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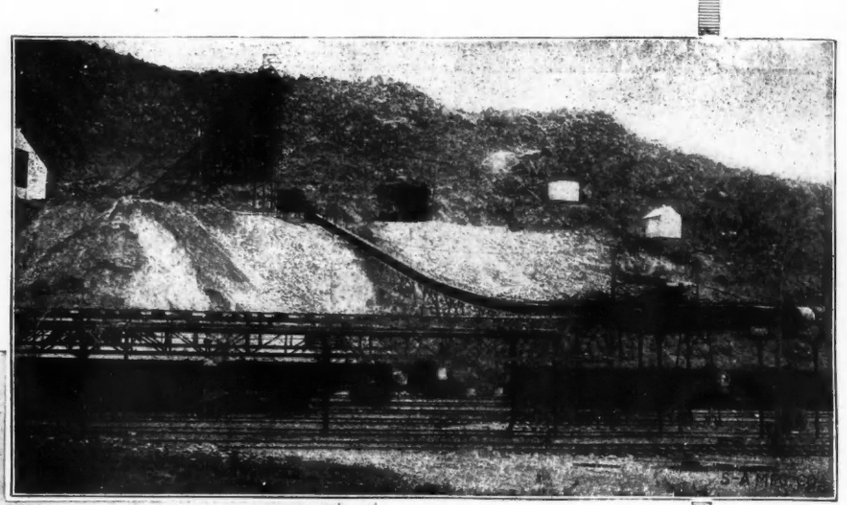

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Volume 106 December 7, 1918 *Number* 23

Engineering and Mining Journal

WALTER RENTON INGALLS, *Editor*

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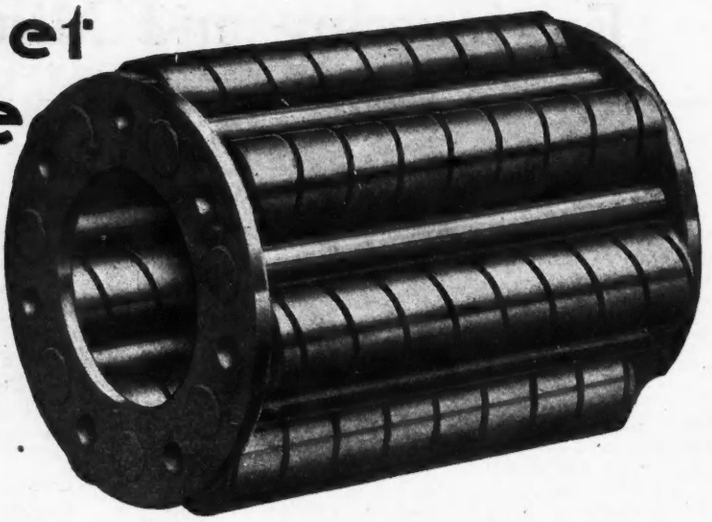

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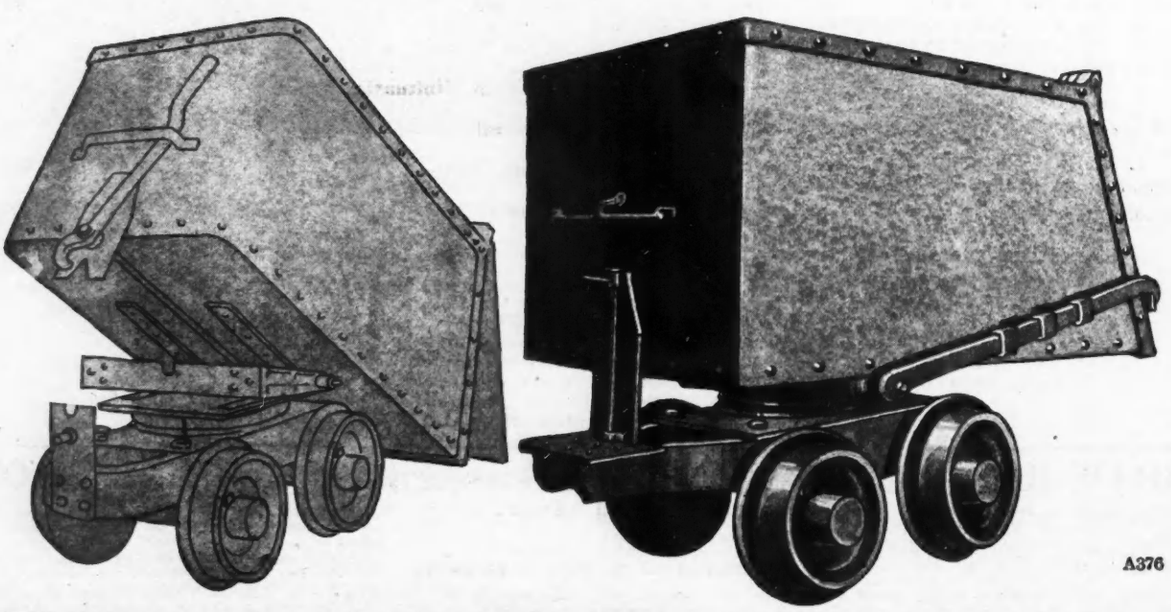

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HYATT BEARINGS FOR ORE CARS

Engineering and Mining Journal

December 7, 1918

Volume 106 *Number* 23

FIG. 1. STEAM SHOVEL OPERATING IN THE OREBODY OF THE WEST TEXAS SULPHUR COMPANY

Sulphur Deposits of the Trans-Pecos Region, In Texas

BY KIRBY THOMAS*

An account of the location and characteristics of the sulphur deposits which occur in Culberson and Reeves counties, Texas. Although the extent of these deposits has long been known their exploitation was begun only a few years ago. A number of companies are now operating in the district, and a large amount of intensive geological, mining, and metallurgical research has been carried out. The future of the industry in this part of the country is hopeful, and a steady output for many years may be anticipated. The data given will be of general interest.

THE deposits of native sulphur, or brimstone, which occur in Culberson and Reeves counties, Tex., in the region just south of the New Mexico boundary and west of the Pecos River, have been known for many years, but it is only recently that serious attempts have ben made to utilize them, on a commercial scale, as a source of supply of this essential commodity. Within the last three years more than 20 companies, some of them with large capital issues, have been formed to operate in the district; and investigations and explorations have been undertaken by representatives of private interests and by the geologists of the Texas Survey.

Several deposits in the district have been explored and developed to a considerable extent, and two have been equipped with mining and treatment plants and have produced a small amount of refined sulphur for shipment. Owing partly to internal difficulties with the operating companies and to mistakes in the installation

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of the treatment equipment, together with a failure to provide facilities for transportation from mines to railroad, the output of the district so far has been restricted.

Commercial Future of the District

The commercial future of the Trans-Pecos sulphur industry, in my opinion, is much more important than the present accomplishments indicate. The obvious and essential factors in the situation are, first, sufficient tonnages of commercial ore, accessible and available for mining and treatment, at low costs; second, the application of suitable mining and treatment methods, with the provision of economical and effective equipment

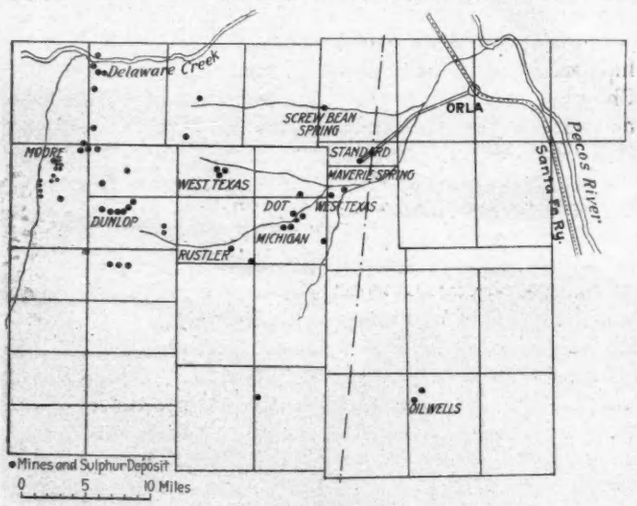


FIG. 2. LOCATION OF SULPHUR AND OTHER DEPOSITS IN THE TRANS-PECOS REGION OF TEXAS

therefor; and, third, the provision of transportation facilities for the cheap delivery of crude material at the treatment plants and inexpensive and reliable transport of the product from the treatment plants to the main-line railroads which bound the district on the east and south. The question of market need not be here discussed because the conditions considered are predicated on profitable operation at the pre-war price of $22 a ton for the product delivered at the railroad.

