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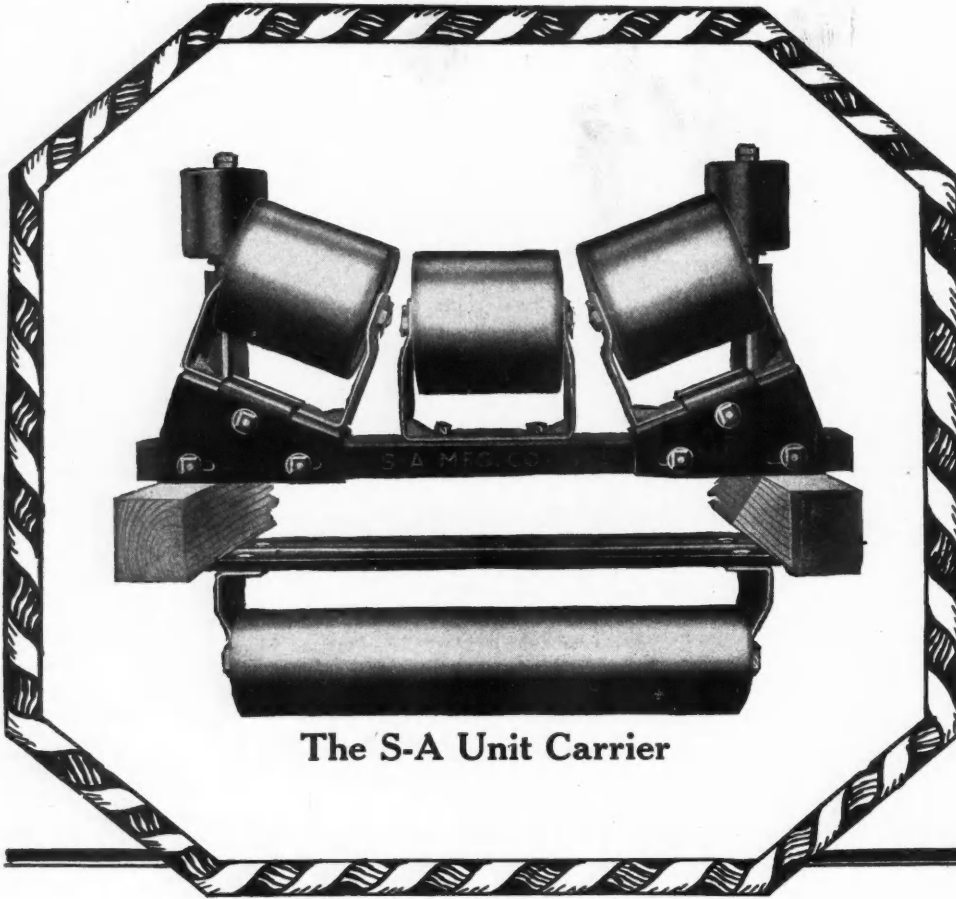
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June 12, 1920

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Engineering and Mining Journal

A Weekly Journal of the Mining and Mineral Industries

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METALS

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PETROLEUM

Volume 109

New York, June 12, 1920

Number 24

The Federated American Engineering Societies

ON THE third and fourth of June there took place in the little auditorium of the Cosmos Club in Washington a gathering of engineers which may well be epochal. Fifty-seven engineering societies from all sections of the United States sent delegates to what may be called the First Congress of Engineers. They did not foregather for scientific discussion or the reading of technical papers, or for the formulation of rules regarding professional conduct. No whisper of any of these things was heard during the well-attended and earnest sessions. They were met together as a class to devise means to further the influence of that class for the good, as they sincerely believed, of the country, and for the advancement of their own human position. Delegates were present from the great technical societies, from state and district affiliated societies, and from local societies or clubs.

We have in an earlier issue, in reporting the meeting of the American Institute of Mining and Metallurgical Engineers in New York in February, referred to this movement at the time that the Institute decided to embark upon it. We referred at that time to the pioneer work of Professor S. F. Newell and the American Association of Engineers, which was organized for the purpose of promoting the economic welfare of the engineer, and whose success admonished the great technical societies that the spirit of the times called for the abandonment of old traditions, and for the engineer boldly to take his social, civic, and economic place with relation to other groups. The first step is organization, and this was accomplished in Washington

The constitution adopted by the gathering is brief, wisely planned and liberal; it breathes of progress. The meeting leaned over backward in favoring the small societies as against the large ones, but it was felt that as members of these small societies are usually also members in the great ones, the result would not be unbalancing. An account of the meeting and a copy of the constitution appear on pages 1322-23-24.

Among the societies represented was the American Association of Engineers, which numbers 18,000 members. We are inclined to think it unfortunate that the budding Federated Societies did not make a working arrangement with the American Association, wherein the work and the field and the precedence of the latter society should have been recognized. As it was, however, an admirable spirit and courtesy prevailed on both sides, and though it appears doubtful whether the Association will join the Federated Societies, there is no question that each organization will proceed with the utmost good will toward the other.

The habit of the engineer is still to clothe his political or economic purposes in vague and flowery language, and at least one delegate expressed himself privately at the end as wistful of knowing just what the new organ-

ization intends to do. What it intends to do is to use its power as an organization—as a machine—to maximum advantage in politics and civics, in municipal, state, and national affairs. There are many public matters whose basis is essentially of an engineering nature. In their conduct it is essential to the public welfare that engineers should dominate. Individually, they are and would be slighted, even as to these, by other groups—lawyers, common or machine politicians, business groups, and the like; but collected in a strong organization it is possible for them to take their proper place in controlling public affairs. This is a development of the doctrine which has been lately preached by many, including this journal, of the duty of the engineer to take up public service work; it is a logical step in the practical carrying out of this idea. Therefore, *Engineering and Mining Journal* is strongly behind this organization, for which it bespeaks enthusiastic and continued support. Every engineering organization in the country should affiliate with it, and every engineer should be represented. The Federated Societies is conceived on a forward-looking and liberal basis. Its meetings and deliberations are to be open. The responsibility now rests on the member societies to see that their own relations to the Federated Societies are marked by the same principle, and especially that delegates shall be really elected by some democratic system. All this, however, we must take for granted and get behind the Federated Societies to a man.

A Division of Mines and Geology

AS REPORTED in our news section on May 22, a bill has been introduced in the Senate by Senator Henderson, of Nevada, the ranking member of the Senate Committee on Mines and Mining, which provides for the consolidation of the U. S. Geological Survey and the Bureau of Mines under a special division of the Interior Department, to be known as the Division of Mines and Geology. It is further provided that the division shall be under the control and direction of an Assistant Secretary of the Interior, "who shall be technically qualified by experience and education to exercise the powers and duties herein imposed. He shall be appointed by the President, by and with the advice and consent of the Senate, and shall receive a salary of \$10,000 a year."

This bill has our hearty approval, and we believe it will be supported by the different mining societies and organizations and by the mining industry, and that it will have the support of the two Government bureaus involved. It should have the approval of those who think the mining industry should be represented by a Department of Mines, and also of those who do not believe in the further multiplication of departments and Cabinet officers; for the head of this Division, although

a direct Presidential appointee, will not be a Cabinet officer. Senator Henderson is especially to be congratulated on the breadth of vision which led him to insert in the specifications for this official that he must be a properly prepared technical man; thereby removing the office from the grasp of politicians as such.

The plan has the further advantage over a Department of Mines in that geology has a co-ordinated representation, so that the present work of the Geological Survey would be compassed in it, and geology apart from mining applications would be recognized. In such a Division it should be feasible to gather together and properly systematize all the mineral work of the Government in Washington, whether in the Interior Department or outside, and to form a strong policy for both domestic and foreign mineral-supply problems. Co-operation with the state geological surveys and state mining bureaus would be greatly simplified, and Congress would have a definite executive source to turn to as a guide for legislation, and the other executive departments for their information.

Under the terms of the bill it does not necessarily follow that the importance of either of the existing bureaus would be diminished, or the position of their chiefs lessened: rather would their authority and prestige be increased by their consolidation and extension.

It is to be hoped that the bill will be promptly indorsed by the representative people and groups of the mining states, as well as by the national mining and geological groups, and that it will receive prompt consideration and action.

Phosphate in the West

DEVELOPMENT of the Idaho-Wyoming-Utah phosphate field that was discovered in 1906 has been retarded to such an extent that in 1919, thirteen years later, only 16,000 tons of rock was reported sold. This may be ascribed to various causes, chief among which were the Government's conservation policy, through which lands were withdrawn from entry; and the distance of the field from existing markets. Southern phosphate, richer and more easily mined, from Florida, South Carolina, Tennessee, and Kentucky, but principally from Florida, after conversion into the "soluble" form of superphosphate by treatment with sulphuric acid, has had the domestic market to itself and has also been exported in quantities that, before the discovery of the Western field, boded ill for the future. Europeans until recently have been more alive than American farmers to the importance of phosphate.

Despite difficulties, a few companies have established themselves in the new field, and now that the general leasing act is effective, the entry of others will be facilitated. Regulations for leasing deposits on public lands were approved by Secretary Payne on May 22, under which areas not exceeding 2,560 acres in extent may be leased. It has been demonstrated that the raw rock, when ground, is assimilable as a plant food, though requiring a longer period than the acid soluble conversion product. Rock shipments, however, must have a more favorable freight rate if distant markets are to be supplied. Lately, Japanese shipping firms have entered the market, seeking phosphate rock as return ballast, and bunkers are being built at Portland, Ore., for loading the vessels.

Just at this time, then, it is most unfortunate that the Union Pacific interests, whose Oregon Short Line

is the main artery of the new phosphate field, should threaten to raise the rate about 40 per cent on raw phosphate rock shipped from mines to the coast, for such an increase is sufficient to kill efforts to develop the Idaho-Wyoming-Utah phosphate industry. It is to be hoped that the traffic officials of this great railroad system will be mindful of the benefits and revenue to be derived from the development of this new territory and not pursue the policy proposed.

The most important event in connection with the Western field is the development in the Anaconda company's laboratories of a new process whereby a much more highly concentrated acid phosphate is made than anything placed on the market to date, which product, it is said, by reason of its concentration, will be able to stand shipment anywhere in the United States, and even abroad. For the manufacture of this product, Anaconda will use sulphuric acid made as a byproduct at its own smelting works. The company has already secured phosphate land near Garrison, Mont., and has acquired the right to purchase a large deposit of high-grade rock about seven miles from Soda Springs, Idaho.

The miner must eat in order to mine, and so agriculture naturally takes precedence over the mineral industry in importance. But the farmer must have phosphate, potash, and nitrate, and he thus, in turn, is dependent on the miner. The mineral constituents of the soil are no more inexhaustible than are our petroleum resources, regarding which there has been a rude awakening. Once virgin soil, the acreage of land in the United States requiring artificial assistance is steadily increasing.

Of the three minerals named, phosphate alone occurs in large quantities in the United States. The amount sold in this country last year, according to the U. S. Geological Survey, was 1,941,700 long tons, as compared with 2,490,760 in 1918 and 3,111,221 in 1913, the last being the maximum output in any one year since production began. Of last year's tonnage, Florida produced 1,355,700 tons, South Carolina 110,000, Tennessee and Kentucky 460,000, and the Western states only 16,000. Of the large tonnage produced in 1913, almost one-half, or 1,300,000 tons, was exported.

In Idaho alone a huge tonnage has been proved by the U. S. Geological Survey. The demand is present and steadily growing, and must be met, if the nation is to continue to feed itself. A sufficient supply for generations to come is visible in the Western field, and the sooner it is made available the better it will be for all.

Independence

ONE of our own regular news correspondents has sent in a "story," as the journalistic vernacular goes, concerning a Western mineral industry; and in sending it he expresses uncertainty as to whether policy will allow us to print it. He suggests that the giving attention and publicity to this particular industry might be contrary to the interests of advertisers in certain other papers of the McGraw-Hill Co., and, therefore, we might wish to avoid it. He writes in a spirit not of criticism but of co-operation. The industry referred to, to be explicit, is the budding phosphate industry of Idaho, Montana, and Utah; and we assume that the interests which he fears would frown on publicity for this section are the dominant fertilizer companies, with their holdings of Southern phosphates and their established system of distribution.

Our answer to the correspondent was explicit. We outlined certain points to remember.

1. That the McGraw-Hill Co., which is simply a publishing company, does not determine the editorial policy of any of its journals.

2. That the advertising policy of the McGraw-Hill papers does not affect the editorial policy.

3. That the editorial policy of any or all of the McGraw-Hill papers does not affect the editorial policy of *Engineering and Mining Journal*.

4. That the advertising policy of *Engineering and Mining Journal* does not control or even affect the editorial policy of the paper.

5. That the news columns of *Engineering and Mining Journal* are not controlled by the editorial views of *Engineering and Mining Journal*.

It has astonished us that one of our own Western correspondents should misunderstand the conditions under which *Engineering and Mining Journal* works. Why be virtuous, and not have the satisfaction of having it known? Modesty and reticence concerning misconduct may have their uses; but shyness concerning our own righteousness certainly has nothing to recommend it, especially as our first and last business is that of pitiless publicity.

Are virtues such as ours so rare in the journalistic world? We had supposed that they were the rule rather than the exception, and we still hang on to this belief, which must be proved wrong in individual instances before we shall give it up. Our principles are not only admirable, but they work well in a business way, as is demonstrated by the development of the McGraw-Hill Co. into the greatest technical publishing house in the world.

As we look over the five points of our declaration of independence as set down, and compare it with the certain outside viewpoint revealed by our correspondent, our independence seems almost immodest in its crudity. Dare we add that all this is not necessarily due to any outstanding rebellious virtue on the part of *Engineering and Mining Journal* editors, but that our advertising staff approves of this policy, and would have little respect for us if we thought otherwise? Must we also acknowledge that this spirit could not obtain if it were not the dominant ideal of the publishing company, as embodied in its vigorous president? We say this with hesitation, lest we should be accused of sycophancy, as a Western subscriber accused us when we published an article by our respected friend, Mr. Daniel Guggenheim; but we shall put in a good word for those of whom we approve, even when it is hard and unpopular for us to do so, on account of their being plutocrats, or our bosses.

Must we go still further, and say that we have no knowledge of any of our advertisers *trying* to control the editorial policy of the *Journal*, and therefore that our virtue costs us no effort? Many of our subscribers write in and call us down in no uncertain terms; but not the advertisers. We should like to believe in the turpitude of someone. Certainly, when we had to pay \$26.50 for a pair of shoes the other day, that we used to buy for \$8, we were convinced that there were rascals in the world somewhere; but the average person we meet in the circles in which we move is so absolutely all right that our militant muck-raking ambitions become stupefied.

Should any sneerotics' doubt our own admission of our own uprightness, we shall not lower our dignity to reply; but as a blanket precaution, we can state that they are liars, thieves, assassins, and low vulgar cads.²

The Cheerful Optimist

"IT IS NOT necessary," says the *Sun and New York Herald*, "to take a pessimistic view of America's future simply because the Geological Survey declares that our available oil supply will not last more than twenty years. There are abundant supplies in Mexico, Colombia and Venezuela" . . . and so on.

Good for the optimist! Never be a bear on the United States. Our petroleum supplies will last in an increasing ratio, keeping pace with consumption, to remote generations. Our tungsten supplies are endless, we are informed from many sources, Congressional and otherwise; but we must develop them, like any other industry.

A prominent Congressman—a member of the Committee on Mines and Mining—also observed in our hearing that such was the record of tin mining in the United States that whereas we formerly did not produce enough for our own needs, by protection we were able to develop the latent resources of the good old U. S. A., till we now mine not only our own requirements, but export substantially besides. We are a great people, and when we set our genius to beating the world at tin mining, why, naturally, we did it.

History is a pessimistic mocker: we are looking forward, not backward. The wane of gold production in the Appalachians, in the Sierras, in Alaska, was due to bad management and dishonesty. There is plenty of gold left, if you go after it. There is more chrome in California than in New Caledonia or Rhodesia—any stalwart American knows that. If not, he'll make it so.

Therefore, patriots and feller-citizens, hoop-la! Down with science! What do we care for twenty years, ten years, hence, anyhow? "As changes are coming nowadays," adds the *Sun and Herald*, "twenty years is a long time." Let the geologist be careful not to speak slightly of our great Republic and its foundations, or the Department of Justice will be on his trail.

Support of the Metric System

THOSE Americans who look upon the metric system as a troublesome and impracticable fad will be surprised to learn that the great new factory of the Goodyear Tire & Rubber Co. in Los Angeles is equipped and operated entirely under the metric standard; that the American Chemical Society indorses it; and that citizens like ex-President Charles W. Eliot of Harvard University, Franklin K. Lane, Thomas A. Edison, Leonard Wood, Henry Ford, W. G. McAdoo, Samuel Gompers, Otto H. Kahn, and Newton D. Baker favor it.

Up to March 31 last there had been placed on file in Washington 86,650 petitions urging upon Congress the adoption of metric units for weights and measures in the United States, of which 13,438 were from manufacturing and engineering firms. The movement is indorsed by the U. S. Steel Corporation and the Baldwin Locomotive Works. It is a good thing, and opposition is explainable only by the psychology of reactionism.

¹This is a good word. We made it ourselves.

²This last we think peculiarly effective. We get this from a recent letter from an English gentleman, a contributor, who applied it to us because, in the turmoil of strikes, suspension, and changing editors, publication of his manuscript was delayed for really an unpardonable length of time. We felt grateful for him for the phrase, so effective from its very anemicity.

WHAT OTHERS THINK

Mexico and Bolshevism

I think that "X," writing in *Engineering and Mining Journal* of May 22, pp. 1152-1153, must have been taking too much for granted when he accuses the government of the martyred President Don Venustiano Carranza of having taken bolshevism as a model.

I know nothing of bolshevism except such as I read in the press, and if the newspapers distort Russian news as they do Mexican, it is mostly false. But how does the writer in the issue mentioned reconcile the fact that the policies of General Carranza have never been changed since his revolt against the usurper Huerta, whereas bolshevism dates more or less from the fall of Alexander Kerensky? The pamphlet alluded to may have praised the Russian system, but in that case, if the Mexican and Russian systems are identical, which I doubt, the Russians modeled after the older plan.

I have lived in Mexico a number of years, and I never experienced any ill-treatment from Carranza officials. In fact, their courtesy could not have been exceeded. Most of the trouble between mining companies and the Mexican government has its origin in disregard of Mexican laws and customs by the foreign managers. A better spirit on their part would aid greatly in remedying matters.

Y.
Humboldt, Tenn.

World's Shaft-Sinking Record

It seems to me that it is not merely a question of the distance sunk, but the area, hardness, and quantity of rock excavated. The Crown Mines record of 279 ft. in 31 days in 1918 represented cutting out 21½ ft. in diameter, equal to, say, 360 cu.ft. of rock.

The Van Dyke Copper Co. sank a shaft 308 ft. in 31 days in 1920, but it was only 6 by 11 ft. outside measurement, equal to, say, 70 cu.ft. The Crown Mines therefore did over five times as much work as the Van Dyke in the same time. Is the Van Dyke ground as hard as the Rand quartzite? The former, I believe, is Gila conglomerate, harder than hardpan, but not as hard as ordinary rock; yet it does not break well.

Of course the number of men employed at the Crown Mines would be greater, being natives, whose efficiency is low

M. VON BERNEWITZ.
New York City.

More About Pinion Double-Duty

Referring to "What Others Think" in the *Engineering and Mining Journal* of May 15, 1920, on page 1105, the salesmen to whom Mr. X. refers seem to have little knowledge of gears from the practical standpoint.

I have re-faced gears for the last twenty years in all kinds of mining machinery, and can say that when the tooth of a pinion is worn to a sharp point its usefulness as a gear is ended. There is so much play between the teeth that the running may become noisy and irregular. In reversing a pinion, a new wearing surface is put into

service, but the tooth has no strength. The wearing area is soon greatly reduced, there is too much play to permit good service, and at the most unexpected moment the pinion will be stripped of all teeth. Often a pinion is placed where it cannot be reversed, the bore may be a cone, the keyway may be tapered, one side of the hub may expand more on one side than the other, and it will take just as much time to reverse that pinion as it will to put on a new one. Mr. X. will find that there is practically "nothing in it," for the simple reason that the pinion is worn out.

CHARLES LABBE.
Johnnie, Nev.

Oil-Shale Land Locations

Referring to your explanation of that part of the Oil Leasing Act which pertains to oil-shale locations, which appears on the "Consultation" page of *Engineering and Mining Journal* in the issue of March 27, allow me to call your attention to Section 37 of the act, which reads as follows:

"That the deposits of coal, phosphate, sodium, oil, oil shale, and gas, herein referred to, in lands valuable for such minerals, including lands and deposits described in the joint resolution entitled 'Joint resolution authorizing the Secretary of the Interior to permit the continuation of coal mining operations on certain lands in Wyoming,' approved Aug. 1, 1912 (Thirty-seventh Statutes at Large, page 1346), shall be subject to disposition only in the form and manner provided in this act, except as to valid claims existent at date of passage of this act and thereafter maintained in compliance with the laws under which initiated, which claims may be perfected under such laws, including discovery."

De Beque, Col.

G. R. DE BEQUE.

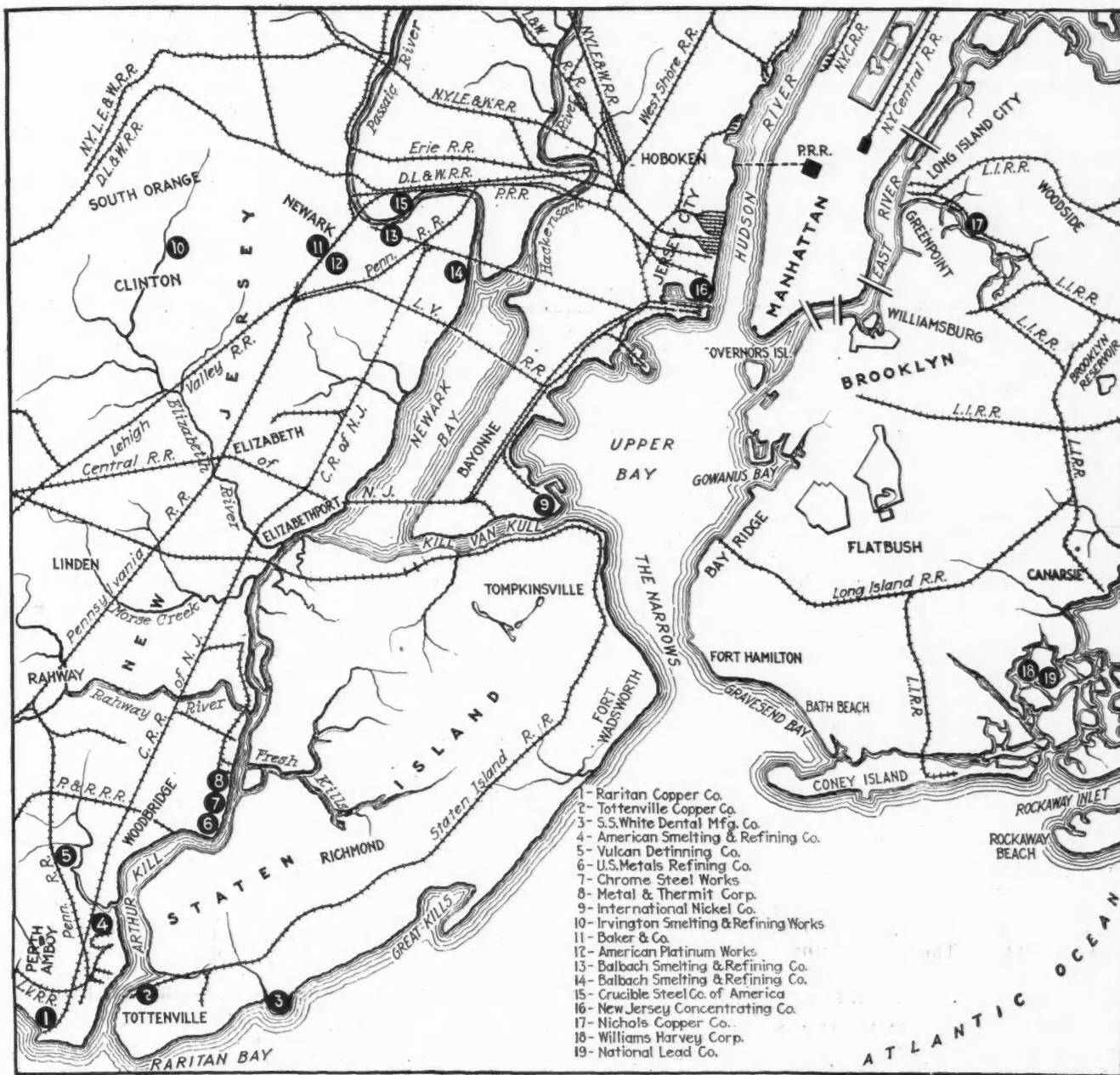
[This letter gives further information regarding the status of oil-shale locations made prior to Jan. 1, 1919, and considers another element in the situation—that relinquishment of prior claims is not made.—EDITOR.]

The Hoover Cartoon

Although I am inclined to the belief that a technical periodical such as *Engineering and Mining Journal* should devote little space in its columns to politics, I was greatly pleased with the cartoon reproduced in the May 29 issue on page 1199. I think I am safe in saying that the editorial comment which has appeared from time to time in *Engineering and Mining Journal* with reference to Mr. Hoover has met with the unanimous approval, not only of engineer readers of your paper, but of those outside of the profession who cannot be accused of class favoritism.

Certainly the country needs a man of Hoover's strength of character, executive ability, and broadness of vision. In Vol. 1, No. 1 of the recently issued *Hoover News*, the "weather forecast" is as follows: "Generally cloudy, with high west winds and thunder gusts, shifting to easterly and followed by clearing on nomination of Hoover." Who will gainsay it?

S. F. H.
New York City.



Metallurgical Plants in the Vicinity Of New York

Mines, Mills, Smelters, and Refineries Within a Radius of Thirty Miles From the Heart of the City—Copper and Tin Refineries of Particular Importance—
Even Steel Industry Represented

BY EDWARD H. ROBIE

Metallurgical Editor, *Engineering and Mining Journal*

WESTERN metallurgists are not accustomed to think of New York City as a metallurgical center. When visiting the East, their itinerary often includes the nation's metropolis, but not for the purpose of picking up new wrinkles which will help them in their mines and reduction works. And yet, few districts as limited in extent offer as wide a field for observation. A real mine and mill—that of the Ramapo Ore Co., at Sterlington, N. Y.—is operating

only twenty-eight miles from New York City. Iron from this mine, so the story goes, was used in making the chains which pulled George Washington's troops across the Hudson River.

The tubes under the rivers and the ever-present subway construction present many problems of interest to the miner. Jackhammers and mounted drills attract the attention of the passer-by on Broadway. Large-scale mining and concentrating operations are conducted by

the New Jersey Zinc Co. at Franklin Furnace, N. J., which is situated only about forty miles from the city.

On the accompanying map the situation of most of the metallurgical plants in the metropolitan district is shown. Several works will appeal particularly to those interested in copper.

The Raritan Copper Works, at Perth Amboy, N. J., A. C. Clark, manager, refines the blister copper and anodes from Anaconda and Miami as well as custom bullion, producing refined copper in all commercial shapes, together with silver, gold, copper sulphate, nickel sulphate, selenium, tellurium, tellurium oxide, platinum, and palladium. The furnace department contains six refining furnaces, with a capacity of about 2,300,000 lb. of copper per day, and five anode furnaces, which can take a slightly less amount. The electrolytic refining is carried on in two tank houses, No. 1 containing 1,800 lead-lined tanks, and No. 2 1,656 tanks. Silver and gold are parted electrolytically by the Thum and Moebius systems, the gold being refined by the Wohlwill process. The plant, when running to capacity, employs about 1,400 men and requires 14,000 kw. About 288,000,000 lb. of copper was produced in 1919. The company is glad to show visitors through the plant when they are provided with letters of introduction from the New York office.

The refinery of the Nichols Copper Co., on Long Island, at Laurel Hill, O. C. Martin, manager, handles the Phelps Dodge, C. & A. and Granby products, and does a large custom business. The equipment includes a blast furnace and converters, for a variety of material is received: matte from Mexico; ore and concentrate from Cuba; ore, matte and concentrate from South America and Africa; and blister copper from Arizona, Montana, and British Columbia. The electrolytic plant has 550 tanks and is operated on the series system. The principal products are refined copper and blue vitriol, the 1919 production being estimated at 310,000,000 lb. When running to capacity, which is about 550,000,000 lb. annually, about 5,600 kw. are used, and 1,600 men are employed. Properly accredited visitors are shown over the plant.

The Perth Amboy, N. J., works of the American Smelting & Refining Co. are of considerable interest on account of their size and the variety of the processes employed. The plant was established about 1894 as a lead refinery. The Moebius electrolytic parting process was first employed there. The lead refinery was soon followed by a small copper refinery. Both have been greatly enlarged. In 1916 the first successful tin smelter and electrolytic tin refinery in the United States was started, and has been in continuous operation since that time. The plant handles a portion of the lead and copper bullion from the A. S. & R. properties in the United States and Mexico; copper bullion and mattes from South America; tin ores from South America and Alaska; and various lead and copper residues from all over the world. The finished products are necessarily varied. They include the precious metals; refined lead, copper, and tin; arsenic, sulphuric acid, hard lead, blue vitriol, and other metal products. The 1919 production was about 250,000 oz. of gold, 30,000,000 oz. of silver, 140 oz. of platinum, 125 oz. of palladium, 35,000 tons of lead, 70,000 tons of copper, and 7,500 tons of tin. About 1,800 men are employed when running to capacity, and 7,000 hp. is then required. The manager, J. F. Austin, welcomes visitors

who are engaged in similar work. A recent installation of interest is a powdered-coal fired reverberatory refining furnace.

Another large refining works is that of the U. S. Metals Refining Co. at Chrome, N. J., fifteen miles southwest of New York City, of which R. W. Deacon is superintendent. This plant handles custom copper, gold and silver ores, mattes and bullion; and scrap metals from Spain, Canada, Africa, Japan, Cuba, South America, and the United States. It gives employment to 1,200 men when the entire plant is running, and 6,700 boiler-horsepower can be generated. The plant is supplied with excellent sampling and analytical equipment for accurate determination of the metallic content of material received. There are two blast furnaces, three converters, seven reverberatory refining furnaces, and 1,225 electrolytic tanks operated on the multiple system. The copper is cast on Walker wheels. The precious-metals department is equipped with a Cottrell treater for the flue gases. The 1919 production was roughly 80,000 tons of copper, 165,000 oz. of gold, 8,500,000 oz. of silver, 125 oz. of platinum, 250 oz. of palladium, and 1,000 tons of nickel sulphate. No selenium was produced, though this is ordinarily recovered. The works are open to members of the profession.

SOME ONE MUST HANDLE THE SCRAP METAL FROM A BIG CITY LIKE NEW YORK

The Balbach plant, in Newark, of which E. E. Dieffenbach is superintendent, has several features of interest. The business was founded in 1852, when a small smelting plant was built on Passaic Ave., which is now well within the city limits of Newark. The main plant is now situated on Newark Bay and is accessible to ocean-going vessels, besides having splendid rail facilities. It covers about fifty acres of ground, and comprises a copper-smelting plant, a lead-desilverizing plant, and an electrolytic refinery. The former is particularly interesting, as the work done is quite unlike that with which Western metallurgists are familiar. Scrap copper of various kinds is one of the chief ingredients of the charge. I understand that if the furnace gets in bad condition the charge may be changed from alarm clocks to bird cages. An inspection of the stockpiles shows what becomes of all the dollar watches which now cost \$2.50.

The lead refinery is up to date, employing the Parkes process. The lead bullion used as raw material is secured from domestic and Mexican sources, and gold and silver and lead ores are also imported from South America. Miscellaneous drosses, residues, byproducts, and doré bars are also handled. Production last year amounted to about 290,000 oz. of gold, over 10,000,000 oz. of silver, 1,500 oz. of platinum, 200 oz. of palladium, about 23,600 tons of lead, and 18,300 tons of refined copper. Seven hundred to eight hundred men are employed when maximum production is maintained.

The company evinces a liberal policy toward visitors. Many groups of mining students have enjoyed the courtesies extended by the management, and professional men with the proper credentials have no trouble in securing permission to inspect the plant.

The National Lead Co. has several interests in the vicinity of New York, but, in general, manufactures lead carbonate and oxides and performs special work, all of which comes without the province of this article.

Tin smelting and refining is a comparatively recent

industry in this country. No publicity has been given to the methods used, but it is understood that the problem of reducing the imported ores is not a difficult one. The American Smelting & Refining Co.'s plant at Perth Amboy has already been mentioned. On the Mill Basin, Brooklyn, N. Y., the Williams Harvey Corporation has a smelting plant with a reported annual capacity of 20,000 tons, though only 4,000 to 5,000 tons of pig tin was produced last year. William F. Kemble is superintendent of this plant, which employs about 130 men, and requires 600 hp. when running to capacity. Two or three other companies are also interested in tin smelting; the Tottenville Copper Co. has a small plant, and the Andes Electin Corporation, of 35 Nassau St., is doing some work, so far largely of an experimental nature. The Vulcan Detinning Co. recovers tin and its salts from tin plate and scrap. Two reverberatory furnaces are included in the equipment, and the production is about 25,000 tons a year. The company has another plant in the West.

NICKEL REFINING AT BAYONNE, N. J.

Most of the world's supply of nickel was, until recently, refined at the International Nickel Co.'s Bayonne works. Part of the International's refining is now done at the new plant at Port Colborne, Ont., although the local works is still a large producer. The raw material is a converter matte from Copper Cliff, Ont., containing about 25 per cent copper and 54 per cent nickel. This is treated by the Orford process, which consists in successive smeltings of the matte with niter cake and coke, the resulting nickel and copper sulphides being separated on cooling the melt, by reason of their different specific gravities. Further purification and reduction to metallic form is accomplished in various operations, in which leaching, roasting, reverberatory-furnace smelting, and converting each plays a part.

The refined nickel is produced in two forms, one a furnace product and the other as electrolytic nickel. Monel metal is also made, the sulphur being removed from the matte without separating the nickel and copper. The processes used are kept as secret as possible, although the Port Colborne refinery was recently opened to the members and guests of the Canadian Mining Institute.

Some competition in the nickel business is offered by the United States Nickel Co., which has a small plant at New Brunswick, N. J., about forty miles from New York, operating on raw material secured from sources other than the Sudbury deposits.

Platinum and palladium, together with their associated rare metals, are recovered and started on useful or ornamental careers in several plants near New York. In fact, this district may be said to be the center of this industry in this country. A considerable quantity is recovered by the large refineries as a byproduct, and a much larger supply is furnished by Colombia. Just now the platinum market seems to have collapsed, and the price has dropped below \$100 per ounce, compared with \$150 a short time ago. The pre-war price was about \$45.

The high value of platinum, and the small number of concerns in the business of refining and marketing the metal, combine to create a policy of secrecy, and visitors are decidedly unwelcome. Among the principal plants are the Irvington Smelting & Refining Works, Baker

& Co., the American Platinum Works, Kastenhuber & Lehrfeld, and the S. S. White Dental Manufacturing Co. The U. S. Government assay office in New York should also be mentioned, as a large amount of precious metal is there handled, separated, and purified.

The Irvington plant, of which Dr. Bachofner is superintendent, is especially equipped to handle ores, concentrates, silver-gold-copper bullion sweeps, or any other material containing gold, silver, or the platinum metals. Some copper sulphate is also produced. The value of the product last year was nearly \$10,000,000, and as many as 150 men have been employed. The plant will consume about 500 hp. when running to capacity. Baker & Co. work on the same character of material, but require only about one-half the power of the Irvington works. Platinum, gold, and silver in practically all forms for the chemical, electrical, dental, jewelry, and kindred trades are sold. E. A. Colby is superintendent.

The American Platinum Works, Theodor Koch, superintendent, do much the same type of business, and treated about five million dollars' worth of precious metals last year. About fifty men and 100 hp. are required with capacity operation. Kastenhuber & Lehrfeld have a plant in Newark in which high-grade ores, concentrates, and scrap are smelted in an oil-fired reverberatory furnace. About ninety men are employed and over 100 hp. is used. The finished products are gold, silver, platinum, iridium, palladium, ruthenium, rhodium, and osmium. George Starkweather is superintendent.

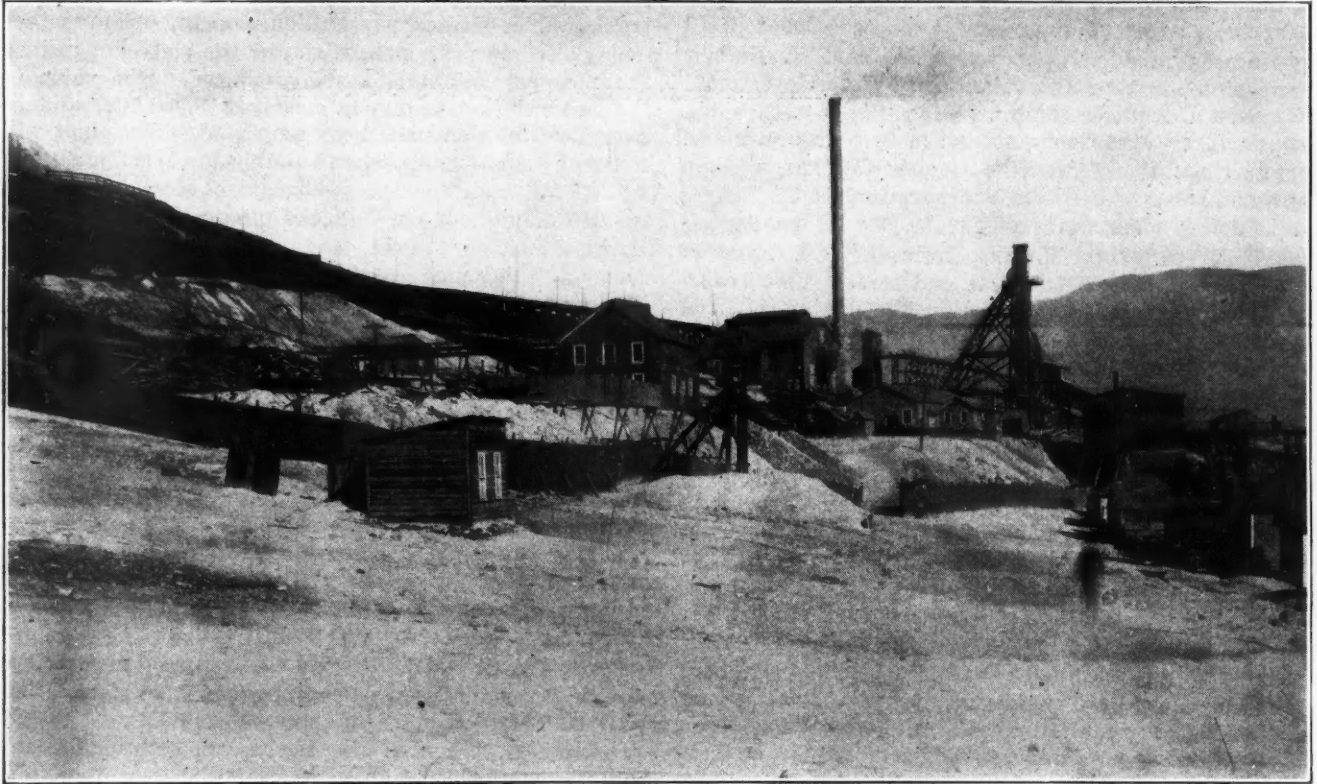
With the S. S. White Co., the refining of precious metals takes up only a small part of the plant. The raw materials handled in this department, of which Frederick A. Johnston has charge, are gold bullion and dental scrap, and platinum ore, ingots, and dental scrap. Visitors are admitted to the works as a whole on application to the Philadelphia office.

