los Angeles and San Francisco before returning.

Colonel H. C. Rizer, the genial chief clerk of the U. S. Geological Survey, was the guest of honor at a lunch given by all his associates on Jan. 15 to celebrate his completion of thirty-five years of service with the survey. He also received a flood of letters, "smokes," and other tokens of regard from his many associates.

Colonel Rizer was a schoolboy in his native state of Maryland at the opening of the Civil War. As soon as his parents consented he enlisted as a private. At once he was appointed first sergeant of his company, and eventually rose through all higher grades to come out of the service at the close of the war as colonel of his regiment. The study and practice of law occupied him for the next fifteen



H. C. RIZER

years, chiefly in Kansas, where he also edited a weekly.

Early in the history of the survey Rizer made the acquaintance of Major J. W. Powell, with others of the staff of the second director, and was disbursing agent of the Geological Survey during 1883 to 1886. For three years he was away, serving as secretary to the Board of Railway Commissioners of Kansas. Major Powell again offered him a survey position at higher pay, so in 1889 he returned to "one of the pleasantest associations of his life," and in 1890 succeeded Mr. Pilling as the latest incumbent of the chief clerkship.

The colonel has filled that office continuously ever since, and today, at over eighty, is still serving genially, gladly and helpfully. His life's work has been to serve the many material needs of one of the most strenuous of our leading scientific bureaus, and the testimony of all its directors backs a host of associates in assuring him that it has been well done. All "that which should accompany old age, as honor, love, obedience, troops of friends," is his indeed.

Dr. J. Austin Bancroft, Dawson professor of geology at McGill University, Montreal, has obtained leave of absence for a year beginning in May, and will serve as assistant general manager of the Granby Consolidated Mining, Smelting & Power Co.'s mines, Anyox, B. C. **E. E. Campbell**, former assistant general manager, has resigned to become general superintendent of United Verde Extension Mining Co., Jerome, Ariz.

W. Burling Tucker, district engineer in charge of the southern California field division of the California State Mining Bureau, has resigned to engage in mining in Mexico. He was succeeded on Feb. 3 by **Charles S. Haley**, a mining engineer graduated in 1907 from the University of California and with experience in the Western States, California, Alaska, and South America. Mr. Haley's headquarters are in the Pacific Finance Building, Los Angeles, Cal.

Edward Doheny, mining engineer, left Mexico to visit in Merrill, Wis., in September, 1920, and has not been heard from since that time. He was traced as far as Chicago, Ill. Mrs. William Doheny, his mother, will appreciate any information concerning him. Mr. Doheny's description is as follows: Age, twenty-one; height, about six feet; weight, 150 lb.; complexion, fair; black hair; blue eyes. Mrs. Doheny's address is 205 Fifth St., Merrill, Wis.

SOCIETY MEETINGS ANNOUNCED

The American Society of Mechanical Engineers will hold its spring meeting on May 23 to May 26, inclusive, at Chicago, Ill. The Congress Hotel will be the headquarters. Among the sessions planned are conferences on Fuels, Management, Material Handling, and Power.

OBITUARY

W. P. Snyder, late head of the Shephango Furnace Co., died at his home in Pittsburg, Pa., on Feb. 3. Mr. Snyder was a highly respected and well-known mining man, and visited the Mesabi iron range, where his company operates many large properties, many times a year. He took great pride in the fleet of boats operated by his company, and during his administration he had built the largest ore-carrying boat on the Great Lakes.

Joseph Moore, Jr., president of the Wedge Mechanical Furnace Co., Philadelphia, Pa., died suddenly at his home, 1821 Walnut St., on Feb. 11. Mr. Moore, who was seventy-one years old, was a financier and a writer as well as a manufacturer and had traveled extensively.

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

WEEKLY RÉSUMÉ

As the result of the decision last October in the Utah Apex-Utah Consolidated lawsuit, the Utah Consolidated company has filed a statement and accounting with the Utah District Court, showing the tonnage and value of ore illegally extracted from the Utah Apex workings. The Silver King Coalition Mining Co. at Park City, in the same state, has decided to rebuild its mill that was destroyed by fire the last week in January. In Colorado, the Legislature has voted to abolish the office of Inspector of Ore Buyers. At Washington the Senate Committee has allowed an appropriation for a mining experiment station at Butte. A higher duty on lead ore has been asked in a petition made by the Utah Legislature, and in Montana a similar request has been made for a tariff on manganese ore.

In Butte, the Anaconda company has perpetuated the testimony of three aged witnesses respecting the title to certain claims, regarding which a dispute with the Davis-Daly company is said to be not impossible. In the Coeur d'Alenes, the Amazon-Dixie Mining Co. has increased its capital stock, and the Caledonia Mining Co. has suspended the payment of dividends. At Eureka, Utah, the Chief Consolidated has cut its quarterly dividend in half. At Marysville, Cal., the parts of the Guiana Development Co.'s new dredge are said to be ready for shipment to South America.

Jones & Laughlin Still Drilling on Eastern Gogebic

The Jones & Laughlin company are still proceeding with their exploratory work on the Gogebic Range, having a diamond drill at work on the south-east quarter of section 8, town 47 north, range 45 west. The drill is located just east of the Sunday Lake fault which threw the formations to the south, forming the orebodies that are being mined in the two open pits, and they hope to find merchantable ore in the same horizon that the Sunday Lake mine and the Castile mine have developed their orebodies. The drill is located north of the footwall and dips south. The drilling is being done under the direction of Archibald, of Negaunee, with James Trebilcock in local charge. Drilling was done in this vicinity several years ago, when some ore of good grade was found, and the present work is to determine what tonnage may be expected.

Utah Consolidated's Accounting In Apex Suit Filed

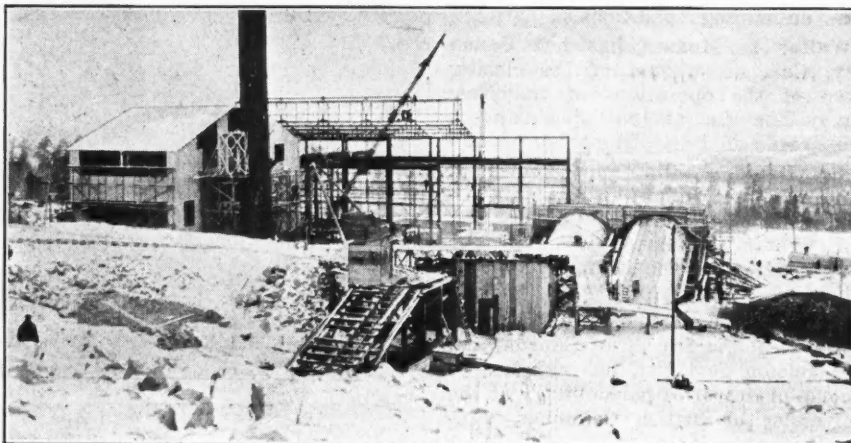
Claims Profit on Tonnage Taken from Plaintiff's Workings Was About 25 Per Cent of Damages Asked

According to the statement and accounting just filed by the Utah Consolidated Mining Co., of Bingham Canyon, Utah, with the Utah District Court, the tonnage mined by it from the disputed workings of the Utah Apex Mining Co. was 117,000. The profit made on this was \$658,000. In the suit decided on Oct. 20 last the damages asked by the plaintiff were \$2,500,000 or

Mesabi Iron Co.'s First Unit More Than Half Complete

New Plant at Babbitt a Pilot Mill to Certain Extent—Appealed to Jackling as Did Utah Copper Project

The important iron enterprise of the Mesabi Iron Co. under charge of D. C. Jackling, as president, and the New York firm of Hayden, Stone & Co., as financial sponsors, and situated at Babbitt, on the Mesabi Range, will probably be treating iron ore early in the shipping season of 1921. Its first unit is now about 65 per cent completed, and almost everything in the way of ma-



FIRST UNIT OF MESABI IRON CO.'S PROPOSED CONCENTRATOR AT BABBITT, MINN., ON EASTERN END OF MESABI RANGE

almost four times this amount. The action of the Utah Apex Mining Co. is awaited with interest. The complete story of the Utah Apex-Utah Consolidated apex suit was given in the Oct. 30, 1920, issue.

Silver King Coalition Company To Rebuild Mill

New Plant To Use Gravity Concentration and Flotation—Judge Offers Plant

The Silver King Coalition Mining Co., Park City, Utah, will rebuild its mill recently destroyed by fire. The loss is practically covered by the insurance and it will be possible to use most of the old foundations, although the mill will be made smaller and more compact. The new mill will use straight gravity concentration and flotation. It is reported that the Judge Mining & Smelting Co. has offered the Coalition the use of its concentrator for the treatment of a part of its mill ore.

chinery is either on the ground, completed at the shops, or under guarantee of delivery very soon.

As is generally known in the iron trade, the plan of this works calls for the quarrying of hard, low-grade, magnetic taconite that is now lying exposed without cover, its transportation on the company's railway over its own land to a mill, the crushing and fine grinding of the material, separation of the iron from gangue minerals, in this case chiefly silica and phosphorus, and the agglomerating of the enriched ore in Dwight-Lloyd machines. The final product will vary, in accordance with the desire of customers, from an ore of say, 61 or 62 per cent iron, natural analysis, and about 0.025 per cent phosphorus, to an ore that is richer. Experiments have shown that a product can be made that is between 69 and 70 per cent iron and containing but a trace of phosphorus.

The company owns a vast quantity of the lean iron-bearing material that it proposes to concentrate, and its appeal

to Messrs. Jackling, Hayden, Stone and their associates was along the lines of the appeal that the immense tonnage of Utah Copper made to them, twenty years ago; the entire scheme is being worked out along the lines between which Utah Copper and its associated enterprises have been successfully developed. They recognize that no small tonnage and no trifling operation can succeed, and the unit now approaching completion is but a beginning of what will result, if this first unit meets the expectations of the company. It is said that Mr. Jackling expects it to become much the largest metallurgical plant in the world, and the tonnage of available material in the possession of the company is such that this expectation can well be realized.

Something more than \$750,000 was spent in an initial experiment at Duluth, and now more than \$3,000,000 is being put into the first or pilot mill. This, too, can be classed as to a certain extent an experiment, for many new ideas and practices, some of them quite revolutionary, have been worked out by the engineers of the company, and remain to be subjected to large scale, commercial test.

Colorado To Abolish Office of Inspector of Ore Buyers

The office of Inspector of Ore Buyers, which was created a few years ago by an act of the Colorado legislature to

curb the activities of "high graders," who were causing the metal mining industry losses amounting to many thousands of dollars, will be abolished. Recently, the fees collected have been so small that they have not justified the continuance of the office. With the consent of the state civil service commission the duties of the inspector will be performed in the future by the regular clerical force of the office of the Secretary of State.

Recent Production Reports

In January, Alaska shipped to the United States 6,513 gross tons of copper ore, matte, etc., containing 5,241,634 lb. copper; also 87 oz. palladium, 18 oz. platinum, \$145,448 in gold ore and base bullion, 6,371 oz. gold bullion and \$59,346 in silver ore and base bullion.

Arizona Copper produced 2,300,000 lb. copper in January, against 2,650,000 in December.

East Butte produced 1,664,880 lb. copper in January, compared with 1,538,760 in December.

Phelps Dodge produced 8,701,000 lb. copper in January (8,318,000 in December) as follows: Copper Queen Branch, 4,660,000; Moctezuma Copper Co., 2,362,000; Burro Mountain Branch, 1,319,000, and custom ores, 354,000.

Calumet & Arizona produced 2,438,000 lb. copper in January.

New Cornelia produced 2,170,000 lb. copper in January.

Cassidy Collieries Decisions Favor Granby Co.

The Granby Consolidated Mining, Smelting & Power Co., of British Columbia, all but entirely won its two appeals against a decision of Justice Gregory, who some months ago gave a judgment in favor of the Esquimalt & Nanaimo Ry. Co., affecting the rights of Granby and its coal operations at Cassidy, on Vancouver Island. In two judgments delivered Granby wins absolutely in what is known as the Dunlop case and the propriety of the provincial legislation in this regard is upheld. Justice Eberts dissented from the remainder of the court in this judgment.