Character of Deposits

The sulphur deposits in the Trans-Pecos region are all of the same character and have a common origin, though differing slightly as to the kind of ore and the accompanying gangue or waste material, and varying considerably in individual extent. They have their genesis in the combination of geological and physical conditions which have permitted the escape to the surface, from great depth, of sulphurous waters or gases along fissures or fault planes. These have intersected and dislocated a thick series of beds of limestone, gypsum, clay, and other sedimentary rocks. The sulphur may have had its primary origin in the iron pyrite-bearing shales which occur in the district, or in some of the deep gypsum beds, from which it may have been freed by thermochemical action. Under a suitable combination of conditions, the sulphur in solution, or as a gas, was precipitated as elemental sulphur on coming to the surface or within a short distance from the surface, thus forming localized deposits of varying and often considerable horizontal extent, having only moderate depth except in the chimneys or channels through which the solutions have ascended, and here occurring to depths of a few hundred feet at most. The deposits, however, are numerous, and, individually, some of them have sufficient horizontal area to assure for the district as a whole, and as far as the most important deposits or groups of deposits are concerned, an ample tonnage for commercial operations, notwithstanding the localization and limitations of the deposits individually, and their surface character.

Estimation of Available Sulphur Impracticable

Calculation of definite tonnage is precluded, except in a few instances, owing to the limited amount of exploration and the nature of the developments. However, careful consideration of the conditions disclosed, and comparison with the results of developments in the district, justify the expectation that a number of the deposits may each yield upward of several hundred thousand tons of sulphur, and that the district itself presents a reasonable expectation of production on a commercial scale for a number of years. It will be observed from a study of the general map that the deposits are roughly in convenient groups for operation in combination.

The sulphur-bearing material grades from practically pure sulphur, in masses, to mixed gypsum and earthy material carrying a small percentage of sulphur. The commercial limit, of course, will be determined by conditions and efficiency of operations. The character of the deposits is such that many of them possess commercial reserves in quantities sufficient to justify operations, utilizing all of the sulphur-bearing material down to 25%. Probably lower-grade material can be utilized for its sulphur content or sold as fertilizer.

Method of Mining Desirable

The material must be mined by open-cut methods, as the escaping gases make underground operations impossible. I have observed no deposits in the district, so far disclosed by exploration, where the Frasch method of underground liquation and pumping would be feasible. There are no obstacles, mechanical or physical, to cheap mining in the district. The application of open-cut methods, using the steam shovel or the dragline scraper, will permit of the mining of the ore, and its delivery at the treatment plant at a low cost. A factor in the mining cost will be the removal of the overburden of gypsum, which occurs several feet thick in many places, and the selective extraction of the commercial grades from the low-grade and barren part of the deposits. If operations are undertaken on a large scale, with adequate and proper equipment, the material can probably be mined for less than $1 a ton.

The recovery of the sulphur presents a comparatively new metallurgical problem. The liquation method used in connection with other similar deposits had been found more economical than volatilization in retorts. This method was used in the earlier operations of the Trans-Pecos district, and adaptations of it were installed in the two commercial plants erected. The results indicate that the process is commercially possible, but that it is costly to install, expensive to operate, and that the per-

centage of recovery of sulphur is low. Several other processes are being tested, but recent experiments have practically demonstrated that the sulphur-bearing material is amenable to the new oil flotation process, which has been recently applied to other phases of metallurgy with important results as to costs and saving. The introduction of flotation in the Trans-Pecos district will probably result in greatly reducing treatment charges, and in effecting a high percentage of recovery. The present difficulties with regard to bad water and high fuel costs will also be largely overcome by the adoption of flotation.

Transportation Is Main Problem

A present problem in the district is transportation from the deposits to the railroad. It is difficult to maintain roads for trucking in the gypsum-covered surface, and there has been no adequate expenditure of money to provide suitable roads, and no coöperation of the different interests. The conditions, however, present no serious obstacle if the problem is properly attacked, with

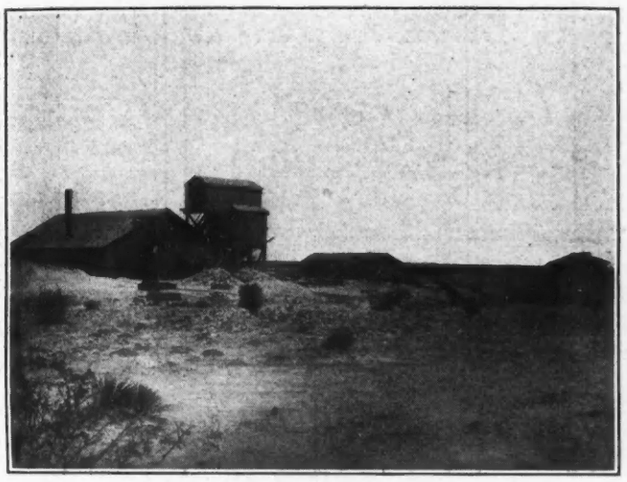


FIG. 3. LIQUATION PLANT OF THE WEST TEXAS SULPHUR COMPANY

an expenditure justified by the volume and value of the traffic involved.

The deposits lie from 12 to 30 miles from the nearest railroad station; and a suitable trunk line road, with branches, should and can be provided, so that haulage and trucking can be done at moderate costs. However, it is practicable to build a broad-gage or industrial railroad to serve all the principal properties at a cost that is justified by the traffic which is assured by the present state of development. The Santa Fé railroad is willing to provide facilities under proper assurances, and Government agents have indicated their intention to authorize and support the project for railroad extension, providing serious endeavors are made to realize the sulphur possibilities of the district as a whole.

It will probably be found advisable to establish central treatment plants, and to assemble the ore from groups of deposits within a reasonable radius. This can be effectively done by providing a system of portable industrial tramways, using mule haulage or gasoline engines for motive power.

Adequately equipped and effectively managed operations on a reasonably large scale can probably produce sulphur at a cost of about $10 a ton for operating charges, this cost to include mining, treatment, and general management, but not to provide for the amortization of capital investment in property, plant, or equipment, or to include the cost of transport to railroad of the product in case the extension of the railroad to the district is not arranged.

It is hardly likely that the limited exploration and development which have been done in the district have disclosed all of the deposits or fully defined the limits of any of them, and it is probable that expectations based on present available data, conservatively interpreted, will be greatly exceeded by actual operations and development.

Dummy Mining Lease Fraud

In respect to the occurrence of gold, Western Australia occupies a unique position, states the *Journal* of the Chamber of Mines there. A great deal of the richest material occurs in sulphide and telluride ores; and the government should provide against unlawful traffic in these ores as well as in the case of gold or free milling ore. It might seem more difficult to deal in sulphide and telluride ores, which require special treatment, than in the metal itself, but in the present imperfect state of the local laws this is hardly so. Such dealings are rendered easy by the "dummy lease" fraud. Under this simple but effective plan a person might own and work a lease with ore containing, perhaps, a few pennyweights of gold per ton, but the ore alleged to come from it, after treatment at works owned by himself or by an accommodating friend, would often give phenomenal results, perhaps 10 oz. to 20 oz. or even 100 oz. to the ton. To put a stop to this ingenious fraud it was recommended, in addition to the licensing of treatment plants, that power should be given to magistrates and the police to take samples for assay from leases of this peculiar description, and so arrive at some estimate of their real value.

The "dummy-lease" fraud was thoroughly exposed by the proceedings in the Golden Zone case. It is certain that the proprietor could not long have carried on his illicit gold dealings had he been compelled to license his Golden Zone treatment plant, and bring it under police supervision, and had he been required to say from what part of the mine came the ore that yielded him such bountiful returns. The Golden Zone mine, out of which thousands of pounds worth of gold had been nominally coming, month by month, was subsequently put up at auction and sold for a five-pound note. There are other leases on the Kalgoorlie-Boulder field of no greater intrinsic value than the Golden Zone, under the cloak of which the holders are making fortunes, by means of some scheme of adding to actual mill returns, similar in general characteristics to the fraud described.

Before the war electric steel was not noted in the official returns of output in Great Britain, according to the *Mining Magazine*. In 1917, however, 110,000 tons was made, of which 90,000 tons was in the form of ingots and 20,000 tons in the form of castings. There are now more than 50 electric-steel furnaces at work in Sheffield. The development of the electric furnace for the production of high-class steels has provided a notable innovation in Sheffield practice.