New York can hardly compete with Pittsburgh as a steel center, but the Crucible Steel Co. has a plant (the Atha works) of no mean proportions at Harrison, N. J., across the Passaic River from Newark. The steel-making equipment includes several crucible furnaces, an acid and a basic openhearth, and a five-ton Heroult electric furnace. The C. Pardee Works, at Perth Amboy, has two 25-ton and two 50-ton basic openhearth furnaces; and Heller Bros Co., in Newark, has a 30-pot crucible melting furnace. The Chrome Steel Works, a large plant at Chrome, N. J., is well known as a manufacturer of "Adamantine" chrome steel for the wearing parts of mining and milling machinery.

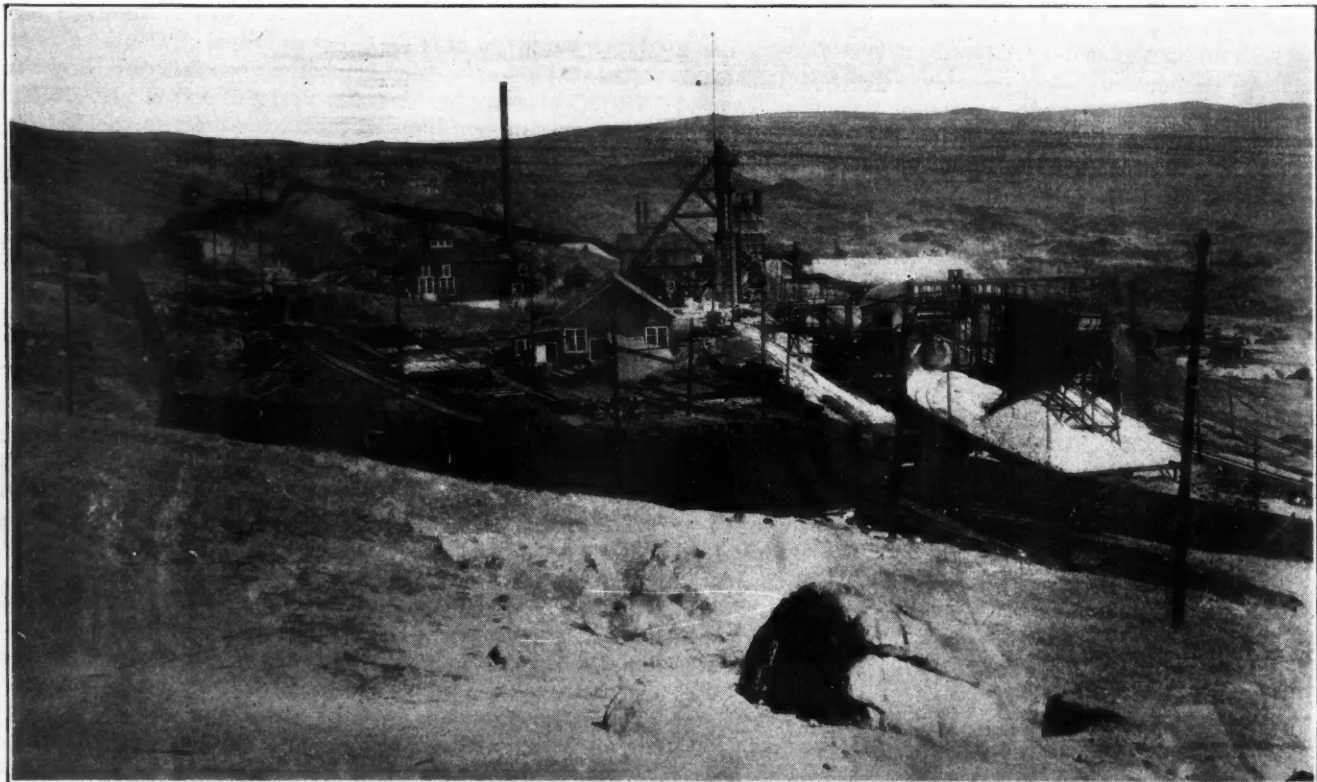
The New Jersey Concentrating Co., J. J. Haesler, superintendent, has a magnetic concentrator in Jersey City for treating wolfram, chrome, zinc, and similar ores. The laboratories at the Columbia School of Mines might also be mentioned as a place where the visiting mining engineer or metallurgist will feel at home. The metallurgical laboratory is particularly complete.

Many mining schools include New York in their student trips, as it offers an unusual opportunity of mingling the bright lights with latest metallurgical practice. The companies whose names have been mentioned by no means exhaust the list of those which are engaged in the metal industry near New York. Those works whose principal business is the alloying and fabrication of metals for industrial purposes have been purposely omitted.

Mines in the Butte District



THE PENNSYLVANIA MINE OF THE ANACONDA COPPER CO. HAS A 2,800-FT., THREE-COMPARTMENT SHAFT *Photo by Schoettner Studio, Butte*



BADGER-STATE SHAFT, THROUGH WHICH THE BADGER STATE, JESSIE, EDITH MAY, EMILY, AND OTHER VEINS ARE DEVELOPED. *Photo by Schoettner Studio, Butte*

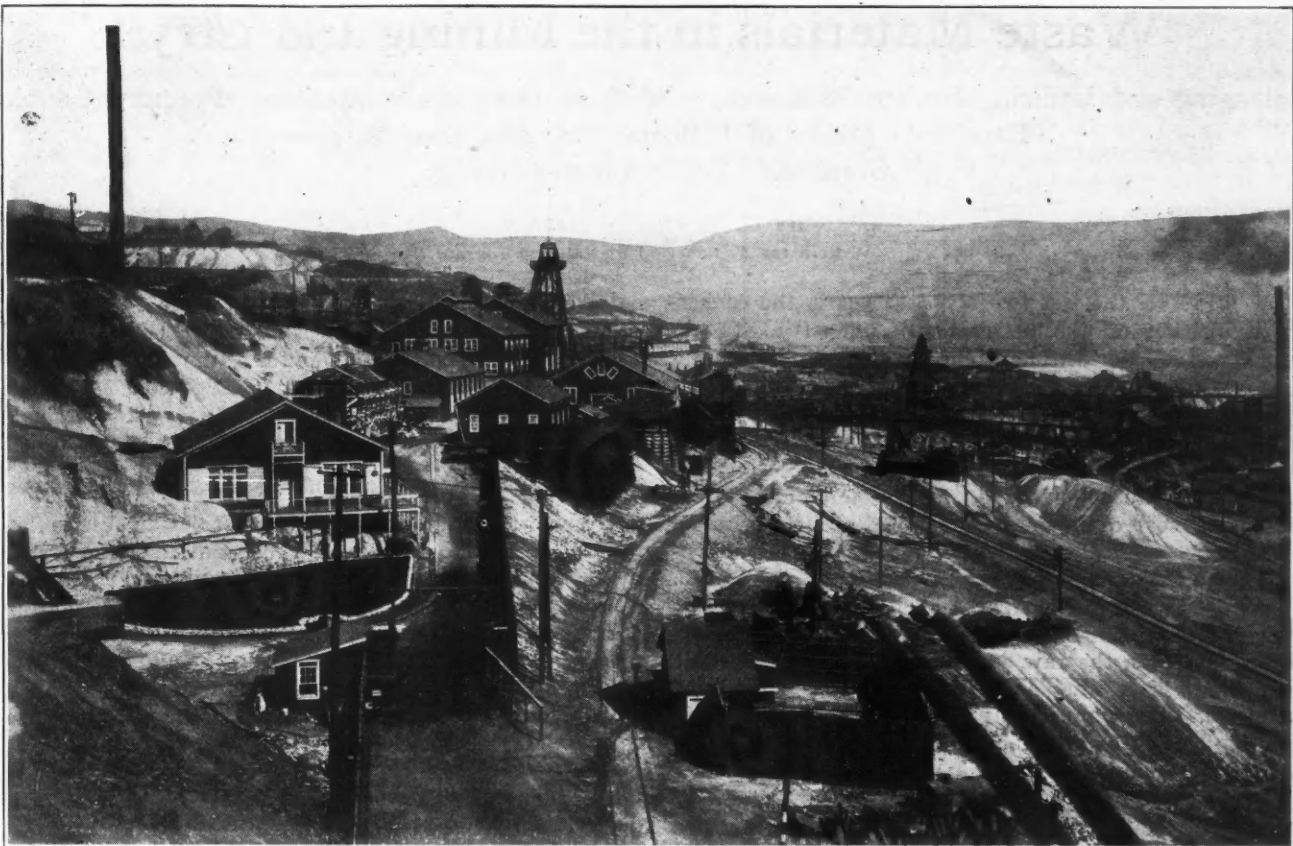


Photo by Schoettner Studio, Butte

SURFACE PLANT AT THE TRAMWAY SHAFT INCLUDES BOILER AND ENGINE HOUSES, CARPENTER AND MACHINE SHOPS, OFFICE BUILDINGS, WAREHOUSE AND CHANGE HOUSE



Photo by Schoettner Studio, Butte

HOISTING AT THE ANACONDA IS BY EIGHT-TON SKIPS, SWUNG UNDER DOUBLE-DECK CAGES AND WORKED IN COUNTER-BALANCE

Waste Materials in the Mining Industry

Salvaging and Utilizing Broken Machinery—Working Over the Scrap Piles—Foundry Cupola
Excellent Means of Utilizing Iron and Steel Scrap—
Systematic Collection and Storage

BY G. TOWNSEND HARLEY

Written for *Engineering and Mining Journal*

WITHIN the last two or three years, the conservation of the materials of industry has received world-wide attention. The rapidly diminishing supply of domestic natural resources is forcing upon the people of the United States the realization that to waste material, whether in the raw form or as scrap, is an industrial crime and should be stopped. Not only should all waste be saved, but, on account of the ever-increasing cost of labor, due to its scarcity, as much use as is economically possible should be made of all supplies, once they are put on the market as raw products.

During the war, the War Industries Board of the Council of National Defense asked all users of materials to conserve both the raw supply and the scrap, so that more might be available for the excessive demands of the world. The manufacturers were asked to sort their scrap as closely as possible under the conditions existing at their plants, and to ship it regularly to convenient markets. As an indication of the advantage of sorting material, it is sufficient to state that a mixture of cast-iron borings and machine-shop turnings brought \$3 per ton less than when either of these materials was shipped separately. The American Iron and Steel Institute made a canvass of the country, acting for the War Industries Board, to determine the scrap resources of the United States, so that an organized effort could be made to bring this class of scrap back into service, and users would know whence, and in what quantities, their supplies would come.

DEVELOPMENT OF SALVAGE DEPARTMENTS

Industrial plants in the manufacturing sections of this country have so organized and developed their salvage departments that nothing that has been discarded in the shops goes to waste until a careful effort has been made to put it into use again, or to sell it in a profitable market.

In the larger plants, separate buildings have been provided in which to take care of the waste byproducts. These buildings are equipped with trackage systems, both narrow and broad gage, and overhead traveling cranes, for the recovery of material and for shipment loading. There is also an equipment of metal shears, presses, cutting and bundling machines, furnaces and melting pots, and the necessary small tools, such as vises, wrenches, and saws, which are needed in taking apart and preparing materials for shipment to foundries and dealers. Outside of these sheds, the yards are laid out conveniently with tracks, platforms, roadways, and cranes, so that heavy materials and castings can be stored awaiting disposition. In the plants of the smaller manufacturers, sections in one of the shop buildings have been placed at the disposal of the salvage crews, and none of the work is done by hand. The number and kind of tools are, however, dependent in each case on the amount and kind of waste material handled. The

total amount of the byproducts produced in this way, from what had, only a few years before, been considered as worthless scrap, has amounted to hundreds of thousands of tons each year, and one large concern in the East has salvaged more than 40,000 tons of material per year for the last two years.

THE SALVAGE PROBLEM AT A MINE

Despite the fact that these conditions have been in existence for a considerable time, and that the larger manufacturing concerns find the salvaging of their piles a profitable side issue, comparatively few of the mining companies of this country have seen fit to look into the matter to see if economies might result. At nearly every mine there is to be found a large scrap pile which contains everything which has ever been discarded. It includes old engines, hoists, and pumps, down to scrap timber, track spikes, and machine-shop borings and turnings. As a rule, the history of the plant can be traced in the waste pile, through all its changes in mining and milling practice, enlargements and improvements, and abandonment of certain parts of plant or of certain types of machinery. The amount of money that can be made out of the ordinary mine scrap pile is certainly not realized; otherwise one would not see the quantity of material lying around that disfigures nearly every mining camp in the West.

The objection is raised that mining camps differ from industrial plants to such an extent that salvage is not practicable. To a large extent the conditions are different, and the mining camps will always find it harder to make a salvage crew show a profit, but it is by no means impossible. The objections that are heard are: (1) Many camps are a long way from a railroad, and the cost of the haul would seriously eat into the profits. (2) Many mines are so small that the amount of scrap made does not warrant its being sorted, except perhaps at long intervals. (3) Even when railroad facilities are close to the camp, the nearest dealers and foundries may be so far off that freight rates are prohibitive.

Any of the above reasons may be valid at times, but, on the other hand: (1) Even in the smaller mines, the amount of material that may be picked out of the scrap heap, repaired, and put back into use in the same mine will, in many cases, more than pay for the labor involved, besides cutting down the supply bill materially. (2) When there is more than one mine in a camp or district, it might be possible to send all scrap made to a central salvage plant, supported by the various companies, from which shipments could be made, and credit given to each company according to the amount it sends in. Any material that could be re-used would be put in good working order and sent back to the mine from which it came, a charge being made for repair, labor and supplies. (3) When there is a foundry in the camp, or in some near-by town, the

scrap problem is solved, and there is a ready market for the material just where it is made. (4) Many of the larger companies, especially those having their own smelting plants, have cupolas to which scrap can be sent.

Machinery—Old hoists, engines, pumps, motors, fans, blowers, crushing plants, rolls, fine-grinding mills, tables and vanners, and similar antiquated or useless equipment which has been taken out of service should be put in first-class condition, painted and all working parts heavily oiled, to prevent rusting, and stored in a covered space away from the weather. All spare parts should be packed and stored with the machinery. Some of this machinery may be of use to the company in the future, but in case it is not, it should be listed and advertised for sale. If there are branch companies, lists of available machinery should be distributed among them so as to avoid duplication and purchase of new when old materials are available.

Hoisting Equipment—Cages, skips, buckets, hoisting cable, sheaves, and other complementary equipment can be cleaned up, repaired, painted, and stored. Time after time I have known of new material being bought for use at some outlying prospect, when, if old material had been cared for and properly listed, merely the expense of moving and setting up would have been incurred.

Churn Drill Supplies—Churn drills, bits, stems, cables, rope, and other tools are to be found scattered about all over a property which is being drilled. The average churn-drill foreman does not for a moment consider the value which material may have to future users, and consequently when he is through with a hole, anything that is not immediately needed in a new place is left behind. As a rule, when once left behind, it stays behind, and becomes so much wasted material. Just recently a trip was made over a property where there had been extensive churn-drill work, and in that trip thousands of dollars in supplies were seen which had been used, broken, and thrown away down the hillside, regardless of how little was needed to repair the parts and put them back into service, or of what the scrap value of the steel would have been. Near where one drill had been working, over 500 ft. of practically new $\frac{3}{4}$ -in. steel cable, in one length, had been thrown on the ground and left behind, no attempt having been made to reel it up and treat it to prevent rusting. All churn-drill supplies, when not in use, should be brought to a central station, or to the salvage plant, where they can be inspected and repaired, or sent to the junk dealer.

Pipe—Air, water, and ventilating pipes and fittings should be inspected by the salvage man, straightened, the rust and dirt scraped off, the battered ends of the pipe cut off, and the new ends re-threaded. The pipe should then be painted and stored, ready for use again. The reclamation, re-threading and painting of old pipe and fittings is a large item at a mine of any size.

Track—Rails, splice bars, track bolts, spikes, frogs, switches, and like parts should be taken out from underground as soon as they are torn up. When a drift is of no future value, and in places where acid waters would corrode the track before it will be used again, the track should be taken up at once. This also applies to pipes and fittings. The rails should be straightened, scraped free of dirt and rust, painted, and stored for future use. Splice bars and bolts are cleaned and

saved, and track spikes can be pulled from old ties, and if not too badly bent or corroded, are put in kegs and used again. Frogs and switches can be put into good working condition by, in many cases, simply changing a point or a small section of rail. If too badly worn, they should be taken apart, any usable material saved, and the remainder thrown in the scrap pile.

Mine Cars—When mine cars are worn, the cast wheels can be broken and sold as scrap. Bearings of babbitt can be melted into bars and re-used. Brass bearings can be machined and re-used on other work, or sold as old brass, and roller bearings will probably go as steel scrap. In many cases the housings for roller-bearing wheels remain in excellent condition after all other parts are worn out, and these may be salvaged and used with other new equipment. Car trucks, as a rule, can be re-used after a slight amount of repair work. Car bodies, which are usually badly worn, can be dismantled and the angles and sides put to some use. The sides of a mine car, when cut to shape, make good bases for mine-track switches. If not large enough for other use, washers can be cut from scraps of sheet steel.

Mine Timber—An enormous amount of timber can be salvaged from mines in which it is used, if care is taken to see that all which has served its purpose is removed immediately to prevent its being covered up with caved ground or filling, and before it has had time to decay. The possibilities which exist for recovering timber which is standing in place underground are great, but have not been fully utilized. Timber which has been broken on one or both ends can be cut into shorter lengths and re-used. As an example: Nine-foot posts and caps used in top slicing can be cut into 6, 7 or 8-ft. lengths and used as tunnel caps, braces, raise cribbing, or tunnel posts. Old spillings can be cut into wedges in a wedge cutter, and old flooring and lagging can often be re-used many times underground before it is too badly broken or worn.

Tin Cans—In a camp of 4,000 persons, the tin cans thrown out in the course of a month will weigh about 13,000 lb. If there is a mine-water precipitating plant in the camp, the cans are probably sent directly to it; if not, they are carried to some canyon and dumped into a pile. Tin cans are of value; they can be flattened out, baled in a special machine, and sold at a good price. If enough cans are accumulated weekly to warrant the expense, the solder can be melted out of the joints and poured into moulds before the sides and ends of cans are baled. The solder could be used on the job or sold. When tin cans are thrown into precipitating plants, the solder in the joints is not affected by the acid waters, and is removed from the launders at intervals, with the fine particles of scrap. If this solder-bearing scrap is then put into a special box or launder, so that strong acid water will percolate through the mass, still more of the scrap iron may be removed, after which the solder may be recovered by melting in pots.

Waste Paper and Rags—The waste paper that is thrown away or burned each week in a camp of 4,000 persons amounts to thousands of pounds. When unsorted, paper does not bring a large price, as it is paid for on the basis of the lowest grade of paper in the bale, but when carefully sorted, the higher grades yield good returns. Not nearly so much rag scrap is made, but in the course of time, especially if it is properly sorted, it should amount to enough to ship profitably.

One man, working with a paper-baling machine, should be able to sort and bale several tons of scrap and rags in a day.

Miscellaneous Materials—Old iron and steel scrap, in sizes unsuitable for further use, should be sorted and broken to proper size for cupola or smelting-furnace charging. It is then stored until enough has accumulated to make a shipment. If there is a precipitating plant near by, all suitable material would be used in it.

Old brass and copper have a high salvage value per pound. Brass to be saved would consist of valves, bearings, oil cups, old lamps, door knobs, brass trimmings, brass chips, tubing, and other such parts. Copper to be saved would consist of trolley, field and heavy armature wire, (not tangled), copper plates, clippings, borings, and tubing.

There are machines on the market for extracting the oil from old waste and cleaning it so that it can be used again. Cutting oil can be profitably extracted from machine-shop floor sweepings, when in sufficient amount. A ton of cuttings will yield a barrel of oil, or more. Lubricating oils can be filtered, mixed with new oil to bring them back to a good condition, and re-used where low-grade oils are suitable. Babbitt metal and solder should be melted into bars and re-used. Rubber and leather scraps can be sorted and sold.

To obtain an index of the benefits derived from the work the actual cost of salvaging cannot be compared with the actual selling price of the salvaged material. In many cases the direct cost of reclaiming material may be high, and consequently the profits from sales will be low or may even disappear altogether, and yet salvage work might be a desirable feature of the plant operations. If a lot of material can be saved and put back into use, there is a saving in the buying of new material, usually at a much higher price than the reclamation of the old material costs; freight, transportation and handling charges are saved, and that much more material and labor is released for perhaps a more important use; not to mention the importance of relieving the railroads and other transportation systems of unnecessary freight tonnages. In general, if a salvage plant will save enough to pay back the investment over the life of the mine, and return an income, however small, it should be maintained for the indirect benefits that will accrue not only to the particular mine but to the country at large.

One instance, however, of a mine salvage plant making large direct profits was at a mine producing 1,500 tons of ore per day. The shed and equipment, which consisted of a forge and hand tools only, cost the company about \$1,200. Two men were steadily employed, who handled only the material which was taken out of the mine. No material was sold during the period under discussion, the men devoting their entire time to recovering and repairing only such material as could be used again underground. Considering the salvaged material to be worth half of its original purchase price, although in many cases the actual value was considerably above this, the salvage department netted an average of \$180 per month, or 180 per cent per year on the investment. A larger plant, costing \$3,000 or \$4,000 and employing four or five men, which would have sorted and repaired all waste material made in the camp, and disposed of it to the best advantage, would have made no such percentage of profits, but the volume of business would have been two or three times larger and a com-

fortable income returned on the original investment.

It is desirable that salvage work be handled systematically, and that proper credit be given to each person or department sending material to the salvage shed. A card-index system should be installed and a record kept on all materials salvaged, so that at all times up-to-date knowledge is available showing what second-hand supplies are in stock and ready to be issued.

A record should be kept of all materials that are received at the central salvage shed from the various departments, and when these materials are sold or used by another department, the department sending them in should be credited with anything received above the cost of salvage, shed operating, repair parts, hauling, supply operating, freight, or other charges. If the various departments were given credit in this manner for any materials saved by them and sold at a profit, a keen rivalry would soon spring up and there would be much less wastage of raw materials.

If the volume of waste thrown out in the homes in the camp will warrant the expense, a regular collection of such materials can be made, and a small price paid to the inhabitants for the various classes of scrap. This would cause everyone to take an interest in the plan, and would be a great factor in keeping a camp clean and pleasing in appearance.

The supply house would be the logical place to keep the card-index system, for it can then be put to constant use, and, whenever requisitions are presented for material, issues can be made as far as possible from the second-hand supply stock. The supply also has charge of purchases and sales, and is in a position to list, and to advertise for sale, machinery for which no further use is had at the plant, and to dispose of waste materials at the best current market figures. It would also be able to keep informed on what second-hand supplies other branches or companies may have which could be used locally.

Unless proper provision is made for systematic collection and storage of all waste material, the best intentions are likely to prove unsuccessful. Separate boxes should be set aside, properly labeled and conveniently placed in each department, for the various classes of materials made in that department. When full, these boxes should be removed to the salvage plant for future sorting and disposal. When properly managed, the equipment provided for the conservation of scrap, and the time and effort devoted to its accumulation and proper disposal, will prove not only directly profitable, but the indirect returns which will come from the greater care that will be given new material will certainly be of enormous value. Plants at which salvage work has been made a routine feature of operations have found this to be true almost from the beginning of the department's operations.

Prices of scrap material vary, depending on the supply and demand, and in different localities, depending on the nearness or remoteness of the sources of supply, so that all of the scrap made will not be salable at all times, and no figures can be given which would be of real value or generally applicable. There are a number of trade journals through which one can learn the fluctuations in the market values of the various classifications of materials, among them being the *Waste Trade Journal*, *The Metal Industry*, *Foundry*, *Iron Age*, and *Iron Trade Review*; and at least one of these should be in the files of every mining company.

Flume Suspension by Cables

Advantages in Regions Where Snowslides and Mudslides Are Incidents of Operation—Practical Construction Details

BY DOUGLAS LAY

Written for *Engineering and Mining Journal*

IT FREQUENTLY happens that a flume following the contour of a steep mountainside crosses the path of a snowslide or mudslide in a draw, and large portions of the flume are carried out whenever a slide takes place. Obviously, a constantly recurring bill of expense of this kind is not to be tolerated. The difficulty may be overcome in any one of several possible ways, depending upon the local conditions. For instance, by carrying the flume on trestles it may be kept sufficiently far away from the hillside, but, on the other hand, more often than not the trestles themselves are carried away by the slide. The best general solution appears to be to carry the water in a flume on a suspension bridge. To convey the water in pipes, either by trestle or suspension, is open to the objection that if the pipe line is to be run only partly filled, a pipe of excessively large diameter will be required, whereas, if the maximum carrying capacity of the pipe is to be utilized, a penstock will be required and a certain loss of head will be inevitable. It is of course assumed that the water is to be delivered into a flume on the other side of

Referring to Figs. 1 and 2, the nature of the place in question will be evident. On one side of the steep draw or gulch was a precipitous rock bluff, affording good anchorage for cables, and on the other side, out of the path of slides, was a good site for a tower. It was accordingly decided to anchor cables on the one side by eye-drifts in the rock, and on the other side to a deadman, the cables on the latter side passing over a tower through turnbuckles to the deadman.

The span was 200 ft. Four 1½-in. cables were sus-

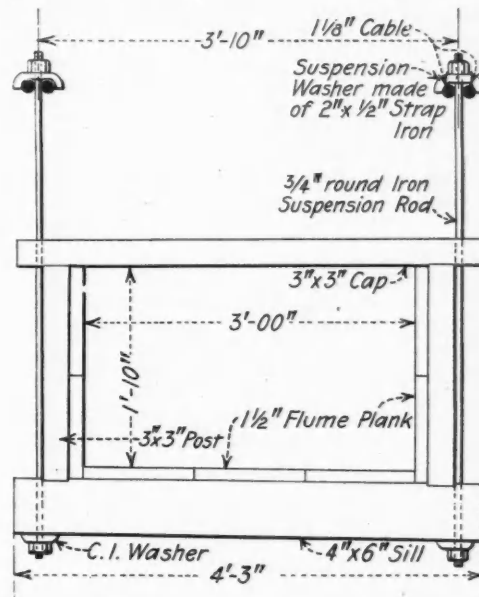
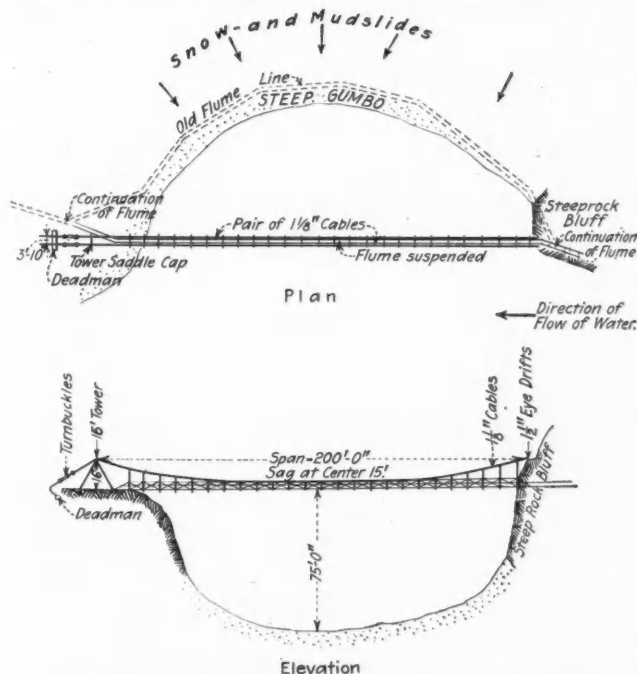


FIG. 3. CROSS-SECTION OF FLUME AND HANGERS



FIGS. 1 AND 2. CABLE SUSPENSION OF FLUME

the draw or gulch. Otherwise the continuation of the pipe line to the point of consumption might prove the best solution of the difficulty.

Some time ago I was in charge of a property on which a 3 x 2 ft. flume crossed a very bad spot, constantly swept by snowslides or mudslides. On one occasion about 200 ft. of flume was carried out and I was compelled to make repairs in the shortest possible time, with such material as was available on the ground or could be procured at short notice. It was decided to suspend the flume by means of cables, so that it would be quite untouched by further slides.

ended in two pairs, the distance between the pairs being 3 ft. 10 in., and the distance between the members of a pair 4 in., this being as close as it was practical to get the cables and at the same time to secure individual anchorage for each cable.

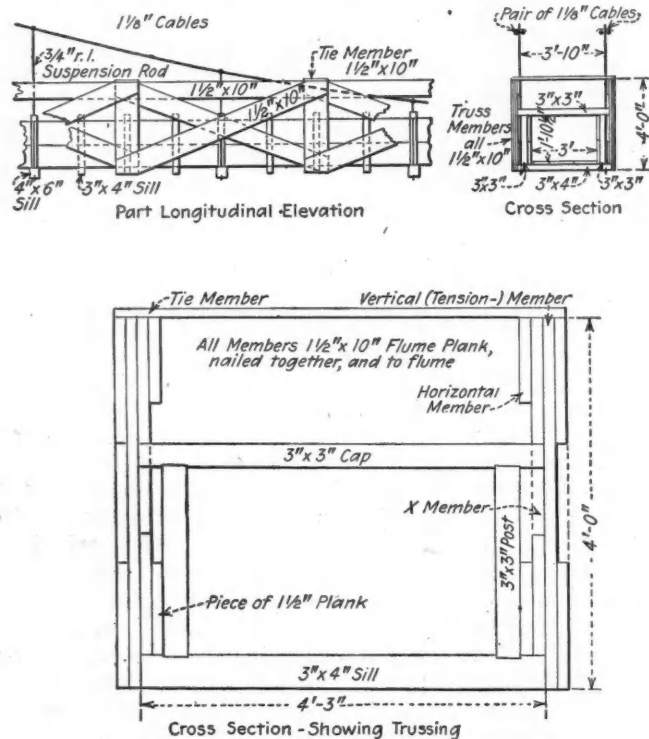
At one end, each cable was attached to a 1½-in. eye-drift 3 ft. long, leaded into a hole up to the eye. At the other end of the span cables were passed over a tower 16 ft. high, and attached to a deadman by turnbuckles, one turnbuckle to each cable, so that tension could be applied to each cable separately.

The flume was 3 ft. x 10 in. in the clear. Bents were placed on 2-ft. centers, caps and posts being of 3 x 3-in. stuff, lumber and sills 3 x 4 in. Every 8 ft., 4 x 5-in. sills were placed, to which ¾-in. suspension rods were bolted, hanging the flume to the cables, as illustrated in Fig. 3. Suspension washers were made of 2 x ½-in. strap iron. Cable clamps, on the lower side of washers on the steeper portions of the cables, kept the washers in position.

The total uniformly distributed load to be carried by the cables was 34,200 lb., composed as follows: Water, 93 lb. per running foot (depth in flume being 6 in.); lumber, 75 lb. per running foot; iron, 3 lb. per running foot; total, 171 lb. per running ft. The load to be carried by each cable was therefore 43 lb. per running foot. In this case the allowable tension of the loaded cables corresponded with a sag of 15 ft. at the center of the span, and the cables were therefore set at this deflection.

Owing to the fact that suspension considerably reduced the original length of the flume, the grade was correspondingly increased, the depth of water on the suspended portion was therefore less, and the velocity greater than at other points, which facts, as tending to reduce the load to be carried, are all in favor of suspen-

sion. Despite the fact that the calculated depth of water on the suspended portion was only 6 in., it was decided to make the height of the flume the same as at other points, not only having regard to any possible greater future requirements, but also to take advantage of the trussing effect of the sides. It was also evident that further trussing would be necessary, and inasmuch as there was abundance of flume plank (1½ x 10 in.) on the ground, it was decided to make a truss of this material, rather than wait until more suitable material could be procured, time being, as is usually the case, of great importance. The trussing adopted is shown in Figs. 4, 5, and 6. All truss members were nailed together and to the flume. After suspension of cables, construction proceeded with great rapidity, the flume being built in 16-ft. sections, each section being run out along the cable as soon as built. When the flume



FIGS. 4, 5 AND 6. DETAILS OF BUILT UP TRUSS

was finished, a slight crown, amounting to 6 in. at the center, was put in, and then the flume was trussed from end to end.

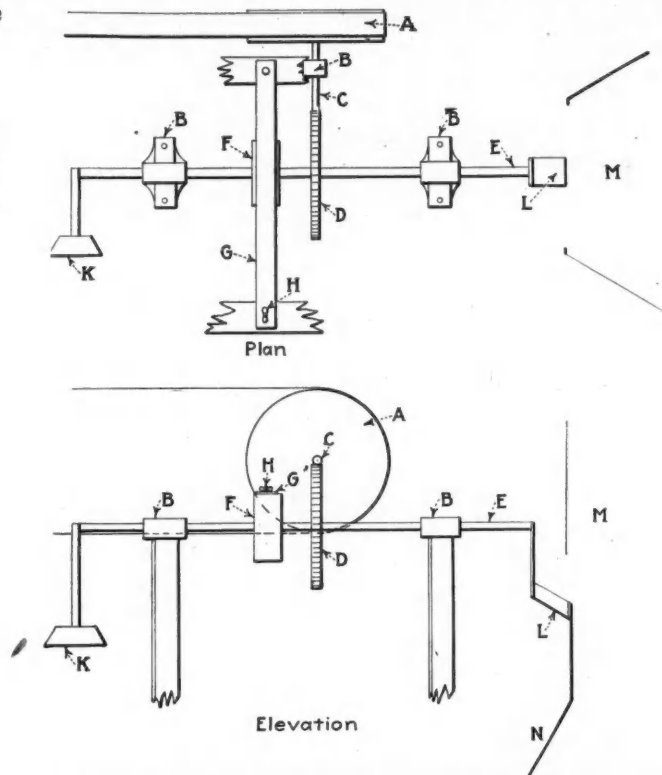
The completed job was highly satisfactory, and no further trouble was experienced at this point. Attention is drawn to the high importance of adequate trussing, otherwise any local sagging of the flume will increase the load of water at this point, and the cables will respond to the increased load by local deflection, which will still further increase the load of water, the process going on until relief is afforded by an overflow of the flume at this point. In such a case no water will pass to the outlet end of the flume, and it will be obvious that an element of danger may be introduced. It is to be noted, in this connection, that though the exigencies of the particular case described did not permit of other than an improvised truss, it is highly advisable to devise a more scientific truss, of suitable material, than that described, even though the latter served the particular purpose for which it was intended and required only a reasonable outlay of capital.

The Cornwall Automatic Sampler

BY FREDERICK W. FOOTE

Written for *Engineering and Mining Journal*

The sampling device designed and built by William Cornwall, mill superintendent for the Smuggler Leasing Co., Aspen, Col., has so many clever points that I feel that it is worth describing. This sampler is used in the stream of the mill feed, and receives material that has previously passed through rolls set with a ¼-in. opening. As shown in the accompanying plan and elevation sketch, the sampler is composed of the following component parts: A, drive wheel; B, bearings; C, worm shaft and worm; D, worm gear; E, cutter shaft; F, clutch and brake; G, brake; H, tension screw; K, counterweight; L, cutter; M, ore bin; N, sample bin.



DEVICE FOR SAMPLING ¼-IN. MILL FEED

The operation of the sampler is as follows: The revolution of the drive wheel, A, causes the turning of the worm shaft, C. This, engaging in the worm gear, D, causes it to rotate. The cutter shaft, E, passes through the worm gear, D. The wheel, F, is fastened to the cutter shaft and is engaged by a pin on D, for a period sufficient to throw the cutter, L, across the path of the ore. The arrangement of the cutter, pin and counterweight, K, are such that the normal progress of the worm gear carries the cutter shaft around until just before the cutter is to enter the stream of ore. At this point the pin engages and the counterweight throws the cutter across. The cutter shaft is then engaged and the process repeated.

The cutter takes one cut every sixty-five seconds, or a 1 to 100 sample. The cutter is set at a slight angle to its shaft, so that in passing through the ore it takes a cut perpendicular to the flow. The brake beam regulated by a thumbscrew acts on the periphery of the wheel, F, so as to cause the action of the cutter to be retarded or accelerated as required. This sampler was made in the mill of the scrap material available.

Stories From a Laboratory

BY ALBERT R. LEDOUX

Written for *Engineering and Mining Journal*

ON APRIL 30, 1880, the laboratory of A. R. Ledoux & Co. issued its first certificate of assay; on the same day in 1920 our certificate number was 290,562. In these days of change it is not uninteresting to find a technical organization still operating under the same active head at the end of a period of forty years, and I suppose that it is partly for this reason that I have been asked to say something about what we have been able to accomplish for the mining or metal-selling industry, that being the industry with which we have been most closely in contact, and I take pleasure in complying—although with some hesitation, because considerable use of the personal pronoun will be necessary.

There was a time when American exporters were obliged to sell their rich ore, matte, and blister copper on European weights and assays. The so-called "Cornish" assays in vogue in Great Britain did not attempt to give the exact amount of copper which the material contained, but professed to imitate in the laboratory the process then in vogue in smelting and refining, and the figure reported by the assayer was called the "produce." It inevitably showed less copper to be paid for than the material actually contained.

The system of weighing in Great Britain likewise was for the benefit of the buyer, and, in addition, a so-called "draft" of 3½ lb. per hundredweight was deducted. Moreover, the settlement sheets, which came with the ultimate payment after long delay, were most complicated, based among other things as far as ore was concerned, not upon the ton of 2,000 lb., nor yet upon the ton of 2,240 lb., but upon a ton of 2,352 lb. Then there were deductions for "master portorage," "dock dues," "town dues," etc.