In the Ganner case, title to the property is found to be vested in the Granby company, but there is a finding that in case of assessment of damages against Granby in respect to the coal rights these shall be considered as to the coal "in nature." The outside price at this rate is stated to be a matter of \$150 an acre, so that in respect to the total of 200 acres the outside amount of the claim that Granby may have to settle is unofficially estimated at \$30,000. The original charge against Granby, had the cases gone against the company, might have run from half a million to a million dollars. Justice McPhillips dissented in the Ganner case. Counsel for the E. & N. announced that the case would be appealed.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

Opponents of McFadden Gold Bill Present Arguments

Sponsor Claims They Avoid Question That Jewelers Are in Effect Receiving a Subsidy

Further arguments were made on Feb. 8 before a subcommittee of the Committee on Ways and Means as to the merits of the McFadden Gold Bonus Bill. The hearing was given over largely to the opponents of the measure. The presentation was under the direction of G. Niemeyer, who represented the Jewelers' Vigilance Committee, Inc., the United States Gold Leaf Manufacturers' Association, and the Gold Pen Manufacturers' Association. Mr. Niemeyer argued that any justification that may have existed for the McFadden Bill is now disappearing, owing to the rapid decline in the price of materials and commodities. He placed great emphasis on the point that fraud and waste would result if the McFadden Bill should become a law. The bounty of \$10 per oz., he argued, would make a \$20 gold piece worth \$30.67. "It would be easy," he said, "to drop a \$20 gold piece in a mine and bring up gold

worth \$30.67, because gold is not easily identified." He declared that the bounty would enable the profitable gold mines to earn an enormous profit. He predicted that the tax on the use of gold in the arts would not meet the bonus and that on the 1918 basis an appropriation of \$32,000,000 would have to be taken from the public treasury.

Morris L. Ernst, counsel for the interests opposing the bill, argued that the bill would be unconstitutional.

E. W. Kemmerer, professor of economics and finance at Princeton University, was one of the witnesses presented by the jewelers. He declared that the question is an international one, but that apparently it is being considered simply on a national basis in this country. It would be necessary, he said, to influence the flow of the world's supply of gold. He cited numerous authorities who regard the plan as impracticable, and he denounced it as flying in the face of economic and financial laws.

Representative McFadden introduced into the record the report which he made to the American Bankers' Association. He pointed out that the jewelers had avoided the question that

they were in effect receiving a subsidy in purchasing gold at less than the cost of production. He presented to the committee a large number of letters and endorsements from bankers, state legislatures, chambers of Commerce and individuals favoring his bill. In effect, his argument was that stilted and academic reasons are being urged to camouflage a very simple situation. He held that it is very evident that the countries of the world soon will draw importantly upon our gold supply and that it is an urgent necessity that we increase our production. He stated that he fails to see the wisdom of telling our gold miners that they must shut down.

Many of the economic questions raised by the jewelers were answered by H. N. Lawrie, economist, and J. F. Callbreath, of the Mining Congress.

Mine Rescue Car No. 1, with R. D. Gardner as engineer in charge, was at Reno Jan. 31 to Feb. 13 for the purpose of training mining students at the University of Nevada. From Feb. 14 to Feb. 24 the car will be at Oatman, Ariz.

Experiment Station for Butte, Perhaps

Senate Adds \$25,000 to Appropriation — Senator Walsh Describes Camp's Importance

So as to make possible the establishment of a mining experiment station at Butte, the Senate has approved an amendment to the Sundry Civil Bill, increasing by \$25,000 the amount to be available for the establishment, maintenance, and operation of mining experiment stations. In urging that the amendment be adopted, Senator Walsh of Montana called attention to the fact that eight mining experiment stations already have been established but that none as yet has been located in the city of Butte, which he referred to as "the greatest mining camp in the United States and perhaps in the world." Within the radius of one mile at Butte, Senator Walsh told the Senate, one-fifth of the copper production of the world is brought to the surface. As a result of this copper mining activity, he said, Montana is able to lead all other states in the production of silver and is fast becoming one of the most important producers of zinc. He also called attention to the fact that it is the plan of the Bureau of Mines to study mining rather than metallurgical problems at the Butte station in case an appropriation is allowed. He also called attention to the fact that the State Mining College is located at Butte which would co-operate with the Bureau of Mines. At the request of Senator Walsh, the Bureau of Mines furnished

him with the following statement of the objectives of its study into mining problems.

Government's Helium Plant Given Trial Run

Encouraging results were obtained at a trial run made at the helium plant at Petrolia, Texas, where the Bureau of Mines is co-operating with the Helium Board of the Army and Navy in the production of helium from natural gas. H. S. Mulliken, the special technical assistant to the Director of the Bureau of Mines, has just returned from an inspection visit to the plant.

The Bureau of Mines is co-operating with the Army and Navy in the study of the helium problem. It involves the protection of the gas field in which helium occurs. So far as is known, the United States is the only nation in which large helium resources exist. An intensive effort is being made at this time to devise cheaper processes for separating helium from the other constituents in natural gas.

War Mineral Awards

Awards recommended during the week ended Feb. 5 by the War Minerals Relief Commission totaled \$2,069.93. The recommendations were as follows (the name of the claimant, the mineral, the amount recommended, and its percentage relationship to the amount claimed, are shown): Earle N. Young, manganese and tungsten, \$371.29, 27 per cent; Frank C. Livingstone, chrome, \$116, 41 per cent; Dan W. Powers, chrome, \$1,582.64, 54 per cent.

Utah Legislature Asks Higher Duty on Lead

Montana Petitions for Tariff on Manganese Ore To Protect Industry in State

A petition has been presented to Congress by the Governor and the Legislature of the State of Utah asking that the import duties on lead be increased as soon as possible "to enable domestic producers to resume and continue operations."

A petition asking for an import duty of 1c. per lb. on manganese ore was presented by the legislature of Montana. The petition pointed out that large sums have been spent in the West during the war in the development of manganese deposits but that they were unable to continue operations due to importations of cheaper ore.

Dyer Bill To Aid Business in China Approved

American business men operating in China recently appeared before the House Ways and Means Committee in an effort to overcome the handicap of excess profits taxation, from which their competitors are free. The committee approved the Dyer bill by a vote of ten to three. This bill provides for the Federal incorporation of American companies in China and exempts them from excess profits taxation on business done in China. The bill was returned to the Judiciary Committee and will likely be before the House in a few days.

NEWS BY MINING DISTRICTS

Special London Letter Conditions in Mining Industry Disappointing—Burma Corporation Reported Seeking Control of Lead Market — Brakpan and Springs Mines Compared

By W. A. DOMAN

London, Feb. 1—Things are not moving very briskly in the mining world. In fact there seems to be a general feeling of disappointment. The continuous drop in the price of metals, and the slow process of European economic reconstruction, from which so much was expected, seem to be having a disheartening effect. First of all on the public, because they see share prices going against them, and secondly on the minds of directors who are unable to procure sufficient funds for carrying on. Various schemes are in course of incubation, but some of them have already proved abortive. As regards tin undertakings, the Cornish companies experience even greater difficulty in attracting funds than if they were oper-

ating at the other side of the world. The Jantar, a Nigerian company, offered distinctly good terms for £25,000 of debentures; shareholders have not put up the money, and there is talk of ceasing operations until an improvement occurs in the price of tin. Companies are hit both ways. If they ask too large a sum the public will not find it; if on the other hand only a small amount is wanted difficulty exists in negotiating the scrip and in these days negotiability is a great desideratum.

It is reported that the damage done by the fire at the Port Pirie works of the Broken Hill Associated Smelters will take twelve months to repair. Unfortunate though this undoubtedly is, it may not be entirely without its advantages. The Zinc Corporation is working on short time and is treating only tailings, its mine being left alone for the time being. This is a great blow to the public who have held Zinc Corporation Preference shares as a sound mining investment, and who now are receiving no return.

The December quarterly reports of the Brakpan Mines and Springs Mines, (South Africa) both under the control of the Consolidated Mines Selection Co., are interesting as showing variations in reef widths and values in the same district.

	Brakpan	Spring
Ft. on reef	3,107	2,523
Average value, dwt.	12.12	22.0
Average width, in.	29.75	16.85
Payable, feet	1,615	1,330
Per cent, pay.	52.0	53.3
Average value, dwt.	18.96	27.23
Over inches	31.29	22.68

Taken in the way in which the Rand mining companies regard development there is really little difference between the 593 inch-dwt. of the Brakpan and the 617 inch-dwt. of the Springs. In the estimate of ore reserves the figures compare thus:

	Tons	Value dwt.	Stop. width in.
Brakpan	2,526,517	8.88	70.0
Spring	2,726,178	8.76	63.5

The Consolidated Mines Selection is still assisting the Springs Mines financially, and during the last three months of the year took up 9,000 shares at the agreed price of £3 per share. Another member of the Consolidated Mines Selection group, the Daggafontein Mines, is being financed and has drawn a further £100,000, the loan now amounting to about £450,000. The total development in this mine to date is 12,988 ft., of which 6,219 ft. are on the reef, and of the 6,010 ft. sampled the average value is 23.38 dwt. over an average reef width of 10.8 in. Here again can be seen a great difference in width when compared with Brakpan and Springs.

A report is current that the Burma Corporation is connected with a scheme called the Associated Lead Manufacturers, Ltd., to acquire the control of H. J. Enthoven & Sons, Walkers, Parker & Co., Locke, Lancaster, and other firms for the pooling and sale of output, and almost of domination of the lead market. So far as the East is concerned, Burma Corporation has the field largely to itself. Before and during the war much of the Australian lead was disposed of in the East—in fact some of it is said to have reached this country via China.

BRITISH GUIANA

Demerara Bauxite Co. Shuts Down—December's Diamond Output Greater Than Entire 1919 Production—Gold Drops

By L. T. EMORY

Georgetown, Jan. 28—The exportation of bauxite from British Guiana increased greatly in 1920, when it jumped to 29,399 long tons, having been 1,967 tons in 1919, 4,199 in 1918, and 2,790 in 1917. Nothing was produced in 1916, mining operations having begun late in that year. The small production of 1919 was owing largely to the decision on the part of the Demerara Bauxite Co., Ltd., to erect a crushing and drying plant, so that dried ore could be shipped and handled by mechanical means. Construction operations and lack of shipping seem to have been the cause of the small production for the year.

Since 1916 the company has completed ore docks, a crushing and drying plant, and its own town (Mackenzie) with modern improvements opposite Wismar, at the head of navigation for ocean-going vessels, which is seventy-two miles up the Demerara River from the sea. It has built ten miles of standard-gage railway from Mackenzie up the east bank of the river to its crown land lease, Three Friends, near Akyma, and cleared quite a large tonnage of ore of overburden. The investment covering this work runs into several million dollars.

As long ago as 1897 and again in 1919 Prof. J. B. Harrison, Director of Science and Agriculture, noted in his reports the existence of bauxite on the

Demerara River. It was not until 1913, when Francis G. Harvey, a civil engineer, took samples of ore from the Three Friends property to London, that any interest was shown in the deposits.

Mr. Harvey tried to interest British and German users of ore without success, but finally got in contact with an agent of the Aluminum Company of America. During 1914 and 1915 agents of the Aluminum company bought up about 20,000 acres of privately owned land extending for fifteen miles on both banks of the Demerara River above Christianburg and obtained crown and colony land leases, including in all 3,600 acres.

In the fall of 1916, a local company was organized called the Demerara Bauxite Co., Ltd., to take over these holdings. This company is nominally a subsidiary of the Northern Aluminum Company of Canada, which in turn is owned or controlled by the Aluminum Company of America.