Standardization of Mining Methods IV—Explosives*

By CHARLES A. MITKE†

Safe and efficient methods of storage and handling of explosives, both on the surface and underground, are enumerated. Suitable powder and fuse sacks are described, and details given of the construction of an effective and economical fuse cutter. The use of a modified brick-and-tile machine for producing stemming, an idea originally suggested by the author of the paper, is advocated. Data are given on the practice of loading and blasting; and precautions mentioned to obviate, or minimize the danger from, missed holes. The paper concludes with details of gas production from explosives and gives information on improved methods of ventilation.

THE dangers incidental to the storage and handling of explosives are the cause of much concern to members of mining organizations. Apart from unavoidable hazards and fatal and serious accidents due to carelessness, the injurious effects produced by large quantities of noxious gases resulting from the explosion of dynamite must be considered. Many serious injuries have been sustained by men who are gassed.

All operations connected with the handling and use of explosives should be standardized. This would be of considerable help in eliminating many of the regrettable

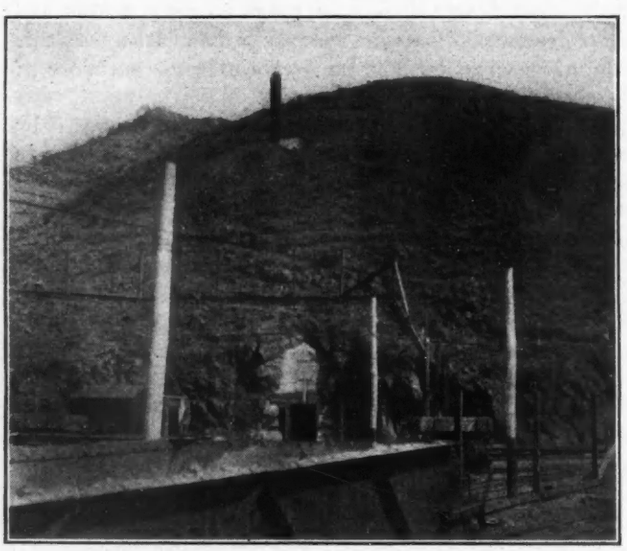


FIG. 1. EXPLOSIVES MAGAZINE IN HILLSIDE

accidents which are constantly occurring, and would tend to reduce the quantity of noxious gases, produced by the explosives, to a minimum.

When a carload of powder is received at the mines, it is necessary to have it unloaded and stored on the surface. Great care should, of course, be exercised in its transportation to the magazine, and provision made for the different kinds of powder stored in one place, so that there may be no confusion between low- and high-strength explosives. To prevent this, the magazine should be divided into a number of compartments, each being properly labeled for the different kind and strength of powder which is to be stored in it. The magazine should be well ventilated, to avoid the powder being kept in an atmosphere where the humidity is high, and should preferably be constructed as a chamber

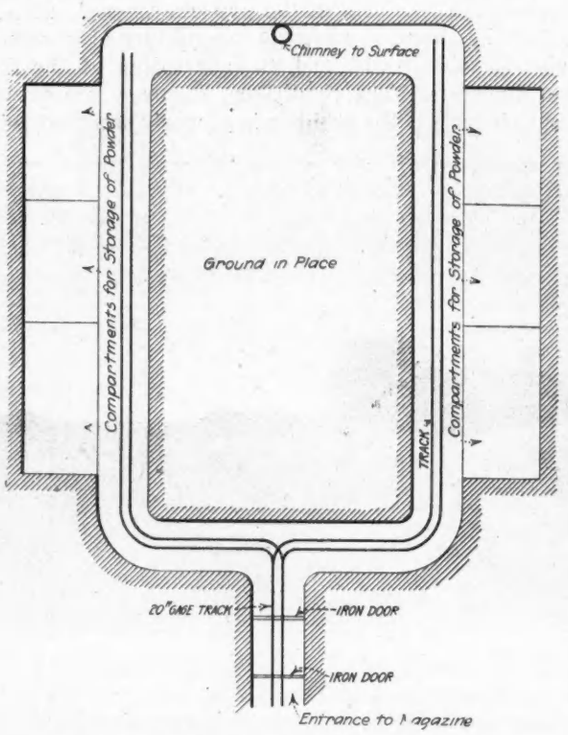


FIG. 2. PLAN OF POWDER MAGAZINE

driven into the hillside, where it will be free from shock and where there will be no possibility of a chance rifle bullet entering it. In exceptional cases, where it is not practicable to drive into the hillside, an adobe, cement, stone, or brick magazine is usually constructed in which to store the powder. Adobe is preferable to cement, stone or brick, because, in case of an explosion, it will probably crumble and there is less danger of the material used in its construction being broken up into missiles.

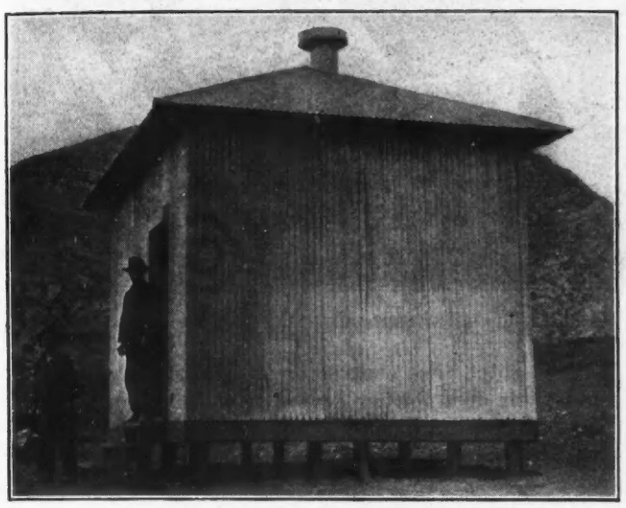
The powder house should have double doors, with openings large enough to admit a man's hand, so that they may be locked from the inside. This is effectual in preventing any one working at the lock in an endeavor to pick or strike it with a hammer. Fig. 1 is an illustration of such a magazine. In this case there is one main adit leading into the hillside, closed by double doors, locked from the inside. In Fig. 2 a plan view is given of the parallel drifts leading from the main tunnel, showing the placing of chimney and the different compartments in the magazine.

*The fourth of the series of articles which began in the Nov. 9 issue of the *Journal*. Copyright, 1918, McGraw-Hill Co., Inc.

†Mining engineer, Bisbee, Arizona.

When the powder is transported from the surface magazine to the different mine shafts, it should not be left at the collar of the shaft longer than is absolutely necessary, as many accidents have occurred through the explosion of powder there, before being taken underground. This is of the utmost importance. I have recently noted cases where the powder is taken to the collar and left there for an hour in the morning during the time when the shift is going to work.

Not more than one day's supply of powder should, of course, be taken underground. Powder should never be lowered with tools or supplies of any kind, as that will establish a practice which will lead to the lowering of powder with steel and similar material. At the different shaft stations it should be a rule that the powder men must remove the powder from the stations



HOUSE WHERE FUSES ARE CUT AND CAPPED

immediately after it is brought down. A boulder falling down the shaft might accidentally strike the explosive.

From the shaft stations the powder is taken to the underground magazines, of which there should be one on each level. These magazines should be situated conveniently for all the men on the level, and at the same time far enough removed from the blasting to minimize the danger from shock. The magazines should be well ventilated, and not placed where the humidity rises to more than 80% and the temperature is high. They should be used for the storage of powder only and not as combination magazines for powder, tools, and supplies, as is the practice in some mines. Each magazine should be in charge of a powder man, usually called the "powder monkey." His duties are to give out the powder to the drillers as they call for it, and to keep an accurate check on the amount and the place where it is to be used, and this work is usually combined with other duties, such as checking up tools and other supplies in the tool house, which should be situated some distance from the magazine. The same man also attends to another magazine which contains the caps and fuse.

Though it is advisable to have the powder and capped fuses taken to the heading separately, it is impracticable in most cases, and all miners coming to the powder magazine should have powder and fuse sacks in which to carry their powder, fuse, caps, and stemming. The fuse, caps, and stemming should be placed in one sack and the powder in the other. These sacks should have suitable handles, so that a man can put one on each shoulder when climbing up a raise. Instances have been known of men tying fuse around sticks of powder, and carrying it up ladders in this manner. Should the fuse become loose and a stick of powder drop, the results are likely to be serious. The caps and fuse should be kept in separate houses on the surface. In mines where the humidity is high, the fuse should not be capped underground. The cutting and capping should be done by men who devote their entire time to the work, and these operations can readily be standardized.