SENATOR CLARK'S PROTEST AGAINST ENGLISH ORE SETTLEMENTS

There came a time when Senator W. A. Clark, who had been shipping copper matte to Liverpool and Swansea and accepting the English method of settlement, grew tired of the delays and deductions and uncertainties, and sent a cable to James Lewis & Son, of Liverpool, refusing their tender for his product on the usual terms, offering as a counter proposal that settlement should be completed in New York on the assay of my firm. I remember that the cable ended with these words: "I will no longer submit to the robbery of English terms and conditions."

I had personally made the acquaintance of James Lewis and of his son, Arthur Hornby Lewis, of this very old metal firm, and they were disposed to make an experiment, and, greatly to the disgust of other British buyers, entered into a contract with Mr. Clark to buy 3,000 tons of his matte and to settle for it on American weights, sampling, and assay. That was the entering wedge, but neither other American producers nor my own efforts could persuade the large buyers of Swansea to take what they considered this risk. The late Lord Swansea, then Sir Hussey Vivian, told me with indignation that it had been the custom to settle on their assays for one hundred and fifty years; that I would never live long enough to see any of the Swansea smelters, or

anyone other than Lewis, submit to a change in this system, and that my efforts in that direction were absolutely wasted.

RESTRAINING ORDER PREVENTS COMPLETION OF McDERMOTT ASSAYS

A year or two after that, Billy McDermott, of Butte, sold about five hundred tons of rich copper ore to a firm of buyers in New York. He was to be paid on the weights and assays of my firm, and came on here to be present at the sampling and to get his money. We had to sample the ore on the dock, as it was unloaded in bags from the steamer which had brought it from a Western port around the Horn. As fast as we could finish the weighing and sampling the material was delivered to a tramp steamer bound for Swansea, where it had been resold on English terms.

We began reporting the assays of each small lot into which we had subdivided it for sampling, when, to my astonishment, we were served with a court order restraining us from completing the assays and ordering us to deliver all the samples into the custody of the court. On asking my lawyer to ascertain on what the court had based this injunction, I found that it was charged that our results were much too high; that McDermott was known to have been present on the dock and to have watched the sampling, and intimations were made that possibly he had influenced the samplers or the assayers or in some way brought it about that the figures which we would report should be too high.

With my lawyer I called upon the New York firm, and its members begged me to keep quiet. They said that McDermott was here and needed the money; that they could settle with him without the use of our assays; that they would pay us just what we would have received had we continued the assay and would pay my lawyer his fee for advising me in this matter. I declined to let the matter stand in that way, stating that our reputation was our capital; that it had been publicly attacked by this court action; that we considered ourselves trustees as between these people and the owner of the ore.

I made a counter proposal to the effect that we should be permitted to complete the assays of the samples drawn, that I should send our chief assayer to Swansea, who by taking a fast steamer could arrive ahead of the tramp; that the material should be resampled on arrival—jointly by our man and the representative of the Swansea purchasers, who in turn should select a third assayer of reputation, preferably from London or Liverpool; that after this sampling was completed the material should be assayed by the electrolytic method—preferably in London. If the results of this sampling showed that we had made an error in our New York sampling or assay I would incur the expense of the investigation and have nothing further to say about it. If, on the other hand, the Swansea sampling and assaying should prove the correctness of the American figures, then the New York firm should pay all the expenses of the investigation and should settle with McDermott on my original assay certificates. After

demurring considerably, but to avoid further trouble—for which I was ready—this firm consented to such an arrangement and signed the necessary agreement.

Our representative arrived at Swansea ahead of the cargo, and, fortunately for us, he talked rather freely, so that when the material arrived all Swansea was watching the sampling operation and was on the *qui vive* to know how the results would come out. Fortunately for us, they confirmed the New York assays, and the various Swansea buyers began to say, "Why, these Americans do know how to sample and to assay after all!" and one and another quickly followed the example set by James Lewis & Son and began buying on our assays.

Through this fortunate chance we had at first a practical monopoly of the sampling and assaying of furnace products for export, and with the establishment of our mechanical sampling plant in Jersey City this business greatly increased.

FRENCH CONVERTED TO AMERICAN ASSAYS

While all the British smelters and refiners fell into line, as stated, and purchased and paid in New York for such material as they required, on Ledoux & Co.'s assay, and the Germans followed suit, we had not succeeded in persuading the French buyers to settle on American assays; but a fortunate accident brought this about. At that time the late M. Secretan was organizing a syndicate to control the copper of the world, his agents in New York being a well-known firm which for many years had handled iron and steel particularly. I was about to go to Europe, and one of the partners in this firm said that a French correspondent, M. Secretan, was bombarding them with questions about copper for some reason that they did not understand, and they would be obliged if I would call on M. Secretan with a letter of introduction and explain to him the American situation so far as I could.

I was very busy in Paris and delayed calling until the day before I was to leave for London. Had M. Secretan been out I would have felt that I had an excuse for not having met him; but he was in, and questioned me for an hour or more on the relative grades of refined copper in this country, on the output of our various mines, and related matters. He then said: "Mr. Ledoux, I am about to undertake a very big transaction the result of which will mean the control of the copper of the world, making Paris the headquarters for trading in this metal rather than London, but I must have different agents in America. These friends know all about iron and steel, but I have had a recent experience with them which shows me that they are not posted in copper. I asked them at what price they could secure for me a quantity of copper which would be the equivalent of the English 'best select.' It seems that they made inquiries and were told that the characteristic of this grade was that it would make yellow metal which would roll, but they purchased for me from the Baltimore Copper Works an ordinary casting grade of copper on the solemn guarantee that it would 'make brass'! When it arrived it was useless for my purpose. Now, you see I must have an agent thoroughly up on such matters and I offer you the agency. I will guarantee that your commissions will amount to far more than you can possibly make in your assaying or consulting business, and I beg of you to accept."

I said to him: "M. Secretan, your offer is very flattering and tempting, but you forget that I owe the pleasure of your acquaintance to a letter of introduction from your present agents, and I could not possibly use it to supplant them in the agency." In spite of his further urging I was firm.

A day or two afterward the late Theodore Morrison called at my hotel in London and explained that he had met Secretan in Amiens by appointment and they had talked half the night about the American agency. Mr. Morrison told me more of the details of what M. Secretan proposed and offered to have his nephew come to New York and enter my firm to take charge of the international copper business, in case I needed someone more familiar with European trade methods than I at that time was. I was still firm in my refusal, but soon after reaching New York M. Secretan's agents called upon me and stated that the former had written them fully of the honorable position which I had taken and urged them to make some business connection with me by which I would advise them, if they needed advice, and had put into all his contracts for unrefined copper products the clause that he would settle for them in New York in cash, provided the sellers secured Ledoux & Co.'s certificate of sampling and assay.

This condition compelled us to enlarge our sampling plant in New Jersey, and as long as the syndicate lasted we did an enormous business, for although some shippers might have preferred some other assayers to get the advantage of American settlements, they were obliged to put the material through our works.

FAILURE OF THE SECRETAN SYNDICATE

Toward the end of this attempt to corner the world's supply, copper matte began to accumulate in our works, not being ordered out, until we had 7,000 tons in storage. M. Secretan's failure was precipitated by the suicide of one of the directors of a French bank which had been backing him, and for a long time nobody dared admit that he had an interest in the ownership of this lot we were storing, but at the end of seven years our warehouse certificates were returned to us covered with endorsements of French, German, Dutch, and English banking houses, and the material was ordered exported.

This brings me to say a word about the establishment of our sampling works. In those days there was a railroad "pool" with headquarters in Chicago, which arbitrarily divided east-bound shipments among different roads, so that, no matter how the material was billed when originally shipped, it might come into New York by any railroad or to be divided between two or more roads. Being uncertain as to where we had better locate, I sought the advice of James M. Hill. He stated that the Erie was preferable, as some shipments came by way of Buffalo; and that the Pennsylvania or New York Central was his next choice. When I called upon the officials of the New York Central its officers said that my proposal to locate on their line did not interest them; that I could do as I chose, but they could not promise me any facilities.

ERIE COURTESY SECURES SAMPLING WORKS SITE

The Pennsylvania people were more courteous and offered us a site on their line, beyond Newark, and promised to stop any cars which were to be sampled at these works and to continue the transportation after

we had finished with them. George H. Valliant, of the Erie, said that they would give us a site on their road, advising us, however, not to locate too far away from any other line; that while under his administration we would be treated fairly, his successors might change conditions, and we might find ourselves compelled to cart material at expense from some other road. He put me in charge of his real-estate man, and we selected a site just outside of the Erie tunnel at Bergen Junction, Jersey City, within a stone's throw of two other railroads.

Mr. Valliant further stated that at that time they were tearing down their station in Jersey City, and if we could use any of the old material we were welcome to it, and, further, that if I would give them plans of our proposed works they would have the Erie carpenter gang build them for us, charging only the actual cost to the road. The works were thus erected cheaply and quickly; our annual rental was only ten dollars, and our contract provided that all cars containing material to be sampled by Ledoux & Co. should be stopped at Bergen Junction, unloaded by us, and when ready could be reloaded on cars which the railroad would provide, and go forward to destination under the original bill of lading. Nothing was said about how long we might keep the contents of cars.

When the successors in ownership of this Secretan matte finally ordered it out, after seven years, we simply notified the Erie railroad to send us empty cars, and they completed the haul to Jersey City and the lighterage called for on the original bills of lading, without extra charge. Of course the road profited by this, because we were handling most of the copper products at that time exported in an unrefined form, so that the "pool" agent in Chicago was compelled to make the Erie the copper-carrying line; otherwise the cars could not get to our works without delay and switching charges.

Conditions have long since changed! Now comparatively little ore or other furnace product is exported in a raw form, and we are handling imported material from the ends of the earth, or were before the war stopped shipments at least temporarily.

New Plant Will Treat Blue Asbestos

BY OLIVER BOWLES

A circumstance of considerable importance to the asbestos industry has recently been noted in *Asbestos*, published by the Secretarial Service, 721 Bulletin Building, Philadelphia, Pa. During the years 1915 and 1916 considerable "Cape Blue" asbestos was imported into the United States to supplement the Canadian and Arizona supply. The crude fiber was treated in the same way as Canadian fiber, but in general the product obtained was unsatisfactory. Similar results were obtained when blue asbestos was first used in Europe. To overcome the objections of manufacturers, the Cape Asbestos Co., of London, England, the largest producer of blue asbestos, established a spinning plant, and demonstrated that the product is well suited for certain purposes, provided it is properly treated.

To build up a reputation for blue fiber in the United States, a new corporation, associated with the Cape Asbestos Co., and known as Asbestos, Ltd., has recently been chartered under the laws of New Jersey.

The offices are at 8 West 40th St., New York City, and the works are at Bound Brook, N. J. It is the purpose of this corporation to prepare all crude blue fiber for carding machines by a special process which it is claimed is more satisfactory than were the methods formerly employed in this country. The prepared fiber will be sold to manufacturers.

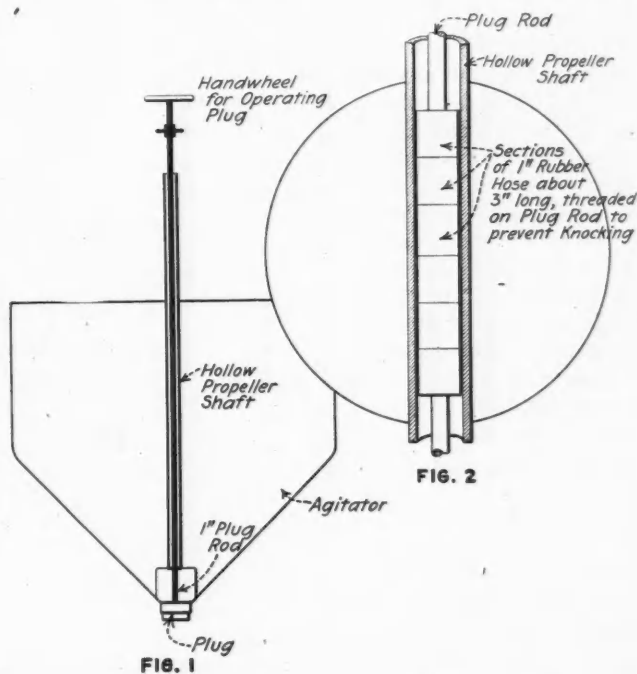
The establishment of this plant marks an important step in the development of a blue-asbestos industry in the United States. Although blue asbestos cannot be substituted for white fiber for all purposes, it is well adapted for certain purposes, and its wider use would tend to relieve the present critical shortage of Canadian crude.—U. S. Bureau of Mines, "Reports of Investigations."

Remedy for Knock in Hollow Shafting

BY DOUGLAS LAY

Written for *Engineering and Mining Journal*

Some years ago I was in charge of a cyanide plant where a conical-bottom agitator was in use, which had a central plug-bottom discharge. The plug rod passed



upward, through a hollow propeller shaft, as shown in Fig. 1. The plug was raised or lowered by operating a hand wheel, which engaged the threaded end of the plug rod.

To prevent the contents of the agitator from leaking during the cyanide cycle, it was necessary to screw the rod down fairly tight. This caused the rod to bend so that it touched the side of the propeller shaft, causing a violent "knock." This was remedied in the following manner:

The plug rod was 1 in. in diameter. Accordingly, a portion of old 1-in. rubber hose was cut into pieces about three inches long. These were slipped on the plug rod and pushed down within the hollow shaft, as shown in Fig. 2. The operation merely entailed taking off and replacing the hand wheel. The idea of having the rubber sleeve in short sections was of course to enable any section, in contact with the hollow shaft, to turn and so to minimize friction and wear.

Leaders in Metallurgical Practice

Edward Payson Mathewson

FROM Eva Tanguay to E. P. Mathewson is a far cry, but both have one characteristic in common to which their successes are largely attributable. Eva used to sing a song about "Personality" (perhaps still does), and it is this same thing which strikes every one who meets E. P. M.

"A pleasant (not to say a hilarious) time was had by all" is always the case when he was among those present. He knows how to tell a story so that the ensuing laughter is not forced; in fact he can say most anything and get away with it. At the recent meeting of the Canadian Mining Institute, he began his address by saying, "The C. M. I. is rotten," or words to that effect. Being a Canadian himself (born in Montreal in 1864) perhaps helped in this instance. Coming from a family of wholesale grocers, his great sagacity was first evidenced in 1886, when he realized that if he followed that business he might be accused of being a profiteer thirty or forty years later. Assayers take hope! for E. P.'s first real job, after graduating from McGill University, was in the laboratory of the Pueblo Smelting & Refining Co. He remained

with that company for eleven years, but he did not stay in the laboratory. Most of his time was spent in getting acquainted with the numerous idiosyncrasies of lead furnaces. His success at Pueblo attracted the attention of Ben Guggenheim, who made use of his experience and ability at several of the Guggenheim properties, Pueblo, Perth Amboy, Monterrey and Antofagasta.

Mr. Mathewson is most often thought of in connection with his work at Anaconda. He switched from lead to copper in 1902, and in June of that year began his work of making the Washoe plant the show-place of the metallurgical world. The blast furnaces first engaged his attention. Conditions were such that plenty of opportunity was offered for improvement, and the momentum thus established carried the Anaconda blast-furnace practice to a point which had not yet been touched by others. Several furnaces were combined end to end, making one, 87 ft. long, with its attendant economies. In making repairs, however, it was not

necessary to shut the whole furnace down; the night shift could sleep in one end while ore was being smelted in the other. The reverberatory department also received attention, and under his direction that method of smelting at Anaconda came into its own. While at

Anaconda he made a reputation as a good citizen as well as a metallurgist. He exhibited a lively interest in playground activities, holiday sports, the library, and especially good roads. Mr. Mathewson's pleasing personality brought results where others would have failed. Men were glad to do their best for him. They knew they would get a square deal. When the Mathewson family left Anaconda in the fall of 1916 the entire town turned out, brass band and all, in a demonstration of affection which will never be forgotten by those who took part. Most of us consider ourselves honored if only a friend offers his car to take us to the station when we leave. The next move was to Canada—back to the land of his birth—where Mr. Mathewson went to take charge of construction of the new plant of the British America Nickel Corporation. However,



EDWARD P. MATHEWSON

his stay with that company was comparatively short, for he was offered a position on the board of directors of the American Smelting & Refining Co. in New York, which he accepted in 1918. Only last fall he severed his connection with that company, and is now a free lance as a consulting metallurgist. Just at present he is spending a few months at Anyox, thus combining business with pleasure, this being known as the heated term in New York. About next fall look out for reports of improved Granby practice, or of an increasing scarcity of fish and game on the British Columbia coast.

In all of his undertakings Mr. Mathewson has been an advocate of publicity, and the thanks of the metallurgical world should go to him for the policy which he maintained while at Anaconda, of publishing valuable information and in opening the plant to professional visitors. That this policy pays well, both in making friends and in obtaining valuable ideas from others, cannot be gainsaid.

Assaying Quicksilver Ores

Details of Three Methods Used and in Part Developed
By the New Idria Company for Determining Mercury

BY RICHARD G. PLACE

Written for *Engineering and Mining Journal*

ALTHOUGH the old standard methods of mercury assay are familiar to all, little has been published on the modern practice. I give herewith the three methods in use at the New Idria Quicksilver Co's. plant at Idria, Cal., where more quicksilver is produced than in any other plant in this country.

The first method is known as the gold-ball assay, and is conducted as follows: 500 mg. of ore is weighed out, mixed with 500 mg. of calcium oxide, and put in a Jena glass tube of the shape and size of the one shown in Fig. 1. The mixing is done in a small mortar, and the mixture is injected into the tube by means of a small paper funnel. The side of the tube is then tapped with a spatula so that the pulp will pack down, below the offset, with a flat surface, leaving a space between the top of the pulp and the tube for the fumes to pass readily into the open chamber and condense.

The tube is held over the flame at a red heat for ten minutes. The position of the tube while heating is either horizontal or inclined with a slope downward toward the outlet. After the fusion has taken place, the tube is fused off smoothly at the bend. After cooling, about two inches of a solution of dilute potassium cyanide (10 grams per liter) is added, and two or three small gold balls are dropped into the tube. The cork is inserted and the tube is rolled and shaken gently. The balls are then removed and fresh ones inserted in their place, and the process is repeated until all of the mercury has been taken up. It takes about ten to twelve balls to complete the process if the amounts given below are taken.

The balls, when removed, are dropped into a porcelain parting cup about one-quarter full of distilled water. The wash water in the parting cup is now decanted, and the balls are rolled on a blotter and then dried in a Schiebler desiccator for about ten minutes. The balls are carefully weighed; then the mercury is

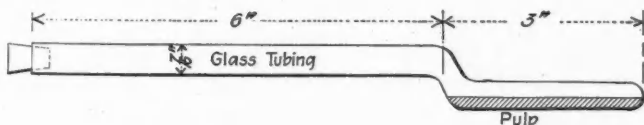


FIG. 1. MERCURY DISTILLATION TUBE

burned off, and they are weighed again. The difference of the two weights is the mercury content of the ore.

The amount of ore taken is decreased as it becomes richer in cinnabar. The following is a table that is adhered to as nearly as possible:

From a trace to 4 per cent, use.....	500 mg.
From 4 to 8 per cent, use.....	400 mg.
From 8 to 16 per cent, use.....	300 mg.
From 16 to 32 per cent, use.....	200 mg.
From 32 to 64 per cent, use.....	100 mg.
Over 64 per cent, use.....	50 mg.

Before using the gold balls, care is taken to be sure they have been amalgamated and ignited, so that they will be free from any mercury or foreign substance. The gold balls used for this work should weigh from 50 to 80 mg. each. This method is applicable to all ores.

The second method is almost that of Eschka (*Zeit. f. Anal. Chem.*, Vol. 2, p. 344) except for a slight variation. One gram of ore is weighed out and mixed with four grams of iron filings in a small porcelain crucible. A cover of filings is sprinkled over the charge. A sheet-gold cover of the shape shown in Fig. 2 is placed on top and the whole set in a ringstand where it is supported by a piece of wire gauze with a round hole for the crucible to set in and several layers of asbestos with similar holes. The wire holds the crucible in place and the asbestos keeps the heat on the lower part of the crucible only.

Now the hollow in the gold plate is filled with water and a porcelain casserole containing water is set on the top of the whole. This dish holds the cover snugly on the crucible and keeps the small quantity of water in the cover cool. Heat is applied for from ten to thirty

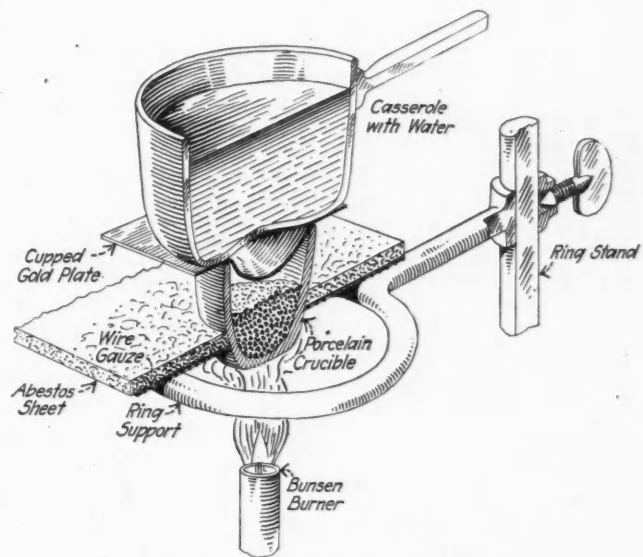


FIG. 2. CRUCIBLE RETORTING OF MERCURY

minutes, and during that time the water in the casserole is changed frequently. When the operation is complete, the water is blotted from the surface of the gold plate as much as possible and then complete drying in a desiccator is effected in a few minutes. The increase in weight in mg. of the gold plate gives the percentage of mercury in the ore. This method is used only for individual determinations such as mine samples or similar work.

The third method is a variation of Kriekhaus' volumetric assay. The initial steps are identical with those described in the first method, up to the point where the mercury is put in solution. In this method, instead of dissolving in cyanide, about 4 c. c. of concentrated nitric acid is added, and then this is washed into a beaker by means of a wash bottle. A reagent solution of potassium permanganate is then added, a drop at a time, until the solution has attained a permanent pink color. Then a 3 per cent solution of peroxide of hydrogen is added a drop at a time until the solution is colorless. About 5 c. c. of a standard solution of ferric ammonium sulphate, to which a few drops of nitric acid have been added, is now stirred into the solution for an indicator. The titration is performed cold with standard potassium thiocyanate which has been standardized against commercial mercury that is shipped from the plant.

The Ajo Test Mill

By C. A. METTE

Written for *Engineering and Mining Journal*

THE test mill which had been constructed for the treatment of the sulphide ores of the New Cornelia Copper Co., and for which David Cole, of El Paso, acted in the capacity of consulting engineer, was placed in operation in September, 1919, and the first campaign has been completed. The general practice was to crush to 1 per cent on one inch and grind in rod or ball mills in closed circuit to 1 per cent on 48 mesh, followed by flotation. Flotation tailings were classified, the slimes being discarded as final tailings and the sands tabled. The tables made middlings and final tailings, the former being returned to the grinding circuit. The flow sheet is shown in Fig. 1.

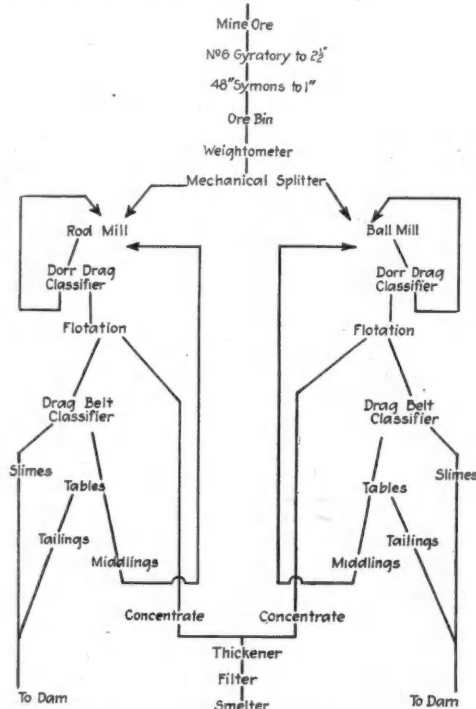


FIG. 1. AJO TEST MILL FLOW SHEET

The ore is clean, hard, monzonite-porphry, containing finely disseminated chalcopyrite. An analysis typical of the ore treated during the test run follows: Cu, 1.30 per cent; SiO₂, 68.3; Fe, 5.6; Al₂O₃, 10.0; CaO, 1.7; S, 1.5; MgO, 2.1; Fe₂O₃, 1.7; Ag, 0.084 oz.; Au, 0.0089 oz.

The flotation machines were of the Inspiration type. A unit consisted of a primary rougher of five cells, with an aerating surface of 44½ sq.ft., a secondary rougher of ten cells with an aerating surface of 88½ sq.ft., and a cleaner machine of five cells with an aerating surface of 29.85 sq.ft. The first rougher was constructed of wood, whereas the second rougher was built of reinforced concrete, as was the cleaner machine.

In making the tests, 1.88 tons of ore was treated per square foot of rougher surface and 0.85 tons of rougher concentrates per square foot of cleaner area. The cleaner tailings were returned to the head end of the rougher cell for re-treatment, making a total of 2.07 tons per sq.ft. of rougher surface. The cell bottoms were set at a slope of ½ in. to the foot.

Almost any oil would float the mineral, though dif-

ferences were noted in the ease of control and steadiness, and a slight variation in the amount of "insoluble" in the concentrate. This difference was just enough to eliminate fuel oil as the base oil. The oils were fed by means of K. & K. feeders to the mill feed. The most economical mixture was composed of 70 per cent coal tar and 30 per cent of P. T. & T. No. 350. From 0.9 to 1.22 lb. of this mixture per ton of ore gave good results. Where most of the water is reclaimed, the proportion of coal tar to No. 350 could be increased.

The first rougher tailings contained about 0.36 per cent copper, the second rougher lowering this to 0.24 per cent. At the outset the concentrate was of low grade, but was later raised so that the last analysis was Cu, 22 per cent; S, 24; Fe, 24; and "insoluble," 25.

Screen-assay tests of the flotation feed and product gave the following results:

Mesh	Feed	Tailings	Concentrates	Percent Recovery
48	0.78	0.70	...	...
65	0.78	0.62	20.1	21.2
100	0.89	0.39	23.5	57.1
150	1.01	0.22	24.1	78.9
200	1.25	0.14	24.9	89.3
200	1.80	0.14	22.2	92.8

It is quite apparent that the ore must be finely ground to save the maximum amount of copper. These tailing samples, when examined under the microscope, showed only a small amount of free mineral. The relation between the tailing assays and the amount of copper in the finer sizes of flotation feed is shown by the curve

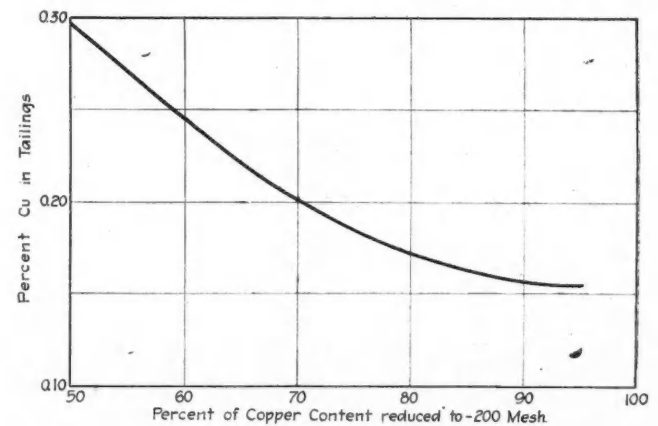


FIG. 2. EFFECT OF VARIOUS FINENESSES OF GRINDING ON TAILING LOSS

in Fig. 2. The curve begins to flatten out when 70 per cent of the copper content has been placed in the minus 200-mesh condition. Grinding the ore to 1 per cent on 48 mesh will not always reduce 70 per cent of the copper content to such a fineness, but is sufficiently close.

The average metallurgical results obtained over the entire test run are indicated in the following table:

Feed, per cent of sulphide Cu	1.298
Feed, per cent of oxidized Cu	0.034
Tailings, per cent of sulphide Cu	0.206
Tailings, per cent of oxidized Cu	0.021
Concentrates, per cent of Cu	16.808
Concentrates, per cent of "insoluble"	34.82
Concentrates, per cent of Fe	22.03
Concentrates, per cent of S	18.63
Per cent of sulphide Cu recovered	85.139
Per cent of total Cu recovered	84.070
Ratio of concentration	15.011
Per cent of Ag recovered	67.32
Per cent of Au recovered	60.77

Deister Plat-O tables were used, and they required little attention. Plateaus ¾ in. high gave better satisfaction than those of ¼ in., in that they were less susceptible to changes in feed. The plain riffles gave as good results as the corrugated riffles.

BY THE WAY

Art Nouveau at Ishpeming

Concrete endures, and it may be that the new shaft-houses built of that material at the Cliffs Shaft mines of the Cleveland-Cliffs Iron Co. at Ishpeming, Mich., will be standing when their origin is forgotten. Some future archæologist, beholding their obelisk-like form, may be led to discuss the influence of ancient Egypt upon their designer, and still others may take them for watch towers or block houses erected in a period of bolshevik unrest. But the facts are different. Standing 98 ft. high and 37 ft. square at the base, as shown in the news pages this week, they were constructed around the old wooden headframes without delays in hoisting.

Engineer vs. Lawyer

Fernando Fuchs, mining engineer and Minister of Finance for Peru, writing from Lima, says:

"As against the great evils that the last cruel war has brought forth, many good things have resulted, and among these is the overpowering influence of applied science.

"The president of our Institute, Mr. Hoover, is the best proof of what engineers can do in public life. The political rule of priests and soldiers is already a matter of the past, and lawyers are beginning to realize that they are bound to give place to engineers in the direction of public affairs."

Carlsbad's Springs

The *New York Tribune* says: "Carlsbad, the famous health resort, is built on a crust, under which is a subterranean lake of boiling water, and all the hot sulphur springs have to be ceaselessly watched and the pressure kept down lest the town be destroyed."

The President is respectfully urged to supplement his recent visits to Europe by a trip to Carlsbad. Here he may rest after his long struggle with a naughty and disobedient Congress and at the same time help watch—but not until after March 4 next.

Saving the Pieces

Every building in the mining camp of Poland, Ariz., has been demolished, and the mine and camp have been abandoned. The lumber secured has been shipped to Prescott, for re-use there in building operations on property owned by the estate of Frank M. Murphy, who was the founder of Poland.

Irish Mining News

"The directors of the Electrolytic Copper Co. (Lim.), are negotiating with the owner, Mr. David Frame, iron merchant of Dublin, to acquire from him a site at Arklow," says *The Ironmonger*. "The new enterprise will, it is understood, be launched toward the end of this month (May) with a capital of £3,000,000, and the development of the Avoca copper mines will be one of the prime moves in the flotation."

Nature has most fittingly bestowed upon the Emerald Isle deposits of copper, which, however, occur there in other forms than malachite alone. Irish copper suggests many things, the New York Police Department among them. Malachite brings St. Malachy to mind. Is the

Electrolytic Copper Co. mentioned above at Limerick, or is it simply limited? Avoca suggests avocation, but it is evident that the company means business, in view of its £3,000,000 capital. Even at prevailing exchange this is a sum worthy of a bonanza deposit. But aside from all this, Ireland seems somewhat like Mexico—in spite of Sinn Fein and bandit, mining appears to invite investment.

The Tripartite Law

"Every physical, chemical, formative or economical property of silver is quantitatively a near mean proportional between the corresponding ones of gold and copper." Thus runs the "tripartite law" as announced by August Knudsen at Santiago, Chile, in 1915. From this, Knudsen reasons as follows:

If the North American syndicates of Chile have actually located and hold reserves of nine million tons of metallic copper, full 50 per cent of what civilization at present possesses, and that is by no means the country's whole inventory, it is a legitimate corollary of the tripartite law that corresponding reserves of the other two metals do exist in Chile or the adjacent territories.

Only the question of where can be a matter of conjecture. Whether the sum of lowest grade gold that is known to exist on the whole length of the Coast range be sufficient to meet the proportion, or whether there be also high-grade reserves in the deep contact planes of alluvial soil with the Silurian bedrock; whether there be silver as suspected, in any second regions of Chañarcillo and Arqueros, or whether the quota is located in the Alto-Peruvian table-land, are questions whose settlement should be fostered by government.

Government can both directly and indirectly protect the copper market and thus build up the country's economic prosperity in a variety of ways without great preparations, expense or bondage to itself, viz.:

(a) By receiving and stamping without fees, deposits of standard copper bullion, giving in exchange warrants or certificates declaring weight and fineness, made payable in the same stamped copper at sight to bearer, for these would circulate as conventional currency at market prices, prospering the producers and reacting favorably on general business. Being backed by metallic deposits, these vouchers would under the tripartite law not only guarantee the holder against devaluation, but also against sudden or violent shrinkages, and anyway being more stable than the legal paper tender would also in quantities exert sanitary influence on this.

(b) By imposing a moderate duty on copper exports, increasing from the bullion to the ore products, with the triple object of stimulating the industry of metallic rendering, of encouraging the bullion deposits and their warranty as builders of a large copper stock, and of eliminating by the tripartite law all timidity about over-production. This duty could be payable in warrants.

(c) By encouraging with grants and privileges the formation of large mining and prospecting companies, with bases at the junctions of the longitudinal with the coast railways, for the purpose of exploring and working both Cordilleras, especially the Andesine range utterly unknown today, except along the old Indian routes that followed the watering facilities.

(d) By an exhaustive study of the possibilities of the tripartite law in regard to Chile as a territory characteristically favorable to its applications, in spite of its slumbering energies, we have seen that first three atomic wealths are nearly balanced up to the present, whereas from Table IV we can gather that the world's atomic gold wealth is eight times, and the silver wealth three times, its atomic copper wealth, a state of things which through the increasing needs of applied science, points to the near advent of a copper boom.

Knudsen's process of deducing his law is too long a jaunt in mathematics for the moment, but his deductions are very comforting.

CONSULTATION

Mineral Locating Devices

"Do you know of any instrument or instruments that are in existence which are used for the purpose of locating mineral? Have you ever seen one, and if so, where and what is it called?"

"I have a friend here in this city who is the inventor of such instruments, and though I have been a doubting Thomas, nevertheless I am about convinced that his instruments are true and that he positively can locate the oreshoots and lodes.

"I took him out on a property of which I am well informed and which he had never seen, and he showed us the location of certain oreshoots, and also demonstrated that the work being performed was not at the right place nor on the principal vein, and that the other veins being worked upon were very small and but stringers. He claims to be able to absolutely determine if a vein is worth working. His instruments work on gold and silver principally. His instruments have no attraction for iron.

"A number of the mining men in this city are engaging his services, and as soon as the snow in higher altitudes disappears a number will make further tests with him and his instruments. I intend to make a test this summer, where we can do work and follow his directions in developing a property without loss as to whether he is right or wrong. Will be able to answer then myself."

The only reliable device of which we know that is used in prospecting is a variation of the magnetic compass, which is successfully employed in searching and for mapping bodies of magnetite, or magnetic iron ores. It depends upon established magnetic principles for its action, but the only metal to which it is applied is *iron*.

Numerous devices have appeared from time to time whose avowed purpose was to locate valuable metals besides iron, such as copper, zinc, silver, and other metals. All these devices had an early demise, and were failures. The relatively small amount of metal in an orebody, particularly in gold and silver deposits, precludes allowing anyone to take practical advantage of the peculiar physical properties that these metals may possess.

However, the fact that a mechanical device for locating ore deposits holds out a tempting bait through the promise of substantial rewards attendant upon the discovery of minerals, accounts for the credulous support which is usually given such apparatus.

The writer recalls a personal experience with that ancient device called the divining rod, which was in the possession of an old prospector who directed the development of his mine through consultation with the instrument. He stated that one deflection of the rod meant gold was near at hand, two successive deflections indicated the presence of silver, and a convulsive vibration, platinum! No doubt he and other credulous people are still clinging to their faith in the merits of the divining rod, as a short-cut to successful prospecting.

Diamond Drill Hole Surveying

"By means of diamond drill we have located a body of ore at a depth of 800 ft. We have also sunk a shaft to this depth, starting shaft on drill hole.

"At a depth of 200 ft. the drill hole disappeared. Testing shows that it veered considerably.

"Is there an instrument that will give us the location or direction of the bottom of drill hole from bottom of shaft?"

The deviation of a bore hole from its intended straight course is a common phenomenon of diamond drilling and is the rule rather than the exception. It usually occurs when the bore hole is of considerable depth, say for lengths over 100 ft., and its cause is variously attributed to the inclination of the strata penetrated, to the use of worn or short core barrels, or excessive pressure on the bit. The deviation rarely occurs in one plane. Judging from the depth of your diamond drill hole, 800 ft., the deviation can easily amount to an extent sufficient to upset careful calculations based upon a straight bore hole. The fact that the hole disappeared at a depth of 200 ft. would indicate that at 800 ft. the deviation in your case is marked. No doubt you can obtain an approximation of the position of the bottom of the hole by plotting the location of its top and its position at 200 ft. and continuing the "curve" formed by a line drawn through these two points.

Various methods have been devised for accurately surveying bore holes, but it is impracticable here to give detailed description of all of these schemes. Common ones are with hydro-fluoric acid, gelatine, and with photographic apparatus. Of these, the simplest is perhaps the hydrofluoric-acid method, in which a small wide-mouth bottle is half filled with weak hydro-fluoric acid and snugly placed in a special container or barrel. After lowering this apparatus into the hole it is allowed to remain there in its inclined position a sufficiently long enough period to etch the glass bottle. The container is then withdrawn and the angle or inclination measured from the etched record on the glass. The effect of capillary attraction on the glass bottle must be taken into consideration in determining the true angle of inclination. This method, though it gives the inclination of bore hole, fails to furnish the strike.

The gelatine method takes advantage of the liquid condition of gelatine when heated. The apparatus essentially consists of a container similar to that used in the hydrofluoric-acid method, in one end of which is placed a small compass and in the other end a small plummet, both of which float is gelatine. In use, the apparatus is heated to melt the gelatine, lowered in the hole and allowed to cool and set. On withdrawing the tube and measuring, by means of a goniometer, the deflection of the compass needle from the meridian and the inclination of the plummet, a record of the vertical and horizontal deviation of the bore hole can be obtained. In a magnetic formation, the use of the compass gives trouble.

A third method employs a combination of the above schemes, and another relies upon photographic principles to perform its function. A description of this delicate and special apparatus is too long to be included here. It might be well to communicate with the diamond-drill manufacturers who supplied the machinery for drilling, to ascertain what particular apparatus they would recommend to use in bore hole surveying.