REMAINING CROWN LANDS STILL WITHDRAWN FROM ENTRY FOR BAUXITE MINING

Soon after the granting of concessions to the Demerara Bauxite Co., then in process of formation in the fall of 1916, all remaining crown lands were withdrawn by the imperial government from entry for the purpose of mining bauxite for the duration of the war. Although the war has been over for two years and draft regulations for the control of bauxite lands have been submitted by the local department to the Colonial Office in London, no action has been taken to reopen the remaining lands for entry.

The present operating company is said to have bought up all privately owned lands known or thought to contain ore. Its crown land leases are believed to be the cream of the crown land deposits which are commercially available from the viewpoint of location. It therefore, has practically a monopoly of the industry and is in such a strong position that there is little chance of competitors entering the field.

The Demerara company suspended operations about Jan. 25, closing down its mines and drying plant for an indefinite period. All common labor except watchmen, cleaners, grass cutters, and other necessary workers, were laid off, but most of the superintendence and technical staff are being held. The managing director has given overproduction of metal and the financial situation in the United States as causes of the shutdown.

DIAMOND PRODUCTION MAKES GREAT INCREASE

Diamond production also increased largely in British Guiana in 1920. An output of 39,362 carats was declared at the Department of Lands and Mines during the year, totaling 234,456 stones. This is equal to almost three times the average yearly production of the five years preceding. During December, 21,244 carats was entered, exceeding the

entire production for 1919 by about 4,500 carats. This rush at the end of the year was due to the miners returning from the interior to the coast lands to spend the Christmas holidays. The enormous increase was attributable in part to the opening up of new districts, but principally to the high prices paid by buyers in Georgetown during the early months of the year, which induced a number of miners to leave the gold fields and other work. Prices vary considerably with the size, quality of the stone, and need of the seller. Early in the year a good one-carat stone (rough) would bring \$80, but this price was cut in half during the closing months.

The stones brought down to Georgetown during December were from the following districts: Mazaruni district, 12,264 carats; Puruni River district, 7,255; Potaro River district, 550; and Cuyuni River district, 1,175. The Potaro River district shows the greatest percentage of increase in production over the same month last year.

The production of diamonds in the colony for the last five years has been as follows: 1916, 16,409 carats; 1917, 17,908; 1918, 14,196; 1919, 16,706; and 1920, 39,362.

The largest individual stone found in 1920 came from the Mazaruni district and was entered at the Department in October. It weighed 21½ carats, but was not of such good quality as the 27½-carat Gushway diamond, which came from the same district last year and sold in London for about \$8,000.

The diamond washing industry in the colony is almost entirely in the hands of small producers. The washers, or "pork knockers," work singularly or in small groups. The diamonds are recovered from gravel beds along the creeks, and are usually panned by hand. The "pork knocker" is usually of African descent and is grubstaked by shop keepers or claim owners. These men band together for mutual help and protection on the trips to and from the interior, which are made by boat, or they help pull the provisions boats of the shop keepers up the rivers. They seem to be immune or nearly so to malaria and other diseases which make the bush so deadly to the white man.

Practically all the diamond producing areas are on crown land, and the mining regulations for taking up claims are very liberal, but the difficulty of transporting supplies up the cataract-blocked rivers, which are the only ways of travel through the unbroken tropical jungle to the diamond fields, has deterred mining companies from going in for the development of the industry.

GOLD OUTPUT DROPS IN COLONY AS ELSEWHERE

During 1920 a total of 12,092 oz. of gold was entered at the Department of Lands and Mines for the payment of royalty, a decrease of 4,124 oz. against the 1919 production. Practically all the gold produced in the colony comes from claims located on crown

lands, and though there are several small dredges operating in the Potaro River district, the bulk of the gold comes from alluvial washings worked by so-called "pork knockers."

The production for the last five years is as follows: 1916, 37,129 oz.; 1917, 29,538; 1918, 24,546; 1919, 16,216; and 1920, 12,092. This steady decrease in production does not seem to be due to the working out of the gold-bearing areas, as the known limits of these areas are being extended all the time, but is owing to the increased cost of provisions as compared with the price paid for raw gold and the diversion of the miners to the diamond fields and to other occupations on the coast offering higher wages.

CANADA

British Columbia

R. T. Ward Moving Equipment from Properties at Cariboo

Stewart—The Premier is shipping ore over the winter trail to Stewart at Tidewater at the rate of about 250 tons a week. The snow has packed on the road and two caterpillar tractors are proving serviceable. On each trip they draw four sleighs carrying either machinery for the new mill or ore. The survey of the proposed aerial tramway from mine to coast is reported to have been completed and the work will proceed as soon as the directors approve the expenditure.

Ashcroft—A large quantity of hydraulic placer mining machinery is being moved from the Bullion and Horsefly properties at Cariboo by R. T. Ward, who recently sold these claims after successfully asserting his title and that of his associates in a legal battle with John Hopp, which was carried to the Privy Council, England. The claims are said to have changed hands at a considerable figure and the nature of future operations is such that the long disused equipment is not required. It, therefore, has been sold in Vancouver.

Trail—Ore shipments received at the Consolidated smelter during the week ended Feb. 7 totaled 7,453 tons. Shippers were as follows:

Mine	Location	Wet Tons
Bluebell,	Riondel	71
Black Prince,	Slocan City	57
Company Mines		7,325

7,453

Princeton—Steps are being taken to develop a deposit of strontium ore, the discovery of which was reported about two years ago. The property is situated about three miles from Princeton.

Vancouver—Dr. M. Y. Williams, a member of the staff of the Geological Survey of Canada, has been appointed to the mining department of the applied science faculty of the University of British Columbia. Dr. Williams is a graduate of the department of mines, Queen's University. He continued the study of geology at Yale.

Ontario

Premier at Porcupine Taken Over by New Company

Cobalt—The Nipissing during January produced silver of an estimated value of \$139,882 and cobalt valued at \$18,200. The mill ran only three-quarters of the month owing to the annual cleaning up.

The vein found on the Bailey about the end of 1920 has been opened up on the 5th level for about 80 ft., averaging about 2 in. in width with shoots of high-grade ore at intervals and about 3 ft. of wall rock on each side carrying good milling ore.

Porcupine—The large underground crusher of the Dome Mines which broke down some time ago has been repaired.

The property originally known as the Standards and more recently as the Premier on which about \$100,000 was expended and some rich ore opened up has been taken over by a new company named the Premier Paymaster, capitalized at \$2,500,000. The main shaft will be sunk to 500 ft. at which depth extensive lateral work will be undertaken.

The Union Mining Corporation, which owns a group of mining claims in Whitesides township, about 25 miles west of the producing Porcupine area, has decided to proceed with development by sinking to 500 ft. with crosscuts at each 100-ft. level. Mining equipment will be brought in before the spring break-up.

Kirkland Lake—At the King-Kirkland the shaft sunk on a promising vein is down about 40 ft. and considerable visible gold has been found. A mining plant is being installed.

Manitoba

Herb Lake—R. J. Kennedy, superintendent of the Bingo, has reported that the main shaft is down 40 ft. At the bottom of the shaft there is about 45 in. of gold-bearing vein matter as compared with a 7-in. vein on the surface. Five other veins run parallel to the main vein and crosscuts will be run to cut them at the 200 level. About 60 tons of high-grade quartz carrying free gold has been sacked.

CHOSEN

Oriental Consolidated's Output Drops Owing to Mine Fire

Unsan—The Oriental Consolidated's January clean-up was \$75,000, as compared with \$104,650 in December. The Tabowie mill crushed only 4,847 tons of ore in December, owing to lack of tonnage caused by the Tabowie mine stope fire. The fire walls, bulkheads and sprinkling systems were brought to the point where the rest of the mine was safe from damage by Dec. 21, since when the company has been busy re- timbering, stoping ore, hoisting and pumping water, and installing a duplicate set of gas-tight bulkheads consisting of iron doors screwed to iron frames set in masonry.

NORWAY

Sulitjelma Company's Administration Reorganized

Christiania—The shareholders of Reymersholm, the Swedish company which owns Sulitjelma, has been informed that the working loss of the latter company in 1919 amounted to 2.5 million kroner. This was partly due to unfortunate contracts with Norwegian buyers and partly to the heavy fall in copper prices. The profits were thereby considerably reduced, and, in addition, the company had to pay taxes in Norway and Sweden to an amount of no less than 2.7 million kroner. As a result there were difficulties in the way of the distribution of the decided-upon 7 million kroner of free shares. Mining operations which, owing to the circumstances prevailing, were curtailed in September, 1919, were again resumed in the early part of 1920, and have been continued without break. The output of pyrites for last year was about 85,000 tons, against an estimated 90,000 tons, and the production has been disposed of by gradation. The placing of the production for 1921, which it is reckoned will be greater, should also be considered disposed of. A thorough reorganization of the Sulitjelma Co.'s administration has, in all essentials, been carried out. The offices in Christiania and Helsingborg have been done away with, and the business management has been established in Stockholm which is now the company's seat. The directorate has been reduced from eight to three members, and, in that connection, four of the company's directors resigned their positions and were not replaced by new. With this simplifying of administration a considerable saving will be effected. The Reymersholm's company's total capital and reserve amounts to 47,800,000 kroner.

MEXICO

Sonora

Business Reviving on West Coast—New York Interests Churn-Drilling Piedras Verdes Property in Alamos District

Business activity is reviving on the west coast of Mexico. The Southern Pacific is operating two Pullman sleepers from Nogales, one running to Guaymas and the other to Mazatlan, leaving Nogales every Sunday, Tuesday and Thursday night. The Pullmans are nearly always crowded with Americans, including numerous classes. The mining industry is represented by prospectors, promoters, mining engineers and a few operators. There are numerous land promoters and men investigating the agricultural possibilities. Few bona fide investors are to be noted. Traveling salesmen are making regular trips. As yet business is extremely dull, but apparently the present activity is the forerunner of a big boom, provided the conditions in Mexico continue to improve.

The Southern Pacific is now operating to Ruiz, which is about forty miles from the city of Tepic. No attempt has been made to rebuild the line from Navajoa to Alamos nor the line from Corral to Tonichi. The rebuilding of both of these lines will be a big undertaking. It is nearly eight years since the last trains were run, and now the right of way has grown up with brush, in many places has been washed out, and in general is in bad condition. The bridges that were not burned need repairing, and all the track ties will have to be replaced. The result is that the mining districts of Alamos and Tonichi are practically dead.

Alamos District—Emos Yeager is operating the mill on the Minas Nevas property. The old tailings dump is being run through a cyanide plant, which is driven by electrical power generated by a steam plant and is equipped with Hardinge mills. No ore is being mined. Work has been carried on intermittently for several years, and there is still a large tonnage remaining in the old dumps. The average grade is from 7 to 10 oz. silver per ton.

The Piedras Verde property is being churn-drilled by New York interests, with J. Erdlets in charge of operations. Two drills are operating, and it is reported that two more are ordered. Fifteen Americans are working. Roads are being improved and permanent buildings are being erected. The results of the drilling are not announced.

Nothing has been done at the famous old Promontorio since September, 1920. During the eighteen months preceding that date S. L. Pearce and C. C. Groesbeck were rebuilding the mill and getting the mine in condition for operations. The interests behind the proposition failed to raise the necessary capital, and plans for continuing work have fallen through.

Obermiller & Wilson are operating a five-stamp gold mill in the Minetas district, eighteen miles north of Alamos. It is reported they have secured an option on a property thirty miles east of Fundicion.

Don Joaquin Mauge is the agent in charge of the Quintero Mining Co.'s property near Alamos. Nothing has been done at this famous old silver mine since 1909. The company is controlled by French interests.

Coahuila

Smelter Preparing To Resume Operation

Torreón—A move on the part of the smelters in this district to resume operations this month has caused a general revival of the mining industry. Many of the producing properties which have been closed down for the past three months will soon be shipping again. Applications for titles to new mines are being filed with the mining agents in nearly all of the principal mining districts.

The Santa Cecilia Mining Co., composed largely of Americans of Tor-

reón, has filed on a group of several claims in the old Ramirez Mountains of the San Juan de Guadalupe district. The new group lies contiguous to the San Acasio mines which produce silver-lead ores.