Mechanical Fuse Cutter

A fuse cutter is preferable to a knife or ax, as it is necessary that the fuse be cut square across and to exact measurements. Fig. 3 is an example of a suitable arrangement. This consists of a table 3½ ft. high, 3 ft. wide, and 10 ft. long, with a blade of steel, foot pedal, and spring attached. The table is marked into feet and inches, so that the fuse may be cut any length up to 10 ft. At one end is a movable block, set at right angles to the table. This regulates the length of the fuse. The fuse spools are set on pegs, just above the table at the opposite end to the movable block. In cutting, the movable block is placed at the length desired, and the fuses, of which the table accommodates any number up to about 25, are drawn along the table until the ends touch the movable block. The operator then steps on the foot pedal, which pulls the steel blade, set at zero, down to cut the lengths of fuse. On releasing the pedal the spring raises the steel; the operator again pulls the freshly cut ends to the movable block, steps on the pedal, and repeats the operation. The use of this machine obviates all danger arising from the fuses not being cut square. After being cut, the lengths of fuse are drawn along the table a little further, where they are capped.

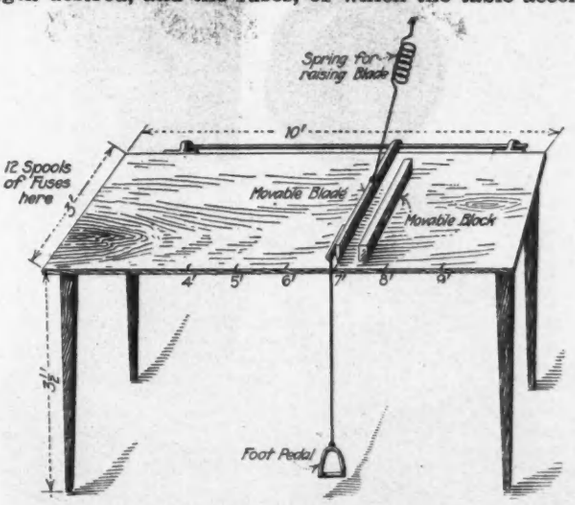


FIG. 3. ADJUSTABLE FUSE CUTTER

Capping of Fuses

In capping, the fuse should be placed in the cap so that it barely touches the charge, and the cap not too tightly crimped on. If the fuses are to be used in damp or wet places, a further precaution should be taken by using P. & B. paint, heavy grease, or some other mate-

rial which is water-tight, to keep all moisture from penetrating the cap through the junction between the cap and fuse. Whenever a sufficient quantity of fuses are capped and ready for use, they are put into special fuse cans. These may be made by taking carbide cans, cutting them down about 9 in., fitting them with special lids which are water-proof, and lining the inside with felt ½ in. thick. The lids should be lined as well as the cans. The fuses are coiled and placed inside these cans and transported in this manner to the shafts, from which they are transferred to the different underground fuse houses. The fuse cans should be sent back to the fuse house on surface to be refilled as the supply underground runs low.

From the standpoint of efficiency, the capping of fuses by men specially employed for that purpose has proved to be a success at a number of mines. In one instance, two men do all the cutting and capping on the surface for the entire mine, averaging 3000 caps a day. This work was formerly part of the duties of sixteen powder men, who cut and capped fuse for their individual levels, and who are now required to do repair work and

FIG. 4. FUSE CANS

cleaning tracks in the time formerly spent in crimping caps. At another mine, one man is employed in a well-ventilated fuse house underground, and cuts and caps from 1100 to 1400 fuses a day.

Stemming or Tamping

Stemming, or tamping, as it is occasionally called, is used in practically all mines except metal mines. Its use has been in practice in coal and iron mines and in mines in England and on the Continent for many years, but it is not extensively used in the metal mines in this country. In Michigan, where many of the miners originally came from England, stemming is used, for the reason that the men have been trained in that country to the idea that stemming goes with the powder, but its use has never been enforced by the operators in the West; and the miner has come to know that by filling the hole with powder and using the explosive instead of stemming he can satisfactorily pull the ground, and, inasmuch as the company furnished the powder, there is no need for him to be economical.

It naturally became the practice for miners in this country to load a hole with powder and then use an extra amount for stemming, thus establishing a custom for the use of an excessive amount. In this connection

FIG. 5. MAKING STEMMING AT A MEXICAN MINE

it may be noted that contractors in the Southwest who furnish their own powder generally use stemming. The miners working on day's pay, on the other hand, never do so, as they well know that holes loaded with an excessive amount of powder without stemming will satisfactorily break the ground, and that the use of stemming entails extra work and is contrary to custom. In justification of the miners' attitude it should be taken into account that not enough has been done in eliminating missed holes, as it is dangerous to clear out the stemming in a missed hole in order to blast it over again. It is therefore absolutely essential that the number of missed holes be reduced to a minimum before making the use of stemming compulsory.

Stemming Increases Efficiency

It is an established fact that stemming increases the efficiency of the charge, and Technical Paper No. 17 ("The Effect of Stemming on the Efficiency of Explosives") of the U. S. Bureau of Mines, describes experiments showing that the gain in work accomplished when dynamite is tamped varies from about 35% with the quick-acting to over 90% with the slow-acting explosives. De Kalb says that in no case is detonation absolutely perfect under ordinary conditions, but this perfection is approached more closely according to the concentration of the explosive impulse, due to good confinement.

Experiments made by the Western Australian Government Commission, and described in the "Blue Book" of 1905, showed that the tamping of charges has a marked effect on the proper detonation of the explosive used. When bore holes are tamped carelessly, or when no tamping is used, the lack of confinement apparently causes a small part of the explosive to be detonated incompletely, and consequently more offensive fumes

are given off than when the charge is tamped properly.[1]

Some of the arguments advanced against the use of stemming are as follows:

1. It takes longer to load a round of holes when stemming is used.
2. In the case of missed holes, the stemming must either be cleaned out or another hole drilled alongside; and if the miner is careless there is danger of drilling into the unexploded charge.
3. It is contrary to custom, especially in the Western States.

The advantages of stemming are:

1. Greater efficiency of the explosive.
2. Complete detonation, and, therefore, a minimum amount of noxious gases.
3. A saving in powder and, incidentally, in cost.

Classes of Stemming Used

Different kinds of stemming are used on a small scale in some of the metal mines in the West. In one mine, for example, the powder man collects several boxes of clay, which he brings to the powder magazine. The clay is rolled into balls about the size of the ordinary baseball, and he hands these to the miners when they come for the powder. About half this stemming is scattered along the way to the working places. When ready to load, the miner is often so rushed for time that he is unable to take these large balls of clay and roll them down by hand to fit the holes, so the remainder of the stemming is usually lost. In cases where the miners actually do use it, the quantity is so small that the effect is negligible.

Another method which is being tried in some places is the use of paper forms made the same size as the powder. These forms are filled in some instances with wet and in others with dry sand (see Fig. 5). So far, this has been tried out only occasionally in certain mines, and therefore has not produced the results for which it was intended. Mill tailings are sometimes used, the fine dust in drill holes has been collected and used in others, and dust from the ores has been tried in a few mines, but this has not as yet passed beyond the experimental stage.

Value of Clay for Stemming

It has been proved by experiments that plastic clay which has been properly tempered is most suitable for stemming. Consequently, when an attempt is made to introduce the practice in a mine, it is advisable to use the best material available. At the property of the Mogollon Mines Co. a machine was devised and has been in use for some time to mold clay in the desired form, and a system also has been adopted by which the stemming is properly distributed.

In the larger mines 3000 or more shots are fired every day. This requires a large amount of stemming and necessitates manufacture on a large scale. After a careful study of this matter and after taking up the question with authorities on brick-making at different plants, I came to the conclusion that a brick-and-tile machine, with a die made to suit the measurements of stemming, would be practical for such a purpose. Fig. 6 shows a machine of this kind, capable of turning out stemming in quantity greater than required at the average mine. For this reason a smaller machine should be designed to meet requirements.