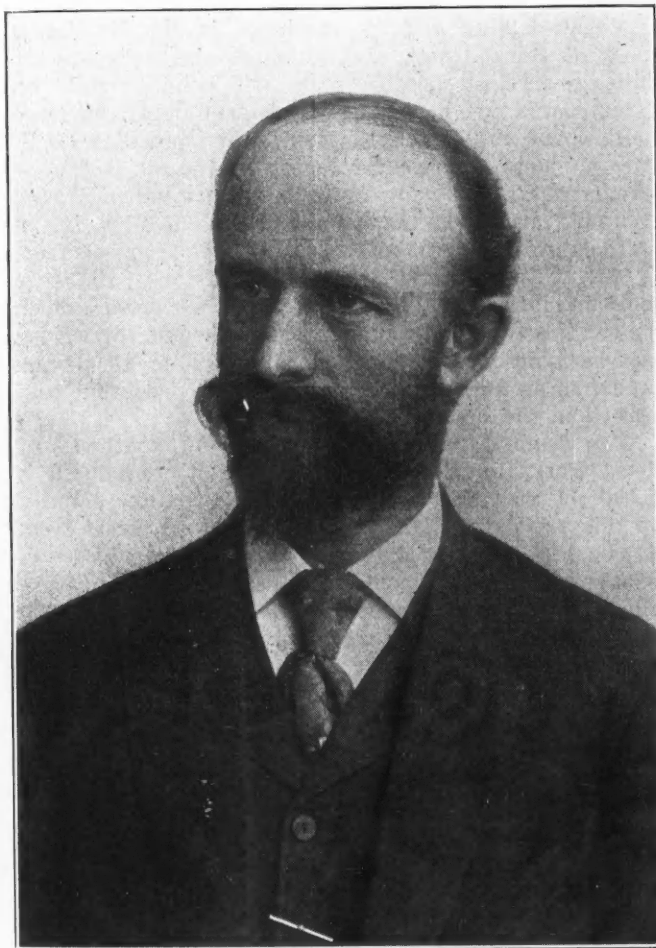
The North Texas Oil Fields

Defining the Term "Oil Sands"—Drilling Active in Sections and Some Good Producers Being Brought In—Healthier Growth Predicted for Cities in Oil-Producing Belt—
Life of Wells Dependent on Petroleum Market

By H. A. WHEELER

Written for *Engineering and Mining Journal*

IN THE CRITICISMS of John R. Roberts in the April 24 issue of *Engineering and Mining Journal* concerning my article on the North Texas oil fields on March 27, he lays great stress on there being "no sands" in the Bend series in the Ranger district. As there are no true sands in the form of silica grains in the "Black Lime," Mr. Roberts is quite correct from the standpoint of the geologist.



H. A. WHEELER

My article was written, however, for the layman, in a popular vein, rather than for oil geologists, as most of the readers of *Engineering and Mining Journal* are not oil experts. Hence I used the term "sand" in its usual sense as employed by oil operators for the oil-bearing material. Drillers and oil operators see the formations below ground only in the form of drill cuttings or finely comminuted rock, or "sand," as brought up by the bailer or sand pump. Hence they generally apply the term "oil sand" to any formation that carries oil, regardless of whether it is derived from a sandstone or a limestone.

In the Ranger district, the two oil horizons that are known as the Upper and Lower Bend sands are porous zones in the "Marble Falls" or Bend limestone, which are locally known as "sands," although they are not silica sands. Though these two horizons in the Bend limestone are usually sufficiently open and porous to produce oil, I attempted in my earlier article to emphasize that it required a shattered, creviced condition of the limestone to yield the large wells that were frequently found in the Black Lime district. This feature was not understood or appreciated by many oil operators, who could not interpret the freaky occurrence of big gushers at or close to small wells, if not dry holes. That Mr. Roberts has drawn the conclusion that I was alluding to oil-bearing sandstones is surprising, in view of the paragraph on page 746, which reads:

That there are large wells with such moderate to insignificant sand thickness, together with the fact that the offsets to some of the large wells are small or dry, leaves no doubt that the black limestone is more or less shattered and creviced. The finding of large wells is therefore dependent mainly on striking a shattered zone in the limestone, rather than in local thickening of the sand, as in normal pools. The rapid decline of the entire Ranger pool, and especially in the output of the big wells, is readily explainable if the yield is mainly from cracks and crevices in the limestone, rather than from the pores of a normal sandstone.

That the Ellenberger limestone, which occurs below the Bend series, may be of Cambro-Ordovician age, as stated by Mr. Roberts, instead of being Devonian, I will accept if that is the decision of the latest studies by Dr. Udden, the State Geologist, although its position and character suggest Devonian age.

LIFE OF OIL WELLS SUBJECT TO VARIATION

Mr. Roberts states that the average life of the Ranger deep wells is only five to seven months, and I infer that he means the period of flush production, and not the real life, or the time from the first day's output until it is abandoned as unprofitable. For he subsequently says: "That is, a well will give up, in its flush production, in that time, from 95 per cent to 97 per cent of its total yield." This last sentence indicates that 3 to 5 per cent of the total yield is obtained after five to seven months of flush production, which would extend the life several months longer.

Although the drainage into an expiring well is small, it usually lasts for a considerable period before the non-profitable point that causes its abandonment is reached. In my former paper, I approximated the life of an average Ranger well as two years (not one year, as misstated by Mr. Roberts), and though I think this is a fair estimate, it is subject to many exceptions, as in some of the examples previously given and as also shown in Mr. Roberts' paper. However, oil wells are like men—no two are alike, and generalities as conveyed by averages are only for popular guidance.

I agree with Mr. Roberts that the *flush* period of production is usually not over five to seven months and will grow shorter as the pool becomes more thoroughly drained. However, the life of any oil well is largely a function of the oil market, and if crude oil prices continue to advance, wells at Ranger that have declined below the point of profitable production at former oil prices may be reopened and operated at a small profit.

My estimate of two years as the life of the *average* Ranger well was based on a \$2.25 to \$3 market, or the prices that had ruled at Ranger up to Jan. 1, 1920. Since then Ranger oil has advanced to \$3.50 to \$4, and may reach \$5 within a year or so, which will greatly prolong the life of the small wells, especially when boom prices subside. For as soon as reasonable operating conditions prevail, and they are likely to work considerably lower within a year or so, a small well that could not be operated under the extravagant boom conditions that prevailed in 1919 will yield a fair profit to the experienced operator, even with little or no further advance in oil. "Strippers" and "gallon" wells were unknown in the vocabulary of the average Texan during the boom, when the big oil operators were racing with one another to get acreage near gushers that came in at 1,000 to 10,000 bbl., and small wells were given little attention, and under the high operating costs that then prevailed they were of little value except for "junk" or the casing.

SMALL-CAPACITY PRODUCTION PROFITABLE

The small well will soon have its friends, however, and will attract old Pennsylvania operators who came to Texas during the boom and then took the next train home for their "gallon wells," which to them looked much safer and in many cases more profitable than the big Ranger wells, with their enormously high costs for leases, drilling, and operating. Although it may never pay to drill 2,600 to 4,000 ft. for 2- to 20-bbl. wells, the old wells, even though unprofitable today, should be saved, as the time is not far distant when deep wells making only 1 to 5 bbl. per diem may yield a profit.

The future operators who will make a profit on the small wells will not be of the vintage of 1918 and 1919, as they were too much concerned with big wells, big ideas, and huge extravagance to meet successfully the close attention and economic demands of a field that needs only 50- to 100-bbl. storage tanks. But a Pennsylvania operator is likely to make these "little strippers" worth \$3,000 to \$5,000 per bbl. of daily output, as compared with \$100 to \$200 per bbl. for Burkburnett production in 1919 during the halycon days.

DECLINE IN PRODUCTION OF NORTH TEXAS FIELDS

In the four months that have elapsed since preparing my previous article, there have been important changes in north Texas conditions. The wells in the deep or Black-Lime district in Stephens (Breckenridge), Eastland (Ranger) and Comanche (Desdemona) counties have shown heavy declines, and the weekly drilling reports show that most of the new wells are coming in at 5 to 100 bbl. per diem, with few large wells. The Ranger district is now (May 1) outputting about 30,000 bbl., as compared with about 50,000 bbl. on Jan. 1, and has been eclipsed as the premier producer by Stephens County. The Desdemona district is down to about 18,000 bbl. daily, whereas four months ago it was producing about 40,000 bbl. This is the most heavily overdrilled pool in the deep-sand country, which explains

the severe decline. Stephens County is holding up much better, as it is not overdrilled and is producing about 32,000 bbl., compared with 40,000 bbl. four months ago. As this severe decline has taken place despite the completion of many new wells in the interim, the boom has completely flattened in the deep-sand area, and many of the operators are returning to Oklahoma and to other districts where the wells produce from true sands (sandstone), and consequently hold up much better.

A fair well was recently brought in near the town of May, in Brown County, immediately west of Comanche County, that may open a profitable pool, but it is too early to predict its size and richness. The shallow sand pool at Sipe Springs, in Comanche County, is steadily enlarging and is proving profitable, with 10- to 40-bbl. wells at 200 to 400 ft.

DRILLING ACTIVE AT BURKBURNETT, WITH FEW BIG WELLS

Great drilling activity continues in the Northwest pool, at Burkburnett, and, although the wells are declining, excellent producers are still being brought in. This pool is now producing about 80,000 bbl., compared with about 100,000 bbl. on Jan. 1, and pipe-line facilities are now complete for taking all the oil as fast as produced. Although many wells are coming in around 100 bbl., large wells that yield 1,000 to 3,000 bbl. initial output are still frequent. As this pool produces from a true, thick (20 to 60 ft.) sand (sandstone), the wells hold up much better, are less freakish, and have a much longer life than the Ranger wells, although there have not been produced the occasional 5,000- to 10,000-bbl. wells, as at Ranger, where a highly creviced zone was struck in the limestone.

The Kemp-Munger-Allen pool (K-M-A), southwest of Iowa Park, in Wichita County, recently produced a 2,000-bbl. well that will result in still greater activity in this promising district. Leases that advanced from \$1,000 to \$5,000 per acre when this discovery well was brought in several months ago experienced a severe slump when the pioneer well settled down to about 300 bbl. and some dry holes made their appearance uncomfortably close to it. The bringing in of this recent large well to the west of the discovery well caused leases in that direction to again advance to the high altitudes that prevail only in Texas.

Willabarger County, on Red River and immediately west of Wichita County, has become an oil producer since the recent discovery of a 100-bbl. well near Vernon, and has started an active drilling campaign in the adjacent territory.

Tillman County, across Red River, in Oklahoma, has had a strong play by wild-catters in the hopes of picking up the extension of the Burkburnett pools. Although leases have sold from \$1,000 to \$5,000 an acre in this non-producing county, such overwrought, enthusiastic hopes have not thus far resulted in a good well, although some slight oil showings have been found.

North Texas oil has advanced to \$3.50 per bbl., with such keen competition, especially by the small refineries, that premiums of 25c. to 50c. per bbl. are being paid.

HEALTHY RESULTS OF WILD BOOM

Wichita Falls is slowly and reluctantly settling down to an oil-producers' town, instead of a gigantic stock-selling factory, and though the diminishing presence of the gullible public is a severe blow to the promoters and stock schemers, the atmosphere is changing to a

more healthful, more permanent basis after two years of unprecedented orgy of fortune making and losing. It is a fine modern city, in a growing country that is surrounded by the rich pools at Burkburnett, Electra, Iowa Park, and Petrolia, with considerable undrilled territory that is likely to furnish new pools. It has a bright future and will remain "on the map," even if some of its mushroom oil refineries that have sprung up in the last eighteen months languish and die from lack of sufficient oil; but as most of them were stock-selling schemes, it will not be a serious loss to the oil industry, and later they are likely to be moved to some future boom camp as the basis for unloading more stock on a fresh crop of verdant buyers.

Rock Creek Oil Field, Wyoming*

Eleven Producing Wells, With an Average Daily Production of 260 Bbl. From the First Sand, 220 From the Second, and 1,430 From the Third

BY G. B. MORGAN

THE Rock Creek oil field is in Carbon County, Wyo., about eight miles southwest of Rock River. Certain areas in the west part of T. 19 N., R. 77 W., and the southwest part of T. 20 N., R. 77 W., are also being prospected, but so far no oil has been discovered. The area known to be oil producing is confined to portions of Secs. 26, 27, 34, and 35, in T. 20 N., R. 78 W., and portions of Secs. 2, 11, and 14, in T. 19 N., R. 78 W. On the other hand, it is almost certain that all or portions of the following will prove to be oil-bearing: Secs. 25 and 36, T. 20 N., R. 76 W.; and Secs. 1, 12, 13, 23, and 24, T. 19 N., R. 76 W.

In addition, wells are being drilled east, northeast, and west of the lands noted, and it is probable that at least some of them will bring in oil, although at much greater depth.

The structure in this field is that of an elongated and rather narrow dome, the major axis bearing almost north and south. The dips of the rim rocks surrounding the field are very steep. On the east side of the axis, the dips average about 21 deg. and on the west side about 30 deg.

EXTENT OF THE FIELD

In addition to the principal structure where oil has been discovered, there appear to be two small anticlines, or "fingers," extending or radiating in a northeasterly direction from the north end of the proven field. These structures parallel Rock Creek and lie mostly in flat valley lands or in gravel terraces, so that it is difficult to determine their extent and as to whether or not they are closed.

The Rock Creek field is, to a large extent, on flat bottom lands and terrace deposits and is traversed in a northeasterly direction by the creek after which it is named. The escarpment surrounding this field exposes the Mesaverde formation, including the Teapot sandstone, overlain by the Lewis shale. The underlying formation, which is the Steele or Pierre shale, is eroded in the field to the extent of 1,000 ft. or more. Table I gives a generalized section of the formations at the

apex of the dome from the surface to the producing sands:

TABLE I. GENERALIZED SECTION ROCK CREEK FIELD

Group	Formation	Description	Thickness, Feet
Quaternary		Soil and gravel	0 to 20
Montana	Steele or Pierre shale	Dark brown and black shale containing a thin sand at about 1,200 feet, with a showing of oil	20 to 1,400
Colorado	Niobrara	Light and gray calcareous shales and shells	1,400 to 1,600
Colorado	Benton	Brown and black shales containing several thin seams of bentonite; also thin oil sands in Frontier at about 1,650, 1,900, and 2,200 feet. First muddy sand, 2,570-2,600 feet—Oil. Shale, 2,600-2,670 feet. Second Muddy sand, 2,670-2,695 feet—Oil. Shale, 2,695-2,725 feet.	1,600 to 2,700
Lower Cretaceous	Cloverly	Dakota sand (big pay)	2,725 to 2,775

DEVELOPMENT AND PRODUCTION

There are at present eleven producing wells on the Rock Creek field, with another producer being deepened to the third, or Dakota sand, for the purpose of obtaining larger production. These wells are located in Secs. 34 and 35, T. 20 N., R. 78 W., and Secs. 2, 11, and 14, T. 19 N., R. 78 W. Five of the producers are taking oil from the first sand, four from the second, and two from the third. The heaviest production is from the lowest sand, and as the production falls off in the upper sands, the wells are being drilled to the third sand. The average daily production per well from the first sand is 260 bbl.; from the second sand, 220 bbl.; and from the third, 1,430 bbl. The total production

TABLE II. PRODUCTION AND DEVELOPMENT DATA, ROCK CREEK OIL FIELD

T. 20 N., R. 78 W.						
Sec.	Quarter	Well No.	Depth, Feet	Daily Production, Barrels	Company	Remarks
24	SE	1	3,017	.....	Inland Oil Co.	Shut down
24	NW	2	3,750	.....	Inland Oil Co.	Shut down
25	NE	1	260	.....	Inland Oil Co.	Shut down
26	SW	1	1,813	.....	Ohio Oil Co.	Drilling
34	NE	1	2,745	53	Ohio Oil Co.	Pumping
34	NE	2	3,015	1,400	Ohio Oil Co.	Flowing
34	NE	3	900	.....	Ohio Oil Co.	Drilling
34	SE	1	2,850	75	Ohio Oil Co.	Pumping
34	SE	Tr-1 (a)	3,410	.....	Ohio Oil Co.	Shut down
35	NW	1	2,736	150	Ohio Oil Co.	Pumping
35	NW	2	3,037	.....	Ohio Oil Co.	Drilling deeper
35	NW	3	2,841	210	Ohio Oil Co.	Flowing
35	SW	1	2,648	400	Ohio Oil Co.	Flowing
35	SW	3	2,782	1,465	Ohio Oil Co.	Flowing
35	SW	4	2,635	250	Ohio Oil Co.	Flowing
35	SW	2	1,980	.....	Ohio Oil Co.	Drilling
35	SW	6	1,900	.....	Ohio Oil Co.	Drilling
35	SE	5	2,020	.....	P. & R. Corp. (b)	Rigging up
36	SW	1	2,900	.....	P. & R. Corp. (b)	Drilling
36	SW	2	2,840	.....	P. & R. Corp. (b)	Drilling

T. 19 N., R. 78 W.						
Sec.	Quarter	Well No.	Depth, Feet	Daily Production, Barrels	Company	Remarks
2	NE	3	2,030	.....	Ohio Oil Co.	Drilling
2	SW	1	3,090	825	Ohio Oil Co.	Flowing
2	SE	2	3,157	.....	Ohio Oil Co.	Drilling
4	SE	1	3,420	.....	Hutton Lake Oil Co.	Drilling
11	NE	1	3,187	125	Ohio Oil Co.	Pumping
11	SE	2	2,524	.....	Ohio Oil Co.	Drilling
10	SE	1	2,210	.....	Lance Cr. Royalty	Shut down
14	NE	1	3,310	100	Ohio Oil Co.	Pumping
14	NW	1	3,395	water	Ohio Oil Co.	Drilling deeper
24	NW	1	3,100	.....	Ohio Oil Co.	Fishing
24	SE	1	1,350	.....	P. & R. Corp. (b)	Shut down

(a) Trapshooter, No. 1.
 (b) Producers & Refiners' Corporation.
 (c) Laramie Red Desert Oil Co.

from the field is about 5,000 bbl. daily. Five of the wells in the field are on the pump, and the others are flowing. Table II shows the wells producing and drilling, with the location, operating company, and other data, and is self-explanatory.

The Rock Creek field is one of the most promising

*Bulletin No. 7, Wyoming Geological Survey.

fields in Wyoming, and will probably rank next to Salt Creek in ultimate recovery of oil per acre. The third, or Dakota, sand, which has been opened up within the last few weeks, increases the productivity of the field at least 100 per cent. There is some question as to whether or not this is the Dakota sand. However, an examination of the outcrops near Medicine Bow shows that the Dakota occurs very close to the overlying Muddy sands and that there is a decided change in the characteristics of the formations just below the second Muddy sand. The Dakota sand measures about 55 ft. in thickness at this outcrop.

In practically no other field in the state except perhaps Greybull has oil been found in large quantities in the Dakota or Cloverly sand. In certain localities it is prolific in gas, but in many places throughout the state it has been found to contain only water. The finding of a rich oil reservoir and strong pressure in this sand tends not only to increase the possibilities in the Rock Creek field but to encourage deeper drilling in the fields where the Dakota sand has not yet been prospected.

Unfortunately, the first Muddy sand in this field has shown water in a well in the NW $\frac{1}{4}$ of Sec. 14, T. 19 N., R. 78 W. This well is only 500 ft. from a well producing oil from the same sand, but is 109 ft. lower on the structure. It is believed that the second and third sands will show oil in this well instead of water. However, this will soon be determined, as the well will shortly be drilled into the lower sands.

PRODUCTION WELL SUSTAINED

The limits of the field have not yet been defined by the drill. Probably the producing area will be rather narrow toward the south end and will broaden out considerably toward the center and the north end. The Rock Creek field proper will probably contain more than 3,000 acres of oil land, and if the structures to the northeast are found to be productive a large acreage will be added to this field. The Rock Creek dome is so situated as to have a fairly large area for oil drainage, which is a good indication of strong reserves.

Wells near the center of the structure, producing from the first and second sands, are holding up better than the average in other fields. Those near the outside are becoming pumpers, as the gas pressure has gone off to practically nothing. From the third sand a large and long-continued production may be expected. This sand is fairly thick and is capable of high saturation. Well No. 3 in the SW $\frac{1}{4}$ of Sec. 35, which was brought in on March 15, producing from the third sand, shows practically no decline in flush production to date.

Oil Possibilities in Imperial Valley, Cal.

Information concerning advisability of drilling for petroleum in Imperial Valley, Cal., has been made public by the U. S. Geological Survey. Although seepages and oil sands in Imperial Valley have frequently been reported, none of these reports have been authenticated, and samples of so-called oil sands have always proved to be sands blackened by manganese oxide; but it is reliably reported that asphalt occurs on the southeast edge of a dry lake west of Signal Mountain, about three miles south of the Mexican border. Several wells drilled for oil in the valley have not yielded favorable results. According to William S. W. New, the geological

structure is exceptionally favorable to the accumulation of oil, and if any of the beds of the Carrizo Creek formation contain oil it should be found in some of the anticlines that are now being tested. In his opinion, Imperial Valley should be tested for oil, but the tests should be made only by companies or persons who can afford to invest large sums of money with uncertain chances of success.

Shaft Sinking for Oil in Alsace*

Unique Method Used To Obtain Large Production—
Modern Machinery Employed in Procuring
And Refining Petroleum Products

THE petroleum wells at Pechelbronn, in Alsace, were first discovered in 1735. A few years later a small refining plant was constructed, and the wells have been worked for about 180 years. They are among the oldest petroleum wells in the world. In 1888 underground digging was replaced by the modern boring method; but during the war the older method had to be resumed, and shafts were driven to a depth of 825 ft. These petroleum deposits are now the only ones in the world worked by shafts. This method of exploitation is made difficult by the fact that the beds of sand under the earth become impregnated with inflammable gases and a slight accident will cause a serious explosion. Two thousand workmen are now engaged at Pechelbronn in various kinds of work, including the location of new deposits of oil, the extraction of the crude oil, distilling and refining. Pechelbronn produces 50,000 tons of petroleum products per year.

NEW DEPOSIT RECENTLY TAPPED

All branches of the plant are equipped with modern machinery. The drilling machines, of which there are forty-four, are operated by electricity or steam and are distributed over a surface of 110,000 acres. A network of electric wires, over forty-two kilometers (twenty-six miles) in length, furnishes power to about 500 oil pumps. Three shafts, with 4,000 meters (13,000 ft.) of subterranean galleries, produce more than 25,000 tons of crude petroleum per year.

Recently a drill driven to a depth of 435 meters (1,427 ft.) in a region hitherto untouched located a new deposit, and the well is now spouting petroleum at the rate of fifty tons a day. New refineries are to be installed capable of distilling 73,000 tons of crude petroleum per year. The distillation is to be by the "continuous" process, with perfect vacuum.

These Pechelbronn petroleum deposits are of great value to France at this time, not only because of the fuel which they yield but because of the information which French capitalists can obtain from them as to the best method of handling petroleum deposits in foreign countries in which they are interested.

Crude Oil Sales in the Canal Zone averaged 214,270 bbl. of 42 gal. each per month during the six months ended March 31, according to the *Panama Canal Record*. The consumption has been increasing, and it may be stated that sales are now running on an average of about 240,000 bbl. per month, of which 55,000 bbl. are sold at Balboa and 185,000 at Cristobal. The price of Diesel oil, sold by three companies with tanks at the Balboa terminal, has been advanced to \$3.50 per bbl. of 42 gal.

*Commerce Reports.

NEWS FROM THE OIL FIELDS

Kentucky Oil Fields Active

Three Countries Predominate in New Developments—Simpson County Brings in Two New Wells

From Our Special Correspondent

Interest in Kentucky oil development continues to center around Warren, Barren, and Allen counties. The Davenport pool, six miles south of Bowling Green, Warren County, is now conceded by oil men to be another Big Sinking discovery, fully the equal of that rich pool found in Lee County three years ago. One of the best wells completed in Kentucky recently was on the Rountree lease, in the Davenport pool. It is an offset to the Garner well, brought in recently, and was flowing at the rate of a barrel a minute before closed in.

From Allen County it is reported that Peterson Brothers have brought in No. 3 on the Motley farm, near the Sledge leases, variously rated at from 800 to 2,000 bbl. daily. The production of this well cannot be ascertained, as there is not sufficient tankage on the lease to handle the well when cut loose.

Interest in oil in Simpson County has been stirred to a high pitch recently because of two good wells brought in. One is on the Butt lease situated three and a half miles south of Franklin, and rated at seventy-five bbl. The other is on the Harrison lease, a short distance from the Butte lease, and claims a capacity of 100 bbl. per day.

Conservation of Oil Imperative

John Barton Payne, Secretary of the Interior, in commenting recently on the April petroleum statistical report of the U. S. Geological Survey, said: "It is another chapter of the same story—more oil is coming out of the ground, but even more is being consumed. Slightly less crude oil was imported than in March, but the drafts continued on the stocks both of Mexican oil held by importers and of domestic oil held by importers and of domestic oil held by pipe-line and other marketing companies. This reduction of stocks in April amounted to 750,000 bbl. With four months figures before me, I feel warranted in estimating the year's production at 420,000,000 bbl. and the year's consumption, including exports, at 500,000,000 bbl. The welfare of the nation demands that these figures be reduced. To do that, less gasoline must be bought this summer by the pleasure seekers and less fuel oil burned on shore where coal can be had, or even under marine boilers, where three barrels are needed to do the work of one barrel in an internal-combustion engine. Old style thrift in the use of petroleum ought to be the fashion this year."

Texas and Oklahoma Fields

Deep Sands Developed in Desdemona Pools—New Gas and Oil Production in Okla.

From Our Special Correspondent

A new deep sand has been developed in the Desdemona field recently, which has created considerable excitement and stimulated lease trading. The Hogg well of Skelly-Sankey Co. has deepened to 2,980 ft. and made a good production. The Magnolia Oil Co. has also drilled to this sand, and has oil, but has the well partly plugged with tools. No. 3 Glasscock well of the Jordan lease came in making 3,000 bbl. from 3,190 ft. The Mitchell No. 4 well is also reported to be producing.

The Railroad Commission of Texas has appointed C. F. Smith, of Cisco, as deputy supervisor in the oil and gas department. He will be stationed at Cisco temporarily.

The report of Federal Receiver Fred-eric C. Delano, of the Oklahoma-Texas Red River boundary territory, recommended unified operation of the oil fields and drilling of new wells. A conference will be held soon in Washington at which any objections to this report can be filed. It is expected that both Oklahoma and Texas claimants will take exception to this recommendation.

On the Texas Gulf Coast, the West Columbia field, Brazoria County, continues to bring in the largest new production. During the third week of May, the Humble Oil & Refining Co. completed its No. 23 and No. 21 Japhet wells, the two making a combined initial production of about 4,000 bbl. daily. The Texas and Crown Oil companies are testing new wells.

New Drilling in Cat Creek Field, Mont.

From Our Special Correspondent

Oil excitement in Fergus County, in the central part of Montana, and to the north, continues unabated, with the representatives of the larger oil producing companies flocking into the Cat Creek field, the scene of recent developments. The latest well to be brought in is the second well of the Frantz Corporation, with a flow variously estimated as ranging from 250 bbl. to 1,000 bbl. daily. This well will gush for about fifteen minutes, pouring oil over the top in a steady stream through a 15-in. casing, then it will subside for about ten or twelve minutes, when the gushing resumes. The oil is of high gravity and carries a gasoline content, it is said, of 52 per cent. The Frantz Corporation proposes to start seventy-five more drilling rigs as soon as possible. Glenrock and the Producers & Refiners companies also are active in this field, as is the Midwest Refining Co.

Obispo Oil Applies for Lease

First Company To Comply With Leasing Bill Conditions—Other California Petroleum News

From Our Special Correspondent

Application for a Federal lease on the property of the Obispo Oil Co. has been filed. For the past ten years the company has worked the land, which is known as the Hawk placer claim, comprising 160 acres. The title to the property has been in legal entanglement, and is now on appeal to the higher courts. The company sent its check for \$248,458.08, being one-eighth royalty on all oil extracted from the wells on that portion of the property within withdrawn territory, to the Federal office. The Federal receiver has \$1,987,254.64 in escrow from the sales of oil since the litigation began. The company is the first in the state to comply with the alternative conditions of the leasing bill.

The Standard Oil Co. has purchased from J. A. Hughes and Alfred Harrell a lot adjoining the new headquarters building of the company on Nineteenth St., Bakersfield. A new building in addition to the present one will be erected in the near future.

The General Petroleum Corporation has brought in its first well on the Botten lease, near Ventura. The flow is from 100 to 125 bbl. daily. The hole is 3,600 ft. deep, and drilling has been in progress for a year and a half.

Many wells are under test of water shut-off in the Kern County district and in the Coalinga field. There are nineteen in all. Thirteen wells are being redrilled in the various fields of the state.

The Kramer Consolidated Oil Co. has asked a patent for the N. W. ¼ Sec. 11-10-15 near Hawes, in San Bernardino County, basing its claim upon discovery made last year. The well has pumped at intervals, but is now standing after having experienced considerable water trouble.

Upon application for the issuance of complaint, the Federal Trade Commission has, as required by law, the public interest appearing, cited the Bankers Petroleum & Refining Co., Fort Worth, Tex., on complaint of unfair competition in trade. Forty days are allowed for the filing of answer, after which time the case will be set down for trial on its merits.

The commission seeks to prevent misrepresentation to the public in selling oil stock. The respondent is cited to answer averments of using false and misleading statements concerning the location of its wells, the construction of its refinery and its supply of crude oil, to promote the sale of corporate stock.

ECHOES FROM THE FRATERNITY

First Congress of Engineers A Powerful Federation of Engineering Societies Organized at Washington To Take Up the Work of the Engineer as Citizen

THE Organizing Conference of National, Local, State and Regional Engineering and Allied Technical Organizations was held at the Cosmos Club, Washington, D. C., on June 3 and 4. The conference was called by the Joint Conference Committee appointed by the four great national engineering societies, to formulate plans for an organization which should deal with public and welfare problems. The Joint Conference Committee was constituted as follows: American Institute of Mining and Metallurgical Engineers, Joseph W. Richards (chairman), J. V. W. Reynders, Philip N. Moore, Allen H. Rogers; American Society of Civil Engineers, Richard L. Humphrey (chairman), Gardner S. Williams, George C. Anderson; American Society of Mechanical Engineers, L. C. Marburg (chairman), D. S. Kimball, L. P. Breckenridge, E. S. Carman; American Society of Electrical Engineers, Charles F. Scott (chairman), Calvert Townley, Lewis P. Robinson.

SOCIETIES REPRESENTED

The result of the deliberations of the above named Joint Committee was to summon the meeting in Washington, to which delegates from national, local, state, and regional engineering societies were invited, and about seventy district societies from all over the country responded. Following is the printed list of participating societies, and other societies were registered later: American Association of Engineers, American Association of Petroleum Geologists, American Ceramic Society, American Concrete Institute, American Electric Railway Engineering Association, American Electrochemical Society, American Institute of Architects, American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Railway Engineering Association, American Society of Agricultural Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, American Society of Naval Architects and Marine Engineers, American Society of Naval Engineers, American Society of Refrigerating Engineers, American Society of Safety Engineers, American Society for Testing Materials, American Water Works Association, Associated Engineers' Societies of St. Louis, Associated Engineers of Spokane, Boston Society of Civil Engineers, Brooklyn Engi-

neers' Club, Cleveland Engineering Society, Colorado Society of Engineers, Connecticut Society of Civil Engineers, Detroit Engineering Society, Duluth Engineers' Club, Engineers' Club of Columbus, Ohio; Engineers' Club of Baltimore, Engineers and Architects' Club of Louisville, Engineers' Club of Philadelphia, Engineers' Club of St. Louis, Engineers' Club of Trenton, Engineering Council, Engineering Society of Akron, Engineering Society of Buffalo, Engineers' Society of Western Pennsylvania, Florida Engineering Society, Grand Rapids Engineering Society, Heating and Ventilating Engineers, Illinois Society of Engineers, Illuminating Engineering Society, Indiana Engineering Society, Institute of Radio Engineers, Iowa Engineering Society, Kansas Engineering Society, Los Angeles Joint Technical Society, Mining and Metallurgical Society of America, Mohawk Valley Engineers' Club, National Fire Protection Association, New England Water Works Association, New York Electrical Society, New York Society of Architects, Oregon Technical Council, San Francisco Joint Council of Engineering Societies, Society of Automotive Engineers, Society of Engineers of Eastern New York, Society of Industrial Engineers, Society for Promotion of Engineering Education, Taylor Society, Technical Club of Dallas, Topeka Engineers' Club, Vermont Society of Engineers, Washington Society of Engineers, Western Society of Engineers.

ORGANIZATION DEBATE

The meeting was called to order by Richard L. Humphrey, chairman of the Joint Conference Committee, following which Calvert Townley, of the American Institute of Electrical Engineers, was elected chairman, and J. C. Hoyt, of Washington (American Society of Civil Engineers), secretary. Committees on program, credentials, constitution, and bylaws and resolutions were then appointed. The important committees were naturally the two last named, and Richard L. Humphrey, American Society of Civil Engineers, and Philip N. Moore, American Society of Mining and Metallurgical Engineers, were chairmen of these respectively.

The chief issue of organization was attacked immediately after the calling of the meeting to order, by a motion presented by Major Gardner Williams (A. S. C. E.), providing that the unit of the proposed organization should be the existing engineering societies, rather than the individual. Major Williams' resolutions were as follows: "Resolved, That it is the sense of this conference that an organization be created to further the public welfare where technical knowledge and engineering experience are involved and to consider and act upon matters of common concern to the

engineering and allied technical professions; and, Resolved, That it is the sense of the conference that the proper organization should be an organization of societies and affiliations and not of individuals."

This resolution meant that instead of a new society being formed, the organization would represent a federation of existing societies. This principle was opposed vigorously, in the debate which followed, by the delegates from the American Association of Engineers, who were present in force, their opinion being that such a federation would be unwieldy and ineffective, whereas an organization dealing directly with the individual members would get results. They instanced the success of their own organization, which has been built up along the latter lines, and stated that they now had 18,000 members, and would soon have 20,000, and that Herbert Hoover had been a recent applicant for membership. The delegates of other societies, however, favored a federation; and it was stated frankly on both sides of the debate that the new society and the American Association of Engineers would probably both exist, side by side, in the future. On the rollcall for the motion, the delegates of the American Association created great enthusiasm by voting solidly against their arguments, in favor of the federation, a courteous acknowledgment of the majority sentiment: although later it became evident that it was unlikely that the association would join the Federated Societies.

CONSTITUTION AND RESOLUTIONS

The question of the organization of a federation being settled in the affirmative, the next most important matter was that of a constitution, and this was handled promptly and with skill by the committee appointed for that purpose, as the attached copy shows. The document that it produced was accepted with minor changes, the only new article inserted being Article X, "Publicity," which insures a frank and open policy. Both constitution and bylaws were adopted unanimously by the voting delegates, with the understanding that their votes did not commit their respective societies, as in most cases they had not the authority. The delegates of the American Society of Mechanical Engineers, however, did have the authority, and aroused applause by formally applying for admission to the Federated Societies at the first opportunity.

The resolutions committee reported favorably upon several resolutions, among them one indorsing a Department of Public Works, one asking for higher pay for teachers of engineering, and one asking for a more satisfactory compensation for engineers in the Government service.

A big spirit prevailed throughout the sessions; courtesy, consideration, and alert business action were the rule, and no one who was present can have gone away without feeling more optimistic concerning the destiny of the engineer group as a group of citizens than had been possible before the meeting and action of the conference.

ADDRESSES BY NOTED ENGINEERS

There was time, at the day sessions, for short addresses on pertinent topics; and evening sessions at the New Willard were devoted to such addresses. At the day sessions, brief speeches on the "Functions of the Engineer in Public Affairs" were made by Arthur P. Davis, president of the American Society of Civil Engineers and director of the United States Reclamation Service; by Philip N. Moore, vice-president of the American Institute of Mining and Metallurgical Engineers and member of the War-Minerals Relief Commission; and by Leroy K. Sherman, president American Association of Engineers and president United States Housing Corporation. The subject of "Good Roads" was covered by Thomas H. MacDonald, chief of the Bureau of Roads and Rural Engineering at Washington, and by William D. Uhler, chief engineer of the Pennsylvania State Highway Department. Frederick H. Newell, speaking on "Rendering Service," gave a brief account of the work and future plans of the American Association of Engineers, and the subject of "Co-operation of the Engineer at Local Affairs" was discussed in general by Marshall O. Leighton, chairman National Service Committee. Mr. Leighton likened the engineers in their imagined limitations as citizens to a captured herd of wild elephants in India, of which he had read, who were kept from escaping by the expedient of building a tall fence of bamboo poles around them; and this simile was much appreciated by the assemblage.

On the evening of June 3, at the New Willard Hotel, notable speeches were made on the "Co-operation of the Engineer and the Business Man in Public Affairs," by Homer L. Ferguson, past president of the United States Chamber of Commerce and president Newport News Shipbuilding Co.; on "The Value of Publicity for the Engineer," by James H. McGraw, president of the McGraw-Hill Publishing Co.; and on "The Engineer and National Prosperity," by George Otis Smith, director of the U. S. Geological Survey. At the evening session of June 4, addresses were made on the "Education of the Engineer for Public Service," by Robert S. Woodward, president of Carnegie Institution, Washington, D. C.; and on "Engineering Research and National Progress," by James R. Angell, chairman of the National Research Council.

TEXT OF THE CONSTITUTION

The constitution of the Federated Societies as adopted by the conference was as follows:

Article I. Name

The name of this organization shall be Federated American Engineering Societies.

Article II. Object

Service to others is the expression of the highest motive to which men can respond, and duty to contribute to the public welfare demands the best efforts that men can put forth; therefore, it shall be the object of this organization to further the interests of the public through the use of technical knowledge and engineering experience, and to consider and act upon matters common to the engineering and allied technical professions.

Article III. Membership

Sec. 1. Scope. The membership shall consist of national, local, state and regional engineering and allied technical organizations and affiliations, classified as follows:

(1) National engineering and allied technical organizations.

(2) Local, state, or regional engineering or allied technical organizations other than local associations, sections, branches, or chapters of national organizations.

(3) Affiliations consisting of any one, or a combination, of the following constituents:

(a) Local sections or associations of members of national organizations included under (1).

(b) Local engineering or allied technical societies or clubs, not of national scope.

(c) Local engineers and members of allied technical professions and their associates.

Sec. 2. Qualifications: The qualifications for membership shall be as provided in the bylaws.

Sec. 3. Application for membership. Application for membership shall be made in the form and manner prescribed in the bylaws.

Sec. 4. Termination of membership. The membership of any constituent organization may be terminated by it or by the council in the manner provided in the bylaws.

Article IV. Management.

American Engineering Council

Sec. 1. The management of this organization shall be vested in a body to be known as the "American Engineering Council," and its executive board.

Sec. 2. Functions. The American Engineering Council shall consist of representatives of Member Societies selected as hereinafter provided. This council shall co-ordinate the activities of state councils and of local affiliations whenever these activities are of national or general importance or may affect the general interests of engineers.