Saltillo—The Peralita y Anexas Mining Co., at a meeting of stockholders held in Saltillo, decided to duplicate its capital stock by the issuance of new shares to be divided among the present stockholders in proportion to the amount of stock each possesses. The new issue will be paid for at the rate of one peso per month per share. The capital acquired by the new issue will be devoted to development work.

A. V. Cerda, of Saltillo, has filed on a group of eight claims in the mining district of Monclova, which he will develop for silver and lead. The survey will include the old abandoned mines, San Agustin and El Guero, the latter being formerly owned by H. M. Diffembach. George G. Blackaller has charge of the survey of the properties.

CALIFORNIA

Parts for Guiana Development Co.'s New Dredge Ready at Marysville for Shipment to South America

San Francisco—Continued reports of decreasing costs by reason of greater labor efficiency emanate from the mining industry generally. There have been very few instances of wage decreases.

The following comparative statement of accidents in relation to number of shifts worked has been issued by the Empire Mines of Grass Valley, and indicates the steady progress that is being made to decrease the number of accidents in that mine:

	Total Shifts	Total Accidents	Shifts per accident
1916	109,721	255	430.2
1917	139,315	221	630.3
1918	121,575	183	664.3
1919	139,787	189	739.5
1920	131,961	162	814.5

At the Empire mine a miner's accident committee makes a monthly inspection of the mine and surface plants. Three days are required for the inspection. A safety society among the miners meets regularly and discusses accidents with a view to prevent their recurrence.

Sutter Creek—The Central Eureka Co. is operating thirty stamps continuously and occasionally when the bins are full its full complement of forty stamps. For the week ended Feb. 5 827 tons was milled. The south drift on the 3,850 level has opened up in ore for its entire width. Concentrates are averaging \$109 per ton.

Grass Valley—Empire Mines Co. is said to be sinking an additional 400 ft. and the 80-stamp mill is operating at full capacity. Local rumor credits the Empire as negotiating for the control

of the Champion, Pittsburg and other properties.

Forest—The Kate Hardy Mining Co. is preparing to install a twenty-drill compressor and is said to have decided upon the erection of a 10-stamp mill.

Portola—The Engels Copper Co. is operating. The Mason Valley company in the Plumas County copper belt is said to be planning active work in the near future.

Claude M. Eye addressed the local section of the A.I.M.E. at San Francisco, Feb. 8, on "The Development of the Mineral Resources of the Philippine Islands."

Marysville—A special train of eight cars has been chartered to load the mechanical equipment and parts of a 7-cu.ft. dredge purchased by the Guiana Development Co. from the Yuba Manufacturing Co., Marysville, Cal. The dredge parts will be loaded upon a steamer at San Francisco for transportation to Dutch Guiana, S. A. The necessary lumber will be shipped from Tacoma and the dredge buckets from New York.

ARIZONA

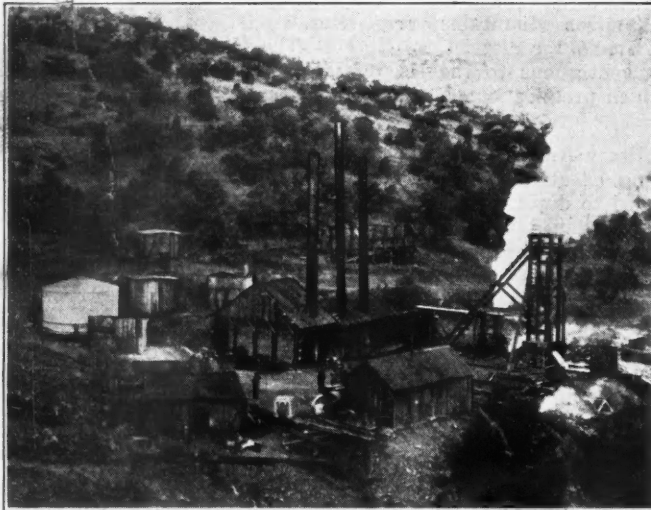
New Company Organized To Work Dumps at Tombstone

Tombstone—Local business men have financed the National Metals Recovery Co. which has secured a lease on seven of the old dumps in the district. The old Guard mill is being overhauled and will be put in operation at once. Its capacity is 200 tons per day. The ore in the dumps was thrown there when no attention was paid to a streak that did not assay better than \$100 per ton. All work is under the supervision of J. W. Stockholm, formerly of Bisbee.

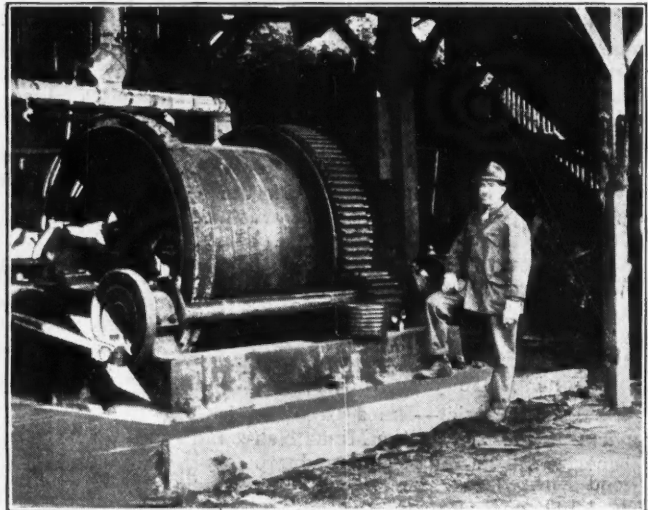
The Tombstone Co-operative Co. is building a 120-ton concentrating and cyanide plant to treat the ore of lessees in the camp. V. G. Mellgren is manager and will have the mill running in sixty days.

The Solstice Mining Co. has completed sinking and timbering its shaft, and will start breaking ore at once. Holland and Cavanaugh have installed a new 40-hp. gasoline engine in the mill on their lease.

Phoenix—A start has been made on the great suit brought in Gila County in which the Inspiration Consolidated Mining Co. and the International Smelting Co. have attacked the state method of determining taxable value on the basis of profits within five-year periods. Judge Frank Lyman, of Maricopa County, presided, the local magistrate considering himself disqualified. Will E. Ryan and Alexander Baker appeared for the state and offered demurrers to the complaint. E. W. Rice, of Globe, represented the complainant corporations. Payment of about \$1,000,000 to the state in alleged excess taxes is involved, as well as the larger point of right of taxation on anything but a physical property valuation.



PLANT OF HARDSHELL MINING CO., PATAGONIA, ARIZ.



NEW HOIST AT HARDSHELL MINE

Patagonia—The new shaft of the Hardshell Mining Co. has been unwatered by bailing, and the station pump on the 425 level is in operation. A ventilating system has been installed, and crosscutting toward the vein is in progress. In the old workings the ore from the Gardiner stopes is being handled through a new raise from the 325 level. The first-class ore is averaging about 100 oz. silver a ton and nearly 70 per cent lead. Second-class ore is running about 25 oz. silver and 35 per cent lead. The crosscut from the bottom of the new shaft will be advanced to cut the Hardshell vein, and the upper workings will be unwatered by means of a drift and raise to connect with the bottom of the winze from the 325 level.

NEW MEXICO

C. & A. To Restrict Output of Eighty-five Mine—Altering Co-operative Co's. Mill

Lordsburg—Ore shipments from this district for January amounted to 54 cars, or 2,594 tons, valued approximately at \$40,000.

Until market conditions improve the C. & A. Mining Company will restrict the output of silicious ores from the Eighty-five mine, confining the shipments to such ores as are taken out in the regular course of development work which will be continued on the plan as followed last year. The main shaft has reached a depth of 1,120 ft. and a station has been cut at 1,050 ft.

Changes and improvements are being made in the mill of the Co-operative Mining Co. A new road is being built and development work is going forward steadily. A depth of 300 ft. has been reached in the inclined shaft.

Work upon the new mill of the Great Eagle Fluorspar Co. is progressing. The 150 hp. gasoline power plant for mine and mill is completed.

Hatch—The Nakayr Mining Co. shipped 6 cars of fluorspar to the C. F. & I. Co. at Pueblo, Col., during January.

COLORADO

Lincoln Mines Mill at Cripple Creek Ready for Operation

Telluride—Shipments of concentrates for January were as follows: Tomboy, 42 cars; Smuggler-Union, 41; Liberty Bell, 15; total, 98 cars.

Aspen—The Cowenhoven tunnel is being cleaned out and relaying of track and retimbering are in progress preparatory to resuming development work in properties tributary to the tunnel. The work is under the direction of J. T. Boyd.

Cripple Creek—The Lincoln Mines & Reduction Co. has made trial runs in its new 400-ton mill, and is ready for regular operations. The treatment of ore from the Rex property, which contains considerable manganese, has been devised by F. G. Gasche, general manager of the company. It is claimed that ore running 11 per cent Mn can be concentrated to 54 per cent Mn, and that the mill can recover 90 per cent of the gold value in the ore. The company plans to sink a new 3-compartment shaft on Ironclad hill, and drive a double-track tunnel into the hill to connect with the shaft. Electric haulage will be installed.

UTAH

Chief Consolidated Cuts Dividend in Half—Miner Electrocuted at Woodlawn

Salt Lake City—At the Howell in Big Cottonwood canyon the tunnel, which is being driven for the downward extension of orebodies found in higher workings, is in 2,900 ft., and is within 50 or 60 ft. of its objective. At the Woodlawn, not far from the Howell, a miner was electrocuted while trying to put out with water a fire caused by a short-circuited wire.

Eureka—Ore shipments from the Tintic district for the week ended Feb. 5 totaled 172 cars. Shippers were: Tintic Standard, 67 cars; Chief Consolidated, 37; Iron King, 15; Eagle &

Blue Bell, 13; Iron Blossom, 12; Victoria, 7; Dragon, 7; Gemini, 4; Centennial Eureka, 4; Grand Central, 2; Gold Chain, 2; Bullion-Beck, 7; and the Colorado mine, 1.

The Chief Consolidated, owing to high operating costs (which include the cost of the new three-compartment concrete-lined shaft recently completed) is paying for the quarterly dividend just due 5c. a share instead of the usual 10c., the total this time being \$44,211. Reduced operating costs, which will result from the use of the new shaft are expected to make it possible soon to return to the usual quarterly payments. Like other Utah properties the Chief is hampered by high taxes, smelting, and freight rates. The new shaft has been connected with the old workings on the 1,000 level, and a second connection is to be made on the 1,800, and this, it is expected, will greatly improve ventilation. The 1,800 level will also be connected with the Eagle and Blue Bell mine, which adjoins.

Mine rescue car No. 11 has been in Eureka and on the evening of Feb. 8 an open meeting devoted to mine-rescue and first-aid work was held, a general invitation having been given, and an effort was made to make the program of popular interest. Motion pictures were shown to impress upon the public the necessity of safety and health measures. The meeting was addressed by A. G. MacKenzie, secretary of the Utah chapter of the American Mining Congress, and by members of the state board of equalization. The car was open to inspection by the public during the period of its stay in the camp.

Park City—Shipments for the week ended Feb. 5 amounted to 1,263 tons of ore and concentrates and 35 tons of spelter, as compared with a total of 2,121 tons the week preceding. The shippers were: Judge and allied companies, 785 tons and 35 tons of zinc; Silver King Coalition, 273; and the Ontario, 205. The other companies in the camp made no shipments.

NEVADA

Conditions Normal at Tonopah, Divide and Virginia City

Tonopah—Conditions are normal in the district. Gross ore tonnage is about 1,250 tons per day. The Tonopah Belmont has resumed work below the 1,300 level. At this depth values in the Belmont vein, the principal producer, were low where developed. At present drifting in an intermediate level below the 1,300 is being done. Fair ore has been found and results are more satisfactory than at any other time at this depth. The Rescue Eula had a prosperous year in 1920, total production being given as 4,380 tons with a gross value of \$109,000. Net profits were \$11,000. Mine conditions are good with the east and west faces on the 1,100, or deepest level, in ore. These developments give promise of a considerable undeveloped tonnage between the 1,100 and 900 levels. The McCane shaft of the Tonopah Extension has connected with the 1,540 level workings of the Victor shaft, and a station is now being cut preparatory to crosscutting. The south crosscut on the 1,880 level of the Victor shaft is being run to pick up the Murray vein and its branches. This being the deepest work in the district results are being watched with interest.