Use of American Auger Machine

The clay from which the stemming is to be made should first be thoroughly mixed and tempered in a pug mill, boulders broken and sufficient water added to make it plastic. After being thoroughly mixed, the clay is run through the stemming machine and forced out through a cluster die, containing six to ten orifices each approximately one inch in diameter, cut into about ten-inch lengths, and wrapped in paper. This paper should be of different color to that used for the powder. The product should be sent to the various shafts, lowered, and taken to the powder magazines together with the powder. When the miner goes for his powder and caps he should receive the stemming at the same time.

A plant such as is suggested could be designed and constructed at a reasonable cost. The pug mill and stemming machine can be operated by electricity at small expense, and the clay obtained from waste dumps,

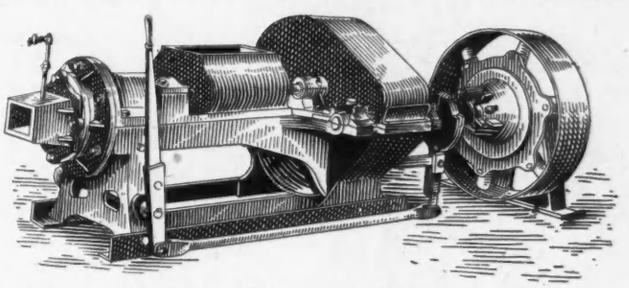


FIG. 6. AMERICAN AUGER MACHINE FOR MAKING STEMMING

and the quantity of water used would be negligible. When it is considered that the machine shown in the illustration is capable of turning out from 1000 to 2000 building bricks per hour, it is obvious that with a smaller machine, designed to meet the requirements of the average mine, two men could turn out sufficient stemming within a few hours to supply the daily needs, and for the remainder of the shift they could be put to other work.

Loading and Blasting Practice

Great care should be exercised in slitting the powder and putting it in the holes. Except in the case of very wet holes, every stick of powder should be slit. A wooden tamping stick should be used, and the powder carefully tamped so that it will fill all the air spaces in the drill holes.

In placing the primer, there is considerable difference of opinion as to where it will have the greatest effect. It is best to decide on one particular place, let that be the common practice, and adopt it as standard. Though it is possible, with the uninflammable ammonia dynamite and the gelatins so extensively used in mining, to place the primer anywhere with small danger of ignition, (providing a high quality of fuse is used), the tamping can be done more effectively if the primer is placed near the top of the charge. On the other hand, the explosive is more generally detonated by having the cap in the center of the charge. In the Southwest,

[1] "Blasting Explosives and Accessories," by Charles S. Hurter, technical representative, Hercules Powder Co., Wilmington, Delaware.

the general practice seems to be to place the primer near the bottom of the hole; and although there is a possibility of the powder being set on fire by the fuse before it reaches the detonator, the use of the best quality of fuse seems to have, so far, avoided this danger.

In making up the primer many methods have been practiced, of which Fig. 7 shows one of the most popular. In the practice illustrated misfires are of frequent occurrence. In those instances where the fuse was cold it was doubled up by the miner so as to break, which was also the cause of misfires. The wrong way and the right way, shown in Figs. 7 and 8, respectively, should be illustrated by blueprints, which should be placed in front of the mine office for the benefit of the men. Orders should also be given to the men regarding the standard practice which has been adopted.

After loading and placing the primer (in case stemming has been introduced and become a regular practice), the remainder of the hole, to within about six inches of the collar, should now be filled with stemming. By leaving this distance unfilled it will then be

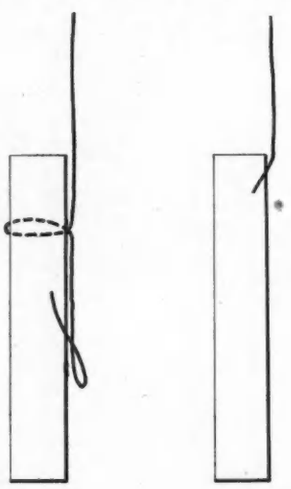


FIG.7 FIG.8

WRONG AND RIGHT WAYS OF MAKING UP THE PRIMER

possible, in the case of a misfire, to ascertain the exact direction of the missed hole, so that another may be drilled with safety.

The fuses are now spit about ½ in. so that they can easily be ignited. The old method of using a piece of fuse about a foot long and cutting it about every inch is the most practical fuse spitter in use at present. At this moment caution should be exercised to spit the cut holes first, as many rounds are lost on account of miners neglecting this important point, and hastily spitting the fuses, regardless of the order in which they should be fired.

Danger From Missed Holes

As previously mentioned, before stemming is used, the number of missed holes must be reduced to a minimum. The causes have frequently been enumerated and are well known. A thorough investigation of conditions should be made at mines where a large percentage of missed holes occur, and the causes eliminated. Frequently, the use of a stronger detonator will have a marked effect on the reduction of missed holes. If, therefore, proper attention is given to the handling and care of powder, caps, and fuse, as outlined above, and only the best quality is used, there should be few misfires. In some mines the number has already been reduced to less than 1%, and at one in particular, where a strong detonator is used, the monthly average is about 0.25%. In headings where a great deal of water is encountered, or when sinking in wet ground, it is generally advisable to blast by electricity in order to eliminate missed holes.

Gases From Explosives

Some conception may be formed of the effects of gases produced by explosives from the fact that, in one mine, 37 men were gassed during a year, of whom 11 (29.72%) were gassed in stopes, 12 (32.43%) in drifts, 12 (32.43%) in raises, and 2 (5.42%) in winzes. The total time lost was 84¼ shifts, with individual losses up to 10 shifts per man. At another mine 21 men were gassed in a single night as the result of excessive powder smoke and gas from blasting.

When it is considered that one stick of 1⅛-in. 40% gelatin dynamite will produce approximately 1.54 cu.ft. of carbon dioxide and 0.09 cu.ft. of carbon monoxide (calculated for atmospheric pressure at sea level), and that in a drift or raise averaging 10 to 20 holes, with six sticks of powder to a hole, there would be about 90 times this amount, or 157 cu.ft. of gas, some idea can be formed of the effect. It takes approximately 650 cu.ft. of fresh air to dilute the gas from one stick of such powder and improve the atmosphere until the carbon dioxide present is 0.25%. For the drift mentioned, a relatively larger amount, about 58,500 cu.ft., of good air would be necessary.

Stopes worked by undercutting systems, where boulders must be plugged during the shift; caving systems where ore is simply drawn off and where it is necessary to put in more holes with the stoper from the chute in order to cave the ground above; horizontal or incline cut-and-fill stopes, necessitating the breaking of boulders for the chutes; top slices, in order to break the ore in case the previous shift did not blast—all require blasting to be done during the shift. This results in an excess of gas over and above that formed from the regular blasting at the end of the shift. The greater the atmosphere is vitiated, the more good air must be produced. This requires more power and closer supervision of the ventilating system in order to have the place ventilated as thoroughly as possible; and this naturally adds to general cost.

The large amount of gas produced is due partly to the excessive use of powder on the part of the miners and partly to incomplete detonation. The former naturally multiplies the volume of gas, and it is a well-known fact that when a charge of dynamite burns instead of exploding, a much greater amount of carbon monoxide is formed, and other harmful gases are produced. Incomplete detonation, due to the use of caps of insufficient strength, or the presence of moisture in the cap, adds to the seriousness of the situation by increasing the percentage of dangerous gases present. The efficiency of the explosive is also reduced when the charge burns instead of exploding; in fact some authorities estimate its efficiency to be only about 50%.