Sec. 3. Representation. Each national, local, state, or regional organization or affiliation shall be entitled to one representative on the council for a membership of from 100 to 1,000 inclusive, and one additional representative for every additional 1,000 members

or major fraction thereof; provided, that in the determination of the representation of local, state, or regional organizations or affiliations no count shall be taken of any organization which is represented individually or through another local, state, or regional organization or affiliation; and provided further, that no organization shall have more than twenty representatives on the council.

Sec. 4. Selection of Representatives. Representatives on the council shall be selected as stipulated in the bylaws.

Sec. 5. Meetings. The council shall hold an annual meeting. Other meetings may be called by the executive board and shall be called by it upon the written request of twenty-five representatives on the council.

Sec. 6. Officers. The elected officers of the council shall consist of a president, to hold office for two years, and who shall be ineligible to re-election; four vice-presidents, to hold office for two years, two to be elected every year; and a treasurer, to hold office for one year. These officers shall be elected by a letter ballot of the representatives on the council as provided in the bylaws. There shall be an executive officer, who shall be secretary, appointed by and holding office during the pleasure of the executive board. He shall not be a member of the executive board, but he may be a representative on the council.

Executive Board

Sec. 7. Functions. There shall be an executive board of thirty members of the council, constituted as hereinafter provided, and charged with conducting the business of the organization under the direction of the council.

Sec. 8. Membership. The executive board shall consist of thirty members, of whom six shall be the officers elected by the council and twenty-four shall be selected, a part by the national societies, and the remainder by the local, state, or regional organizations or affiliations according to districts, as provided in the bylaws; provided, that the number of representatives of the national societies shall bear as nearly as may be the same ratio to the number of representatives of local, state, or regional organizations or affiliations as the representation of the national societies bears to the representation of the local, state, or regional organizations or affiliations.

Sec. 9. Electoral Districts. For the purpose of facilitating the selection of the district members on the executive board, the council shall divide the country into districts as provided in the bylaws, based upon an equitable representation, having regard to both its membership and area.

Sec. 10. Officers. The president and secretary of the American Engineering Council shall be respectively the chairman and the secretary of the executive board. There shall be two vice-chairmen elected by the board from its members.

Article V. Unexpired Terms

Vacancies in the offices of the president, the vice-presidents, the treasurer, and in the executive board and among the representatives on the council, shall be filled as soon as feasible, by the agencies originally selecting the incumbents. Officers and delegates thus chosen shall serve for the unexpired terms.

Article VI. Funds

Sec. 1. Funds for the use of the organization shall be contributed as follows:

(a) Each national society represented on the American Engineering Council shall contribute annually one dollar and fifty cents (\$1.50) per member.

(b) Each local, state or regional organization or affiliation represented on the council shall contribute annually one dollar (\$1) per member.

No portion of such funds shall be applied to the use of local affiliations or state councils.

Sec. 2. The American Engineering Council may receive and administer gifts, bequests, or other contributions for carrying out the purposes of the organization.

Article VII. Local Affiliations

Sec. 1. Object. The American Engineering Council shall encourage the formation of local affiliations, to consider matters of local public welfare with which the engineering and allied technical professions are concerned, as well as other matters of common interest to these professions, in order that there may be united action and that suggestions and advice may be offered to the council.

Sec. 2. Constitution. Each local affiliation desiring membership in this organization shall submit its constitution and bylaws and all subsequent amendments thereto to the executive board of the council for approval of such portion thereof as may affect its eligibility, or its relation to the work of the council.

Article VIII. State Councils

Sec. 1. State councils shall consist of representatives of local affiliations within the state or otherwise representative of the majority of engineers and members of allied technical professions in the state. The members of a state council shall consider state matters of public welfare with which the engineering and allied technical professions are concerned, as well as other matters of common interest to these professions, in order that there may be united action in state affairs.

Sec. 2. Constitution. Each state council desiring membership in this organization shall submit its constitution and bylaws and all subsequent modifications thereto to the executive board of the council for approval of such portion thereof as may affect its eligibility, or its relation to the work of the council.

Article IX. Delimitation of Authority

Local organizations or affiliations, state organizations or councils and the American Engineering Council shall deal with local, state, and national matters respectively and they shall be autonomous with respect thereto. It shall, however, be the duty of the American Engineering Council to interest itself in the activities of local affiliations and state councils if such activities are of national scope, or affect the general interest of the engineering and allied technical professions; provided, that nothing herein stated shall be construed as preventing the discussion by any local affiliation or state council or by the American Engineering Council of any matters of interest to engineers and members of allied technical professions, or action by the said council on local or state matters where no local affiliation or state council exists.

Article X. Publicity

This organization will stand on the principle of publicity and open meetings in such manner as shall be provided in the bylaws.

Article XI. Amendments

Sec. 1. An amendment to this constitution may be proposed by the executive board.

Sec. 2. An amendment may be proposed in writing, by at least twenty-five representatives on the American Engineering Council. Such amendment shall be considered first by the executive board, which may approve, disapprove, or formulate a modified or alternative amendment, report of which action shall accompany the original proposal to this organization.

Sec. 3. Any amendment proposed as provided in Secs. 1 and 2 shall be considered at a meeting of the American Engineering Council and shall be submitted to its members at least ninety days in advance of such meeting. At this meeting, provided a majority of the representatives are present, the amendment may be rejected, or otherwise ordered submitted to the members of the council for letter ballot within thirty days thereafter, with such modifications as may be adopted by a majority of those present. The amendment shall fail of adoption if one-third of the votes cast are in the negative.

OPENING ADDRESS BY RICHARD L. HUMPHREY

The keynote of the meeting was in the opening address, extracts from which are given below in somewhat abridged form:

The American Society of Civil Engineers was founded in 1852 for "the advancement of engineering knowledge and practice and the maintenance of a high professional standard among its members." Subsequently, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers, and, later, the American Society for

Testing Materials and the American Railway Engineering Association and other national engineering societies, were formed. The activities of these societies are almost entirely technical. In addition to the numerous national societies that have organized to care for special lines of engineering and allied sciences, local engineering societies and clubs, as well as state and regional engineering and allied technical organizations, have been formed. These organizations carry on their activities, generally, independently of one another.

As these organizations increased in number it became evident that it was desirable so to federate them that there would be a representative body that could speak for these professions.

The first step toward this object was taken June 27, 1917, when the representatives of the four previously named societies organized Engineering Council "to provide for consideration of matters of common concern to engineers, as well as those of public welfare in which the profession is interested, in order that united action may be possible."

The American Society of Civil Engineers, on June 18, 1918, adopted a resolution which declared that "Sociological and economic conditions are in a state of flux, and are leading to new alignments of the elements of society. . . . These new conditions are affecting deeply the profession of engineering in its service to society, in its varied relationships to communities and nations and in its internal organizations," and authorized the appointment of a committee on development to "make a broad survey of the functions and purposes of the society, in order that an intelligent and effective readjustment may be accomplished, so that the society may take its proper place in the larger sphere of influence and usefulness now opening to the profession."

This action was followed by the appointment of similar committees by the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Mining and Metallurgical Engineers. These committees appointed conferees, who met and organized the Joint Conference Committee. Its purpose was to determine in what manner these four societies could co-operate on non-technical or welfare work affecting the relations of the engineer to, and his service in, public affairs. The committee presented a report to these societies in September, 1919. At the meeting held in New York on Jan. 23, 1920, the governing boards of these societies, the American Society for Testing Materials, and the trustees of the United Engineering Society unanimously requested the Joint Conference Committee to call, without delay, a conference of representatives of national, local, state and regional engineering organizations of this country, for the purpose of bringing into existence the comprehensive organization recommended by the Joint Conference Committee.

Proposed New Code of Ethics for the Engineer

A. S. M. E. Committee Presents Fourteen Points of Conduct Covering His Professional Activities

The following code applies as properly and as closely to mining engineers as to any others, although it has been drawn up by a special committee of the American Society of Mechanical Engineers. This society adopted a code of ethics in 1912, but the document was considered to be too long, and was seldom consulted by the society members. The present brief statement was completed in April of this year, and presented to both the Society and Engineering Council at the end of May.

Some will be tempted to remark that these various "Thou Shalt Nots" go without saying; several of the paragraphs, however, will bear wider proclamation.

PROPOSED CODE OF ETHICS

1. The mechanical engineer should be guided in all his relations by the highest principles of honor, of fidelity to his client, and of loyalty to his country.

2. His first duty is to serve the public with his specialized skill. In promoting the welfare of society as a whole he advances his own best interests, as well as those of the whole engineering profession.

3. He should consider the protection of his client's or employer's interests in professional matters his essential obligation, provided these interests do not conflict with the public welfare.

4. He shall refrain from associating himself or continuing to be associated with any enterprise of questionable or illegitimate character.

5. He can honorably accept compensation, financial or otherwise, from only one interested party unless all parties have agreed to his recompense from other interested parties.

6. He must inform his clients of any business connections, interests or circumstances such as might influence his judgment or the quality of his services to his clients.

7. He must not receive, directly or indirectly, any royalty, gratuity or commission on any patented article or process used in the work upon which he is retained without the consent of his clients or employers.

8. He should satisfy himself before taking over the work of another consulting engineer that good and sufficient reasons exist for making the change.

9. He must base all reports and expert testimony on facts or upon theories founded only on sound engineering principles and experience.

10. He must not regard as his own any information which is not common knowledge or public property, but which he obtained confidentially from a client or while engaged as an employee. He is, however, justified in using such data or information in his own private practice as forming part of his professional experience.

11. He should do everything in his power to prevent sensational, exaggerated or unwarranted statements about engineering work being made through the public press. First descriptions of new inventions, processes, etc., for publication should be furnished only to the

engineering societies or to the technical press.

12. He should not advertise in an undignified, sensational or misleading manner, or offer commissions for professional work, or otherwise improperly solicit it.

13. He should not compete knowingly with a fellow engineer for employment on the basis of professional charges or attempt to supplant a fellow engineer after definite steps have been taken toward the other's employment.

14. He should assist all his fellow engineers by exchange of general information and valuable experience or by instruction through the engineering societies, the schools of applied science, and the technical press.

A. A. E. Organizes Abroad

Honolulu, T. H., and Anchorage, Alaska, Now Have One Chapter Each

The Association of American Engineers is extending its organization beyond the limits of the forty-eight states. The first of these territorial chapters was organized at Anchorage, Alaska; the second chapter is that at Honolulu, T. H., formed on May 22 last. The chapter has forty-four members and owes its existence to the zeal of J. L. Young, consulting engineer. The first president is John H. Wilson, civil engineer of Stanford University and Mayor of Honolulu. The vice-president, Lyman H. Bigelow, is a graduate of Cornell University and is now superintendent of Public Works as well as chairman of the board of labor commissioners of the territory. George M. Collins, secretary, Frederick Ohrt, and James E. Stewart are other prominent members.

The sixth annual convention of the association, held at St. Louis, recently authorized a committee to consider developing the association in foreign countries.

Hoover and Wood Join A. A. E.

The Association Has Not Declared for Either Candidate

Herbert Hoover, chairman of the American Relief Commission and president of the American Institute of Mining and Metallurgical Engineers, has applied for membership in the American Association of Engineers. The membership number assigned to Mr. Hoover is 20,000. General Leonard Wood, who is also a member, has membership number 10,000. The association has not declared itself in favor of either General Wood or Mr. Hoover as candidates for the Presidential nomination.

Executive Committee of the American Association of Engineers has asked its chapters situated in states bordering on the Great Lakes and the Canadian border to urge upon the President of the United States and the United States Senators representing their respective states, the desirability of appointing an engineer to the vacancy on the International Joint Commission, in recognition of the large engineering problems involved.

The M. I. T. Co-Operative Training Plan a Proved Success

For the last year an interesting experiment in co-operative engineering education has been conducted by the Massachusetts Institute of Technology and the General Electric Co. The class was limited to thirty students, who were chosen entirely upon the records which they had made in the equivalent of the first two years' work of the electrical engineering course at Technology. Included in this group were graduates from Yale, Harvard, Dartmouth, Princeton, and the Naval Academy, besides men who had completed their first and second years solely at Technology. The year (twelve months) is divided into four three-month periods, the students spending alternately thirteen weeks at the Lynn works of the General Electric Co. and eleven weeks at the Institute, followed by a two-weeks' vacation. At Lynn the students are housed together in a fine old residence which has been converted into a modern clubhouse. No break is made in the major studies when the students are at Lynn, courses being conducted at the works in principles of electrical engineering and in general studies. The progress of the students through the plant is regulated not by the production needs of the various departments but by the advantage which the experience in each department is to the student.

The result of this year's work has been gratifying to the originators of the plan. Because the students were a selected group, were all taking the same course, and were thrown together intimately at work and at the clubhouse, an intense spirit of loyalty to one another, to the Institute and to the General Electric Co. soon became manifest, and every man strove to make a reputation for the course. With the students attacking the work in this frame of mind, it is not surprising that their enthusiasm was soon shared by the officials and superintendents of the co-operating company, who are unanimous in stating that the work done in the shops has been pre-eminently satisfactory. As evidence of its approval of the work, the company has increased the number of men who can be enrolled in this year's class to sixty and has already secured a new clubhouse in order to furnish rooming accommodations for them. The new class will enter upon the work July 6.

Utah Companies to Send Five Teams to the Denver Mine-Rescue Contest

The date for the coming mine-rescue and first-aid contest to be held at Denver under the auspices of the Bureau of Mines has been set at Sept. 9, 10, and 11. Teams from Mexico and Canada as well as teams from various parts of the United States will take part in the competition. Utah will be represented by at least five teams, from the Utah Fuel Co. and the United States Fuel Co. forces, and from the Bingham, the Park City, and the Eureka mines.

Book Reviews

Technical Writing. By T. A. Rickard. First edition. Cloth; 8 x 5½ in., pp. 178. John Wiley & Sons, Inc., New York. Price, \$1.50.

Mr. Rickard's work has been sent to us by the publishers, with a request that a marked copy of *Engineering and Mining Journal*, containing a review of the volume, be forwarded to them. It is a pleasure to express approval of the efforts of the editor of the *Mining and Scientific Press* to emphasize the importance of painstaking discrimination in the selection and use of words in the preparation of reports and papers, and in technical writing generally. His volume is a reprint of five lectures delivered before the engineering classes of the University of California in 1916. It is well worth discriminating perusal, the chapter on style being particularly good. Obviously, in such a work there can be little that has not before been said by compilers of books on the correct use of English, from primary grammars to the handy writing-desk "Dont's." The author's counsel as to the choice of words, although not new, may be unqualifiedly approved, particularly as his discussion has been so ordered as to meet the needs of the engineer.

Mr. Rickard makes no claim to literary discovery, and he invites criticism. Inasmuch as he uses up several pages of white paper to indicate wherein Ruskin and Huxley failed to exercise erudite discrimination in the use of the words "that" and "which," his position is logical.

When a man has succeeded in superimposing upon the profession of the engineer that of the journalist also, there is a temptation to go a step further and assume the role of pontifex maximus of all the graphic arts. We cannot accord this position to Mr. Rickard. The printer's apprentice in his second year learns to put periods and commas used in quoted matter where they belong—inside, not outside, of the quotation marks; and to use the single quote only within a double quote. Mr. Rickard's preference for the older and never generally approved method may cause the judicious more amusement than grief, but we should expect that it would evoke bitter tears from both printers and proofreaders. These violations of present-day typographical orthodoxy mar nearly every page of his book. They suggest the amateur. They are not classic. Also, in a work of this sort, it is only reasonable to expect that the author will observe his own precepts, but Mr. Rickard, though insisting on the use of "while" as an adverb of time, repeatedly employs the word, as on pages 44, 49, and 142, in the precise manner that he condemns. The same lack of discrimination is noted in the use of "since" for "as."

We cannot approve Mr. Rickard's idiomatic reiteration of "in order." He says, "in order to accomplish their purpose," "in order that technical literature may pass current," "in order to write clearly," "in order to be understood," "in order to learn." Why the redundant and unnecessary "in order"?

Preferred usage does not justify the continual starting of declaratory sentences after semicolons. On page 88, Mr. Rickard says, "begin a new sentence with a semicolon," and this despite the advice offered later in the book: "Don't be afraid of short sentences or of using periods." Why, with 400,000 or more perfectly good words in the English language, and with twenty-six letters in the alphabet with which to start sentences, should any writer prefer to start them with semicolons? When Aldus Manutius contrived the semicolon, it was not for such a purpose. We prefer the good old rule of starting a sentence with a capital letter. Still, starting with a semicolon may possess advantages. After learning to do this, it might be possible to start a sentence with a period, which our old-fashioned masters thought should be used at the end. No one could get into trouble if he stopped before making a start.

Mr. Rickard is patently more at ease at the editorial and copy desk than in the composing room. He knows all the rocks in the English channel—and bumps into some of them broadside occasionally. His book is a valuable treatise on copy-reading, and, aside from the slips from grace that are chargeable against most writers, and the examples of antiquated and impracticable typography noted, it is an interesting and worthy contribution to technical engineering literature.

W. N. P. R.

Technical Papers

Surface Combustion—In the April number of the Proceedings of the Engineers' Society of Western Pennsylvania, (Union Arcade Building, Pittsburgh; price 50c.), A. B. Blake has an article on this subject in which he points out the conditions necessary for most efficient combustion. Thorough mixing of the fuel and air are necessary, and an excess of the latter should not be present. The paper will be valuable to metallurgists interested in reverberatory furnaces. Many illustrations, a bibliography, and extended discussion are included.

Texas Maps—The U. S. Geological Survey has made topographic surveys of Harris County, Tex., and has recently issued maps covering about twenty quadrangles, approximately half this area. The maps can be obtained from the director of the U. S. G. S., Washington, D. C., for 10c. per copy.

Canadian Technical Papers—The 1919 volume of the Transactions of the Canadian Mining Institute (503 Drummond Building, Montreal) has been published. It contains thirty-nine papers, most of which have been published already in the monthly bulletin. The longer papers include "Some Equipment for a Copper Smelter," by E. J. Carlyle; "Application of Pulverized Coal in Blast Furnaces," by E. P. Mathewson and W. L. Wotherspoon; "Titaniferous Iron Ores in Canada," by W. L. Goodwin; "The Hidden Creek Mine and Its Operations," by E. E. Campbell; "The Granby Mines at Phoenix," by C. M. Campbell; "The Use of Explosives in Mines," by H. Y. Russel; "Liquid Fuels," by B. F. Haanel; "Canadian Platinum and Manganese Resources," by G. C. Mackenzie; Graphite in Quebec and Alabama," by H. P. H. Brumell; and papers by C. V. Corless and W. R. Ingalls on industrial co-operation, democracy, and education.

Iron Ore Analyses—"Analyses Lake Superior Iron Ores, Season 1919," issued by the Lake Superior Iron Ore Association, Cleveland, Ohio, contains complete cargo analyses during the season of 1919 of ores at mines on the Cuyuna, Gogebic, Marquette, Menominee, Baraboo, Mayville, Mesabi, and Vermilion ranges; also those of the Michipicoten and Sudbury iron districts in Canada. In some instances the expected analyses for the season of 1920 are given. An exceptionally high quality of ore is shown in the analysis of East Mesabi sinter, which is given as iron, 63.27 per cent; phosphorus, 0.008; and silica, 10.38 per cent; with small amounts of other elements.

Iceland Spar—Part 5, Vol. 41, of the Transactions of Min. Inst. of Scotland, (Albany Bldgs., 39, Victoria St., Westminster, S. W.) is largely devoted to the Spar mine, at Helgustadir, Iceland. The properties and formation of Iceland spar (crystalline calcite) are described, as well as the method of working the mine, which is on the glory-hole system. A sketch map is appended.

Zinc—"The Zinc Industry of the Tri-State Field" in the May issue of the much-improved *Compressed Air Magazine* (11 Broadway, New York, price 25c.) will interest those engaged in this work. General conditions and the formation of the American Zinc Institute are discussed, as well as peculiarities of mining and smelting, and opportunities for the use of the metal. The article makes entertaining reading.

Utah Geology—An attractive brochure, "Wonders of Utah Geology," has just been issued by the University of Utah to point out the several advantages that may be obtained at that institution by the student considering geology as a profession. The excellent illustrations show many phenomena within easy reach of the university grounds. The proximity of important mining camps is also emphasized.

COURT DECISIONS IN MINING CASES

By Wellington Gustin

What Constitutes Commencement of Drilling Operations

Most Trivial Acts in Good Faith May Do So—Question of Fact Involved With Law

What was the commencement of an oil well, or the commencement of drilling operations, was the question presented the Supreme Court of Wyoming in the case of plaintiff oil operators against their lessors. The land in controversy is in Park County, Wyo., about six miles up the Greybull River from Méeeteetse. The lease provided that drilling be commenced within sixty days from its execution. Extensions were had on the time limits of the lease, extending the time for commencing drilling to Dec. 14. On Dec. 12 the parties proceeded to the premises and set a "stake" for the location of the first well; on the 13th lumber for repair and addition of a derrick was placed on the premises, and plaintiffs had contracted for moving a derrick to the spot. But snows delayed the work, and on Dec. 26 the operators were excluded from the premises, on the contention that the lease had been terminated by breach of the condition. The action was brought to enjoin the lessors from asserting a forfeiture of the lease and from interfering with the prosecution of drilling operations. The lessors were given a judgment in the trial court.

The Supreme Court doubted there being any reasonable distinction between commencing "operations" or commencing "drilling operations," under a provision in an oil and mineral lease, using either of these terms to describe the work to be commenced. But the question of whether acts similar to those here set out are sufficient to constitute the commencement of drilling operations or the commencement of a well, as a question of fact to be determined by the court or the jury upon the evidence, has been decided differently in the few cases reported where the question has been considered.

In a Pennsylvania case, a stake was driven as a location of the well on the last day of the lease. Lessee's servant was prevented from unloading lumber at the spot in the afternoon of the same day, the lessor claiming the lease had expired in the forenoon. In giving its judgment for the lease holder, the court said the commencement of anything might be a very trivial act; "it has to be, because everything, be it ever so great, is accomplished by doing little things one after the other, and the commencement of the drilling of a well may be made by doing an act insignificant in itself."

But all the cases dwell on the point that any such acts to be a commencement must be done in good faith, and, without such, more extended acts might be shown to be mere "bluff." To show good faith the intent and ability to proceed are necessary, and in all cases the acts done and relied upon as a commencement must constitute a part of the necessary work in the drilling of a well.

In the case under review the court held that the facts did not establish as a matter of law that the lessor had failed to commence drilling operations within the prescribed time in the lease, providing the acts were done in good faith with intent diligently to prosecute the work to completion. Judgment for the defendant lessor was reversed and new trial ordered.

Court Protects Defrauded Purchaser

Holds That Misrepresentation Vitiates Sale of Oklahoma Lead and Zinc Mine and Mill

In an action brought by George W. Finley and George R. Gordon against George W. Beck, Jr., M. L. Pierce, and J. L. Todd, the Supreme Court of Oklahoma has affirmed judgment against defendants, and rehearing has been denied. The action involved the sale by the defendants to plaintiffs of a mine and mill in Ottawa County, Oklahoma.

Plaintiffs alleged that defendants represented that the mine had been fully prospected and tested, that it was rich in lead and zinc ore, and that at that time there were great quantities of ore in sight which was more than sufficient to pay the purchase notes within sixty days.

It appears that Todd was the agent of the defendants, but was believed to be acting for plaintiff's interests and equally interested with them. When these facts became known, the plaintiffs asked for a rescission of the purchase contract.

The contention that the mine was worthless was vigorously denied. Defendants claimed that the purchasers were not greatly concerned as to the value of the mill and lease, acquiring it for the purpose of using it for advertising the Miami Lead & Zinc Co., which was denominated by the defendants as a "blue-sky" organization. It cannot be disputed, said the court, that there are some facts and circumstances in evidence from which this deduction might be drawn, but at most the deduction is based on suspicion and is not sufficiently supported by direct evidence.

Oil Companies Win Judgment Against Lessor

Plaintiff Had No Right to Royalties Under Lease Pending End of Litigation—Title Had Been Cancelled

In the action brought by Frederick B. Stein against Rogers Kemp, the Kanawha Oil & Gas Co., and the Prairie Oil & Gas Co., to recover royalties alleged to be due under the terms of an oil and gas lease from the plaintiff to Kemp, the Supreme Court of Oklahoma has affirmed a judgment in favor of the defendants.

It appears that, subsequent to the making of the lease in January, 1908, suit to cancel deed was started by Ben Adams, a Creek Indian, and original allottee of the land, against Stein, on the grounds of fraud, and that about three and one-half years thereafter said deed was cancelled by the Supreme Court of the state. In the meantime the Kanawha Oil and the Prairie Oil companies entered into possession and made rich finds in oil. Stein prayed for judgment against the oil companies for the value of the oil produced on the premises, for an accounting and a decree directing the defendants to assign and transfer to the plaintiff an undivided one-fourth interest in the lease contract, and asked that defendants be required to pay the one-eighth of all oil produced from the land to plaintiff. Defendants knew of the litigation over the lands at the time they took possession and developed the oil field there.

The question presented the court was whether, under the terms of the lease made between plaintiff Stein and the oil companies, these having taken possession thereunder from the plaintiff while he was in possession, the companies could be required to pay rent while their possession under plaintiff continued.

In support of plaintiff's claims, his counsel relied upon the rule of law that a tenant will not be allowed to dispute the title of his landlord. The Supreme Court holds that, assuming, without deciding, the relation of landlord and tenant exists between the lessor and lessee in an oil and gas mining lease, yet there is a well-recognized exception to the general rule that a tenant cannot dispute his landlord's title, which is, that the tenant may show that his landlord's title has expired or has been extinguished subsequent to the commencement of the tenancy. As plaintiff's title had been cancelled about three and one-half years after he had given leases to the oil companies, the exception applied, said the court, and he could not recover royalties from his tenants in the meantime.

MEN YOU SHOULD KNOW ABOUT

H. Foster Bain has been making geological examinations in Yunnan, southern China.

George Clothier, mining engineer, has recently inspected prospects and properties on the Queen Charlotte Islands, B. C.

Charles F. Mason, metallurgical engineer, with the Bonnot Co., of Canton, Ohio, sailed for Japan on June 3 on powdered coal engineering work. He will not return for several months.

Frank A. and Theodore H. M. Crampton, mining engineers, have reopened their offices and laboratories at 1247 Ocean Ave., Santa Monica, Cal.

Morris Bien, assistant to the Director of U. S. Reclamation Service, is chairman of the committee on balloting of American Association of Engineers.

Alfred James, consulting mining engineer, of 28 Victoria St., Westminster, London, was in New York a week ago. He left for Mexico on May 28.

Fred P. Williams, recently of U. S. Bureau of Mines, is now engaged in oil development work for the Colombia Syndicate, in Colombia, South America.

E. J. McNamara, secretary of Seneca Copper Corporation, 11 Broadway, New York, has returned to the New York office from his recent visit to the mines.

Frank L. Stack, mining engineer, 2624 Laguna St., San Francisco, Cal., has left for Pachuca, Hidalgo, Mex., to accept a position with the Santa Gertrudis Co., Ltd.

Robert H. Gross, president of East Butte Copper Mining Co., 85 Devonshire St., Boston, Mass., is in Butte, Mont., with a party of officials for an inspection of the company's property.

J. B. Mertie, Jr., geologist on staff of the Division of Alaskan Mineral Resources, U. S. Geological Survey, is on leave and left Washington on June 3 for a year in Bolivia and Argentina.

C. Will Wright, mining engineer, of Rome, Italy, arrived in New York last week from Italy and will remain in the United States until his return to Italy on July 3. Mr. Wright was in Washington on June 3.

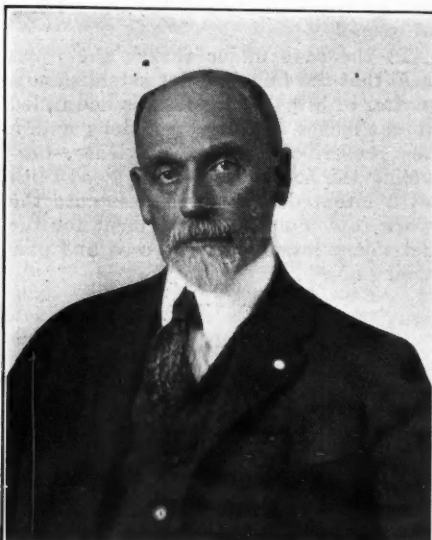
D. Dale Condit, oil geologist with S. Pearson & Son, 47 Parliament St., London, S. W., has finished his field work on the coast of British North Borneo and left that district for Singapore, where he arrived about April 21.

H. C. Plummer, for the last seven years chief engineer and assistant superintendent of mines with Cananea Consolidated Copper Co., Cananea, Sonora, is now in charge of operations for Arizona Commercial Mining Co., Globe, Ariz.

Alfred H. Brooks, geologist in charge of Division of Alaskan Mineral Resources, has returned to Washington.

He spent two weeks in Seattle as chairman of the commission appointed by Secretary Payne for the development of Alaska's economic resources. While there Mr. Brooks spoke before the Puget Sound Section of the A. I. M. E.

Harold S. Munroe, general manager of the Consolidated Coppermines at Kimberly, Nev., for several years, has resigned to become general manager of Granby Consolidated Mining, Smelting & Power Co., of British Columbia. The office of managing director of the Granby company, hitherto filled by F. M. Silvester, vice president, has been abolished.



Moffett, Chicago
FREDERICK HAYNES NEWELL

Frederick H. Newell, former director of the U. S. Reclamation Service and head of the Department of Civil Engineering, University of Illinois, Urbana, Ill., was one of the prominent engineers in attendance at the Washington sessions of the Organizing Conference of the Engineering Societies of the United States. Dr. Newell will be remembered as the enthusiastic Director of the U. S. Reclamation Service, established under President Roosevelt, a position in which he earned the grateful esteem of his countrymen. Applying the same abilities then revealed, he has recently again put the engineering profession under debt to him by his devoted and untiring service in broadening and building up the American Association of Engineers, from whose presidency he retired last month. During his term that association grew from 4,000 to 17,000 members and became established in the favor of the engineering public of the country.

Clyde E. Williams, electrometallurgist, U. S. Bureau of Mines, arrived at the Seattle station on May 17 to resume experimental research work in electrometallurgy. A flexible and complete equipment for electric furnace experimental work has been installed, and experiments will be directed toward the efficient utilization of the water power resources of the Pacific Northwest.

Frank M. Smith, assistant director of the Bunker Hill smelter of the Bunker Hill & Sullivan Mining & Concentration Co., at Kellogg, Idaho, has been elected director, succeeding Jules Labarthe, resigned. Mr. Labarthe will give all his time to the firm of Bradley, Bruff & Labarthe, San Francisco. Mr. Smith, who was for many years manager of the East Helena plant of American Smelting & Refining Co., will continue to have his headquarters at Spokane, Wash.

OBITUARY

Robert H. Lindsey, mining engineer of Great Falls, Mont., missing since May 22, was found dead May 25 in twenty feet of water at the bottom of the shaft of the Ticon Mining Co., Butte, Mont. This mine has been idle for the last four years.

SOCIETY MEETINGS ANNOUNCED

The Nevada Section of American Institute of Mining & Metallurgical Engineers will meet at Tonopah, Nev., June 25 and 26.

Society of Chemical Industry will hold its annual meeting this year at Newcastle-Upon-Tyne, July 13 to 16, inclusive. Among the papers on the program may be mentioned a joint contribution by G. W. Hewson & S. H. Fowles on the economical utilization of coke-oven and blast furnace gases for heating and power; R. A. Sturgeon's paper on his self-discharging centrifuges for separating solids from liquids; "Catalytic Chemical Reactions and the Law of Mass Action," by E. F. Armstrong; and "Recent Developments of the Electric Furnace in Great Britain," by D. F. Campbell.

The papers and addresses will be presented on the 13th and 14th. The afternoon of the 14th and the whole of Thursday, the 15th, will be devoted to visits to metallurgical and coking installations accessible from Newcastle, together with the annual dinner on the evening of the 14th and a conversazione at Armstrong College on the evening of the 15th. For Friday, the 16th, a delightful all-day excursion is planned by motor, up the Derwent Valley, across the moors to Blanchland and to the Tyne, to the Roman station at the Chesters, returning along the Roman Wall.

Hotel accommodations in Newcastle are quite limited, and Armstrong College has placed Easton Hall at the disposal of the society. Members wishing to attend should apply to F. C. Garrett & H. Dunford Smith, Hon. Local Sec., No. 7, Side Newcastle-Upon-Tyne, England, before July 1, next.

THE MINING NEWS

LEADING EVENTS

Seeking a Second Cripple Creek Mining Men of Camp Hold Theory That Area to North Is Also Mineralized —New Company Formed With Strong Backing

A project has been financed by Colorado mining men, that is based upon the possibility of the extension of the mineralized area of Cripple Creek to practically double its present limits. The theory is that something like 5,000 acres adjoining the producing district on the north and locally known as Gillette Park has a granite capping overlying what is believed to be the northern half of the crater; that this condition was brought about by the toppling over into the crater, when its contents were molten, of the granite walls, or possibly by a slide in connection with the Pike's Peak upheaval. The project is to demonstrate a theory advanced several years ago by W. H. Trask, of Denver.

Among those who have financed the project is George A. Stahl, general manager of the Vindicator company, who after a study of the data assembled by Mr. Trask, presented it to A. E. Carlton, general manager of the Cresson Consolidated, with the result that he was authorized to organize a syndicate backed by the Cresson and Vindicator companies, by Bulkeley Wells and other prominent mining men. Harry W. Robinson, a mining attorney of Denver, who is counsel for the syndicate, was instructed over a year ago by Mr. Stahl to examine titles and acquire acreage in that locality. Much ground has already been acquired, and the development is about to begin.

The plans include diamond drilling sufficient to demonstrate the correctness of the theory. If the drill penetrates through the granite into the eruptive at an economic depth, a working shaft will be sunk to the eruptive, and extensive horizontal holes drilled from a station at the bottom of the shaft to locate orebodies. Success in the first shaft will be followed by further drilling and shaft sinking. Details of development and operation will be under the direction of W. E. Ryan, general superintendent of the Vindicator.

The contract for the diamond drilling has already been let to Egildson Brothers, of Rock Springs, Wyo., and the drill outfit is on its way to the district.

The trusteeship will shortly be terminated by the organization of a company, of which the directorate will include L. G. Carlton and A. L. Blomfield, of the Cresson company, G. S. Wood and George A. Stahl, of the Vindicator company, Bulkeley Wells, W. H. Trask and Harry W. Robinson.

WEEKLY RESUME

Congress has adjourned without passing any of the tariff bills or the measure for liberalizing war minerals relief legislation. The appointment of Dr. F. G. Cottrell as director of the U. S. Bureau of Mines has been confirmed by the Senate.

Word is received that the Granby Consolidated company has appointed Harold S. Monroe as manager and abolished the position of managing director. The contempt case against Butte & Superior in the flotation litigation has been dismissed. An important merger of companies on the Comstock lode has been effected by Bulkeley Wells and others. At Cripple Creek, the work of proving up the territory north of the camp has been undertaken with the backing, it is understood, of the Vindicator and Cresson companies. At Tonopah, it is announced that a recent discovery in the Halifax has an important bearing on the eastern part of the district. The hearing in the Mason Valley smelter rate case has been set for June 24. Several English steel companies have consolidated.

Bulkeley Wells Heads Newly Organized United Comstock Mines Co.

The recently incorporated United Comstock Mines Co. has elected Bulkeley Wells president, G. H. Humphrey vice president, A. D. Snodgrass secretary and treasurer; Roy H. Elliott, R. A. Hardy and Rufus Thayer the other directors. This company controls practically all the ground at the Gold Hill end of the Comstock lode. Plans are said to call for mining by steam shovel and the erection of a large mill. The capitalization is \$5,000,000.

Whitman Symmes has resigned from the presidency of the Consolidated Virginia, Ophir, Mexican, Union, and Sierra Nevada companies, which control everything on the lode proper. The election of Alex Wise to take his place and the placing of Roy A. Hardy on the board of directors confirms the rumor that G. H. Humphrey has secured control of these properties. If reports are correct, he has been quietly buying these stocks for six months past, avoiding exchange transactions.

Granby Con. Changes Managers

The Granby Consolidated Mining, Smelting & Power Co., of British Columbia, has abolished the office of managing director, which has hitherto been filled by F. M. Silvester, one of the vice presidents. Harold S. Munroe has been appointed general manager. Mr. Munroe has long been associated with the Consolidated Coppermines at Kimberly, Nev., and has been its general manager for the last two or three years. He will have his headquarters at Anyox. E. P. Mathewson is consulting engineer for both companies.

Butte & Superior Contempt Proceedings Dismissed Defendant in Minerals Separation Case Not Using Less Than 1 Per Cent of Oil

Judge Bourquin, in the United States District Court, Butte, Mont., on June 1 dismissed the proceedings instituted by Minerals Separation, Ltd., against the Butte & Superior company, in which Minerals Separation, Ltd., subsequent to the Supreme Court decision, sought to have the Butte & Superior company declared in contempt of court upon the ground that that company, in its flotation operations, continued to feed less than 1 per cent of oil to the pulp at the head of its flotation machines. Butte & Superior showed that the "circulating load" entering the machines contained sufficient oil, so that together with the oil fed there was sufficient to constitute 1 per cent, contrary to Minerals Separation's charge.

Minerals Separation contended, however, that the oil in the circulating load is without efficacy and that the situation involves the use of oil in quantity less than 1 per cent contrary to the injunction.

The text of Judge Bourquin's decision is as follows:

"Subsequent to the decision of the Supreme Court of the United States and pending accounting herein complainants instituted these proceedings in civil contempt based upon allegations that an account filed herein by defendant discloses it was and had been operating with the methods of the patent process with less than 1 per cent of oil and contrary to the injunction. Hearing was had and it appears that at the head of its machine (see 245 Fed. Rep. 583, for description) defendant adds to the pulp less than 1 per cent of oil but that the circulating load there entering the pulp contains sufficient oil to constitute the total 1 per cent and more. It incidentally appears that when the pulp arrives at the tail cells, at last of the machines, the oil is less than 1 per cent. Complainants contend that the oil in the circulating load is without efficacy and that both the situations aforesaid involve use of oil less than 1 per cent and are contrary to the injunction and contempt. During proceedings upon the merits, complainants urged that both these situations then existed and involved infringement, but not being vital and being rather doubtful in respect to both facts and law, the courts made no express reference or decision in respect to them. To now conclude that the Supreme Court's decision impliedly determines them favorable to complainants is mere conjecture and inadmissible. That either situation in-

volves infringement and violation of the injunction is by no means clear. In these circumstances, having also in mind the severity and delays of contempt proceedings to the defeated party, complainants cannot be permitted to transfer the controversy from the merits to contempt. They must fully litigate upon the merits what they have there half litigated so that the defeated party may have prompt review rather than suffer hardships from delays due to inability to appeal from the decision in contempt until sometime after final decree in accounting. It is believed equity, patent law, discretion requires that complainants be remitted to some one of the familiar methods to secure determination upon the merits of these alleged infringements. Accordingly the contempt proceedings are dismissed."