Divide—In the Divide district many small properties are doing development but the Tonopah-Divide mine is the only producer. Favorable reports are current regarding improvement in values on the 300 level of the Rosetta, but ore in commercial tonnage is questionable. The Tonopah-Divide reports finding a new orebody in the hanging wall of the main vein on the 270 level which is now being developed by drifting. Favorable news regarding the southeast drifts on the 800 and 1,000 levels appears to be lacking. Progress is normal in both faces.

Arrowhead—In the Arrowhead mine shaft sinking has been resumed and the east and west drifts on the 260 level driven ahead. The values in the east drift have improved.

Virginia City—Conditions are normal in the district. The Consolidated Virginia reports important ore has been found on the 2,250 level in the north drift, and on the 1,650 level. The management have stated that they expect to mine and mill 4,500 tons of ore per month soon at a total estimated cost of \$6 per ton. This is an optimistic statement considering the small tonnage and mining conditions.

Gold Hill—The Goldfield Development Co. is completing its camp at Gold Hill, 26 miles from Goldfield. Shaft sinking has been discontinued temporarily at a depth of 50 ft. and adequate surface equipment is being provided. In the West Divide mine a 2-ft. width of ore assaying \$200 per ton has been opened on the tunnel level. The Silver Pick is making regular shipments of two cars of \$40 ore per week to the Millers plant of the Tonopah Mining Co.

Reno—About three miles north of Reno, in the Peavine district, some shipping ore has been found in the Fravel-Paymaster and Standard Metals mines at a depth of 300 ft. The principal values are in silver.

IDAHO

Amazon-Dixie Increases Capitalization—Caledonia Suspends Dividend Payments

Wallace—The Amazon-Dixie has authorized an increase in its capital stock from 1,500,000 shares to 2,500,000 shares for the purpose of taking over the Leslie Mining Co., which owned a group of seven claims adjoining and on the same vein. Stock in the Amazon-Dixie will be issued, share for share, in exchange for Leslie stock. Leslie ground is now being explored by extension of the main Amazon-Dixie tunnel. The Amazon-Dixie shaft, which has been sunk 400 ft. from the main tunnel level, is being unwatered and will be sunk 400 ft. further. Good showings of lead-silver ore have been exposed in the tunnel and in the 200 and 400 shaft levels, the ore improving with depth, and it is expected that when the new level is opened the amount of ore in sight will justify the construction of a mill. The Amazon-Dixie company is controlled by Cleveland capitalists. The property is situated at Sildix station in Montana near the Idaho line.

The West Sunset Mining Co., controlled by the Days, through an arrangement with Senator Clark, of Butte, who owns the Sunset mine, is extending a drift from the shaft of the latter into the West Sunset at a depth of 1,000 ft. The drift is now near the common end line and shows about 10 in. of high-grade lead-silver ore in a vein 12 ft. wide. This shaft is at a high elevation and if the results of the work are satisfactory it is expected that the West Sunset company will extend a tunnel from the Amazon-Manhattan, another Day controlled property, a distance of about a mile and which will open the ground at a depth of 2,000 ft. and provide a direct outlet to the Ray-Jefferson mill, also owned by the Days.

Kellogg—The Caledonia Mining Co. has suspended dividend payments. This announcement has been made by Stanley A. Easton, president, who states that efforts will continue to find a new orebody, but that no certainty attaches to this work. "Ultimately liquidating dividends will be resumed to finally distribute among the stockholders of the company the balance which may remain after the ore resources have been entirely realized and the obligations of the company fully discharged." For several years the Caledonia company paid 3c. per share per month with an occasional extra dividend. Then the rate dropped to 1c. per month, and since last July the rate has been 1c. quarterly. The company has paid a grand total of \$4,141,950 in dividends.

MONTANA

Anaconda Perpetuates Testimony of Three Aged Witnesses Bearing on Ownership of Disputed Ground

Butte—There is a possibility that Anaconda will temporarily suspend operations at its sampler in Butte, where custom ores are received and assayed, and ship all custom ores direct to its smelter at Anaconda. No announcement has been made.

A feature of the week's news was the perpetuating of the testimony of three old pioneers of the district, upon petition by the Anaconda company for use in possible litigation between the Anaconda and the Davis-Daly over apices in contiguous claims. It was explained by officials that this does not necessarily mean litigation, but because of the advanced age of this trio of old-timers and the serious sickness of one of them it was deemed wise to have their testimony, whether it would prove of worth to one side or the other. The ground in controversy lies to the northwest of the Colorado shaft and embraces a portion of the vein that is known to be rich.

But one shift is being worked at the Pittsmtont property of the East Butte and but one furnace in the smelter. It is not likely there will be a further curtailment. It is planned to reduce the running time of the flotation mill from seven to five days a week in consequence of the reduction of output by the Davis-Daly company, which ships its copper ores to East Butte. This plant has a daily capacity of 600 tons, which East Butte is unable to furnish under the generally curtailed program.

Receipts from ore shipments during the last year from Tuolumne Copper's Main Range mine amounted to \$265,000, with the expenditures for the twelve months \$259,000, showing a profit for 1920 of approximately \$6,000. During this period a pumping plant was installed at a cost of \$10,000, together with a new boiler plant and development work practically was continuous throughout the year. Shaft sinking continues with the sump now well below the 1,300-ft. level. The 1,600 is the first objective. The shaft cut a new 9-ft. vein which shows promising stringers of bornite and pyrites, carrying up to 2 per cent copper, from 2 to 4 in. wide.

Station cutting has been completed by the Butte & Plutus at the 400 level of the Plutus claim and crosscutting both northerly and southerly has begun. The Norwich vein lies to the north an estimated 125 ft. and the Mapleton fissure is about 150 ft. south. Both have ore lying nearer the surface.

Although the mining of zinc ore by Elm Orlu has been suspended because of the closing of the Anaconda's electrolytic zinc plant at Great Falls the production of copper ore is continuing on a limited scale. Development, however, of both zinc and copper ore is continuing.

THE MARKET REPORT

Daily Prices of Metals

Feb.	Copper, N. Y. net refinery*	Tin		Lead		Zinc
		Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
10	12.75	28.50	32.50	4.60	4.25@4.35	5.00
11	12.75	29.00	33.00	4.60	4.25@4.35	4.90@5.00
12	12.75	29.00	33.00	4.60	4.25@4.35	4.90@5.00
14	12.75	29.00	33.00	4.60	4.25@4.35	4.90@5.00
15	12.75	29.00	32.75	4.55@4.60	4.25@4.30	4.90@5.00
16	12.75	28.25	31.50	4.50	4.25	4.90@5.00

*These prices correspond to the following quotations for copper, "delivered": 13c. for the week.

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.

Lead

On Tuesday, Feb. 15, the American Smelting & Refining Co. reduced its official price of lead to 4.60c., New York and St. Louis, the previous figure being 4.75c. This was in accord with the recent New York market, and the reduction was also probably influenced by the possibility of bringing Spanish lead to this country.

Inquiries have not been quite so numerous as usual during the last week, but some good business has been done, nevertheless, a few fairly large buyers having come into the market. Sales for carload lots, however, have been fewer. The New York market held firm at 4.60c. until the A. S. & R. met that figure in its official quotation; whereupon at least one interest dropped to 4.50c. and sold at that figure. The St. Louis market has been more unsettled. A plentiful supply of common lead is apparently available at the prices which we quote, but the demand is quiet. Chemical and corroding grades of lead are more popular just now, the former commanding $\frac{1}{4}$ @ $\frac{3}{8}$ c. premium over the desilverized article, with the customary additional advance of 10 or 15 points for corroding lead.

Producers are not anxious to sell for shipment later than March, and ask a premium of about $\frac{1}{8}$ c. for such business.

Zinc

Very few sales of zinc have been made, and stocks continue to pile up, in spite of the greatly curtailed production. Stocks of zinc of all grades on hand in this country are reported to have increased from 71,000 to 75,900 tons during January. Galvanizing plants are still in large measure closed down, and a resumption is unlikely until the price of steel recedes materially. A start has been made by the independent steel producers. Zinc producers who have high-grade zinc for sale report a fair demand for small tonnages at 7.25c., delivered, in Eastern districts.

Tin

This metal seems to be quieter than ever, if such a condition is possible. The reduced price of the Straits government which we announced last week seems to be an assured fact, and the move is considered a wise one. Holding up the supply does not seem to have strengthened the price of Straits materially so far. Other grades can in many cases be substituted, particularly electrolytic, which, for practically all purposes, is of equal value. It can be obtained at prices a fraction of a cent under those asked for Straits.

Straits tin for future delivery: Feb. 10th, 33.25@33.75c.; 11th, 33.25@33.75c.; 14th, 33.50@34.00c.; 15th, 33.00@33.50c.; 16th, 32.25@32.75c.

London

Feb.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic	Spot	3 M	Spot	3 M	Spot	3 M
	Spot	3 M							
10	71 $\frac{1}{2}$	72 $\frac{1}{2}$	78	165	170	22	22 $\frac{1}{2}$	26	27
11	71 $\frac{1}{2}$	71 $\frac{1}{2}$	78	168	172	21 $\frac{1}{4}$	22	25	26
12	71	71	77 $\frac{1}{2}$	172	175 $\frac{1}{2}$	20 $\frac{3}{4}$	21 $\frac{1}{2}$	24 $\frac{3}{4}$	25 $\frac{3}{4}$
14	71	71	77	170 $\frac{1}{4}$	173 $\frac{1}{2}$	21 $\frac{1}{4}$	22	24 $\frac{3}{4}$	25 $\frac{3}{4}$
15	71 $\frac{1}{2}$	71	76	163	167 $\frac{1}{2}$	20 $\frac{3}{4}$	21 $\frac{1}{2}$	24 $\frac{3}{4}$	25 $\frac{3}{4}$
16	72 $\frac{1}{4}$	71	76	163	167 $\frac{1}{2}$	20 $\frac{3}{4}$	21 $\frac{1}{2}$	24 $\frac{3}{4}$	25 $\frac{3}{4}$

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

Feb.	Sterling Exchange	Silver			Feb.	Sterling Exchange	Silver		
		New York Domestic Origin	New York Foreign Origin	London			New York Domestic Origin	New York Foreign Origin	London
10	388	99 $\frac{1}{2}$	62 $\frac{1}{2}$	36 $\frac{1}{2}$	14	388	99 $\frac{1}{2}$	60 $\frac{3}{4}$	35 $\frac{3}{4}$
11	388	99 $\frac{1}{2}$	62 $\frac{1}{2}$	36 $\frac{1}{2}$	15	390 $\frac{1}{4}$	99 $\frac{1}{2}$	60 $\frac{3}{4}$	34 $\frac{3}{4}$
12	...	99 $\frac{1}{2}$	...	36 $\frac{1}{2}$	16	391 $\frac{1}{4}$	99 $\frac{1}{2}$	59 $\frac{1}{2}$	34

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.

Metal Markets

New York, Feb. 16, 1921

The dullness which has characterized the non-ferrous metal market since the first of the year continues, with no improvement in sight. Consumers are out of the market except for current requirements, which are small. It is distinctly a buyer's market and producers are tempted to shade prices on large lots particularly if for prompt delivery. Neither sellers nor buyers are interested in futures.