"In practice, the fact that an explosive has not been properly detonated is made manifest principally by

the production of considerable quantities of disagreeable and poisonous fumes, the presence of unexploded powder, the small amount of work done by the powder, and often, with high explosives, a section of the borehole in which the powder has burned is unaffected. . . . The bad fumes in incompletely detonated powder are due to the fact that its decomposition was effected at a temperature below that which corresponds to the most violent chemical action. The result is that instead of producing nitrogen and carbon dioxide in the gases from the explosion, both the poisonous nitric oxide and carbon monoxide are formed. . . . The weaker effect from imperfectly detonated powder is due largely to two causes—lesser heat of formation of carbonic oxide gas and the heat absorbed in the formation of nitric oxide. Thus, when carbon monoxide and nitric oxide are present in the gases from an explosion, poorer results are obtained than when carbon dioxide and nitrogen are liberated. Further investigation during late years has shown the presence of volatilized nitroglycerin in the fumes from burning or incompletely detonated dynamite. Nitroglycerin is very volatile, and a small quantity may easily be evaporated by the heat from burning powder. This is made manifest by the action of these fumes on human beings. It is a common fact that men breathing the fumes from nitroglycerin explosives, particularly when improperly detonated, get violent headaches, similar to those due to slight nitroglycerin poisoning. This great similarity, and the fact that the same treatment effects a cure in both cases, are accepted by a number of authorities as satisfactory evidence that nitroglycerin vapor is present in the fumes from poorly detonated or burning dynamite."[2]

Formulating of Blasting Rules Difficult

Though it is difficult to formulate rules regarding blasting in mines where the method employed necessitates the use of explosives during shifts, something can still be done to systematize the work as much as possible. If men are working over a grizzly and find it necessary to blast frequently, then instead of blasting each boulder separately as they come to it, they may be able to keep the ore running until they have five or six of these boulders together. In place of the customary one, two, or three sticks of powder on each boulder, they should put a small hole in each with a Jackhamer, insert about half a stick of powder, a strong detonator, and a little stemming on the top.[2] This will generally break the rock just as effectively and reduce the total quantity of powder from 10 or 12 sticks to about 2½ or 3. This would result in a marked effect on the ventilation in general, as it would decrease the quantity of poisonous or noxious gases which are generated in the first place, and thereby require less air to dilute the products of combustion. It would also effect a considerable saving in powder. The organization can insist on these different operations until they become habitual with the men and finally become standard.

Jaw Crushers Have a Larger Opening, per unit of capacity, than do gyratories. This factor determines the employment of jaw machines for plants demanding a small tonnage, but handling coarse sizes of run-of-mine ore.

[2] *Ibid.*

Mexican Oil Law Redrafted

A new oil law which will be presented to the Mexican Congress will modify the present laws on that subject, to which American holders of oil lands have objected vigorously, says a copyrighted dispatch dated Nov. 21 from Mexico City appearing in the New York *Times*. The law will be effective one month after its promulgation.

Article 2 provides that those lands in which capital had been invested prior to May 1, 1917, for the purpose of exploring for or exploiting oil, are not denouncable, provided the holders of the lands, including owners or lessees, shall justify their rights of possession before the Executive within a period of three months from the date of the law's passage. Claims owned in fee are to pay territorial contributions and the production taxes imposed by the decree of July 31 of this year, or those which may be hereafter established under the classification of rents and royalties on claims to which titles are issued in conformity with the new law.

Claims held under lease contracts are to pay during the life of the contracts the taxes fixed by the decree of July 31. This provision will terminate upon the expiration of the lease contracts, which may not be modified or renewed, even though the power of the contracting parties to do so may be stipulated in them.

Upon the expiration of a contract, an exploiter, during the three months following, may obtain a title in his favor to the claim upon the payment of a title tax. Claims covered in this article are to be subject to the regulations on exploitations which govern claims to titles of petroleum lands. The dispatch continues:

Article 3 provides that land owners holding contracts consummated prior to May 1, 1917, who have not invested capital in oil exploration or exploitation operations, shall enjoy during one year, counting from the day the law is enacted, the preferential right to denounce underlying claims to the properties, provided they justify their rights before the Executive within a period of three months. When a single piece of ground is denounced by various lessees, title is to be issued to that lessee holding the contract at the latest date.

It is provided in Article 4 that in justifying rights to oil lands referred to in the preceding articles the interested parties may use certified documents which had previously been filed in the Department of Industry, Commerce, and Labor.

Article 5 provides that owners and lessees who have invested capital in oil exploration and exploitation operations from May 1, 1917, to the time of the issuance of the new law may obtain titles in their favor to underlying oil claims by the payment of the title tax, upon furnishing proof within a period of three months from the issue of the law of having the authorization of the Executive to carry out the operations mentioned.

Article 6 stipulates that all denouncements of petroleum claims presented to agencies of the Department of Industry in accordance with the provisions contained in the decree of Aug. 8 of this year are valid.

Copper Extraction From Pyritic Ashes

A new method for the electrolytic extraction of copper from pyritic ashes is described in *L'Industrie*, and is based on the electrolytic conversion of sulphide or sulphate of copper into cupric or cuprous chloride by the action of chlorine at the anode. If in an electrolytic bath containing hydrochloric acid in solution the anode is surrounded by a mass of pyritic scoria, the chlorine liberated by the hydrogen attacks the oxides, sulphates, or sulphides of copper more rapidly than it attacks the oxides or iron, and combines with them to form cupric chloride. Copper loss by this method is only 0.1 per cent.

Electro-Cyanidation of Gold and Silver Ores*

By RUSH T. SILL and HARLEY A. SILL

IN THE early development of the cyanide process, an electrical current was used to precipitate gold and silver from cyanide solutions. Though efficient as a means of precipitation, it required a complicated and expensive electrical equipment and a large precipitating area for a comparatively small amount of solution. Exhaustive experiments were then made, using inexpensive base metals as precipitants, which resulted in the ultimate adoption of zinc shavings and dust as economical and efficient agents.

The Pelatan and Clerici equipment consisted of a wooden tank with an amalgamated copper plate on the bottom, forming the cathode, and a rotating vertical cast-iron shaft carrying four arms, which formed the anode of the electrical circuit. The anode segments, which formed one-fourth of the cathode area, acted as a mechanical stirrer and kept the pulp in suspension. This was a distinct advance in the electrometallurgy of the precious metals. However, owing to mechanical imperfections and the rapid development of zinc precipitation, electro-cyaniding received a setback from which it has never recovered; and although many prominent metallurgists worked on the problem and developed electro-cyanide machines, the process became dormant and had been almost forgotten as a metallurgical possibility.

Electro-cyaniding has a wider field of adaptability than the standard methods of leaching and agitation, because it can successfully treat gold and silver ores in the presence of considerable amounts of the base metals, lead, zinc, copper, and arsenic. This is made possible by the fact that the time required for the treatment of ores by electro-cyanidation is from one-eighth to one-twentieth of that in standard methods. The cyanide solution is in contact with the ore a much shorter time, and is regenerated by the electrolytic precipitation of the precious and base metals.

Regeneration of Cyanide

Cyanide is a solvent of base as well as of precious metals; and the lead, zinc, or copper dissolved is precipitated on the amalgamated copper plate, together with gold and silver, forming a base bullion. However, with the exception of zinc, the base metals are less readily soluble in cyanide solution than are gold and silver, and, consequently, relatively small amounts are dissolved, precipitated, and melted into the bullion. With the deposition of the metals by means of an electric current, the cyanide is liberated and again becomes a dissolving agent, thus completing a cycle of alternate dissolution and precipitation. Tests have shown that it is unnecessary to use as strong solutions as in other methods. A strength of one to two pounds has been found sufficient for any class of amenable ores.

Chemically, electro-cyaniding does not differ materially from standard methods. Lime is added to neutralize the acidity of the ore and to provide a protective alkalinity. A small amount of common salt is added to increase the conductivity of the solution. The amount required varies slightly on different ores, but rarely exceeds 10 lb. per ton, and usually is considerably less. With the exception of a few complex cyanide compounds which are formed, and which cannot be decomposed by electricity, the cyanide is kept in a state of active purity, a condition not always easily controllable by zinc precipitation. The electric current also precludes the necessity of the addition of lead acetate and similar compounds which serve as auxiliary chemical reagents.

The salt is decomposed by the electricity, and metallic sodium is precipitated on the mercury-coated copper plate, forming sodium amalgam. The sodium is converted into caustic soda by its reaction with water, which, uniting with the acid radicals in the ore, protects the cyanide from compounds from which the lime does not so readily protect it, thus saving a larger percentage of cyanide salt than can be saved without the current. Chlorine is also generated, but rarely indicates its presence, probably being united with basic radicals of the complex charge.

Current Regulation

The application of the electric current is simple in its operation, but extremely important in its functions. The question of the quantity and character of the current required to produce the highest efficiency in the deposition of the metals has necessitated much experimenting. It has been found that a direct current with 10 volts and approximately 2¾ amperes per sq.ft. of precipitating or cathode area is the most effective. The amperage is easily regulated by the addition of salt to the solution.

The Amalgam Plate

The dressing of the copper plate is identical with general practice in stamp battery plating. The dissolution of the salt into metallic sodium produces sodium amalgam, which keeps the plate soft and in excellent condition. In the treatment of gold and silver tailings containing mercury as amalgam or chloride, the particles of any appreciable size are amalgamated at once without the dissolving action of the cyanide solution, and the more minute particles, in both the metallic and chloride state, undergo dissolution and subsequent precipitation and amalgamation. Gold and silver in a free state act similarly. The copper plate serves as an efficient amalgamator in these instances because the pulp travels a distance of approximately seven miles, over the plate, in the course of a 2½-hour treatment.