This decision, coming at this moment, is of especial interest because of a very similar effort upon the part of Minerals Separation in the U. S. District Court in Delaware, to have the Miami Copper Co. declared in contempt of court for continuing to use its present process.

In the Butte & Superior case the question at issue involving infringement, is as to the percentage of oil used. In the Miami case it is a question as to the degree of agitation which may constitute infringement.

There is as yet, it appears, no decision of the Supreme Court as to the scope of the claims of the patents as to agitation, and the Circuit Court of Appeals, in its Miami decision, said: "On the contrary, agitation results from aeration, and such agitation, though present in some measure, is not even approximately of the violence and duration of the agitation of the patent." (*Engineering and Mining Journal*, Dec. 1, 1917).

The Miami Copper Co. claims to have long since discontinued the use of the three steps which the Court of Appeals found to have jointly constituted the agitation of the patents.

The appeal made by the Miami Copper Co. for a supplemental bill for the purpose of admitting new evidence as to the agitation of the processes of the patents (see *Engineering and Mining Journal*, June 5, page 1280) is also of interest in this connection, since it may affect the determination as to what is the agitation of the process.

Because of the appeal above referred to, and also of Judge Bourquin's decision dismissing the contempt proceedings against Butte & Superior, some are awaiting with interest the result of the contempt proceedings in Wilmington, to see if the U. S. District Court in Delaware will also refuse "to transfer controversy from merits to contempt."

Hearing in the Miami contempt proceedings has been set for June 15 at Philadelphia. Pending these hearings the work of taking an accounting of Miami's operations has been suspended.

In the meantime hearings set for preliminary steps in the Nevada Consolidated and Magma cases at Portland, Me., have been postponed until July.

Broken Hill Mines Still Idle Recent Effort Failed To Patch Up Labor Difficulties After Year's Shut-Down

After almost a year of idleness at Broken Hill, Australia, an attempt has been made to start the wheels running again, but a conference between the employers and employees, held at Melbourne in April, resulted in failure so far as the underground employees, who hold the key to the position, are concerned. The miners desire a minimum wage of \$4.80 per six-hour day for all underground workers, including boys, and a five-day week. The terms offered to all workers on the mines, both surface and underground, are shown in the following excerpts from a statement by C. J. Emery, president of the Barrier Mine Managers' Association:

"The hours of all employees at Broken Hill are reduced. Craftsmen and day workers will in future work only 46 hours, instead of 48 hours, while millmen and continuous process shiftmen will have their hours reduced from 48 to 44 a week. Similarly the underground workers have received concessions.

"As far as craftsmen and day workers are concerned, if the Federal Arbitration Court reduces the hours for these classes of workmen in Australia the reduction will be immediately granted to Broken Hill employees.

"The companies propose, in addition to increasing the basic wage by 2s. per day for everyone, with an extra 6d. per day for craftsmen as an increase for margin of skill, to make payment on the reduced hours to the same extent as if every man still worked 48 hours. Thus in each class where the hours are 40, 44, or 46 per week, the employees will receive 48 hours' pay. This means a big increase in the daily rates of all employees. During the last six months of production at the mines the average earned by contract miners was over 21s. Under the new conditions this amount will be largely increased. These concessions in working conditions and rates of pay will involve the companies in increased cost estimated to be over £500,000 a year.

"The companies wish to secure the cooperation of their employees in bettering the conditions in the mines and at Broken Hill generally, and they have offered to find the capital necessary to establish a co-operative store with a view to keeping down the cost of living. They also have under consideration the establishment of a sickness fund, to which employees, the companies and the New South Wales Government may contribute. Such a fund will be supplementary to the existing Workers' Compensation Act.

"The men demand the abolition of contract. The companies, while not agreeing to abolish the contract system, offered to meet the men to discuss and fairly adjust difficulties which are said to arise under that system."

Cripple Creek Short Line Road Not To Be Junked—Yet Service Between Colorado Springs and Camp Interrupted by Dissension— Hard Hit by Gold Slump

Reports that the Cripple Creek Short Line is to be junked, are premature, according to officials of the road. Train service over the road has been discontinued except for a few miles out of Colorado Springs, where this section will be operated as a scenic line during the summer.

A controversy with the Colorado Midland road over terminal facilities at Cripple Creek, and dissension among bondholders, who are operating the road, has resulted in a suspension of through service between Colorado Springs and Cripple Creek until the affairs of the road can be adjusted either through litigation or mutual agreement.

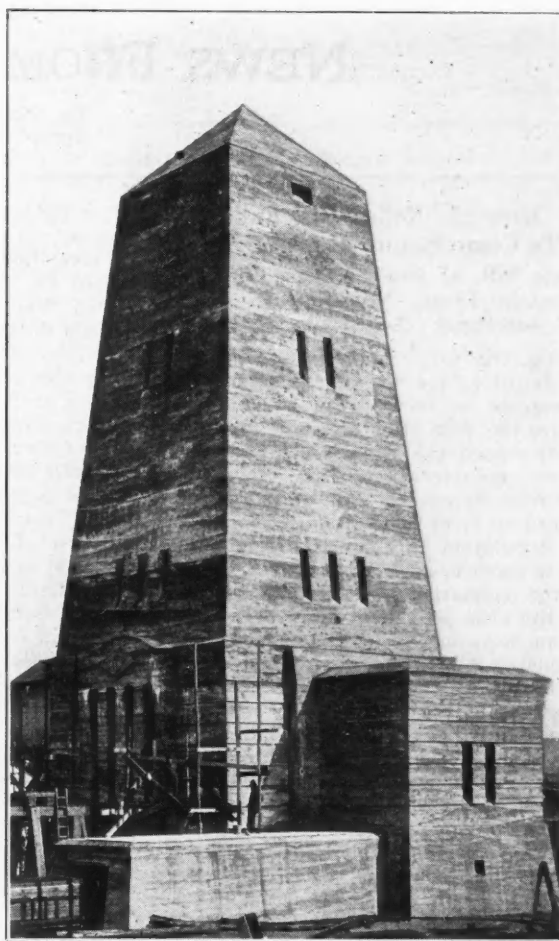
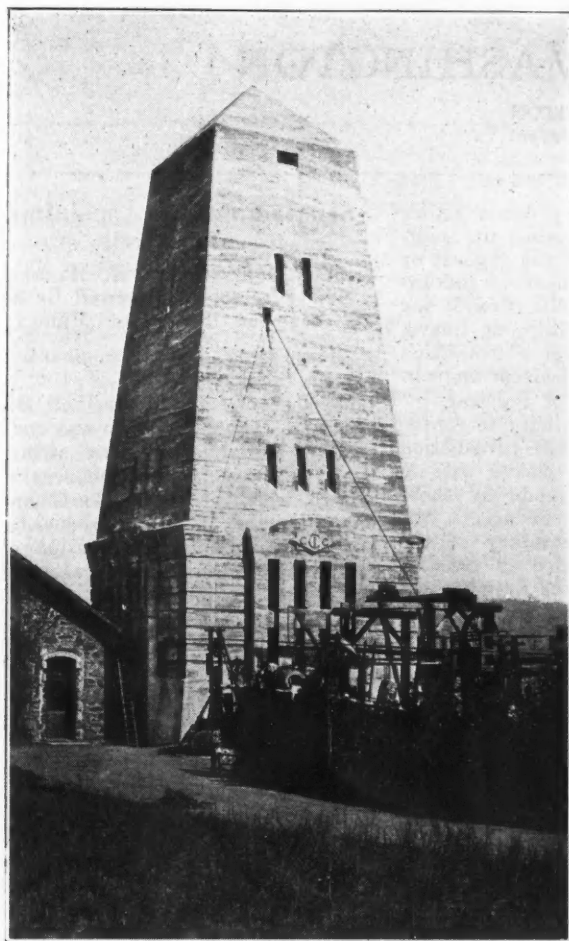
The road was built by Cripple Creek mine owners in 1893 and was almost entirely financed by Colorado capital. The line was afterward leased by the Colorado & Southern railway company and during that period most of the bonds passed to eastern holders. The road was extremely profitable from the start, and until war conditions brought disaster to the gold mining industry, was considered one of the best paying roads in the state.

English Steel Companies Merged

In order to increase their output a number of important steel manufacturing companies in the Sheffield district of England have entered into a combination and working agreement. The capital of the new corporation is £500,000 (\$2,000,000). The firms concerned are Goodwin & Co., (Ltd.), steel and tool manufacturers, Scottish Steel & File Works, Neepsend; Seach, Sellers & Co. (Ltd.), saw manufacturers, Town Head Works; Apex Steel Co., (Ltd.), steel manufacturers, Penistone Road, Neepsend; Neepsend Rolling Mills, (Ltd.), steel rollers, Neepsend; Loxley Forge, (Ltd.), and Hillfoot Forge, (Ltd.), forgers and tilers, Loxley.

Horizontal Freight Increase Opposed in Utah

Utah industries are opposing through the traffic bureau of the state the proposed 24 per cent increase in freight rates. The main contention is that, as rates in the state are already comparatively high, a flat increase would be discriminatory for this section. Figures have been compiled to show that the difference in Union Pacific earnings in Kansas and Nebraska territory and in Utah territory amounted in 1917 to 5½ per cent return on \$131,959 per mile of railroad. The value of the Union Pacific track per mile at that time is given as \$87,000, showing it is alleged, that the western country is already bearing more than its share of the railroad burden of the country. Such an increase, it is put forth, would work a hardship on all shippers.



NOT A GLIMPSE OF ANCIENT EGYPT, BUT MERELY THE NEW REINFORCED CONCRETE SHAFT HOUSES, "A" AND "B," AT THE CLIFFS SHAFT MINE OF CLEVELAND-CLIFFS IRON CO., AT ISHPERING, MICH.

Concrete Shaft Houses Replace Old Headframes Without Shut-Down

The two shaft houses at the Cliffs Shaft property of the Cleveland-Cliffs Iron Co., Ishpeming, Mich., which are shown in the accompanying illustrations, were constructed during the latter half of 1919. They are of reinforced concrete, 98 ft. in height and 37 ft. square at the base. The foundations are 3 ft. thick, and the walls taper upward. The two structures weigh about 1,700 tons each. The work of building them around the old corrugated iron-covered headframes was begun last summer, but cold weather set in before everything was complete. Sand and cement had to be heated before it was poured, but the work was carried out successfully. The forms were permitted to remain in place until this spring. By building around the old headframes it was possible to carry on hoisting through the two shafts without hindrance. No time was lost in mining or hoisting.

The two shafts stand on top of a hill near the general offices of the Cleveland-Cliffs company and can be seen for miles around. It is stated that headframes of this character are cheaper to construct than those of steel, and it is certain that the upkeep is less. There are no bolts to be kept tight in

place and no painting is required. The Cliffs Shaft property is one of the few remaining hard hematite mines in the entire Lake Superior district and has been a producer for a long term of years. There is still considerable ore in sight underground. It is certain that the new shaft houses will remain in place as long as there is ore to be mined, as they appear to be as substantial as the pyramids.

Civil Service Examinations

Those interested in the following examinations should apply to the Civil Service Commission, Washington, D. C. for form 1,312, stating the title of the examination desired.

Metallurgist, \$3,600 - \$4,000, both sexes. An open competitive examination July 13. A vacancy in Bureau of Mines may be filled from results. Not required to report at any place for examination.

Junior topographer and topographic aid, male and female, \$720-\$1,500. An open competitive examination. Vacancies in the U. S. Geological Survey, office and field, may be filled from this examination. Not necessary to report for examination.

U. V. Extension produced 3,219,934 lb. copper in May against 3,270,718 lb. in April.

Recent Production Reports

Inspiration Consolidated produced 7,500,000 lb. copper in May against 6,000,000 in April.

Old Dominion's smelter output in May was 2,287,400 lb. copper against 2,180,000 in April.

Shattuck Arizona's production in May was 219,118 lb. copper, 341,449 lb. lead, 18,964 oz. silver, and 228 oz. gold, compared with 214,122 lb. copper, 750,049 lb. lead, 29,063 oz. silver and 448 oz. gold in April.

Kennecott's production (including that of Braden) in April was 8,319,960 lb. copper compared with 9,030,600 lb. in March.

Greene Cananea produced 4,300,000 lb. copper, 160,530 oz. silver and 830 oz. gold in May, against 4,000,000 lb. copper, 157,400 oz. silver and 940 oz. gold in April.

East Butte's smelter produced 1,412,760 lb. copper and 45,719 oz. silver in May, compared with 1,291,840 lb. copper in April.

Phelps-Dodge produced 7,902,000 lb. copper in May as against 7,798,000 in April.

Miami Copper's May output was 5,054,760 lb. copper compared with 4,924,420 in April.

Arizona Copper's May output was 3,000,000 lb., the same as in April.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

War Minerals Relief Bill Fails To Come Before House

Senate Bill, as Passed, Found To Contain Error, Necessitating Additional Legislation

Among the large number of bills which failed at the end of the session of Congress is the bill intended to liberalize the War Minerals Relief Act. The bill passed the Senate, but failed to receive consideration in the House. Even in the Senate the bill, as passed, contained an error which required additional legislation to correct. A resolution to correct was not considered.

As the legislation is certain to come up at the next session in more or less the same form in which the bill passed the Senate, it will be of interest to know that the Senate changed one of the sections of the bill so as to read:

"The Court of Claims is hereby vested with jurisdiction to determine such claims in accordance with the provisions of section 5 and to render judgment for such amount as it finds to be justly and equitably due to any claimant, on account of such losses, under the terms of said section 5. From the final judgment of the Court of Claims in cases arising under this act an appeal shall lie to the Supreme Court of the United States in the manner provided in sections 242 and 243 of the Judicial Code."

The Senate committee, reporting, said:

"This bill is an amendment of the act entitled 'An act to provide relief in cases of contracts connected with the prosecution of the war, and for other purposes,' approved Feb. 2, 1919. Section 1 of that act authorized the Secretary of War to adjust, pay, or discharge any agreement, express or implied, upon a fair and equitable basis that has been entered into in good faith during the present emergency . . . for the acquisition of lands, or the use thereof, or for damages resulting from notice by the Government of its intention to acquire or use such lands, or for the production, manufacture, sale, acquisition or control of equipment, materials or supplies, or for services, or for facilities, or other purposes connected with the prosecution of the war, etc.'

"Under section 2 of the act, the Court of Claims was given jurisdiction to adjudicate the claim of any claimant who 'shall not be willing to accept the adjustment, payment, or compensation offered by the Secretary of War,' etc.

"Section 5 of the act of Feb. 2, 1919, made a similar provision for the adjustment and settlement by the Secretary of the Interior of 'such net losses as have been suffered by any person, firm, or corporation, by reason of pro-

ducing or preparing to produce, either manganese, chrome, pyrites, or tungsten in compliance with the request or demand of the Department of the Interior, the War Industries Board, the War Trade Board, the Shipping Board, or the Emergency Fleet Corporation to supply the urgent needs of the nation in the prosecution of the war.'

"The act, however, omitted to confer upon the Court of Claims jurisdiction to hear and determine claims arising under said section 5, made by those who were not willing to accept the adjudication of the Secretary of the Interior, as was provided in case of those dissatisfied with the adjudication of the Secretary of War in the cases referred to in section 1.

"The purpose of this act is to put both sets of claimants—claimants for losses due to contracts relating to the sale of lands or the manufacture of supplies or equipment and materials, as provided in section 1; and claimants for losses growing out of mining or preparation for the production of minerals, as provided in section 5—on the same basis as to the right to have their claims adjudicated in some judicial tribunal.

"To deny the latter set of claimants the same due process of law for the determination of just and equitable claims would be inconsistent with the general policy of the Government, and with the particular policy adopted in the act referred to, of giving to every citizen a fair opportunity to be heard before an impartial tribunal upon all claims arising out of contracts express or implied, and also upon all equitable as well as legal rights. This bill will afford such a remedy and we recommend its adoption."

Awards made by the War Minerals Relief Commission during the week ended May 29 are as follows: (The claimant, the mineral, the amount recommended and the percentage relationship to the amount claimed are shown) Independence Mining Co., manganese, \$10,196.76, 34 per cent; M. W. Mouat, chrome, \$4,464.35, 64 per cent; Mrs. Alberta Lang, chrome, \$4,240.31, 43 per cent.

Tariff Bills All Fail

Senator Phipps, of Colorado, made an ineffectual effort during the closing days of the session of Congress which ended June 5 to secure consideration in the Senate of the bill providing for duties on imported tungsten. The Senate, however, declined to consider the bill as well as the other emergency tariff measures, all of which are now dead. It will be necessary for their entire legislative consideration to begin again.

Senate Confirms Appointment of Cottrell

Tribute Paid to Van. H. Manning by New Director at Farewell Gathering at Bureau of Mines

After some delay the Senate confirmed the nomination of Dr. F. G. Cottrell as director of the U. S. Bureau of Mines. The delay in no way reflected on Dr. Cottrell, but was owing entirely to the volume of business in the Senate, which prevented the Committee on Mines and Mining from making an early report on the nomination.

On the occasion of a gathering at the Bureau to bid farewell to Van. H. Manning, the retiring director, Dr. Cottrell made an address, in the course of which he said:

"Dr. Manning, you have long been not only our chief, but our friend. For nearly a decade I have enjoyed that privilege, and there are those here today who outclass me in length of such contact threefold and more.

"Yours has been a long and honorable record both in the public service and in the hearts of your associates, all the way from the seats of the mighty on Capitol Hill down to the humblest member of your own staff. No one leaving the Government service has a better right in looking backward to feel the conscious satisfaction of having ably measured up to every burden placed upon him, and to have fully won the right to leave it now for more tranquil, shall I say, and attractive occupation elsewhere.

"And yet again it is characteristic of you, that, even in thus leaving the Government's employ, it is for a field of work which you yourself have created and one which is still distinctly of the nature of public service. Those of us who think we know you best cannot but doubt, I imagine, whether you would ever be altogether happy in any work which did not strongly savor of this element. Thus, though officially and geographically separated from us, we shall still feel that you are with us in spirit.

"The Bureau of Mines will persistently look upon the American Petroleum Institute as its godchild and upon you, not as having strayed from the fold, but more as that member of its family who, with the true spirit of the pioneer in his blood, has gone out West, into the frontier of technical and economic adventure and development, carrying with him and sustained by the traditions and ideals acquired under the parental roof, and your progress and achievements in the new fields, I can assure you, dear friend, will be eagerly watched as were those of the sturdy pioneer sons of earlier days.

NEWS BY MINING DISTRICTS

MEXICO

Start of Veta Colorado Mill Held Up— Calumet & Sonora Mill Being Altered—Important Developments Expected at Zacatecas

Sonora

La Cananea—At the Calumet & Sonora mine, owned by the Carnegie Lead & Zinc Co., numerous changes are being made in the new mill. Mine and mill are being operated, which will continue until all preliminary changes are completed. According to plans, operation of the mill will be stopped for a short time only, when making the final rearrangement.

Operations at the Democrata mine are considerably curtailed. Only one of the three blast furnaces is being run. Approximately 275 men are now employed.

Zacatecas

Zacatecas—The Bote Mining Co., at Zacatecas, and the Fresnillo unit of the Mexican Corporation, about two hours ride by rail to the north, are the only companies conducting active milling operations in this section. Important developments are expected soon in the State capital district.

Chihuahua

Minas Nuevas—Because of the recent political disturbances it is stated that the American Smelters Securities Co. will be delayed about a month in starting its new cyanide plant on the Veta Colorado property. This will be the largest cyanide plant in the state. It is stated that its output will be equal to that of some of the larger mills in southern Mexico. It will draw ore from the following mining claims: Veta Grande and Pachuqueña, which are the original properties of the company; the Quebradilla and other claims acquired from the Veta Colorado Mining & Smelter Co. in 1915; the Verde and Los Muertos claims acquired from the Sierra Plata Mining Co.; and the Los Remedios-Santa Gertrudis group, which was operated up to 1907 by a Pittsburgh company. It may also handle ore from the Terrenates claim, recently acquired by the Alvarado Mining & Milling Co., which is at present considering its sale to the American Smelters Securities Co. The above named claims cover more than a kilometer along the well defined and consistently mineralized vein. Recent developments on the Veta Colorado claims are said to have developed a valuable parallel vein in the foot wall.

The Alvarado company's cyanide plant continues to operate to capacity and has lost no time due to revolutionary activity. George Miller, the company's mine superintendent, was recently detained for a time by Villa followers but his release was effected. In view of the fact that Parral usually feels the

effects of any revolution in its earliest stages and up to the end, this is a remarkable record for continuous operation.

The San Patricio cyanide plant belonging to the Mexican Northern Light & Power Co. interests is almost finished and will shortly begin operation. This property was acquired in 1912 but owing to many delays and difficulties the mill is just going into commission. This will be the third large cyanide mill in the Parral-Minas Nuevas section. Its principal ore supply will come from the vein which runs from the Palmilla claim, of Pedro Alvarado fame, through the San Cristobal claim and roughly parallel to the main Veta Colorado or "Red Vein" which supplies the Alvarado and Smelters Securities mills, although over a mile to the east.

These three mills should add greatly to the silver production of the state of Chihuahua and it is predicted that Parral will see greater activity than ever before in its history.

Parral—The Parral Fire Clay Co., which owns one of the few deposits of this material in Mexico, will soon be reorganized under the leadership of W. S. Harrison and will begin the manufacture of fireclay crucibles and muffles for assaying, fire brick and other similar products.

It is stated that Adan Schaefer will shortly begin operations on the properties of the Esmeralda-Parral Mining Co., owned by Philadelphia capital. This mine is known to have large reserves of milling ore.

Equipment of the properties on the Sierra de la Cruz owned by the American Smelting & Refining Co. is in progress. It is expected that these properties will be large producers of lead and zinc concentrates.

In the Santa Barbara section of the Parral district the Tecolotes mill of the American Smelters Securities Co. is operating and will shortly be producing a large tonnage of zinc concentrates in addition to the usual lead product. The zinc concentrates are shipped to the United States. The lead concentrates are smelted at the Chihuahua smelter.

In this section Francisco Rueda Quijano is said to have made very favorable developments on the Orion claim and it is expected that he will begin shipments at the rate of five cars per week soon.

Rodolfo Alvarado, son of Pedro Alvarado, former owner of the Palmilla mine, is operating the Maria mine in the Roncesvalles district and has recently shipped two cars to the Chihuahua smelter. The Maria mine produced a substantial tonnage of high-grade ore in past years.

Almoleya—It is rumored that one of the large American operating companies has acquired control of the Cia Minera Rodrigues Ramos, S. A., which

owns the famous Cigarrero mine at Baca station on the branch line of the railroad which runs from Jimenez to Parral. This mine has been an important producer of lead, copper and zinc ores for many years.

Santa Eulalia—Operations in this district are on a larger scale than ever. The Potosi shaft of the Chihuahua Mining Co., is producing 300 tons of high-grade silver ore per day.

The Buena Tierra Mining Co., and the A. S. & R. continue to produce their usual tonnage.

The Reyna de Plata Co., has joined the ranks of producing mines and is making occasional shipments of lime ores carrying good silver values to the Chihuahua smelter.

Hillery and associates are leasing on the Cristo property.

R. E. Miller has taken a lease on the Nuevo Santander claim belonging to C. O'Callahan.

The Compañia de Minerales y Metales, S. A., operating the Inglaterra mine, is shipping an increased tonnage to the Chihuahua smelter.

ALASKA

The Ward Copper Co., of Teller, Alaska, is working a high-grade copper property on Kougrak Mountain, fifty miles inland from Port Clarence Bay, its shipping point. The deposit was discovered in 1904 by T. F. Ward, president of the company. The Ward company was organized in 1918 with \$250,000 capital, of which \$50,000 was issued in 1920. The ore is mainly carbonate, azurite and malachite, and its croppings occur along a 3,000-ft. stretch beginning at the discovery point where an open cut has been started. From this most of the small quantity of ore shipped to date has come. Shipping has been by horse team over snow and has cost \$51 per ton. Shipments have run not less than 30 per cent copper. There are three shallow shafts on the property, the deepest, sunk in ore, being 50 ft., from which a 30-ft. cross cut has been driven without reaching the hanging. This shaft will be deepened to 150 ft. Eight men will be worked this winter and a hoist bought at Nome. The New York office is at 41 Broadway. J. S. Eaton is vice president, T. A. Ward, secretary, and Francis Purnell, treasurer. T. F. Ward, president, left Seattle for Teller on June 2.

Juneau—The Admiralty Alaska Mining Co. has let a contract for driving 1,000 ft. of tunnel at Funter Bay.

Valdez—The Columbia Red Metal Mining Co. will begin work this summer on its property with a crew of 50 men and expects to ship ore. A six-drill compressor and auxiliary equipment has been installed. The Valdez Gold Mining Co. is resuming operations. Supplies are being assembled.

ARIZONA

Flux at Patagonia Cuts New Ore—Iron Cap Mill To Start Soon—Phelps-Dodge Protests Morenci Assessment

Patagonia—At the Three R mine, now being worked by interests affiliated with Magma Copper Co., Superior, Ariz., diamond drilling is progressing and several headings are being driven. Five horizontal holes crosscutting country have been drilled up to 1,000 ft. in length. During one six-day week with one diamond drill nearly 600 ft. of hole was drilled.

The new shaft of the Hardshell mine is still closed down pending the arrival of more machinery. At this shaft 350 gal. of water per minute is being handled. The company is planning to install electric pumping equipment. Power will be obtained from power line extending to this district from Nogales. Tom Gardner is still shipping lead-silver ore under lease from old stopes in the upper levels.

An announcement has been made by the Flux Mining Co. that ore has been cut on the 260-ft. tunnel level, that is said to carry about \$25 in lead, silver and zinc and to be 22 ft. wide. This is believed to be an off-shoot to the south from the main orebody. A drift is now being driven on this level to get under the old carbonate stope of the main orebody.

Johnson—The Johnson Copper Development Co., which shut down during the war, owing to the shortage of labor, has been operating since Jan. 1, all work being confined to development. The property is worked through a two-compartment perpendicular shaft, which has been retimbered since the first of the year. The bottom level has been unwatered and crosscutting started. The eight claims included in the company's holdings are situated in the center of the district, bounded on three sides by producers such as the Arizona United, Peabody and Copper Chief.

At present, work is being concentrated on the level, where a 500-ft. crosscut has been run intersecting several small veins of medium-grade copper ore. The main orebody should be reached within 100 ft., from surface indications. In other parts of the mine many small pockets of high-grade copper ore have been found.

Equipment consists of a 40-hp. Fairbanks Morse gasoline hoist, a 650-ft. Chicago Pneumatic class N-50 compressor, and Leyner drills. A well equipped shop is maintained at the collar of the shaft for sharpening and repair work.

H. S. Krug, of St. Louis, Mo., is president. Ralph R. Wilson, vice president, and E. H. Elliott, secretary treasurer, live in Frankfort, Ky., where the main office is situated. J. T. Tong, of Johnson, has direct supervision of all work.

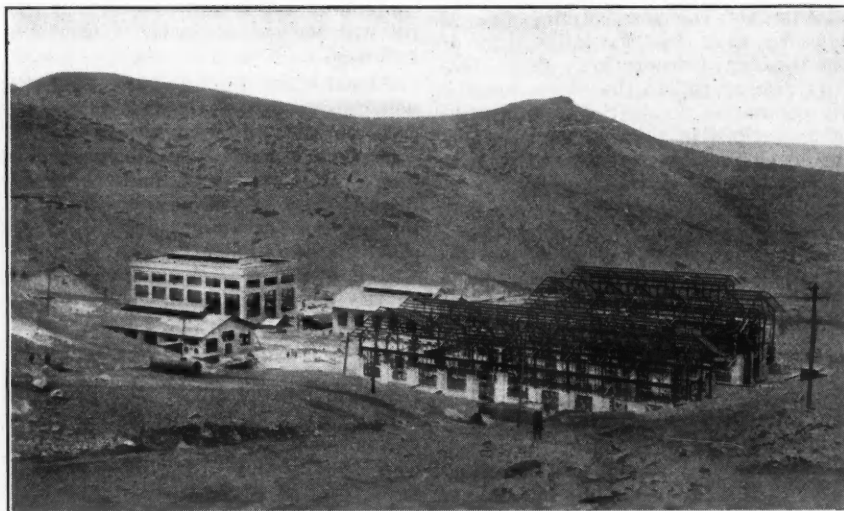
Kelvin—Practically all the equipment for the White Metals Mining Co.'s mill is on the ground. It consists of two 60-hp. Western gas engines, a 40-hp.

engine, crushers, rolls, tables, Dorr classifier and a 12-ft. K & K flotation machine. It is estimated that there is about 40,000 tons of ore on the dumps at present.

Globe—The Iron Cap mill is expected to be in operation early this month.

Jerome—Verde Combination's new mill and cyanide plant is expected to be completed by July 1. Nearly all of the equipment is on the ground. The property, consisting of nine claims, is on Cherry Creek hill in the southern end of the district. A shaft has been sunk about 400 ft. and over 1,000 ft. of other work done. The plant will have a daily capacity of 40 tons.

Mayer—United Arizona, a Phoenix corporation, has made a notable strike on its property, on Copper Creek, 26 miles southeast of Mayer. At 980 ft. depth a 14-ft. ledge of high-grade bornite is being developed. The main shaft is 1,000 ft. deep. The mine is to be electrically equipped and will use current from the Arizona Power Co. C. J. Bendewald is in charge of development.



NEW POWER HOUSE AND MACHINE SHOP OF UNITED VERDE COPPER CO., AT PORTAL OF 500-FT. LEVEL, JEROME, ARIZ.

Arizona-Binghamton, at Stoddard, is installing new power lines, an electric 200-hp. hoist and electric signal system.

Parker—Arizona Standard is to install a 200-ton leaching plant on its property, 14 miles east of Parker. Development has been done mainly by Star drills and has shown the existence of carbonate-oxide deposit said to sample from 4 to 10 per cent copper. F. L. Barber, of Swansea, is to be in charge of the plant, which is to be in operation by October.

Phoenix—Captain J. P. Hodgson, representing the Morenci branch of the Phelps-Dodge Corporation, stated before the State Tax Commission, with respect to the annual assessment of the property for taxation, that there had been no production since last September, operations now being limited to development, in which there had been outlined large bodies of ore of low grade, concerning which there had not yet been reached a decision as to treatment.

ALABAMA

Birmingham—Production of pig iron in Alabama during May rose to 210,000 tons, owing principally to an increase in the number of furnaces in blast. For the first five months of 1920 the output was 996,153 tons against 837,612 tons for the same period in 1919.

Railroad difficulties, shortage of equipment, and labor unrest are the prominent features of the situation. Union mine workers are threatening to strike in Alabama. A state convention of union mine workers has been called for June 14 in Birmingham. At a dozen mining camps already strikes are on, the workers demanding a contract. Coal production in the state is lagging and in consequence coke making has decreased, but iron and steel plants have not felt the effects of this so far. Operators are firm against the open shop.

CALIFORNIA

Jackson—Dewatering of the Argonaut and Kennedy mines is proceeding vigorously. Some time will be required to clear the bottom levels.

Tuttletown—High-grade ore has been uncovered in the 175-ft. level of the winze in the Patterson mine.

Angels—The Carson Hill company has leased the Melones shaft and tunnel adjoining, gaining about 2,400 ft. of working available for developing Carson Hill orebodies.

Grass Valley—Eighty stamps are dropping at the Empire Mines taking ore from both Empire and Pennsylvania properties. The Pennsylvania mill is idle and will be dismantled. Skilled miners are scarce.

Foundations for the Alcalé's ten-stamp mill are being laid and the plant is expected to be ready next month.

Colfax—The ten-stamp mill at the Rising Sun is practically complete. E. C. Klinker is superintendent.

Dedrick—Preparations are being made to start the mill on the Globe property, which recently changed hands.

MICHIGAN

**Fire Damages Princeton Plant at Gwinn
—Bristol Lays off Night Shift—
Three Gogebic Mines Shipping
from Stock**

Marquette Range

Gwinn—Fire destroyed the coal dock, boiler house and did considerable damage to the laboratory at the Princeton mine on May 28. Much coal was lost. A large crew of miners and others helped keep the flames from spreading. The loss is covered by insurance.

Menominee Range

Crystal Falls—The night shift at the Bristol mine was laid off on June 1. With the ore now in stock and what can be hoisted during the shipping season by working but one shift, the company will be able to fill its contracts from this property. This is the second Michigan company to announce a reduction in working forces, the Montreal mine, at Hurley, having gone on one shift on the same date.

Iron River—Operations have been resumed at the Delta mine, which was recently transferred by the St. Clair Mining Co. to the Wickwire Steel Co. Fast time was made in getting the mine ready for production. Considerable machinery has been installed.

Gogebic Range

Ironwood — The Pabst and Aurora mines of the Oliver company started to ship ore from stock this week, and also the Ottawa mine at Hamilton, Wis.

At the Plumer mine near Pence, Wis., the shaft is being sunk and other development done, but no attempt has been made to mine ore. The Republic Iron & Steel Co., which now operates the property, has purchased a number of houses in the village of Knight from the Oliver company, which formerly operated the Plumer and Atlantic mines. The latter property has been drilled extensively in the last few years by other interests, and one or two diamond drills are still in operation there. A transmission line has been built to the Plumer from the 33,000-volt line of the Ashland Power Co. Transformers and line are about ready for operation. The load will not be great until present operations are extended.

The Copper District

Calumet—Seneca is rapidly reaching a point in shaft where it may be possible to open up both additional drifts in Kearsarge lode ore. The shaft is down 70 ft. below the 4th level and the raise to the 4th is under way. It will take three weeks to reach the 5th level and have the plat cut ready for lateral development to the lode. On the 3rd and 4th levels drifts are being driven north and south in average lode rock.

At the Gratiot shaft the 15th level drift south is in 250 ft. from the shaft and in good looking rock.

Houghton—Franklin is badly hit by the lack of coal and has been compelled to limit operations to pumping.

MONTANA

**Anaconda Cuts Rich Ore at Depth in
Stewart Shaft**

Butte—Uncovering of an orebody at a depth of 3,740 ft. in shaft sinking at the Anaconda's Stewart mine is regarded as significant in that it shows the extension downward of high-grade ore. The deposit is more than 6 ft. wide and is an extension of the shoot on the 2,800-ft. level, where it was cut 200 ft. north of the shaft. On the 2,800 level it ran about 25 per cent in copper, and at the greater depth as high as 40 per cent. This development is regarded as one of the most important Anaconda has made for some time. The Stewart shaft is one of the deepest in Butte, the deeper shafts being the Granite Mountain of the North Butte company and the High Ore of the Anaconda, the latter being used as a sump for the mines situated on the Anaconda hill.

The labor situation is improving slowly and a class of labor is being secured that is more efficient, due to the weeding out of the I. W. W.

Production at the Davis Daly is increasing gradually as men are added. A working agreement has been reached with the Butte & Ramsdell, whereby the latter's ores at depth will be mined through the former's workings.

Neihart—The Cascade M. & M. Co. has suspended operations in consequence of the I. W. W. calling a strike in the district. Other companies followed, including the Neihart Consolidated, Neihart Silver, and the Florence and Gault properties. Merchants and business men immediately announced that they would go upon a cash basis and that credit would be denied all stores, cafes and hotels in the district. It was the extension of credit to the I. W. W. in Butte by several cafes which enabled the radicals to hold out as long as they did. The I. W. W. called a strike without notifying the mine managers, later making a demand for an increase of wages from \$5.50 to \$6.

Glenn District—A wide fissure carrying low-grade copper, silver and lead has been opened in the Great Western property on Lost Creek.

Road building to the Bieber-Keith Mines Co.'s gold property in the McCartney mountains will be started at once.

Deer Lodge—Emery Silver Mining Co. is building a power line from Deer Lodge to its 50-ton mill at the mine dump.

Bannack — The Stallings company, operating in Beaverhead county, has about completed its mill on the old Hendricks mine, a gold property.

Elliston — Monarch mill will soon start shipping of concentrates to the East Helena smelter.

Libby—Buildings are being repaired and the work of completing the mill is being rushed at the Lukens-Hazel mine.

NEVADA

**Mason Valley Smelter Rate Hearing
on June 24—Rochester Combined
Sued — Tonopah-Divide
Changes Announced**

Reno—The Interstate Commerce Commission has set for hearing here on June 24, the application for a readjustment of rates on copper ores and concentrates from Plumas County, Cal., to the Mason Valley smelter at Wabuska, Nev.

The Nixon Nevada mine and mill, ten miles north of Reno, has been sold at sheriff's sale for \$7,000. The property was bid in by Attorney W. M. Gardner, representing Boston creditors. Other suits are pending.

Lovelock—Suit has been instituted against the Rochester Combined Mines Co. for \$260,000 by 18 note holders. The company owns a 400-ton mill as good as new.

Candelaria—Active work has begun at the Consolidated Cortez Silver Mines Co., that passed into eastern hands some time ago. This is the old Wenban silver mine, discovered in 1863, and credited with a production of \$20,000,000.

Tonopah—Regular production and development are reported for the Tonopah Belmont, Tonopah Extension, Tonopah Mining, and West End companies.

Official announcement has been made by Charles E. Knox, president of the Mizpah Extension company, that the recent discovery on the Halifax 1,100 level and developments in a raise to the Mizpah Extension 1,155 level, in Mizpah Extension territory, bid fair to become important to both the Mizpah Extension and Halifax companies and to the eastern portion of the Tonopah mining district as a whole. Some high-grade ore has been encountered and mill ore is being developed and stoped over a width of 7 ft. To date 1,018 tons have been mined of an average gross value of \$19 per ton. The Halifax company has an option on the "Bird" group of the Mizpah Extension company, which can be closed at any time during the next fifteen months, provided developments warrant; the Halifax to organize a new company and retain 51 per cent of the stock, and the Mizpah Extension to receive 49 per cent of the stock.

Divide—The change in the personnel of the operating department of the Tonopah Divide Mining Co., effective June 1, has been officially announced. E. J. Erickson, who is Cal Brougher's representative in Tonopah, is to have general supervision; William Watters is to resume as superintendent of the mine; and George H. Garrey is to be consulting geologist. Development work is to be vigorously prosecuted. The sulphide ore in the southeast drift on the bottom, or 585 level, is lower in grade than last week but is still commercial. No crosscutting has as yet been done in order to determine the width of the orebody.