Copper

The export demand continues better than that from domestic consumers, although it is not large. The price has

held firmly at recent levels, and metal may be had for delivery spread over February, March, and April at these figures. May delivery commands about $\frac{1}{8}$ c. more, and June delivery a premium of about $\frac{1}{4}$ c. Sellers should not take too seriously reports by possible buyers that 13c. delivered is too high and that copper can be obtained for 12.75c. We have had reports of only one carload sold below 13c., and this brought 12.95c. Second-hands seem to have little copper on hand and are not pressing it on the market. In fact they are prone to quote somewhat higher prices than producers.

Stocks of copper are low in London, and standard seems especially scarce, as the price of that grade is now within £3 15s. of the figure quoted for electrolytic.

Arrivals of tin, in long tons: Feb. 10th, Straits, 150; China, 20; 12th, China, 5; 14th, Singapore, 150; 15th, London, 185.

Silver

Since our last report, the London spot price has fallen from 37 to 34d., and the future price from 35 to 33½d. This narrowing of the difference between spot and futures from 2d. to ½d. indicates that the recent squeeze in London, occasioned by the demand for near-by delivery, is now over. The New York price has also declined from day to day, in sympathy with the London market, and business continues on a small scale. Although the China New Year holidays and the accompanying settlement period have passed, there has been no resumption of buying for China account, and as a consequence the San Francisco market remains purely nominal.

Mexican Dollars—Feb. 10th, 47½; 11th, 47½; 14th, 46; 15th, 45½; 16th, 45½.

Gold

Gold in London: Feb. 10th, 105s. 10d.; 11th, 105s. 6d.; 14th, 105s. 6d.; 15th, 105s. 1d.; 16th, 104s. 7d.

General stock of money in the United States Feb. 1: Gold coin (including bullion in Treasury), \$2,853,480,649; standard silver dollars, \$269,746,326; subsidiary silver, \$271,511,384; United States notes, \$346,681,016; Federal Reserve notes, \$3,484,226,195; Federal Reserve Bank notes, \$225,938,400; National Bank notes, \$719,653,927; total, \$8,171,237,897. The gold coin has increased, in the last month, about \$69,000,000 and the Federal Reserve and bank notes have decreased \$267,000,000.

Foreign Exchange

Sterling continues to advance, and \$4 probably will soon be reached. Other foreign exchanges have also exhibited firmer tendencies. On Tuesday, Feb. 15, francs were 7.38c.; lire, 3.68c.; and marks, 1.70c. New York funds in Montreal, 13½ per cent premium.

Other Metals

Aluminum—List prices of 28@28.5c. are nominal. Outside market 24@25c.

Antimony—Chinese and Japanese brands, 5½c.; market quiet. W.C.C. brand, 6½ per lb. Cookson's "C" grade, spot, 9½c. Chinese needle antimony, lump, nominal at 4½c. per lb. Standard powdered needle antimony¹ (200 mesh), 7@7½c. per lb.

White antimony oxide, Chinese, guaranteed 99 per cent Sb₂O₃, wholesale lots, 7c.

Bismuth—\$2.25@2.35 per lb., 500-lb. lots.

Cadmium—Nominal, \$1.40 per lb., in 1,000-lb. lots.

Cobalt—Metal, \$4.50 per lb.; black oxide, \$3@3.10 per lb. in bbls.; sulphate, \$1.35 per lb. in bbls.

Iridium—Nominal, \$325 per oz.

Magnesium—Crude, 99 per cent, \$1.25@1.35 per lb., f.o.b. Philadelphia.

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

Nickel—Standard market, ingot, 41c.; shot, 41c.; electrolytic, 44c. Small ton-nages, spot, 38@40c.

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

Osmium—Open market, \$70@80 per troy oz.

Palladium—\$65@70 per oz.

Platinum—\$70 per oz.

Quicksilver—Nominally \$50 per 75-lb. flask. San Francisco wires \$43. Quiet.

Rhodium—\$200@225 per troy oz.

Ruthenium—\$175@200 per troy oz.

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

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

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

Metallic Ores

Chrome Ore—Guaranteed 50 per cent Cr₂O₃ foreign ore with a maximum of 6 per cent silica, 50@55c. per long ton unit, f.o.b. Atlantic ports.

Manganese Ore—35@40c. per unit, seaport; chemical ore (MnO₂) \$60 per gross ton, lump; \$65@70 per net ton, powdered.

Molybdenum Ore—85 per cent MoS₂, 55@60c. per lb. of contained sulphide, New York.

Tantalum Ore—Guaranteed minimum 60 per cent tantalic acid, 40c. per lb. in ton lots.

Titanium Ores—Ilmenite, 52 per cent TiO₂, 1¼@2c. per lb. for ore. Rutile, 95 per cent TiO₂, 12c. per lb. for ore, with concessions on large lots or contracts.

Tungsten Ore—Scheelite or wolframite, 60 per cent WO₃ and over, per unit of WO₃, \$3@3.25, f.o.b. Atlantic ports.

Uranium Ore (Carnotite)—Ore containing 1½ per cent U₃O₈ and 5 per cent V₂O₅ sells for \$1.50 per lb. of U₃O₈ and 75c. per lb. of V₂O₅; ore containing 2 per cent U₃O₈ and 5 per cent V₂O₅ sells for \$2.25 and 75c. per lb., respectively; higher U₃O₈ and V₂O₅ content commands proportionately higher prices.

Vanadium Ore—\$1.50 per lb. of V₂O₅ (guaranteed minimum of 18 per cent V₂O₅), New York.

Zircon—Washed, iron free, 3c. per lb.

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

Zinc and Lead Ore Markets

Joplin, Mo., Feb. 12.—Zinc blende, per ton, high, \$27.65; basis 60 per cent zinc, premium, \$22.50; Prime Western, \$22.50; fines and slimes, \$20@17.50; average settling price, all grades zinc, \$26.09.

¹Furnished by Foote Mineral Co., Philadelphia, Pa.

Lead, high, \$52.80; basis 80 per cent lead, \$45; average settling price, all grades lead, \$50.17 per ton.

Shipments for the week: Blende, 5,193; lead, 1,439 tons. Value, all ores the week, \$207,680.

With only \$20 basis offering at the close of last week, most of the 4,400 tons sold this week was purchased on \$22.50 basis, with week-end offerings again on \$20 basis. Buyers think today this will be the ruling price next week, with one more purchasing company out of the market, and this one of the heaviest purchasers. Lead continued without change in basis price, with increased shipment, and demand fully equal to the production.

Platteville, Wis., Feb. 12—No market for zinc ore. Shipments for the week: Zinc ore, 537; lead ore, 90 tons. Shipments for the year: Zinc ore, 5,182; lead ore, 480 tons. Shipped during week to separating plants, 466 tons blende.

Non-Metallic Minerals

Asbestos—Crude, No. 1, \$2,000@ \$3,000; No. 2, \$1,400@2,000; spinning fibres, \$400@\$1,000; magnesia and compressed sheet fibres, \$325@\$500; shingle stock, \$110@\$150; paper stock, \$60@ \$75; cement stock, \$17.50@30; floats, \$8.50@\$15, all per short ton, f.o.b. Thetford, Broughton, and Black Lake mines, Quebec, Canada; 5 per cent to be added as export sales tax.

Barytes—Crude, 88 to 94 per cent barium content, \$10@12 per net ton; ground (white) \$24@30 in bags, carload lots; (off-color) \$22@26 in bags, carload lots; all f.o.b. Kings Creek, S. C. Crude, 88 to 94 per cent, \$23; ground (white), \$45; ground (off color) \$30@32 per net ton, less than carload lots, f.o.b. New York. Crude, first grade, \$10 per ton, f.o.b. cars, Missouri; floated, \$28 per ton in bbls.; \$26.50 per ton in 100-lb. bags; extra charge for bags, f.o.b. St. Louis.

Chalk—English, extra light, 5@5½c.; light, 5@6c.; dense, 4½@5c. per lb., all f.o.b. New York.

China Clay (Kaolin)—Crude, \$8@ \$12; washed, \$12@15; powdered, \$18@ \$22; bags extra, per net ton, f.o.b. mines, Georgia; crude, \$8@12; ground, \$15@40, f.o.b. Virginia points. Domestic lump, \$10@20; powdered, \$25@ \$30; imported lump, \$25@35; powdered, \$30@35, f.o.b. New York.

Feldspar—Crude, \$8@14 per gross ton, f.o.b. Maryland and North Carolina points; \$7.50@\$10, f.o.b. Maine; ground, \$27@30, car lots, f.o.b. Baltimore; ground, \$17@21, f.o.b. North Carolina points; \$17@21 per ton, No. 1 ground, f.o.b. New York State; \$21@ \$23 per ton, ground, f.o.b. Maine.

Fluorspar—Gravel, guaranteed 85 per cent calcium fluoride and not over 6 per cent silica, \$25 per ton, f.o.b. Illinois mines, and \$25.50, f.o.b. Kentucky; ground, suitable for acid, chemical or enameling purposes, \$60; lump, \$17.50, f.o.b. Heathden, N. M. In Canada

85 per cent calcium fluoride sells for \$20 per ton, f.o.b. Madoc; output limited. Canadian price generally \$18 (Canadian currency) per ton, f.o.b. mines.

Fuller's Earth—\$16 per ton, carload lots, f.o.b. mines.

Graphite—Ceylon lump, first quality, 8@9c. per lb.; chip, 7c.; dust, 5½c. No. 1 flake, 7½c.; high-grade amorphous crude, 3c.

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

Kaolin—See China Clay.

Limestone—Dolomite, 1@2 man size, \$1.60@\$1.65; 2@8 in., \$1.55@\$1.65 per net ton, f.o.b. Plymouth Meeting, Pa.; fluxing, \$1.65@\$1.75 per net ton, f.o.b. Howellville, Pa.

Magnesite, Calcined—High-grade caustic calcined, lump form, \$35@\$40 per ton, carload lots, f.o.b. California points. In Chicago district, \$57.70; Atlantic seaboard, \$61@\$63.

Dead - Burned—\$38 per net ton, Chewelah, Wash.; \$58@\$64, Chester, Pa. Austrian grade, \$55@\$60 per ton, f.o.b. Baltimore. (Magnesite brick—See Refractories.)

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

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

Phosphate Rock—Per long ton, Florida ports: 77 per cent tricalcium phosphate, \$13; 75 per cent, \$11.50; 75@74 per cent, \$11; 70 per cent, \$8.35; 68 per cent, \$7.85; 68@66 per cent, \$7.60. Finely ground Tennessee rock sells for \$8.50 per net ton for 13 per cent phosphorus content, agricultural application; for acid-making, 14 per cent, \$9; both prices f.o.b. Centerville, Tenn.

Pumice Stone—Imported, lump, 4@50c. per lb.; domestic lump, 6c.; ground, 4@7c., all f.o.b. New York.

Pyrites—Spanish fines, per unit, 16c., c.i.f. Atlantic seaport; furnace size, 16½c.; Spanish lump, 14@16c.; domestic fines, f.o.b. mines, Georgia, 12@14c.

Quartz—(Acid tower) fist to head, \$10; 1½ to 2 in., \$14; rice, \$17; all net ton, f.o.b. Baltimore; lump, carload lots, \$5@\$7.50 net ton, f.o.b. North Carolina mines.

Sand (Glass)—Dry glass sand, \$4 per net ton, f.o.b. cars Mapleton, Pa. Sand, f.o.b. Ottawa, Ill., is \$3 per ton; \$2.50 on annual contracts. Sand at Klondike, Gray Summit and Pacific, all in Missouri, is \$2.50 on contract; some outside sales have been made at \$4. St. Louis, open market, at \$3.50; contract price on large quantities, \$2.50; on small quantities, \$3.

Sulphur—\$18 per ton for domestic; \$18@\$20 for export, f.o.b. Texas and Louisiana mines. Market quiet.

Talc—Paper making, \$11@\$20 per ton; roofing grades, \$8.50@\$13; rubber grades, \$11@\$18; all f.o.b. Vermont. California talc, \$18@\$45, talcum powder grade. Southern talc, powdered, carload lots, \$12@\$15 per ton; less than carload, \$25, f.o.b. cars; freight to New York \$5.25 per ton, carload lots; less than carload lots, \$9.25. Imported, \$40@\$50; Canadian, \$20@\$40 per ton.