Two distinctly different products are obtained from electro-cyaniding and standard methods of leaching and agitation. In the one, the precious-metal values are recovered as amalgam, which requires retorting before melting. In the other, zinc-press or zinc-box clean-ups are necessary. Frequently the precipitates require further refining to facilitate their melting, because of the relatively high melting point of zinc, and consequent complications due to an excess of the precipitant. An excess of zinc raises the melting point and causes a correspondingly greater degree of loss in gold and silver due to volatilization.

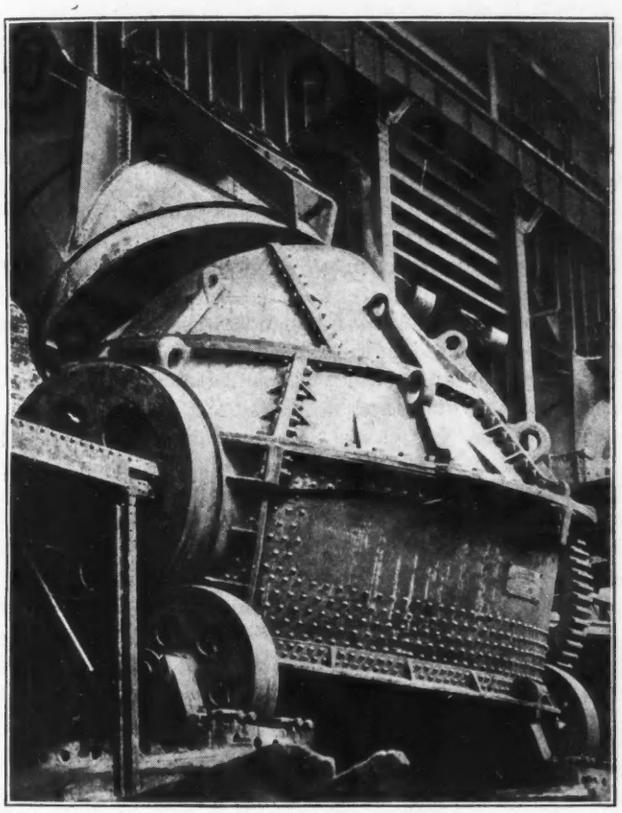
*Abstract from the *Mining and Oil Bulletin*, April, 1918.

From tests on a large number of ores it has been determined that from 70 to 95% of the dissolution takes place within two hours, and that all of the commercially extractable materials of value are obtained in six to eight hours for silver ores and two to four hours for gold ores. A process that has such a wide field of application and which is so simple and efficient in its operation merits the attention of metallurgists and electrochemists.

New Converters at Granby Plant

By W. A. Williams*

A new type of 20-ft. Great Falls converter was installed at the plant of the Granby Consolidated Mining, Smelting, and Power Co. last summer. The main feature of the improved machines, of which two have been



GREAT FALLS CONVERTER

erected, will be appreciated by reference to the accompanying halftone.

Experience has shown that with converters of the usual design there is a tendency to sag after operating, thus throwing the gears out of line. To obviate this, the new type of converter has been reinforced with cast angle plates and a ribbed top. These additions insure a stiff beam effect; but, in order to compensate for any possible sagging, the gears have been designed slightly beveled, so that when the sag does develop it will straighten up.

The two converters are now in operation, and all the matte will soon be converted direct from the blast furnaces at whatever grade made, although it is hoped to keep this at 16%. The modification in treatment method has eliminated the regrading furnace and the rehandling of the matte—a considerable saving, considering the tonnage handled. The change has also permitted an increase in the amount of "green" ore handled and will reduce costs. The furnaces are giving entire satisfaction.

*Superintendent of smelteries, Granby Consolidated Mining, Smelting, and Power Co., Anyox, British Columbia.

To Advise on Contract Adjustment

By agreement with all the war-making agencies of the Government, the War Industries Board is to be promptly advised of revisions and adjustments of all war contracts of the Government in excess of $100,000, it was recently announced. Though it has never been the function of the War Industries Board to make contracts, and, therefore, it cannot assume responsibility for any of the financial adjustments with contractors incidental to cancellations, the board will undertake by advice and recommendation to so control the situation as to stabilize the flow of materials, labor, and plant facilities back to peace channels.

To this end, the facilities section of the War Industries Board will act as the clearing house of all information relating to contract adjustment. It will receive information concerning contracts to be cancelled from the various departments of the Government, and, through the commodity sections of the board, keep in contact with the various industries. At all times contact will be maintained with the Labor Department also, so that as labor is released from the war industries by contract cancellations immediate demand for its services can be placed elsewhere. Bearing in mind the fact that for some time those parts of the war program necessary to maintain the existing military establishment here and abroad must be continued, it will likewise be a function of the facilities section to divert, where possible, the materials, labor, and facilities, released by one department, to the requirements of another department.

Utah Copper Co.

The last quarterly report of the Utah Copper Co., covering the third quarter of 1918, shows that 3,412,700 tons of ore was treated, 210,800 tons more than for the preceding quarter. The average grade of the ore was 1.2004% copper, and the average extraction, 65.07%, as compared with 1.2535% and 64.49%, respectively, for the second quarter. The gross production of copper was 53,311,943 lb., an average monthly production of 17,770,648 lb. In addition, a total of 1,116,509 lb. of copper was contained in precipitates from the leaching plant, 35,481 lb. in shipment of precipitates, and 275,745 lb. in ore shipped direct to the smeltery, making a total gross production for the quarter of 54,739,678 lb., as compared with 52,724,053 lb. for the previous quarter. Total net income amounted to $5,310,011.59, and disbursements to stockholders were $4,061,225.

Tin Smeltery at Arica, Chile, has a reverberatory and a roasting furnace with a capacity of 1000 tons of barilla per month and an approximate production of 650 tons per month. The plant is being enlarged so as to make its capacity 1500 tons per month. Petroleum residuum imported from California is used as a fuel.

Leaching and Filtration Nomenclature *

By A. W. Allen

The difference between the meaning of the words "percolate" and "leach" is not always recognized. "Percolation" infers the passage of a liquid through the interstices of any material or materials permitting it. "Leaching" is the process of extracting soluble matter by percolation. "Lixiviation" is analogous to "leaching." Percolation and leaching may occur simultaneously. Percolation may be hastened by the application of pressure or vacuum. Leaching may be improved by modifying the physical or chemical character of the solvent. Percolation occurs during filtration.

A filter may be used for one of two purposes—either to strain suspended or finely divided matter from a liquid, or to separate a liquid from a solid. In the former case it is usually referred to as a clarifier, although the term "clarification" usually infers the addition of some settling or flocculating agent which permits the decantation of the clear supernatant liquor. The use of the word "clarifier" has apparently been adopted to mark a distinction from the more complex filtration methods. A clarifying press may be, and usually is, an ordinary type of plate-and-frame filter press. A clarifier or clarifying filter may consist of a straining device containing filter cloth or sand by which a clear solution is obtained, with or without the aid of artificial vacuum, natural gravity, or applied pressure.

In chemical or wet chemico-metallurgical processes the use of the word "filter" has been extended beyond its previously accepted scope. The simple separation of solid from liquid, such as occurs when a thickened flotation concentrate is filtered, is usually termed dewatering. The word "filtration" is used more to cover the complex process of separating, as far as possible, solid from liquid by vacuum or pressure, removing the residual solution by wash, and at the same time leaching any recrystallized, absorbed, or undissolved matter by percolation with the solvent. At the Homestake plant the gold is leached from the sandy product in vats. The slime pulp is dewatered in presses, and the cakes are leached with cyanide solution and water. In this instance the filter press functions mainly as a convenient means of permitting satisfactory percolation after dewatering has been accomplished.

The filters used in various processes are of two classes—pressure filters and vacuum filters. A pressure filter, usually termed a filter press, is an apparatus in which the separation of liquid from solid and the percolation of liquor through the cake are insured by means of pressure against the filtering medium. A vacuum filter, on the other hand, is an apparatus by means of which the same result is achieved by the aid of a vacuum *through* the filtering medium. There is often a lack of distinction between the two terms which results in failure to appreciate the fundamental difference of operation between the two types of apparatus.