NEW MEXICO

Lordsburg—A contract will be let at the 85 mine by the Calumet & Arizona company, the new owners, for deepening the main hoisting shaft 300 ft. Work will begin promptly. It is reported that the title to the property has been found to be clear. A number of old employees at the 85 have been let go by the C. & A. company.

UTAH

Bingham — The old New England mine, covering 50 acres centrally located in Bingham and bounded on three sides by the Utah Copper, United States, and Utah Metal & Tunnel properties, has been acquired by Eastern interests. The new company, known as the Utah-Boston Development Co., is incorporated under the laws of Maine, and capitalized at 500,000 shares, par value \$1. The property is accredited with net proceeds of about \$500,000.

WASHINGTON

Valley—A kiln of special design, a crusher and storage bins are to be erected at the magnesite mines of the American Mineral Production Co., six miles from Valley, Stevens County. The crusher will be built near the portal of the Allen tunnel.

CANADA

British Columbia

BY ROBERT DUNN

The snow in the northern mineralized areas of British Columbia is taking rather longer to disappear from the high lands than is usual and miners operating in the Yukon Territory, in Atlin and other contiguous districts will be hindered to some extent. Notwithstanding, there has been a steady stream of prospectors and operators into the Portland Canal region during the last two months. The provincial government is planning considerable road and trail work for this summer and a number of the soldiers' prospecting parties, being outfitted by the administration, have chosen the area for their work. The strike of the Dolly Varden employees has been settled by granting the demands made, miners being paid at the rate of \$6.25 a day; muckers \$5.75 and trackmen \$5.75.

Jedway—The Ikeda mine near Jedway is to be opened up this summer and it is said that a concentrator will be installed. On the Southeastern mine in the same locality surface work will continue and the American Smelting & Refining Co. has had representatives inspecting another property near Jedway.

Slocan District—Most of the mines in the Slocan district are again in action, water scarcity and labor trouble now being over.

Allenby—The Canada Copper Corporation expects to start work at Copper Mountain and at the Allenby mill by fall. Trains are running between Princeton and Allenby on the Copper

Mountain Branch of the Kettle Valley Ry. The concentrator is awaiting the power which is to be brought over a high power line from Bonnington Falls by the East Kootenay Light & Power Co. H. R. Van Wagenen, general manager, has returned from Denver, Colo. where he spent the winter.

Rosslund—Resumption of operation of the Velvet mine, near Rosslund is expected to follow its acquisition by H. E. Innis, of Sandon, B. C. This property was controlled for some months by the Granby Consolidated company.

Hope — Foley, Weleh & Stewart, of Vancouver, are to develop the Eureka gold mine, near Hope, on Silver Creek. Machinery and supplies are being shipped in.

Princess Royal Island—The Tonopah Belmont Development Co. has purchased the Princess Royal property situated close to its mine. Development is planned during the summer.

Ontario

Radium Ore Found in Ontario Not Proved in Commercial Quantity to Date

The discovery of radium-bearing ore in the form of pitchblende in Butt township in Ontario, was reported in *Engineering and Mining Journal* of Nov. 22-29. Since then the ore has been found on a number of other claims surrounding the original discovery, and its distribution seems to be fairly extensive. This is not to be wondered at, however, as there were a number of dykes similar to the one in which the ore was found, throughout the country adjoining.

The ore is similar in character to that found on the original discovery but it is doubtful that it occurs in any larger quantity. At the original discovery it was necessary to make a long search to secure a couple of ounces of the ore and the proposition was apparently not commercial. It is recognized, however, that there is always the chance of finding a sufficient concentration to render the find more interesting.

The Mining Corporation of Canada, which has the option on the original discovery, is not doing anything at present as there is some conflict regarding the title. A syndicate of Northern Ontario people has been formed to do some work on one of the other properties, and more or less work is going on, but nothing of any particular merit has yet been found.

Silver Islet—R. C. Jamison and D. C. Peacock, engineers of Duluth, are reported to be installing a compressor, boilers and other equipment at the old Silver Islet mine on Lake Superior preparatory to unwatering the property. Pumping is expected to begin soon.

Sturgeon Lake—The old St. Anthony mine at Sturgeon Lake has been leased and work will be started at once. The property is equipped with a complete

mining plant and a mill, and has been developed to the 400-ft. level.

Toronto—The Canadian Light-Railway Construction Co. has an engineer and staff at work laying out a route for its line from Elk Lake to Gowganda.

Chronology of Mining, May, 1920

May 3.—Severe windstorms on this and following day caused much damage in the Joplin-Miami district. Minerals Separation hearings resumed before Federal Trade Commission in New York City.

May 5.—Frederick G. Cottrell, assistant director, U. S. Bureau of Mines, nominated to be director, succeeding Van. H. Manning, resigned.

May 8.—First annual mine rescue and first aid contest held at University of California, Berkeley, Cal.

May 10.—American Zinc Institute held second annual session at Chicago. —Colorado committee for drafting new mine taxation law for state filed report with Tax Commission.—Sudbury nickel district operators granted wage increase, machine men getting \$5.25.

May 14.—Governor of New York signed bill for licensing professional engineers. — Representative Oldfield (Ark.) introduced bill repealing War Minerals Relief Act.

May 15.—Winona mine at Houghton Mich., finally suspended operations.

May 16.—Spindletop oilfield, Texas, damaged by windstorm that levelled 171 of the 185 derricks there.

May 17.—Representative Fairfield introduced bill authorizing \$10 premium on new gold produced by American citizens at home or abroad.—Bill introduced authorizing incorporation of United States Oil Corporation.—U. S. Circuit Court of Appeals, San Francisco, Cal., reversed decision in Federal M. & S. Co. vs. Star Mining Co. lawsuit.—Director of Mint announced standing order from Secretary of Treasury to buy silver at \$1 per ounce under Pittman Act.

May 18.—First permit under general leasing act issued by Secretary of Treasury to Crowley County Oil Development Co. to prospect in Pueblo, Col., land district.

May 22.—Secretary of the Interior Payne approved rules and regulations for leasing phosphate deposits on public lands.

May 26.—Miami Copper Co. petitioned, before the U. S. Circuit Court, Philadelphia, Pa., to file supplemental bill which would reopen Minerals Separation-Miami Copper Co. infringement suit to admit newly discovered evidence.

May 27.—American Institute of Mining & Metallurgical Engineers received endowment for Robert W. Hunt medal, and conferred first award of that medal on Mr. Hunt himself.

May 31.—Senator C. B. Henderson (Nevada) introduced a bill authorizing loans to silver producers, that mining operations may continue.

THE MARKET REPORT

Published in part in San Francisco and mailed from there to our Western subscribers as a special service without charge pending the arrival of the *Engineering and Mining Journal*

Silver and Sterling Exchange

June	Sterling Exchange	Silver		June	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
3	392	99 $\frac{1}{4}$	56 $\frac{3}{4}$	7	388	94 $\frac{1}{4}$	54 $\frac{3}{8}$
4	390	98 $\frac{7}{8}$	56 $\frac{1}{4}$	8	390	84	48 $\frac{3}{8}$
5	389	97 $\frac{7}{8}$	56 $\frac{1}{2}$	9	391	81	45 $\frac{5}{8}$

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.

Daily Prices of Metals in New York

June	Copper		Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.	
3	18.35	48.75	50.50	8.55	8.50	7.50	
4	18.35	47.25	49.00	8.50	8.40	7.55	
5	18.35	47.25	49.00	8.50	8.40	7.55	
7	18.25	46.50	48.50	8.50	8.40	7.60	
8	18.25	46.75	49.25	8.50	8.40	7.60	
9	18.25	46.25	48.75	8.50	8.40	7.60	

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 prompt and nearby deliveries constituting the major markets, reduced to the basis of New York, cash, except where St. Louis is the normal basing point. All prices are in cents per pound.

Copper is commonly sold on terms "delivered," which means that the seller pays the freight from refinery to buyer's destination. The delivery cost varies, and it would be confusing to figure net prices on individual transactions. Consequently, an average deduction is made from the "delivered" price. At present the average cost of delivery from New York refineries is 0.15c. per lb., and that deduction is made to arrive at the New York price. When copper is sold f.o.b. or f.a.s. New York, of course no deduction is made.

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 special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of spot American tin, 99 per cent grade, and spot Straits tin.

London

June	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic	Spot	3 M	Spot	3 M	Spot	3 M
	Spot	3 M							
3	92 $\frac{1}{2}$	95 $\frac{1}{4}$	106	263 $\frac{1}{2}$	271	37	38	41 $\frac{1}{2}$	43 $\frac{1}{2}$
4	91 $\frac{1}{4}$	94	106	255	261	37	38	42 $\frac{1}{2}$	44 $\frac{1}{2}$
5	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	90 $\frac{3}{4}$	94	106	253	259	35 $\frac{1}{2}$	37 $\frac{1}{2}$	43	45
8	91	94	106	255 $\frac{1}{2}$	262 $\frac{1}{2}$	36 $\frac{1}{2}$	38 $\frac{1}{4}$	43 $\frac{1}{2}$	45 $\frac{1}{2}$
9	90	93 $\frac{1}{2}$	106	253	259 $\frac{1}{2}$	36 $\frac{1}{4}$	38	42 $\frac{3}{4}$	44 $\frac{3}{4}$

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

Metal Markets

New York, June 9, 1920

No change of importance has featured the major metal markets during the last week, with the exception of the big drop in silver. Copper remains inactive, lead is a little quieter, zinc firm but sluggish, and tin fairly active but unsettled. The transportation situation continues to improve slowly.

Copper

The slight activity reported last week among the larger producers did not prove lasting, and little business has been reported by them for the week ending today. They are optimistic, however, and feel that, having weathered the storm so far, they can hold out for 19c. for two or three weeks longer, or until the next buying movement starts. The smaller producers continue to sell freely at 18 $\frac{3}{8}$ c., and outside trad-

ers, along with Japanese interests, are selling down to 17 $\frac{3}{8}$ c. The cheaper metal is mostly in the shape of ingot bars.

Lead

Spot metal continues extremely scarce, the price ranging from 8.90c. to 9.25c.; two hundred tons from Buenos Aires is understood to be available at the lower price. Mexican duty-paid lead continues to be sold. Internal affairs in Mexico are satisfactory to the lead producers, but some difficulty has been experienced in securing shipping space from Tampico.

Futures continue to be contracted for about $\frac{1}{2}$ c. under the market for late June and early July, which we quote. A great difference of opinion exists as to what the price of lead will be this fall. Consumers of course are bearish. They point out the high price of lead compared with pre-war levels and say

that the recent general reduction of prices is bound to have its effect. The clearing up of the railroad situation will also release a lot of lead which has been tied up, so they say. Producers, however, can see no reason for any reduction. Labor is scarce and inefficient and promises to be worse this summer; and this has reduced production away below estimates. The lower prices for silver will also tend to retard production. Stocks are low, and it is claimed that no tonnage of moment is in transit. The European countries are getting back to work, as is shown by vastly increased exports, and will require more and more raw materials. Producers consider 8c. for August or September lead a bargain price.

Zinc

The zinc market has been somewhat firmer, with the gradual increase in the London price during the week. However, the latter is down again today. Sales have been small, and confined largely to re-sale lots, producers not being interested at present prices.

Tin

Unsatisfactory conditions still obtain in this market. The London price continues to drop, but the local quotation has not fallen proportionately. This is because the local market quotations are for Straits tin, which is scarce both here and in London. The London market quotations indicate an unrest among the speculative element, although the cost of production is without doubt lower with the drop in silver, as the workers in the Far East are paid in that metal.

Producers of electrolytic are not anxious sellers, and the prices asked are about the same as for Straits.

Straits tin for future delivery: June 3, 49 $\frac{1}{2}$ @50c.; June 4, 48 $\frac{1}{2}$ @49c.; June 5, 48 $\frac{1}{2}$ @49c.; June 7, 48@48 $\frac{1}{2}$ c.; June 8, 48 $\frac{1}{2}$ @49c.; June 9, 48@48 $\frac{1}{2}$ c.

Arrivals of tin, in long tons: June 1, Penang, 175; China, 25; June 2, Liverpool, 25; Penang, 15; Singapore, 20; June 3, London, 130; June 4, London, 150; Liverpool 25; June 7, Liverpool, 170; Australia, 150; Hongkong, 150.

Silver

The London market has had a serious decline the last week, falling from 56 $\frac{1}{2}$ d. to 45 $\frac{1}{2}$ d.—a decline equal to 20c. per oz. in the New York market. The Eastern exchanges have become demoralized; Shanghai rates having fallen to 92 $\frac{1}{2}$. The outlook is reported weak, but there is danger of the selling being overdone. The stock of silver in Shanghai on the 22nd of May consisted of 40,330,000 oz. in sycee; 30,000,000 dollars; and 35 iacs of silver bars and U. S. dollars.

Mexican dollars: June 3, 75 $\frac{3}{4}$ c.; June 4, 75c.; June 5, 75c.; June 7, 71 $\frac{1}{2}$ c.; June 8, 64c.; June 9, 61 $\frac{1}{2}$ c.

See page 1340 for further comment.

Gold

Gold in London on June 3, 105s.; June 4, 105s. 5d.; June 7, 105s. 9d.; June 8, 105s. 9d.; June 9, 105s. 3d.

Foreign Exchange

The market has in general been thin. In units to the dollar, francs and lire on Tuesday were 13.00 and 17.00 respectively. German marks, 2.47c., and New York funds in Montreal, 12 $\frac{1}{2}$ per cent premium.

Other Metals

Aluminum—Ingot is quoted at 33c. per lb., with 31 $\frac{1}{2}$ @32 $\frac{1}{2}$ c. open market for 98@99 per cent virgin; dull. Unchanged.

Antimony—Market very quiet. Spot, 8 $\frac{1}{2}$ @8 $\frac{3}{4}$ c. per lb.; Cookson's "C" grade, 14c. W. C. C. brand, 9 $\frac{1}{2}$ c.

Antimony, Needle—The market for Chinese needle antimony in lump form is firm at 9 $\frac{1}{2}$ c. per lb., although demand continues quiet. Standard powdered needle antimony (200 mesh) is quoted at from 12 to 15c. per lb. according to quantity. Unchanged.

Bismuth—Unchanged at \$2.70@\$3 per lb. for 500-lb. lots.

Cadmium—Quoted nominally at \$1.40 @\$1.50 per lb. Unchanged.

Cerium Metal—There has been no change from the price of \$8@\$9 per lb. in ingot form.

Cobalt—Metal remains at \$2.50 per lb. Black oxide, \$2 per lb.

Iridium—Purely nominal quotation of \$300 per oz. No business.

Magnesium—Metallic, 99 per cent or over pure, \$1.60@\$1.85 per lb. Unchanged.

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

Nickel—Ingot, 43c.; shot, 43c.; electrolytic, 45c.; Monel metal, shot, 35c.; blocks, 35c., and ingots, 38c. per lb.

Osmium—Open market prices, \$50@ \$75 per troy oz.

Palladium—Quoted at \$70@\$85 per oz. Market dull and weaker.

Platinum—Market weaker at \$75@ \$95 per oz. Little business transacted.

Quicksilver—Increased demand. Quotation \$93 per 75-lb. flask. San Francisco wires \$83@\$90; steady.

Ruthenium—Market value, \$200@ \$220 per troy oz. Unchanged.

Selenium, black, powdered, amorphous, 99.5 per cent pure, continues to be quoted at \$1.75@\$2 per lb., depending on quantity.

Thallium Metal—Selling at \$18@\$20 per lb., ingot, 99 per cent pure, depending on quantity.

Metallic Ores

Bauxite—Bauxite for aluminum manufacture, containing about 52 per cent alumina, less than 2 per cent iron oxide and up to 20 per cent silica, and arti-

ficially dried to contain not more than 4 per cent free moisture, sells for \$10 per gross ton at mine. Bauxite containing 54 per cent alumina and about 15 per cent silica sells for \$11 per gross ton. That averaging 57 per cent alumina, 8 to 12 per cent silica, less than 3 per cent iron oxide on the basis of 8 per cent free moisture, \$13. Ores of very low silica content suitable for manufacture of alumina oxide and hydrate of alumina command a fancy price.

Chrome Ore—Current price of chrome ore on the basis of Cr₂O₃ varies with the sesquioxide contained. The guaranteed 50 per cent foreign ore with a minimum of 6 per cent silica ranges from 72c. to 80c. per unit, New York. California concentrates, 50 per cent Cr₂O₃ and upward, 60@65c. per unit, f.o.b. mines. Unchanged.

Iron Ores—Lake Superior ores, per ton delivered at Lower Lake ports: Old Range bessemer, \$7.45; Old Range non-bessemer, \$6.70; Mesabi bessemer, \$7.20; Mesabi non-bessemer, \$6.55. Shipments during May approximated 6,400,000 gross tons, as compared with 6,615,341 tons during May, 1919.

Manganese Ore—Containing 45 per cent Mn and over, quoted 80@85c. per unit. Chemical ore (Mn O₂) \$80@\$90 per gross ton. Unchanged. See p. 1340.

Molybdenum—Few transactions. Quoted nominally at 85c per lb. of contained sulphide for 85 per cent MoS₂.

Tantalum Ore, guaranteed minimum 60 per cent tantalic acid, is still selling at 65@70c. per lb. in ton lots.

Titanium Ores—Ilmenite 52 per cent TiO₂, 1c per lb. for ore. Unchanged. Rutile, very little on market. No price quoted.

Tungsten Ore—Chinese wolframite continues to be quoted \$6.50@\$7.50 per unit of WO₃. Bolivian spot is offered nominally at \$8.50@\$9 per unit of WO₃.

Uranium Ore (Carnotite)—\$2.75@\$3 per lb. for 96 per cent of the contained oxide (U₃O₈). Ores must contain a minimum of 2 per cent U₃O₈.

Vanadium Ore—Prices are usually based on vanadium content, and at present range from \$1 to \$3 per lb. of contained vanadium. Variation also depends on presence of lead, copper, arsenic, molybdenum, uranium, etc.

Zircon—Washed, iron free, continues to be quoted at 10c. per lb. Zirkite—In carload lots, \$90@\$100 per ton is quoted. Pure white oxide, 99 per cent, is quoted at \$1.15 per lb. in ton lots.

Zinc and Lead Ore Markets

Joplin, Mo., June 5.—Zinc blende, per ton, high, \$47.80; basis, 60 per cent zinc, premium, \$45; Prime Western, \$45@\$42.50; fines and slimes, \$40@ \$37.50; calamine, basis 40 per cent zinc, \$36. Average settling prices: Blende, \$45.04; calamine, \$37.20; all zinc ores, \$44.98.

Lead, high, \$104.90; basis, 80 per

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

cent lead, \$100; average settling price, all grades of lead, \$102.64 per ton.

Shipments for the week: Blende, 7,415; calamine, 162; lead, 915 tons. Value, all ores the week, \$434,690.

The basis of \$45 for blende was paid by one agency and it is rumored that another met the advance, the greater sales being on \$43.50 basis, with a few sales \$42.50. Several large producers declined to accept the offerings and sales were abridged. Shipments are severely retarded by lack of cars, even with the use of coal cars predominating.

Platteville, Wis., June 5.—Blende, basis, 60 per cent zinc, \$48@\$51 base for high-grade. Lead ore, basis 80 per cent lead, \$100 per ton. Shipments for the week: Blende, 932; calamine, 120; lead, 115; sulphur ore, 84 tons. Shipments for the year: Blende, 31,544; calamine, 1,980; lead, 2,991; sulphur ore, 680 tons. Shipped during week to separating plants, 2,255 tons.

Non-Metallic Minerals

Asbestos—Quoted per short ton f.o.b. Thetford, Broughton and Black Lake mines, Quebec, Canada. Freight rate from mines to Sherbrooke, Quebec, over Quebec Central R.R., 20c. per cwt; from Sherbrooke to New York, 27 $\frac{1}{2}$ c., carload lots. Crude No. 1, \$1,800@ \$2,500; crude No. 2, \$1,100@\$1,500; spinning fibres, \$400@\$700; magnesia and compressed sheet fibres, \$300@ \$400; shingle stock, \$100@\$150; paper stock, \$60@\$80; cement stock, \$17.50@ \$30; floats, \$8.50@\$15 per short ton. Crude No. 1, f.o.b. Thetford Mine, freight to New York \$8.45 per ton in carload lots. Five per cent Canadian royalty export sales tax must be added to these prices.

Barytes—Crude, 88 to 94 per cent barium content, \$8@\$10 per net ton; ground, (white) \$20@\$22 in bags, carload lots; (off-color) \$16@\$18 in bags, carload lots; all prices f.o.b. Kings Creek, S. C. Prices f.o.b. Cartersville, Ga., are \$23@\$25 per net ton for ground, (white); \$16@\$19 for ground (off-color); \$12 per gross ton for crude, 88@94 per cent. Quotations f.o.b. New York in less carload lots are \$37.50 per net ton for ground (white); \$25 per net ton for ground (off color); \$23 per net ton for crude 88 to 94 per cent barium content.

Chalk—English, extra light, 5@7c. per lb.; light, 5@6c. per lb.; dense, 4@5c. per lb., f.o.b. New York. Unchanged.

China Clay (Kaolin)—Imported lump, \$25@\$35; imported powdered, \$30@\$60; domestic lump, \$10@\$20; domestic powdered, \$25@\$30, all per net ton, f.o.b. New York. Crude, \$8@\$12 net ton f.o.b. Virginia points; ground, \$15 @\$40 net ton, f.o.b. Virginia points.

Feldspar—Crude, \$7.50@\$8 per gross ton, f.o.b. Maryland and North Carolina points; ground, \$18@\$25, car lots, f.o.b. Baltimore; ground, \$16@\$20, f.o.b. North Carolina points; up to \$16 to \$19 per ton, No. 1 ground, f.o.b. New York State, with one large factory two months behind on contracts.

Fluorspar—Ohio district: prompt, \$28 per ton; contract, \$23@25 per ton.

Fuller's Earth—Remains firm at \$25 @ \$30 per ton for domestic and \$35 @ \$40 for foreign, with little material available.

Graphite—Present quotations for crucible flake are: 80 per cent carbon content, 5c. per lb.; 90 per cent, 10c.; 30 per cent (dust polish grade) 1c.; 50 per cent (dust facing grade) 2c., f.o.b. Ashland, Ala. Quotations f.o.b. New York for crucible flake are: 85 per cent carbon content, 8c. per lb.; 88 per cent, 9½c. per lb.; 90 per cent, 10½c. per lb. There appears to be a slightly better market for the 90 per cent grade of crucible flake, with probability of a stronger demand. Mexican amorphous graphite is being sold at \$45@55 per short ton; Korean, 3¼c. per lb.; Madagascar, 8c.; Ceylon, 4¼@15¼c., according to quality.

Gypsum—Wholesale price, plaster of paris in carload lots, is \$3.75 per 250-lb. bbl., alongside dock New York.

Kaolin—See China Clay.

Magnesite—Dead burned, for refractory (see Refractories).

Magnesite, Calcined—High-grade caustic calcined, in lump form, is selling at \$35@40 per ton in carload lots f.o.b. California ports. The price of freshly ground calcined, suitable for the flooring trade, is \$65@75 per ton f.o.b. Eastern points.

Mica—No change in prices per lb. for block mica slightly stained according to grade: No. 6, 50c.; No. 5, \$1.20@1.40; No. 4, \$2@3; No. 3, \$4.25@5; No. 2, \$5.50@7; No. 1, \$8; all prices f.o.b. New York. Prices quoted per lb., f.o.b. New York, for clear block mica according to grade are: No. 6, 55c.; No. 5, \$2; No. 4, \$4; No. 3, \$5.75; No. 2, \$7; No. 1, \$9; A1, \$14; extra large, \$25.

Monazite—Product carrying a minimum of 6 per cent thorium oxide, \$42 per unit is quoted, duty paid.

Phosphate Rock—Prices quoted per long ton at Florida ports are: 68 per cent tricalcium phosphate, \$6.85; 70 per cent, \$7.35; 74 to 75 per cent, \$10; 75 per cent minimum, \$10.50; 77 per cent minimum, \$12.50. Situation unchanged.

Pumice Stone—Imported, 3@6c. per lb.; domestic, 2½c. per lb. Unchanged.

Pyrites—Placing of additional tax in Spain is holding down imports of this mineral. Spanish furnace size ore has sold at 16½c. Freight range from 15s. to 17s. No change in domestic situation.

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.

Sulphur—Market remains unchanged, with a quiet domestic and heavy foreign demand. Prices average \$18 per ton for domestic, and \$20 for export, f.o.b. Texas and Louisiana mines.

Talc—Prices f.o.b. Vermont are \$9.50 @ \$14 per ton, paper making; roofing grades, \$8@9; rubber grades, \$9@15. California talc sells for \$20@35, tal-

cum powder grade. Quotations for southern talc are: powdered, carload lots, \$12 per ton; less than carload, \$15, f.o.b. cars. Freight to New York, \$5.25 per ton, carload lots; less than carload lots, \$9.25.

Mineral Products

Arsenic—White arsenic, 14@15c. per lb.; sulphide, powdered, 20@21c. per lb., f.o.b. works.

Nitrate—Soda quoted at \$3.82 to \$3.85 per cwt., ex vessel, Atlantic ports. Market dull.

Potassium Sulphate—Domestic, \$200 per ton. German, at New York, same price.

Ferro Alloys

Ferrocobalt—For 15-18 per cent material, \$200@250 per ton f.o.b. Niagara Falls, N. Y. Unchanged.

Ferrocobalt—Conditions abroad continue to cause a reduction in price of the American goods, and this alloy is now selling at \$12@15 per lb.

Ferrochrome—Carload lots, spot and contract, 60 to 70 per cent chromium, 6 to 8 per cent carbon, 17@18c. per lb. of chromium contained; 4 to 6 per cent carbon, 18@19c.

Ferromanganese—Domestic, 76 to 80 per cent, delivered, \$200@225 per ton for futures; car lots, spot, \$235@250 per ton; small lots, \$275. English, c.i.f. tidewater, \$200, last half delivery. Spiegeleisen—Spot prices, \$70@75 per ton, f.o.b. furnace.

Ferromolybdenum—Standard grades, carrying from 50 to 60 per cent molybdenum metal, with low sulphur, phosphorus, and arsenic, are quoted at \$2.25 @ \$2.75 per lb. of contained metal.

Ferrosilicon—Electrolytic, 50 per cent, delivered, \$78@80 f.o.b. Buffalo; 75 per cent, \$150, delivered, Pittsburgh, Valleys, Cleveland. Bessemer, 10 per cent, \$62.50; 11 per cent, \$65.80; 12 per cent, \$69.10, f.o.b. furnaces at Jackson and New Straightsville, Ohio. All prices, per ton.

Ferrotungsten—Unchanged at 85c @ \$1.15 per lb. contained tungsten.

Ferro-uranium—35-50 per cent U, \$7 per lb. of U contained. Unchanged.

Ferrovandium—Basis 30-40 per cent, \$6.50@7 per lb. of V contained.

Metal Products

Copper Sheets—No change in Jan. 7 price of 29½c. per lb.; wire, quoted 22½ @ 22½c.; market still strong.

Lead Sheets—Full lead sheets, 12½c.; cut lead sheets, 12½c. in quantity prices, mill lots. Unchanged.

Nickel Silver—Unchanged at 39½c. per lb. for 18 per cent nickel.

Yellow Metal—Dimension sheets, 26½c.; sheathing, 25½c.; rods, ½ to 3 in., 23½c. Unchanged.

Zinc Sheets—\$12.50 per 100 lb., less 8 per cent on carload lots, f.o.b. smelter; zinc plates, 12c. per lb. Unchanged.

Refractories

Chrome Brick—Unchanged at \$70 @ \$75 per net ton, f.o.b. Chester, Pa.

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

Chrome Cements—Unchanged at \$45 @ \$50 per net ton, f.o.b. Chester, Pa.

Clay Brick—First-quality fire clay, \$45@50 per 1,000, f.o.b. Clearfield, Pa.; second quality, \$40@45 per 1,000, f.o.b. Clearfield, Pa. Fire clay, \$5 to \$7 net ton, f.o.b. Baltimore. A correspondent informs us that first-quality fire clay brick sells at plants in New Jersey at \$75 per 1,000 and in St. Louis at \$45.

Magnesite—Dead burned, \$48@55 per net ton, f.o.b. Chester, Pa.; brick, 9 x 4½ x 2½ in., \$90@95 per net ton, f.o.b. Chester, Pa. Dolomite is selling at \$12.50 per ton, f.o.b. Ohio.

Silica Brick—\$50@55 per 1,000, f.o.b. Mount Union, Pa.

Note—Minimum price at time of shipment prevails in the list of refractories.

Iron Trade Review

Pittsburgh, June 8, 1920

Pig Iron—Prices are unchanged: Bessemer, \$43; basic, \$43.50; foundry, \$45, f.o.b. Valley furnaces, freight to Pittsburgh being \$1.40. W. P. Snyder & Co. report average prices in May, based on actual sales, at \$42.603 for bessemer and \$43.485 for basic, both at Valley furnaces.

Production of coke and anthracite pig iron during May, according to *Iron Age*, amounted to 2,988,881 gross tons, or an average of 96,415 tons per day, as compared with 2,739,797 tons, or 91,327 tons per day, in April.

Birmingham, June 7, 1920

The pig-iron market in the Birmingham district is strong, although during the past week there has been a little lull in the selling. Effort is being given to production and delivery, with much success. Inquiries for iron for 1921 delivery have not been given encouraging answers, nor has any price been fixed at which the iron for that period will be sold. Present quotations are on a level of \$42 per ton, No. 2 foundry, 1.75 to 2.25 per cent silicon content. Even with an increasing output, the probable make of the last half of the year in Alabama has been sold already, and there is no belief that cancellation of orders impends. Some export business is again in sight. The Gulf States Steel Co. has taken on orders for steel wire and nails for South American delivery, the product to be placed in that country from September to December. Arrangements are being made for transportation.

Charcoal and Coke

Charcoal—Large quantities sell as follows: Willow, 7c. per lb.; hardwood, 4½c. per lb., in 250-lb. bbl.

Buffalo—For 72-hour Connellsville foundry, \$15; for 48-hour furnace, \$13.-50 per ton.

Connellsville—Market stiffer. Prompt furnace, \$14.50@15; prompt foundry, \$15@15.50, contract foundry, \$11 @ \$12 per net ton at ovens. Nominal.

New River—Furnace, \$12@14 and foundry, \$14 per ton.

Pocahontas—Furnace, \$12@13 per ton.

Wise County—Furnace, \$13@14 per ton; foundry, \$14@15 per ton.

Decline in Silver

In view of the fact that the common impression regarding silver quotations is that they should hold around \$1 per oz., an explanation is in order elucidating the significance of the recent drop below the dollar quotation, which is recorded in the early June market. The expected dollar quotation is, of course, in conformity with the prospective re-purchases of silver produced in the United States, under the Pittman Act. The Government will only buy such silver for \$1 per oz. as is certified beyond question to have been mined and refined in the United States. The silver producers should realize that the price of \$1 an ounce is a quotation for deliveries at the mint, so that even when the Government plan is in operation silver prices will net a trifle less than the dollar quotation. However, the arrangements for purchasing this silver have not been perfected, and the Government machinery necessary to expedite the purchases has not yet been put in motion, as the affidavit which the Government has prepared has been found unworkable. Conferences are being held between the smelting companies and the Government to determine details, and it is hoped that within a week's time satisfactory arrangements will have been perfected.

Foreign silver, or silver in markets outside the United States, will depend for its price upon the usual market conditions, and it is this "outside" silver which is being quoted below \$1 per oz. Mexican and Canadian silver, for example, cannot be sold to the United States Government at the \$1 price and must seek its market in the general trade level. The domestic silver-consuming industries such as the moving-picture business naturally will tend to purchase foreign silver under the present condition. Thus we have an unusual situation in silver, with two quotations really in force, one taking care of the domestic production at \$1 per oz. and the other quoting prices in the market for silver produced outside the United States.

Only two months ago silver was still causing anxiety in the financial world, as the price seemed destined to alter existing subsidiary coinage systems, resulting in extensive melting of silver coins. During the last two months, however, a great and unanticipated change has come. From a high in March of \$1.32 to quotations around 81c. at present there is a drop of some 38 per cent, which is a gage of the rapid decline. It would appear highly improbable from the developments in the last few weeks that silver's recovery from the tremendous blow it has received will take it to the heights that were extravagantly predicted last winter.

The causes of the decline in price have been currently indicated in the market section and editorially commented upon in *Engineering and Mining Journal*. Briefly, it has been attributed to the abatement of the Chinese silver purchases, which were the principal sustaining influence during the winter, and still more recently to selling in India. However, the drop may also be considered as due to the general economic tendency toward lower prices. Most of the metals have gradually declined during the spring.

The steadiness of present silver prices now depends in the United States on the Government's purchases under the Pittman Act, whereas the international market looks to India as a stabilizing influence. A few months ago, India reorganized her currency system to conform, as was stated in some quarters, with the high price of silver, but the real purpose of the reorganization was to link the rupee to gold and not to the pound sterling, as had been the case under the former gold-exchange standard. This step was taken by some silver authorities to mean "pegging" the price of silver to over \$1.30 per oz., but subsequent events have shown the fallacy of this assumption. Although India, by raising the rupee rate in February last, restored the token value of that coin, this arrangement had no more effect on the price of silver than a similar action on the part of the United States would have had if the exchange rate of the twenty-five cent piece were arbitrarily raised to three for a dollar. Nevertheless, the change in the exchange rate of the silver rupee was an event of historical importance; this and the Pittman Act may be considered the most important bits of legislation affecting silver that have been enacted for many years.

The uncertainty in making predictions as to the future of silver lies in the fact that silver is a commodity subject mainly to government requirements. This is clear when one realizes that about three-quarters of the world's annual silver production goes to India, to disappear from view, and that the silver imports of India are made under authority of that government. Furthermore, India's requirements are about as much a question of fancy as of trade, which heightens the enigmatical position of that country. Prediction as to what the Indian demand will be, outside of government circles, is difficult.

Mexico's political difficulties should not impair the silver production of that country, as this industry is an essential one to the conduct of the government. As long as one faction of the contending parties is in genuine control of the country, it is likely that no attempts will be made to molest the silver-mining industry. The behavior of the revolutionists has been gratifying, and the belief is expressed in some quarters that the new regime is an improvement over the old. Where American mining interests have been disturbed by the strife, property rights generally have been accorded unusual respect.

The Manganese Market

Conditions in the manganese market are similar to those of the chrome-ore market. The United States has no high-grade manganese deposits comparable to those of India and Brazil, and hence the domestic output finds strong competition in foreign manganese ores imported into this country.

Manganese mining in one respect is a more difficult operation than chrome mining, as the process of selecting the high-grade from the low-grade material gives greater trouble, the appearance of low-grade manganese ore closely resembling that of high grade, and the specific gravity is almost the same for comparatively large variations in impurities. Consequently, there have been received many shipments of manganese ore objectionably high in such impurities as silica. One California producer has recently advised the *Engineering and Mining Journal* that there are many manganese mines in California that could produce had they a guaranteed market with a price of at least \$25 per ton, and states that there are a good many carloads of manganese ore of variable grade at different railway shipping points in California that could be purchased at a price lower than \$25. The possibilities are against any market for this low-grade material.

Production of manganese in 1919, according to the U. S. Geological Survey, amounted to 58,085 gross tons of high-grade manganese ore. A comparative table of production follows.

Grade of Ore	1918	1919
35% or more manganese.....	305,869	58,085
10 to 35% manganese.....	902,946	287,782
5 to 10% manganese.....	242,585	108,481

These figures attest the great decline in production of manganese during the past year, because of a drastic decrease in demand.

Manganese ore imported into the United States amounted to 333,344 gross tons in 1919, compared with 491,303 gross tons in 1918, and 629,972 tons in 1917. Approximately 75 per cent of the imported ore in 1919 came from Brazil, and 10 per cent from Cuba.

The present market is interestingly commented upon by one of our correspondents, who is a large user of ore in the East and advises that his firm was recently offered good grades of ore averaging 48 to 50 per cent metallic manganese for 80c. to 85c. per unit, delivered, Baltimore and New York. This company contends that this price was rather high and that the market is nearer 75c. per unit. He is of the opinion that the domestic producers are fairly well supplied for manganese ore over the remainder of 1920, and it is his personal opinion that the price will be lower.

Correction

In the Monthly Copper Production table published in our issue of June 5 the copper productions of the Ray and Shattuck Arizona companies should be transposed.

COMPANY REPORTS

Arizona Copper Co.

Copper; Arizona

The annual report for the fiscal year ending Sept. 30, 1919, indicates that 18,237 tons of bessemer copper was produced, having a value of £1,473,654 0s. 1d. Working expenses amounted to £1,304,421 8s. 7d.; general charges were £153,965 11s. 6d. Net profit balance totaled £108,634 18s. 11d.; dividends on "A" preference shares for the period amounted to £2,374 0s. 0d.; the dividends on "preference stock" were £22,157 2s. 0d. ("A" preference capitalization is £7,480 10s.; "preference stock" is £316,530 0s.). Surplus on Sept. 30, 1919, amounted to £134,357 18s.

Greene Cananea Copper Co.

Copper; Mexico

The annual report for the year 1919 states that 41,404,810 lb. of copper was produced from its own and purchased ores, as well as 1,739,789.55 oz. of silver and 9,167.647 oz. of gold. The refined copper was produced at a cost of 14.750c. per lb., which includes all expenses and Federal taxes. The price received for refined copper sold during the year was 18.665c. per lb. Net income for the year after charging off all expenses and taxes amounted to \$1,104,037.34. One dividend amounting to \$750,000 was distributed to stockholders (500,000 shares at \$100 par value). Surplus on Dec. 31, 1919, was \$7,837,309.32.

Granby Consolidated Mining, Smelting, and Power Co., Ltd.

Copper; British Columbia

A report of operations for the six months ending Dec. 31, 1919, shows that 11,260,585 lb. of copper, 670,486 oz. of silver, and 9,697 oz. of gold were produced. The average price obtained for the copper sold was 19.6c. per lb. Gross profits amounted to \$599,387.29; taxes, interest, and other charges to \$539,487.21; and net profits to surplus were \$59,900.08. On Dec. 31, 1919, surplus account stood at \$1,184,309.44.

Waihi Gold Mining Co., Ltd.

Gold; New Zealand.

The annual report of the directors of the Waihi Gold Mining Co., Ltd., for the year 1919 states that the gold and silver realized from treating 192,613 tons of ore amount in value to £380,402 1s. 6d. Interest amounted to £28,317 7s. 10d, giving a total of £408,719 9s. 4d. Expenditures totaled £220,803 12s. 8d., so that balance remaining amounted to £187,915 16s. 8d. Four quarterly dividends of 1s. each were paid on the 495,907 shares of £1 par value outstanding, which amounted to £99,181 8s. 0d., a splendid record for a gold mine at this time.

Hollinger Consolidated Gold Mines, Ltd.