Mineral Products

Arsenic—White arsenic, 10@11c. per lb.; sulphide, powdered, 14@15½c. per lb. in carload lots.

Sodium Nitrate—\$2.85@\$3 per cwt. ex vessel, Atlantic ports. Market quiet.

Sodium Sulphate—For 95 per cent material, \$20 per ton, f.o.b. mines, Idaho and Arizona, spot and six months' contract; \$32 per ton, New York.

Potassium Sulphate—Domestic, \$220@\$230 per net ton, basis 90 per cent, f.o.b. New York.

Ferro Alloys

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

Ferrocerium—Per lb., \$12@\$15.

Ferrochrome—Carload lots, spot and contract, 60 to 70 per cent chromium, 6 to 8 per cent carbon, 16@17c. per lb. of chromium contained; 4 to 6 per cent carbon, 16@17c., f.o.b. works.

Ferromanganese—Domestic 76 to 80 per cent, \$100, f.o.b. furnaces; resale, \$90, delivered; English, \$100, c.i.f. Atlantic seaports. Spiegeleisen, 18@20 per cent, \$40@\$45, f.o.b. furnace.

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

Ferrosilicon—For 10 to 15 per cent, per gross ton, f.o.b. works, \$55@\$60; 50 per cent, \$80@\$85; 75 per cent, \$145@\$150.

Ferrotungsten—Domestic, 70 to 80 per cent W, 55@60c. per lb. of contained tungsten, f.o.b. works. Foreign, 60c.

Ferro-uranium—35 to 50 per cent U, \$7 per lb. of U contained, f.o.b. works.

Ferrovandium—Basis 30 to 40 per cent, \$5 per lb. of V contained, plus 75c.@\$2 differentials and according to silicon content, f.o.b. works.

Metal Products

Copper Sheets—Current New York list price, 21½c. per lb.; wire, 15½.

Lead Sheets—Full lead sheets, 8½c.; cut lead sheets, 8¼c. in quantity, mill lots.

Nickel Silver—33½c. per lb. for 18 per cent nickel.

Yellow Metal—Dimension sheets, 19½c.; sheathing, 19¼c.; rods, 5 to 3 in., 16½c.

¹Furnished by Foote Mineral Co., Philadelphia, Pa.

Zinc Sheets—\$11 per 100 lb., less 8 per cent on carload lots, f.o.b. smelter; zinc plates, 10c. per lb.

Refractories

Bauxite Brick—56 per cent alumina, \$160 per 1,000, f.o.b. Pittsburgh.

Chrome Cement—40@45 per cent Cr₂O₃, \$45@\$50 per net ton, and \$55 in sacks, carload lots, f.o.b. eastern shipping points.

Chrome Brick—Straights, \$80 per net ton, shipping point; arches, keys, wedges, \$85; splits, soaps, \$100.

Fire Brick—First quality, 9-in. shapes, \$55@\$60 per 1,000, Pennsylvania, Ohio and Kentucky. Second quality, \$45@\$50.

Magnesite Brick—9-in. straights, \$100 per net ton; 9-in. arches, wedges and keys, \$105; soaps and splits, \$120.

Silica Brick—9-in., per 1,000: Chicago district, \$65@\$70; Birmingham, Ala., \$56@\$61; Mount Union, Pa., \$50@\$60.

The Iron Trade

Pittsburgh, Feb. 15, 1921

In the last week the finished-steel market began what may be called technically a break, but the buying disposition was so light that the break made little progress. Many mills were ready to shade prices by several dollars a ton, but buyers refused to furnish the incentive by offering substantial orders. In trade circles the movement is commonly attributed to the action of the Midvale Steel & Ordnance Co., which began openly to offer some of its products at less than the Industrial Board schedule.

At present concessions of \$3 to \$5 a ton appear possible on sheets, bars, shapes, and plates, with possibly a greater concession in bars and plates. Pipe is moderately firm, as is tin plate from production; tin plate from stocks in second hands has been offered as for some time at large concessions.

Steel ingot production in January was at about 90 per cent of capacity by the Steel Corporation and at 25 to 30 per cent by the independents, making a general average of about 55 per cent, against 80 per cent during the first nine months of last year. Independent mill operations have not materially changed since January, and the Steel Corporation rate is declining, being now at 80 or 85 per cent, still too high a rate to warrant a question as to whether the Corporation will cut prices.

Pig Iron—Foundry iron remains quotable nominally at \$29, Valley. A merchant producer has voluntarily reduced asking prices to \$29 on bessemer and \$27.50 on basic, representing \$3 on bessemer and \$2.50 on basic reduction from previous nominal quotations. There is no inquiry for any grade.

Charcoal and Coke

Charcoal—Willow, 7c. per lb. in bbls.; hardwood, 5½c. per lb., in 250-lb. bbls. Barrel charge is 35c. additional.

Connellsville—Furnace, \$4.50@\$5; foundry, \$6@\$6.50.

The Financing of the Copper Surplus

By Arranging a \$40,000,000 Loan, Producers Have Transferred the Financial Burden of Carrying the Bulk of the Unsold Copper to the Public—Further Curtailment of Production Necessary If Measure Is To Accomplish Its Aim

THE outstanding development in the copper market since the first of the year is the successful effort of the copper companies to induce the public, through the intermediary of the usual banking interests, to provide the necessary funds for carrying 400,000,000 lb. of the copper surplus. This stock of refined copper has been given a value of 10c. per lb., and one- to four-year notes to the value of \$40,000,000 have been issued to cover the loan. The copper companies are to pay interest at the rate of 8 per cent and over (8.30 per cent on the four-year notes if held to maturity), and have individually guaranteed the payment of principal and interest according to the following proportion of the indebtedness:

	Percentage of Proportion	Allotments of Surplus
Anaconda Copper Mining Co.	12.26	49,040,000
Phelps Dodge Corporation	10.90	43,600,000
Inspiration	8.45	33,800,000
Utah Copper Co.	8.20	32,800,000
Chile Exploration	7.58	30,320,000
Calumet & Hecla	6.00	24,000,000
Braden Copper	5.95	23,800,000
Kennecott Copper	5.06	20,240,000
American Smelting & Refining	5.00	20,000,000
United Verde	5.00	20,000,000
Greene Cananea	4.63	18,520,000
Nevada Consolidated	4.45	17,800,000
New Cornelia	4.07	16,280,000
Ray Consolidated	4.00	16,000,000
Chino Copper	3.66	14,640,000
North Butte	1.75	7,000,000
Utah Consolidated	0.34	1,360,000
To be allotted	2.70	10,800,000
	100.00	400,000,000

From this table it can be seen that Anaconda Copper Mining Co., the Phelps Dodge Corporation, Utah Copper, Chile Exploration, Calumet & Hecla, and Braden Copper companies are accounting for over half the financial burden.

There has been some misconception of the purpose and effect of this operation. It was not undertaken to dispose of the burdensome accumulation of copper, for such a result would not be achieved by this method, but was merely utilized to enable the copper companies carrying heavy stocks to procure a longer term loan than could have been obtained solely with the aid of the banks.

Copper is an excellent collateral, and the conservative valuation placed upon it in the note issue, 10c. per lb., indicates that more than adequate guarantees cover it.

Surplus stocks are by no means removed as a factor in the market, and they remain practically as potent as before. The greatest benefit accruing from the arrangement is psychological, as it provides a means whereby producers can proceed with their normal business of marketing copper with the assurance that their funds are not tied up in unmarketed metal. Without an accompanying decrease in copper production and its maintenance at a rate commensurate with the present domestic and foreign copper requirements, the effect of the arrangement will be nullified. It is understood that one-third of the monthly shipments of copper by the Copper Export Association will go toward the liquidation of the copper covered by the notes, so that this requirement of itself should predicate cutting down monthly production from 10,000,000 to 15,000,000 lb. from the present rate of about 95,000,000 lb.

Curtailing production appears to be the inescapable requisite to restoring the copper industry to a normal basis. It is an issue which most producers have been loath to meet, and their attitude has been in some measure pardonable, being due to solicitude not only for themselves but to the welfare of their employees. At present smelter production is proceeding at approximately the pre-war rate of 96,000,000 lb. monthly, but a lower rate is desirable if part of the copper export trade is to go toward reducing the surplus.

This feature of the funding arrangement practically assures that production will be reduced so that a duplication of the present predicament will not occur.

Copper is still selling at very low prices, but domestic consumers are refraining from entering the market. They have kept out so long that should a buying movement of any magnitude begin it would not be surprising to see the price of copper rise rapidly. It is noticeable that the largest producing interests are not willing to sell their copper at the range between 12 and 13c. delivered, and with the financing of the best part of the copper surplus their burden has been lightened and their position strengthened. Producers and consumers are now at least on a more equitable basis.

The step which the copper producers have taken in funding their surplus stocks illustrates one important advantage accruing to them under the Webb Act, which permits the combination of enterprises engaging in export trade and enables them to quote a uniform export price for their product and to enjoy other benefits of combination that are denied to them in domestic competition. Were there no Webb Law, copper producers would have had to make individual arrangements in order to finance their surplus stocks.

It is to be noted that the disposal of the entire 400,000,000 lb. is stretched over a period of four years, which is at the rate of about 8,330,000 lb. monthly, or comfortably within the allowance of one-third the total monthly exports, which can be expected to run well over 35,000,000 lb.

Although foreign trade has shown no encouraging spurt, every effort is being made to sell copper to Europe at present attractive prices, and advantage is being taken of rail and ocean freight rates to lay down the metal abroad at prices equal to those prevailing on the Atlantic seaboard. Thus copper mined and refined in Montana is being shipped to the Pacific Coast under a rail charge of \$7 per ton, and is then transported by boat via Panama Canal directly to Europe for a further water toll of \$15. Contrasted with the rail freight of \$22 to New York or Atlantic seaboard points, plus the ocean freight rate of \$5 to Europe or \$11 to England (this rate was reduced from \$13 early in February), the saving amounts to from \$5 to \$11, and explains why it has been possible for the Export Association to make low European quotations—equal to those in the American market.

A great financial load has been successfully lightened by the efforts of the Copper Export Association, aided by the banks, but its result is expected for the present to be more psychological than direct in affecting the price of copper.