Gold; Ontario

The annual report of the Hollinger Consolidated Gold Mines, Ltd., for 1919 shows a net profit of \$2,321,290.07 from operations, out of which \$1,722,000 was paid in dividends (35c. per share on 4,920,000 shares, \$5 par value, outstanding). Production amounted to 711,882 tons, with an average value of \$9.73 per ton. Net value recovered from operations amounted to \$6,722,266.81. Working expenses absorbed \$3,222,617.11. Including taxes and miscellaneous expenditures, total expenses were \$4,741,939.14.

United Eastern Mining Co.

Gold; Arizona

The annual report for 1919 states that production of gold amounted to 94,126.905 oz. and silver production to 57,684.76 oz. Bullion sales totaled \$1,969,450.83, the average price received for silver being \$1.13. The average cost of all operations and expenses for the year was \$9.21 per ton. Total operating costs were \$883,835.94. The net income from operations was \$1,073,935.04. Distributions to stockholders in 1919 amounted to \$899,580 on the \$1,363,000 capitalization of the company. Capital surplus on Dec. 31, 1920, stood at \$1,576,271.22.

A statement of production and operating costs for the first four months of 1920 shows that total operating income for this period amounted to \$410,170.83, that 38,210 tons was milled, having a total value of \$752,630.95, and that the operating costs were \$317,514.95.

Tonopah Extension Mining Co.

Silver; Nevada

The fifteenth annual report of the Tonopah Extension Mining Co. for the fiscal year ended March 31, 1920, states that the available surplus for the year was \$189,896.76. The dividend distributions were \$321,177.94, or 25 per cent on the 1,292,801 48/119 shares of par value \$1 outstanding. After providing for Federal taxes, but before allowing for depletion, the net income for the year was \$346,653.18, compared with \$537,100.12 for the preceding year. Production amounted to 70,611 tons, containing 858,411.53 oz. of silver, an average of 12.157 oz. per ton, and 8,180.33 oz. of gold, an average of 0.116 oz. per ton. Recovery of metals amounted to \$15.34 per ton. The average price of silver received was \$1.1744 per oz. Surplus March 31, 1920, amounted to \$1,693,726.88.

La Rose Mines, Ltd.

Silver; Canada

Production of silver by the La Rose Mines, Ltd., amounted to 289,317 oz. of silver in 1919, according to the thirteenth annual report of the company. The net profit, on an average price of \$1.17 per oz. received for the product, amounted to \$30,204.81. Surplus on Dec. 31, 1919, was \$514,424.24. The net cost of production was \$1.0521 per oz. No dividend was paid in 1919.

Utah Apex Mining Co.

Silver-Lead; Utah

The annual report of the Utah Apex Mining Co. for the year 1919 states that mining and milling expenses amounted to \$881,993.91. Other items brought total expenses to \$1,171,294.57. Proceeds from sale of ore were \$981,939.76, and the net loss for the year amounted to \$133,647.21.

International Nickel Co.

Nickel; United States and Canada

The annual report for the fiscal year ending March 31, 1920, shows that net profits, after deducting expenses, depreciation, depletion, tax provisions, and other charges, were \$2,745,734.50. Earnings of all properties amounted to \$6,365,472.29; net income was \$4,887,060.06. Dividends amounting to \$534,756, or 6 per cent, were paid from the earnings for the year on the \$8,912,600 preferred stock outstanding. Surplus on March 31, 1919, amounted to \$10,391,233.28.

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5 to 10% manganese.....	242,585	108,481

These figures attest the great decline in production of manganese during the past year, because of a drastic decrease in demand.

Manganese ore imported into the United States amounted to 333,344 gross tons in 1919, compared with 491,303 gross tons in 1918, and 629,972 tons in 1917. Approximately 75 per cent of the imported ore in 1919 came from Brazil, and 10 per cent from Cuba.

The present market is interestingly commented upon by one of our correspondents, who is a large user of ore in the East and advises that his firm was recently offered good grades of ore averaging 48 to 50 per cent metallic manganese for 80c. to 85c. per unit, delivered, Baltimore and New York. This company contends that this price was rather high and that the market is nearer 75c. per unit. He is of the opinion that the domestic producers are fairly well supplied for manganese ore over the remainder of 1920, and it is his personal opinion that the price will be lower.

Correction

In the Monthly Copper Production table published in our issue of June 5 the copper productions of the Ray and Shattuck Arizona companies should be transposed.

COMPANY REPORTS

Arizona Copper Co.

Copper; Arizona

The annual report for the fiscal year ending Sept. 30, 1919, indicates that 18,237 tons of bessemer copper was produced, having a value of £1,473,654 0s. 1d. Working expenses amounted to £1,304,421 8s. 7d.; general charges were £153,965 11s. 6d. Net profit balance totaled £108,634 18s. 11d.; dividends on "A" preference shares for the period amounted to £2,374 0s. 0d.; the dividends on "preference stock" were £22,157 2s. 0d. ("A" preference capitalization is £7,480 10s.; "preference stock" is £316,530 0s.). Surplus on Sept. 30, 1919, amounted to £134,357 18s.

Greene Cananea Copper Co.

Copper; Mexico

The annual report for the year 1919 states that 41,404,810 lb. of copper was produced from its own and purchased ores, as well as 1,739,789.55 oz. of silver and 9,167.647 oz. of gold. The refined copper was produced at a cost of 14.750c. per lb., which includes all expenses and Federal taxes. The price received for refined copper sold during the year was 18.665c. per lb. Net income for the year after charging off all expenses and taxes amounted to \$1,104,037.34. One dividend amounting to \$750,000 was distributed to stockholders (500,000 shares at \$100 par value). Surplus on Dec. 31, 1919, was \$7,837,309.32.

Granby Consolidated Mining, Smelting, and Power Co., Ltd.

Copper; British Columbia

A report of operations for the six months ending Dec. 31, 1919, shows that 11,260,585 lb. of copper, 670,486 oz. of silver, and 9,697 oz. of gold were produced. The average price obtained for the copper sold was 19.6c. per lb. Gross profits amounted to \$599,387.29; taxes, interest, and other charges to \$539,487.21; and net profits to surplus were \$59,900.08. On Dec. 31, 1919, surplus account stood at \$1,184,309.44.

Waihi Gold Mining Co., Ltd.

Gold; New Zealand.

The annual report of the directors of the Waihi Gold Mining Co., Ltd., for the year 1919 states that the gold and silver realized from treating 192,613 tons of ore amount in value to £380,402 1s. 6d. Interest amounted to £28,317 7s. 10d, giving a total of £408,719 9s. 4d. Expenditures totaled £220,803 12s. 8d., so that balance remaining amounted to £187,915 16s. 8d. Four quarterly dividends of 1s. each were paid on the 495,907 shares of £1 par value outstanding, which amounted to £99,181 8s. 0d., a splendid record for a gold mine at this time.

Hollinger Consolidated Gold Mines, Ltd.

Gold; Ontario

The annual report of the Hollinger Consolidated Gold Mines, Ltd., for 1919 shows a net profit of \$2,321,290.07 from operations, out of which \$1,722,000 was paid in dividends (35c. per share on 4,920,000 shares, \$5 par value, outstanding). Production amounted to 711,882 tons, with an average value of \$9.73 per ton. Net value recovered from operations amounted to \$6,722,266.81. Working expenses absorbed \$3,222,617.11. Including taxes and miscellaneous expenditures, total expenses were \$4,741,939.14.

United Eastern Mining Co.

Gold; Arizona

The annual report for 1919 states that production of gold amounted to 94,126.905 oz. and silver production to 57,684.76 oz. Bullion sales totaled \$1,969,450.83, the average price received for silver being \$1.13. The average cost of all operations and expenses for the year was \$9.21 per ton. Total operating costs were \$883,835.94. The net income from operations was \$1,073,935.04. Distributions to stockholders in 1919 amounted to \$899,580 on the \$1,363,000 capitalization of the company. Capital surplus on Dec. 31, 1920, stood at \$1,576,271.22.

A statement of production and operating costs for the first four months of 1920 shows that total operating income for this period amounted to \$410,170.83, that 38,210 tons was milled, having a total value of \$752,630.95, and that the operating costs were \$317,514.95.

Tonopah Extension Mining Co.

Silver; Nevada

The fifteenth annual report of the Tonopah Extension Mining Co. for the fiscal year ended March 31, 1920, states that the available surplus for the year was \$189,896.76. The dividend distributions were \$321,177.94, or 25 per cent on the 1,292,801 48/119 shares of par value \$1 outstanding. After providing for Federal taxes, but before allowing for depletion, the net income for the year was \$346,653.18, compared with \$537,100.12 for the preceding year. Production amounted to 70,611 tons, containing 858,411.53 oz. of silver, an average of 12.157 oz. per ton, and 8,180.33 oz. of gold, an average of 0.116 oz. per ton. Recovery of metals amounted to \$15.34 per ton. The average price of silver received was \$1.1744 per oz. Surplus March 31, 1920, amounted to \$1,693,726.88.

La Rose Mines, Ltd.

Silver; Canada

Production of silver by the La Rose Mines, Ltd., amounted to 289,317 oz. of silver in 1919, according to the thirteenth annual report of the company. The net profit, on an average price of \$1.17 per oz. received for the product, amounted to \$30,204.81. Surplus on Dec. 31, 1919, was \$514,424.24. The net cost of production was \$1.0521 per oz. No dividend was paid in 1919.

Utah Apex Mining Co.

Silver-Lead; Utah

The annual report of the Utah Apex Mining Co. for the year 1919 states that mining and milling expenses amounted to \$881,993.91. Other items brought total expenses to \$1,171,294.57. Proceeds from sale of ore were \$981,939.76, and the net loss for the year amounted to \$133,647.21.

International Nickel Co.

Nickel; United States and Canada

The annual report for the fiscal year ending March 31, 1920, shows that net profits, after deducting expenses, depreciation, depletion, tax provisions, and other charges, were \$2,745,734.50. Earnings of all properties amounted to \$6,365,472.29; net income was \$4,887,060.06. Dividends amounting to \$534,756, or 6 per cent, were paid from the earnings for the year on the \$8,912,600 preferred stock outstanding. Surplus on March 31, 1919, amounted to \$10,391,233.28.

MINING STOCKS

Week Ended June 5, 1920

Stock	Exch.	High	Low	Last	Last Div.
COPPER					
Adventure	Boston	*80	*80	*80	
Ahmeek	Boston	62	62	62	Mar. '20, \$.50
Alaska-B.C.	N. Y. Curb	1 1/4	1 1/4	1 1/4	
Allouez	Boston	30 1/2	30	30	Mar. '19, 1.00
Anaconda	N. Y.	57 1/2	55 1/2	57 1/2	Feb. '20, 1.00
Ariz. Com'l.	Boston	10 1/2	10	10	Oct. '18, .50
Big Ledge	N. Y. Curb	1 1/2	1 1/2	1 1/2	
Bingham Mines	Boston	10	9 1/2	9 1/2	Sept. '19, .25
Calumet & Ariz.	Boston	60 1/2	59	59	Mar. '20, 1.00
Calumet & Hecla	Boston	335	327	327	Dec. '19, 5.00
Can. Copper	N. Y. Curb	1 1/4	1 1/4	1 1/4	
Centennial	Boston	11 1/2	11 1/2	11 1/2	Dec. '18, 1.00
Cerro de Pasco	N. Y.	44 1/2	43 1/2	43 1/2	June '20, q 1.00
Chief Consl.	Boston Curb	3 1/2	3 1/2	3 1/2	Feb. '20, .10
Chile Cop.	N. Y.	16 1/2	16	16	
Chino	N. Y.	32 1/2	31 1/2	31 1/2	Mar. '20, 37 1/2
Con. Ariz.	N. Y. Curb	3 1/2	3 1/2	3 1/2	Dec. '18, .05
Con. Copper M.	N. Y. Curb	3 1/2	3 1/2	3 1/2	
Cop. Range	Boston	40 1/2	39 1/2	39 1/2	Mar. '20, .50
Crystal Cop. (new)	Boston Curb	*30	*27	*30	
Davis-Daly	Boston	9 1/2	9 1/2	9 1/2	Mar. '20, .25
East Butte	Boston	13	12 1/2	12 1/2	Dec. '19, .50
First Nat'l.	Boston Curb	1 1/4	*95	*95	Feb. '19, .15
Franklin	Boston	2 1/2	2 1/2	2 1/2	
Gadsden Copper	N. Y. Curb			*75	
Granby Consl.	N. Y.	38	38	38	May '19, 1.25
Greene-Can.	N. Y.	30 1/2	28 1/2	28 1/2	Feb. '19, 1.50
Hancock	Boston			5 1/2	
Houghton	Boston Curb			*50	
Howe Sound	N. Y. Curb	3 1/2	3 1/2	3 1/2	Jan. '20, .05
Inspiration Con.	N. Y.	53	52	52 1/2	Apr. '20, 1.50
Iron Cap	Boston Curb	10	9 1/2	10	Feb. '19, .25
Isle Royale	Boston	30	29	29	Sept. '19, .50
Jerome Verde	N. Y. Curb			1 1/2	
Kennecott	N. Y.	27 1/2	27	27 1/2	Mar. '20, .50
Keweenaw	Boston	1 1/2	1 1/2	1 1/2	
Lake Copper	Boston	3 1/2	3 1/2	3 1/2	
La Salle	Boston			2 1/2	
Magma Chief	N. Y. Curb			*22	
Magma Copper	N. Y. Curb			32	Jan. '19, .50
Majestic	Boston Curb			*20	
Mason Valley	N. Y. Curb	2 1/2	2 1/2	2 1/2	
Mass Con.	Boston	3 1/2	3 1/2	3 1/2	Nov. '17, 1.00
Mayflower-O. C.	Boston	6 1/2	6 1/2	6 1/2	Feb. '20, 1.00
Miami	N. Y.	21 1/2	20 1/2	20 1/2	Feb. '20, .50
Michigan	Boston	4 1/2	4 1/2	4 1/2	
Mohawk	Boston	62	62	62	Feb. '20, 1.50
Mother Lode (new)	N. Y. Curb	6 1/2	5 1/2	5 1/2	
Nev. Con.	N. Y.	13 1/2	12 1/2	13	Mar. '20, .25
Nev. Douglas	Boston Curb			*15	
New Arcadian	Boston	3	3	3	
New Baltic	Boston Curb			3	
New Cornelia	Boston	17	16 1/2	17	Nov. '18, .25
Nixon Nev.	N. Y. Curb			*9	
North Butte	Boston	18 1/2	17 1/2	17 1/2	Oct. '18, .25
North Lake	Boston	*75	*75	*75	
Ohio Copper	N. Y. Curb			1 1/2	
Ojibway	Boston			1 1/2	
Old Dominion	Boston	28	27	27	Dec. '18, 1.00
Osceola	Boston	40	40	40	Mar. '20, .50
Phelps Dodge	Open Market	†195	†180		Apr. '20, 2.50
Quincy	Boston	53	50	50	Mar. '20, 1.00
Ray Con.	N. Y.	17 1/2	17	17	Mar. '20, .25
Ray Hercules	Boston Curb			*75	
St. Mary's M. L.	Boston	40 1/2	40	40 1/2	Dec. '19, 2.00
Seneca	Boston	14 1/2	14	14	
Shannon	Boston	1 1/2	1 1/2	1 1/2	Nov. '17, .25
Shattuck-Ariz.	N. Y.	9 1/2	9	9 1/2	Jan. '20, .25
South Lake	Boston			2	
South Utah	Boston			*14	
Superior	Boston	5 1/2	5	5	Apr. '17, 1.00
Superior & Boston	Boston	4	4	4	
Tenn. C. & C.	N. Y.	10 1/2	10	10 1/2	May '18, 1.00
Tuolumne	Boston	*70	*70	*70	
United Verde Ex.	Boston Curb	31 1/2	31	31 1/2	Feb. '20, .50
Utah Con.	Boston	7	6 1/2	6 1/2	Sept. '18, .25
Utah Copper	N. Y.	70	68	70	Mar. '20, 1.50
Utah M. & T.	Boston	1 1/2	1 1/2	1 1/2	Dec. '17, .30
Victoria	Boston	3	2 1/2	3	
Winona	Boston	*60	*50	*50	
Wolverine	Boston	18	18	18	Jan. '20, .50
LEAD					
Hecla	N. Y. Curb	4 1/2	4 1/2	4 1/2	Mar. '20, .15
St. Joseph Lead	N. Y.	16 1/2	15 1/2	16 1/2	Mar. '20, .70
Stewart	Boston Curb	†18	†16	†16	Dec. '15, .05
Utah Apex	Boston	1 1/2	1 1/2	1 1/2	Nov. '18, .25
ZINC					
Am. Z. L. & S.	N. Y.	15	14 1/2	14 1/2	May '17, 1.00
Am. Z. L. & S. pf.	N. Y.			48	Feb. '20, 1.50
Butte C. & Z.	N. Y.	8 1/2	8 1/2	8 1/2	July '18, .50
Butte & Superior	N. Y.	23 1/2	22 1/2	23 1/2	Sept. '17, 1.25
Con. Interst. Cal.	N. Y.	14 1/2	14	14	Mar. '20, .50
New Jersey Z.	N. Y. Curb	205 1/2	202	204	Dec. '19, 2.00
Success	N. Y. Curb	*5	*3 1/2	*5	July '16, .03
Yellow Pine	Los Angeles	†	†100	*100	Mar. '20, .03

*Cents per Share. †Bid and asked. ‡Quotations missing.

Stock	Exch.	High	Low	Last	Last Div.
GOLD					
Alaska Gold	N. Y.	1 1/2	1 1/2	1 1/2	
Alaska Juneau	N. Y.	2 1/2	2 1/2	2 1/2	
Carson Hill	N. Y. Curb	*27 1/2	*26 1/2	*27 1/2	
Cresson Gold	N. Y. Curb	1 1/2	1 1/2	1 1/2	Mar. '20, .10
Dome Ex.	Toronto	*21 1/2	*20	*20	
Dome Lake	Toronto	*6 1/2	*6 1/2	*6 1/2	
Dome Mines	N. Y.	10	9 1/2	9 1/2	Apr. '20, .25
Golden Cycle	Colo. Sprgs	†	†	*9 1/2	Mar. '20, .05
Goldfield Con.	N. Y. Curb	*10	*8	*9	Dec. '19, .05
Hedley	Boston			4 1/2	June '19, .10
Hollinger Con.	Toronto	5.90	5.70	5.75	Apr. '20, .05
Homestake	N. Y.			35	Sept. '19, .50
Kewanas	N. Y. Curb	*3	*1 1/2	*3	
Kerr Lake	Boston	3 1/2	3 1/2	3 1/2	Sept. '19, 1.00
Kirkland Lake	Toronto	*47 1/2	*44	*47 1/2	
Lake Shore	Toronto	1.03	1.03	1.03	Oct. '19, .02 1/2
McIntyre Porcupine	Toronto	1.95	1.84	1.90	Jan. '20, .05
Porcupine Crown	Toronto	*27	*26	*26	July '17, .03
Portland	Colo. Sprgs	†	†	*60	Apr. '20, .01 1/2
Reorgan. Booth	N. Y. Curb	*5	*4	*5	
Silver Pick	N. Y. Curb	*7	*5	*6	
Teck-Hughes	Toronto			*13	
Tom Reed	Los Angeles	†1.64	†1.60	1.60	Dec. '19, .62
United Eastern	N. Y. Curb	3 1/2	3 1/2	3 1/2	Apr. '20, .21
Vindicator Consl.	Colo. Sprgs	†	†	20	Jan. '20, .01
West Dome Cons.	Toronto	*7	*7	*7	
White Caps Min.	N. Y. Curb	*8	*7	*8	
Yukon Gold	Boston Curb	1 1/2	1 1/2	1 1/2	June '18, .02 1/2
SILVER					
Arizona Silver	Boston Curb	*72	*61	*64	Apr. '20, .03
Bailey	Toronto	*5 1/2	*5 1/2	*5 1/2	Apr. '16, .05
Beaver Con.	Toronto	*41 1/2	*40	*40	
Coniagas	Toronto		†2.90		Feb. '20, .12 1/2
Crown Reserve	Toronto	*26	*25 1/2	*25 1/2	Jan. '17, .05
Kerr Lake	Boston	3 1/2	3 1/2	3 1/2	Sept. '19, 1.00
La Rose	Toronto	*38	*38	*38	Apr. '18, .02
McKinley-Dar.	N. Y. Curb			*50	Apr. '20, .03
Mining Corp.	Toronto	1.80	1.80	1.80	Sept. '19, .12 1/2
Nipissing	N. Y. Curb	9 1/2	9 1/2	9 1/2	Apr. '20, .25
Ontario Silver	N. Y.	7 1/2	7 1/2	7 1/2	Jan. '19, .50
Ophir Silver	N. Y. Curb	1 1/2	1 1/2	1 1/2	
Peterson Lake	Toronto	*15	*14	*15	Jan. '17, .01 1/2
Sil. King Ariz. (new)	N. Y. Curb	*125	*70	*70	
Temiskaming	Toronto	*35 1/2	*35	*35	Jan. '20, .04
Trethewey	Toronto	*34	*32 1/2	*32 1/2	Jan. '19, .05
GOLD AND SILVER					
Atlanta	N. Y. Curb	*2 1/2	*1 1/2	*2	Nov. '19, .05
Butte	Butte	†	†	1.25	Nov. '19, .05
Barnes-King	N. Y. Curb	*80	*70	*72	
Bost. & Mont.	N. Y. Curb	*7 1/2	*6	*6	
Cashboy	N. Y. Curb	2 1/2	2 1/2	2 1/2	
El Salvador	N. Y. Curb	*2 1/2	*2 1/2	*2 1/2	
Goldfield Merger	N. Y. Curb	*18	*16	*17	Aug. '18, .07
Jim Butler	N. Y. Curb	*7	*5	*7	June '16, .05
Jumbo Extension	N. Y. Curb			*1	
Louisiana Con.	N. Y. Curb	*1 1/2	*1 1/2	*1 1/2	
MacNamara M.	N. Y. Curb	*1 1/2	*1 1/2	*1 1/2	
N. Y. Hond. Rosar.	Open Market	†14 1/2	†13		Apr. '20, .50
Tonopah-Belmont	N. Y. Curb	1 1/2	1 1/2	1 1/2	Jan. '20, .05
Tonopah-Divide	N. Y. Curb	1 1/2	1 1/2	1 1/2	
Tonopah Ex.	N. Y. Curb	1 1/2	1 1/2	1 1/2	Apr. '20, .05
Tonopah Mining	N. Y. Curb	1 1/2	1 1/2	1 1/2	Oct. '19, .15
West End Con.	N. Y. Curb	1 1/2	1 1/2	1 1/2	Dec. '19, .05
SILVER-LEAD					
Caledonia	N. Y. Curb	28	*26	*27	Apr. '20, .01
Consol. M. & S.	Toronto	26 1/2	26 1/2	26 1/2	Apr. '20, .62 1/2
Daly-West.	Boston	4 1/2	4 1/2	4 1/2	Apr. '20, .15
Eagle & Blue Bell	Boston Curb	2 1/2	2 1/2	2 1/2	Apr. '20, .10
Electric Point	Spokane	*40	*38	*38	Dec. '19, .03
Fed. M. & S.	N. Y.	10 1/2	10 1/2	10 1/2	Jan. '09, 1.50
Fed. M. & S. pf.	N. Y.	36 1/2	35 1/2	36	Mar. '20, .75
Florence Silver	Spokane	45	45	45	Apr. '19, .01 1/2
Iron Blossom	N. Y. Curb	1 1/2	1 1/2	1 1/2	Apr. '20, .02 1/2
Marsh Mines	N. Y. Curb	*19	*17	*18	
Prince Consol	N. Y. Curb	*8 1/2	*7 1/2	*7 1/2	Nov. '17, .02 1/2
Pex Con.	N. Y. Curb	*8	*7	*7	
Rambler-Cariboo	Spokane	*14	*14	*14	Feb. '19, .01
Stand. S. L.	N. Y. Curb	1 1/2	1 1/2	1 1/2	Oct. '17, .05
Tamarack-Custer	Spokane	2.40	2.35	2.35	Dec. '19, .03
Wilbert	N. Y. Curb	*6	*5	*5 1/2	Nov. '17, .16
NICKEL-COPPER					
Internat'l Nickel	N. Y.	18 1/2	17 1/2	18 1/2	Mar. '19, .50
Internat'l Nickel pf	N. Y.			82	May '20, q 1.50
QUICKSILVER					
New Idria	Boston	7	7	7	Jan. '19, .25
TUNGSTEN					
Mojave Tungstoen	Boston Curb	*10	*10	*10	
VANADIUM					
Vanadium Corp.	N. Y.	7 1/2	7 1/2	7 1/2	Apr. '20, 1.50
ASBESTOS					
Asbestos Corp.	Montreal	†	†	74	Apr. '20, 1.25
Asbestos Corp., pf.	Montreal	†	†	86	Apr. '20, 1.50
MINING, SMELTING AND REFINING					
Am. S. & R.	N. Y.	60 1/2	58 1/2	58 1/2	Mar. '20, 1.00
Am. S. & R., pf.	N. Y.	90	89 1/2	90	June '20, q 1.75
Am. m. pf., A.	N. Y.	74 1/2	74 1/2	74 1/2	Apr. '20, 1.50
U. S. Sm. R. & M.	N. Y.	60 1/2	60	60 1/2	Apr. '20, 1.50
U. S. S. R. & M., pf.	Boston	44 1/2	43 1/2	44 1/2	Apr. '20, .87 1/2

INDUSTRIAL NEWS

E. G. Spilsbury Engineering Co. are located at 132 Nassau St., New York City ('phone Beekman 150).

The Hyatt Roller Bearing Co. is now located at Sixth Ave. and 41st St., New York City. ('Phone: Bryant 5900.)

Four Wheel Drive Auto Co., Clintonville, Wis., announces the appointment of E. A. Samels as assistant sales manager.

Sturtevant & Bergh, mining engineers, announce opening of offices at 425 Felt Building, Salt Lake City, Utah. ('Phone: 3697 Wasatch.)

L. K. Armstrong & John C. Semple, mining engineers, announce their partnership, with offices at 720 Payton Building, Spokane, Wash.

Edward B. Richardson and Harry Gay announce their partnership as **Richardson & Gay,** consulting engineers, 220 Devonshire St., Boston 9, Mass.

E. J. Buegler, formerly consulting engineer of the Westinghouse, Church, Kerr Co., has been elected a vice-president of The Foundation Co., and will be in charge of engineering.

Allingham Flotation Co., Los Angeles, Cal., is installing one nine-foot rougher and one six-foot cleaner in the new mill of Abe Lincoln Mining Co. at Wickenburg, Ariz.

Conneaut Shovel Co. has recently acquired ten acres of land immediately west of its plant in Conneaut, Ohio, with the intention of building a rolling mill there.

The Copper Range Co. announces that its New York office has been moved from the old location at 32 Broadway to new quarters at 52 Broadway. ('Phone: Broad, 3463, as in the past.)

Salmon River Banking Co., Hyder, Alaska, at the gateway to the Salmon River mining country, announces that it opened for business on May 1. J. A. Hall and Daniel Lindeborg are president and vice-president respectively.

Cutler-Hammer Co. has removed its Chicago, Ill., office from Peoples Gas Building, to its own building at 323 North Michigan Ave., on the new Michigan Boulevard link. H. L. Dawson is manager of the Chicago office.

Allied Machinery Co. of America, 51 Chambers St., New York, N. Y., has recently appointed K. P. Swensen of Tokio, Japan, as oriental manager, with headquarters in New York City.

Aetna Explosives Co., Inc., announces that Milton P. Botsford succeeds F. S. Benjamin as division manager at the company's Duluth, Minn., office. Mr. Benjamin will be attached to the home office of the company 165 Broadway, New York City.

Bucyrus Co., So. Milwaukee, Wis., announces appointment of E. G. Lewis,

manager of its Cleveland, Ohio, office, to be central sales manager, with headquarters at 622 McCormick Building, Chicago, Ill., vice E. C. Hingston, resigned.

Joseph H. O'Brien, formerly vice-president and chief engineer of the Central Construction Corporation, and before that for fifteen years with the Westinghouse, Church, Kerr Co., has been appointed chief engineer of The Foundation Co.

Colombian Commercial Corporation, Ltd., of Canada, which embraces the business in Colombia, S. A., and the affiliations in America, of **Tavera, Navas & Co.,** announces the opening of permanent offices at 54 Dey St., New York City.

Diamond Drill Carbon Co., New York, one of the largest importers of Brazilian black diamonds for diamond drills and all mechanical purposes, kindly supplied us with the photograph for the rather rare cover design of the May 29, 1920, issue of *Engineering and Mining Journal*.

At the reorganization meeting of **Ingersoll-Rand Co.,** W. R. Grace, formerly first vice-president and treasurer, was re-elected first vice-president and Richard D. Purcell was elected treasurer. F. S. Overton was elected secretary to succeed F. A. Brainerd. Other officers were re-elected.

The Universal Asbestos Co., which has been operating for the last three years at the Federal Asbestos Co., making a special type of pipe covering and insulating material, is now installing a second plant under the superintendence of President Aschenhurst, at the Pennington Asbestos Co., plant, Robertson Station.

Detroit Graphite Co., Detroit, Mich., announce the election of J. W. Austin to membership with title of assistant secretary. Mr. Austin has been general purchasing agent for Acme White Lead and Color Works for the last fifteen years. He will direct the purchasing policy for both Detroit and Canadian branches of the Detroit Graphite Co.

A. E. Hitchner, manager of the mining section, industrial department, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., during the last year, has been appointed assistant to the manager of the industrial department in charge of mining and chemical industries. Mr. Hitchner is a member of the American Mining Congress and the Engineers Society of Northeastern Pennsylvania.

The Federal Electric Co. announces that it will move from its present quarters at Lake and Desplaines Sts., Chicago, to a new plant which the company has erected at 87th and State Sts. John F. Gilchrist is the president of the company; James M. Gilchrist is secretary and treasurer, and Herbert I. Markham is general manager. Samuel Insull, president of the Commonwealth-Edison Co., is chairman of the board of directors.

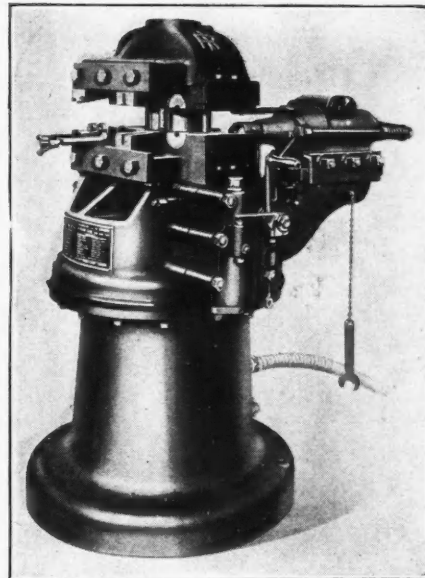
Ingersoll-Rand Drill Steel Sharpener

**A New Machine of Many Other Uses,
That Works Rapidly, Accurately, and
Is Almost Fool-Proof**

A new compressed-air operated drill-steel sharpening machine known as the I-R No. 50 Sharpener has been developed by the Ingersoll-Rand Co., 11 Broadway, New York. This machine embodies a number of new and distinctive features, some of which are described below.

This sharpener was designed primarily to rapidly and exactly sharpen and shank drill steel. However, it has performed so many other tasks that "Drill Steel Sharpener" is almost a misnomer. When fitted with special devices, it will forge boltheads, pins, stanchions, and similar parts.

The single lever, which controls all of the operations of the machine, is fitted



I-R. DRILL STEEL SHARPENER NO. 50

with a safety locking device. This prevents accidents by making it impossible to operate the machine unless the lock is released. The throttle valve is of the balanced-spool type, and operates easily and quickly and positively.

The hammer cylinder is an improved valveless type of hammer-drill cylinder. This construction permits the free-moving hammer to deliver exceedingly fast and powerful blows against the end of the dolly up-setting the steel and so forming the bits and shanks with extreme rapidity. Its capacity is about 20 per cent greater than another make.

The substantial and rigid base needs absolutely no foundation with the exception of a few planks to level it properly, and is not even bolted rigidly to them. The No. 50 Sharpener has no sight-feed or other exposed lubricators. Efficient and positive lubrication is provided for the entire machine by the Ingersoll-Rand "Heartbeat" automatic lubricator embodied in the throttle valve chest casting.

The Blacksmith and Good Drill Bits

Good Steel and Ingenious Machines Cannot Do It—Careful Blacksmith Work Is Essential to Success

BY D. E. DUNN

Manufacturers of rock-drilling machinery can and do make good rock drills and drill-steel sharpeners. However, they can never eliminate the personal equation of the blacksmith. The most uninformed persons should realize that the success in rock drilling is almost entirely dependent on the blacksmith turning out good steels. The drill-steel sharpener has gone a long way toward improving the quality of bits made, but even with this improved and special machine proper bits can be made only when care and judgment are exercised by the blacksmith.

One of the largest manufacturers of rock-drilling machinery not long ago had a complaint that one of its "Jack-

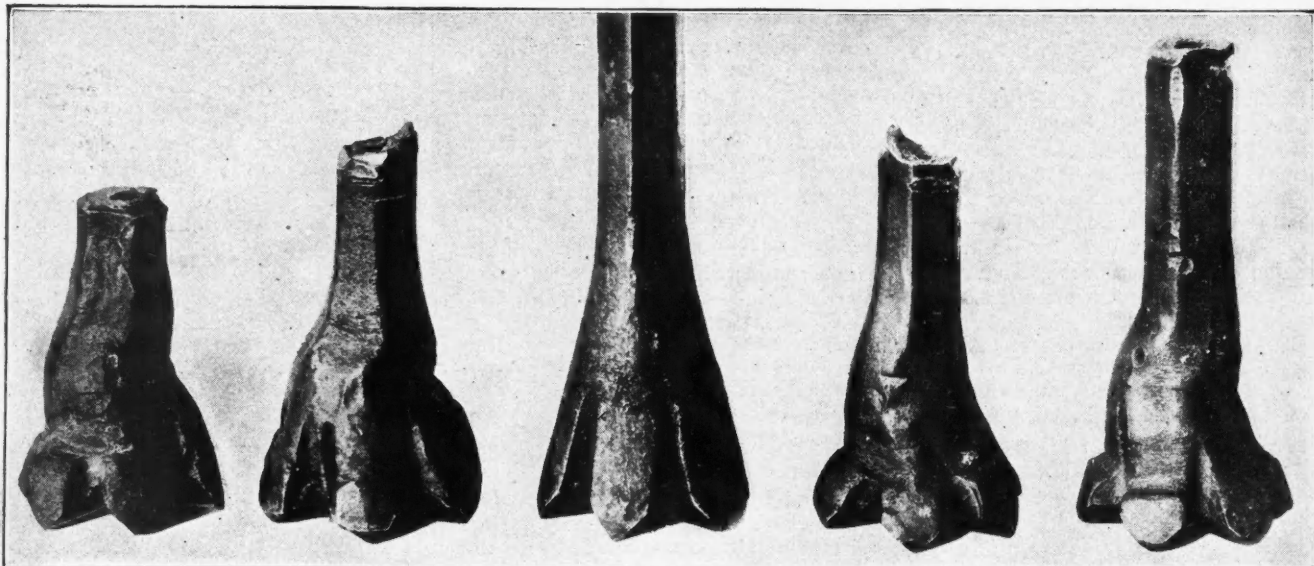
McClure and Bethke Address Engineering Advertisers' Association

At the May meeting of the Engineering Advertisers' Association, William Bethke, secretary and editorial director of the La Salle Extension University, and president of the Executives Club of Chicago, addressed the association on the subject "What makes advertising effective for the engineering advertiser?" Mr. Bethke emphasized the importance of making engineering advertising stand on its own merits by giving positive and dependable data regarding the product or service advertised. "Much advertising today," said Mr. Bethke, "has nine strong points and one weak point, and it fails on its weak point. Engineering advertising cannot afford to have a weak point."

At this meeting also W. Frank McClure gave a brief history of the National Advertising Commission, of which he is chairman, and explained its

TRADE CATALOGS

"The Way to Increased Production" is the title of a new pamphlet just issued by the du Pont Chemical Co., Wilmington, Del., giving some facts in regard to the company's gigantic sale of war surplus material. There are more than five hundred thousand different items of material and equipment available for sale, a little of everything from pins to platinum. General machinery of all kinds is on hand, and there is also special machinery built for manufacturing purposes peculiar to the powder business, but which can, in many instances, be used in other industries with slight changes. Many items such as blowers, anvils, buildings, cafeteria equipment, cars, conveyors, and power equipment are directly available for many mines and mills.



DRILL BITS BY GOOD AND POOR BLACKSMITHS

hamers" was falling down on the job. In the customer's own words, "The drill didn't have any pep." One of the company's representatives investigated this case, and the accompanying photograph shows the actual condition of the bits that were used in this mine. The bit shown in the center was made by this representative with the same machine as the other four bits shown, demonstrating clearly that it was not the fault of the sharpening machine. Is it any wonder that the "Jackhammer" did not have any pep?

A large number of drill complaints can be traced directly to bad blacksmithing, against which the manufacturers are waging a continual campaign of education. The present case illustrates also the problem that representatives of mining-machinery companies frequently are called upon to solve; that is, complaints and dissatisfaction of sincere but not thoroughly informed operators.

functions. The National Commission, Mr. McClure stated, was organized about ten years ago and, through its various departments, has been a leading factor in bringing advertising up to its present standard.

The Engineering Advertisers' Association, Chicago, Ill., has made application, through Mr. McClure, for representation on the National Advertising Commission.

Hyatt Roller Bearing Co., 100 West 41st St., New York, announces the appointment of W. F. Myer as directing transmission engineer in the industrial bearing division, of which D. Gleisen is manager. Mr. Myer will be responsible for the sale of the Hyatt line of shaft roller bearings.

American Graphite Co., Los Angeles, Cal., has ordered two nine-foot and two six-foot Allingham flotation machines for that company's Los Angeles plant.

Electric Furnaces—"Some Installations of Baily Electric Furnaces Melting Non-Ferrous Metals." Electric Furnace Co., Alliance, Ohio, Booklet 8-B. 8½ x 11, 16 p., illus. A series of pictures of typical installations, with brief explanatory notes.

Burners—"Hauck Furnace Burners and Their Uses." Bul. 119. Hauck Manufacturing Co., Brooklyn, N. Y. 6 x 9; 16 p. Illustrates and describes in detail the many types of oil burners built by this firm. Numerous illustrations show the application to various types of furnaces, including donkey engine boilers, tool-dressing and rivet forges, and crucible melting furnaces. The same company has placed a new oil burner on the market. The device is suitable for thawing out switches, frozen pipes, car doors, hopper gates. The outfit is compact and strongly built. Any laborer can successfully handle this device, and his efficiency will be increased if it is available.