Tasmania's Mineral Production

A table showing the quantity and value of mineral products of Tasmania during the year ended Dec. 31, 1919, taken from the "Report of the Secretary of Mines," follows:

Mineral	Quantity	Value
Gold, oz.	7,686.470	£32,650
Silver, oz.	525,343.270	125,564
Lead, tons	2,357.142	64,403
Copper, tons	5,027	504,961
Tin, tons	1,580.22	395,794
Coal, tons	66,253	47,004
Wolfram, tons	120.907	26,613
Bismuth, tons	1.77	573
Shale, tons	600	900
Iron pyrites, tons	3,456.95	4,288
Scheelite, tons	198.98	43,181
Osmiridium, oz.	1,669.715	39,614
Asbestos, tons	51	1,275
Zinc, tons	285	13,110
Barytes, tons	399	1,160
Total		£1,301,090

MINING STOCKS

Week Ended February 12, 1921

Stock	Exch.	High	Low	Last	Last Div.
COPPER					
Adventure.....	Boston	51	50	50	*60
Ahmeek.....	Boston	50	50	50	Sept. '20, Q
Alaska-Bi. Col.....	N. Y. Curb	23	20	23	Mar. '19
Allouez.....	Boston	40	38	39	Nov. '20, Q
Anaconda.....	New York	3	2	2	
Arcadian Consol.....	Boston	8	8	8	Oct. '18
Ariz. Com'l.....	Boston	8	8	8	
Big Ledge.....	N. Y. Curb	8	8	8	Sept. '19, Q
Bingham Mines.....	Boston	255	250	254	Dec. '20, Q
Calumet & Arizona.....	Boston	255	250	254	June '20, Q
Calumet & Hecla.....	Boston				1.00
Canada Copper.....	N. Y. Curb				*13
Centennial.....	Boston	8	8	8	Dec. '18, SA
Cerro de Pasco.....	New York	29	27	29	Dec. '20, Q
Chile Copper.....	New York	12	12	12	
Chino.....	New York	23	22	23	Sept. '20, Q
Columbus Rexall.....	Salt Lake	*31	*29	*31	
Con. Arizona.....	N. Y. Curb				Dec. '18, Q
Con. Copper M.....	N. Y. Curb				
Copper Range.....	Boston	34	33	33	Sept. '20, Q
Crystal Copper (new)	Boston Curb	*41	*36	*40	
Davis-Daly.....	Boston	6	6	6	Mar. '20, Q
East Butte.....	Boston	9	9	9	Dec. '19, A
Fist National.....	Boston Curb	*90	*80	*80	Feb. '19, SA
Franklin.....	Boston	2	2	2	
Gadsden Copper.....	N. Y. Curb				*25
Granby Consol.....	New York	23	22	23	May '19, Q
Greene-Cananea.....	New York	24	23	24	Nov. '20, Q
Hancock.....	Boston	13	12	13	Jan. '21, Q
Howe Sound.....	N. Y. Curb				3
Inspiration Consol.....	New York	37	34	36	Oct. '20, Q
Iron Cap.....	Boston Curb	7	5	7	Sept. '20, K
Isle Royale.....	Boston	21	21	21	Sept. '19, SA
Kennecott.....	New York	20	19	19	Dec. '20, Q
Keweenaw.....	Boston	1	1	1	
Lake Copper.....	Boston	3	3	3	
La Salle.....	Boston	2	2	2	
Magma Chief.....	N. Y. Curb				*21
Magma Copper.....	N. Y. Curb	25	24	25	Jan. '19, Q
Majestic.....	Boston Curb	*15	*15	*15	
Mason Valley.....	Boston	1	1	1	
Mass Consolidated.....	Boston	2	2	2	Nov. '17, Q
Mayflower-Old Col.....	Boston	4	4	4	
Miami Copper.....	New York	18	18	18	Feb. '21, Q
Michigan.....	Boston	13	12	13	
Mohawk.....	Boston	47	46	46	Nov. '20, Q
Mother Lode (new).....	N. Y. Curb	5	5	5	
Nevada Consol.....	New York	11	11	11	Sept. '20, Q
New Baltic.....	Boston Curb				3
New Cornelia.....	Boston	16	16	16	Aug. '20, K
Niron Nevada.....	N. Y. Curb				*5
North Butte.....	Boston	12	11	12	Oct. '18, Q
North Lake.....	Boston	*45	*45	*45	
Ohio Copper.....	N. Y. Curb				21
Old Dominion.....	Boston	21	20	21	Dec. '18, Q
Oseola.....	Boston	28	26	28	June '20, Q
Phelps Dodge.....	Open Mar.		165		Jan. '21, Q
Quincy.....	Boston	39	39	39	Mar. '20, Q
Ray Consolidated.....	New York	14	13	13	Dec. '20, Q
Ray Hercules.....	Boston Curb	*75	*75	*75	
St. Mary's Min. Ld.....	Boston	35	32	34	June '20, K
Seneca Copper.....	Boston				19
Shannon.....	Boston	1	1	1	Nov. '17, Q
Shattuck Arizona.....	New York	6	6	6	June '20, Q
South Lake.....	Boston	1	1	1	
Superior Copper.....	Boston	4	4	4	Apr. '17
Superior & Boston.....	Boston	1	1	1	
Tenn. C. & C. cfs.....	New York	8	8	8	May '18, I
Toulumne.....	Boston	*55	*55	*55	May '13
United Verde Ex.....	Boston Curb	28	26	28	Nov. '20, Q
Utah Consol.....	Boston	4	4	4	Sept. '18
Utah Copper.....	New York	57	55	56	Dec. '20, Q
Utah M. & T.....	Boston	2	2	2	Dec. '17
Victoria.....	Boston	1	1	1	
Winona.....	Boston	*75	*65	*65	
Wolverine.....	Boston	12	12	12	
NICKEL-COPPER					
Internat. Nickel.....	New York	15	15	15	Mar. '19
Internat. Nickel, pf.....	New York				80
LEAD					
National Lead.....	New York	71	71	71	Dec. '20, Q
National Lead, pf.....	New York	104	104	104	Dec. '20, Q
St. Joseph Lead.....	New York	12	11	11	Dec. '20, QX
Stewart Mining.....	Boston Curb				*6 Dec. '15
ZINC					
Am. Z. L. & S.....	New York	8	8	8	May '20
Am. Z. L. & S, pf.....	New York	28	28	28	Nov. '20, Q
Butte C. & Z.....	New York	5	4	5	June '18
Butte & Superior.....	New York	13	13	13	Sept. '17
Callahan Zn-Ld.....	New York	5	5	5	Dec. '20, Q
New Jersey Zn.....	N. Y. Curb	141	141	141	Feb. '21, Q
Succor.....	N. Y. Curb	*3	*2	*2	July '16
Yellow Pine.....	Los Angeles				*59 Sept. '20, Q

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

Stock	Exch.	High	Low	Last	Last Div.
GOLD					
Alaska Gold.....	New York	1	1	1	
Alaska Juneau.....	New York	1	1	1	
Carson Hill.....	N. Y. Curb				22
Cresson Consol. G.....	N. Y. Curb				June '20, Q
Dome Extension.....	Toronto				*45
Dome Mines.....	New York	15	12	14	Jan. '21, Q
Golden Cycle.....	Colo. Sprgs.	6.90	6.61	*73	Dec. '20, Q
Goldfield Consol.....	N. Y. Curb	11	*8	*9	Dec. '19
Hollinger Consol.....	Toronto	6.90	6.65	6.65	Jan. '21, M
Homestake Mining.....	New York	50	49	49	Sept. '19
Kirkland Lake.....	Toronto	*57	*52	*52	
Lake Shore.....	Toronto	1.21	1.20	1.21	Jan. '21, K
McIntyre-Porcupine.....	Toronto	1.90	1.86	1.87	Jan. '21, K
Porcupine Crown.....	Toronto	*21	*20	*21	July '17
Portland.....	Colo. Sprgs.	4	*4	*6	Oct. '20, Q
Reorgan. Booth.....	N. Y. Curb	*6	*7	*9	May '19
Ryan Pick.....	N. Y. Curb	*9	*7	*9	
Teck Hughes.....	Toronto	*11	*10	*11	
Tom Reed.....	Los Angeles				1.06 Dec. '19
United Eastern.....	N. Y. Curb				21 Jan. '21, Q
Indicator Consol.....	Colo. Sprgs.	†22	†17	†18	Jan. '20, Q
West Dome Consol.....	Toronto	*9	*7	*7	
White Caps Mining.....	N. Y. Curb	*9	*8	*9	
Yukon Gold.....	Boston Curb	†1	†90	*60	June '18
SILVER					
Arizona Silver.....	Boston Curb	*27	*24	*25	Apr. '20, M
Batopilas Mining.....	New York	1	1	1	Dec. '07, I
Beaver Consol.....	Toronto	*39	*39	*39	May '20, K
Coniagas.....	Toronto	2.05	2.00	2.05	Nov. '20, Q
Crown Reserve.....	Toronto	†18	†16	*18	Jan. '17
Kerr Lake.....	Boston	†3	†3	3	Jan. '21, Q
La Rose.....	Toronto	*30	*26	*30	Apr. '18
McKinley-Dar-Sav.....	Toronto	*30	*27	*27	Oct. '20, Q
Mining Corp. Can.....	Toronto	1.10	1.05	1.05	Sept. '20, QX
Nipissing.....	N. Y. Curb	8	8	8	Jan. '21, Q
Ontario Silver.....	New York				50
Ophir Silver.....	N. Y. Curb				50
Peterson Lake.....	Toronto	*9	*9	*9	Jan. '12
Temiskaming.....	Toronto	†22	†24	*24	Jan. '20, K
Trethewey.....	Toronto	†18	†15	*17	Jan. '19
GOLD AND SILVER					
Atlanta.....	N. Y. Curb	*2	*1	*2	
Barnes-King.....	Butte	1		1.11	Aug. '20, Q
Boston & Montana.....	Boston				*63
Cashboy.....	N. Y. Curb	*8	*6	*7	
El Salvador.....	N. Y. Curb	†5	†5	5	
Jim Butler.....	N. Y. Curb	*18	*16	*17	Aug. '18, SA
Jumbo Extension.....	N. Y. Curb	*12	*7	*9	June '16
Louisiana Con.....	N. Y. Curb				
MacNamara M. & M.....	N. Y. Curb	*19	*15	*18	May '10
N. Y. Hond. Rosar.....	Open Mar.	†10	†9	9	Jan. '21, Q
Tonopah-Belmont.....	N. Y. Curb	1	1	1	Jan. '21, Q
Tonopah-Divide.....	N. Y. Curb	1	1	1	Jan. '21, Q
Tonopah-Extension.....	N. Y. Curb	1	1	1	Jan. '21, Q
Tonopah Mining.....	N. Y. Curb	1	1	1	Oct. '20, SA
West End Consol.....	N. Y. Curb	1	1	1	Dec. '19, SA
SILVER-LEAD					
Caledonia.....	N.Y. Curb	*14	*11	*12	Jan. '21, M
Cardiff M. & M.....	Salt Lake				1.15 Dec. '20
Chief Consolidated.....	Boston Curb	2	2	2	Nov. '20, Q
Consol. M. & S.....	Toronto	20	19	20	Oct. '20, Q
Daly Mining.....	Salt Lake				2.50 July '20, Q
Daly-West.....	Boston	4	4	4	Dec. '20, Q
Eagle & Blue Bell.....	Boston Curb	†2	†2	2	Dec. '20, K
Electric Point.....	Spokane	*8	*7	*7	May '20, SA
Federal M. & S.....	New York				8 Jan. '09
Federal M. & S., pf.....	New York	27	27	27	Dec. '20, Q
Florence Silver.....	Spokane	*15	*12	*15	Apr. '19
Grand Central.....	Salt Lake				*37 June '20, K
Hecla Mining.....	N. Y. Curb	4	4	4	Dec. '20, QX
Iron Blossom.....	N. Y. Curb	1	1	1	Apr. '20, Q
Judge M. & S.....	Salt Lake				3.00 Sept. '20, Q
Marsh Mines.....	N. Y. Curb	*10	*9	*9	
Prince Consol.....	N. Y. Curb	8	8	8	Nov. '17
Rambler-Cariboo.....	Spokane	*8	*8	*8	Feb. '19
Rex Consol.....	N. Y. Curb	*7	*5	*7	
South Hecla.....	Salt Lake	*70	*61	*70	Sept. '19, K
Standard Silver-Ld.....	N. Y. Curb				Oct. '17
Tamarack-Custer.....	Spokane	2.60	2.00	2.50	Jan. '21, K
Tintio Standard.....	Salt Lake	3.42	3.25	3.40	June '20, Q
Utah Apex.....	Boston	2	2	2	Nov. '20, K
Wilbert Mining.....	N. Y. Curb	*3	*2	*3	Nov. '17
QUICKSILVER					
New Idria.....	Boston				*95 Jan. '19
VANADIUM					
Vanadium Corp.....	New York	37	34	37	Jan. '21, Q
ASBESTOS					
Asbestos Corp.....	Montreal	†75	†75	80	Jan. '21, QX
Asbestos Corp., pf.....	Montreal				95 Jan. '21, QX
MINING, SMELTING AND REFINING					
Amer. Sm. & Ref.....	New York	44	41	42	Dec. '20, Q
Amer. Sm. & Ref. pf.....	New York	82	82	82	Dec. '20, Q
Am. Sm. pf. A.....	New York	67	67	67	Jan. '21, Q
U. S. Sm. R. & M.....	New York	34	33	34	Jan. '21, Q
U. S. Sm. R. & M. pf.....	New York				43 Jan. '21, Q