Revolving-drum and suspended-leaf types of vacuum filters are frequently referred to as filter presses, with the result that their comparatively limited application is often overlooked. All the operations of a vacuum filter are dependent on the pressure of the atmosphere at the particular elevation where the machine has been installed. The maximum force available for the purpose of separating solid from liquid, or for drawing the percolating solution through the cake, is limited to a theoretical pressure of 30 in. of mercury, or under 15 lb. per sq.in. The maximum pressure obtainable in practice at sea level is probably nearer 12 lb. per sq.in., and is proportionately reduced at altitude. This pressure is, however, ample for many purposes.

The limit of operating force in the filter press is controlled only by the strength of the apparatus and the filter cloth, and the permeability of the caked material. It is usual to operate such a machine at a pressure that may rise to 80 or 100 lb. per sq.in. A pressure of 200 lb. per sq.in. may be adopted in certain operations in the ceramic industry where it is necessary to dewater a finely divided colloidal clay. On account of the pressure which can be used within this type of apparatus, a pulp carrying certain finely divided noncrystalline substances can be successfully dewatered in a filter press, whereas the use of a vacuum filter would be impracticable.

Cake formation in a filter press is achieved by means of gravity pressure, compressed air, or a force pump. Hydraulic pressure is often adopted to close the press and maintain contact between plates and frames during operation, but it is not usually used in the actual filtration, as stated in the Standard Dictionary.

I remember an instance where an engineer was impressed by a published account of a certain type of vacuum filter, in which the apparatus was referred to as a filter press. Having satisfied himself, after questioning his technical associates, that the operation of a filter press was practically unaffected by altitude, he arranged for an installation in a plant situated at a considerable elevation above sea level. The results were disappointing, and the equipment was subsequently dismantled to make room for pressure filters.

In all preliminary work dealing with proposed filtration installations at altitude it is advisable to keep in mind the fact that theoretical vacuums cannot be realized in practice; and that, in all the intermittent-action filters, particularly those of the suspended-leaf types, the failure of vacuum at certain stages of the cycle of operations may result disastrously. On the other hand, a reserve of pressure is usually a valuable asset. Hence the imperative need of distinguishing between a filter press and a vacuum filter in the first instance.

*The second of a series of articles on the standardization of terms used in hydrometallurgical operations. The first paper, "The Difference Between Extraction and Recovery," was published in the October 26th issue.

South African Diamond Output

According to the official figures of the South African Department of Mines and Industries, the total diamond production of South Africa for the first six months of 1918 amounted to 1,410,836 carats, valued at $19,086,092. Of the total output, 1,395,596 carats were sold for $18,162,425, says a consular report.

The Transvaal produced 446,411 carats, of which 412,900 carats were from the Pretoria district and 33,498 from river diggings. The Cape Province was, however, the largest producing area, with 847,538 carats, and the Orange Free State was responsible for 116,887 carats.

Driving and Timbering Transfer Chutes

By C. T. RICE

A successful method of driving raises used as transfer chutes is employed in the Coeur d'Alene district where the veins are from 8 to 10 ft. wide. It consists of carrying up a combined manway-and-slide compartment in the center of the raise. This permits the ore to run down on either side, saves timber and insures safe operation. Sufficient bracing is provided to prevent side thrust, and only enough ore is drawn at each blast to make room on top of the last set for the men to carry on operations. When the raise is holed through, timber is removed, taking out the bottom set first.

AT THE Hecla mine, at Burke, Idaho, chutes used in transferring ore from level to level in order to drop it to the main haulage levels are placed in the mine where the ore is from 8 to 10 ft. wide and when the walls are sufficiently strong to stand without timbering. Moreover, these transfer raises are driven 15 ft. long in section, in addition to being flared out at the bottom to permit the placing of two chute discharges, as is shown in Fig. 1. Then when the raises have been driven through to the level above, they are stripped of all timbers, and the wear is thrown ore upon ore. At the bottom, a method is used for timbering which protects the bottom timbers from wear and tear, as well as making it possible to start the ore again easily and safely in case the raise gets blocked. The two chute mouths permit rapid loading of trains as well as larger storage capacity.

Combined Manway and Slide Saves Use of Timber

Instead of carrying up a manway and chute and three lines of stulls, as is often done in putting up transfer chutes, a combined manway-and-slide compartment is carried up in the center of the raise, and the broken ore allowed to run down to each side. This enables the miners to place their drilling stages easily and reduces the expense of putting in timbers, as well as of tearing them out when the raise is finally completed.

The first set above the level is cut 25 ft. long in section, whereas the next set above tapers to the regular length of 15 ft. The posts on the level and those on the floor immediately above are 9 ft. 3 in. long, which gives plenty of working room over the chute mouths in case the chute becomes blocked. But above the two bottom sets of the chute, the stulls are placed with 5-ft. centers vertically as well as horizontally, which makes it practicable to use for lagging the sides of the manway as a covering over the manway while making room for the next line of stulls.

Method of Timbering the Level and First Floor of the Raise

The level is timbered by means of a line of horizontal stulls from foot to hanging at 5-ft. centers along the vein, and with posts placed under them, both at their foot and hanging ends. On the first floor of the raise, posts are placed along the foot and hanging walls, and four stull caps are put in. These stulls are reinforced with headings from three to four 3-in. planks thick at each end, and round braces 8 in. in diameter are used to brace them laterally against the heavy side thrust that occurs later in the life of the raise. The posts are strongly braced to prevent side movement.

Center posts are placed under the two outside stulls about 3 ft. out from the foot-wall posts, as shown in Fig. 2, so that the outside posts may be lagged in such a way as to limit the flow of ore to the chutes. These posts are then lagged with a double layer of 3-in. planks. The lagging extends from the center post out beyond the hanging-wall post to the hanging wall itself. Then

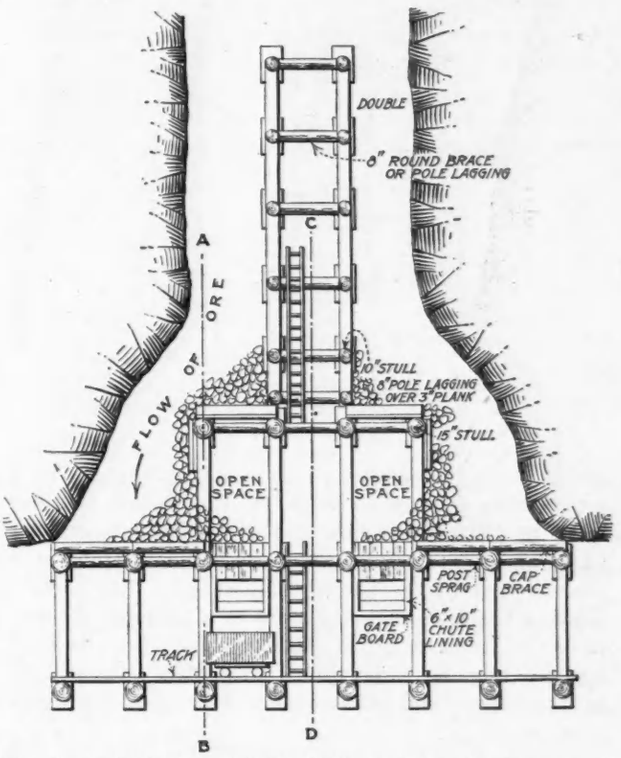


FIG. 1. SECTION ILLUSTRATING TRANSFER CHUTE AT HECLA MINE, BURKE, IDAHO

for about 3½ ft. down from the top, laggings, that extend from the center post beyond the foot-wall post to the foot wall itself, are nailed on. The purpose of the hanging-wall lagging is to keep an open space near the hanging and over the chute, to enable a man to work while starting the chute when a timber or a boulder blocks the opening. The lagging at the top is put in to prevent the flow of ore from reaching beyond the far side of the chute mouth. When this has been done, the stulls to each side of the manway are lagged over tightly with a floor of 3-in. planks, and then a layer of 8-in. poles is put on top to protect them. Two extra sprags, one on each side, are then put in from foot to hanging over the manway stulls, to keep these poles in position, in addition to holding the lagging of the manway set on the floor above, as the manway is lagged vertically with a double layer of 3-in. planks.

Fig. 1 shows the manner in which the timbers are

protected from wear by the ore itself. The poles extend a few inches out beyond the outer stulls, to keep the flow of ore off these timbers. The ore banked up along the hanging wall protects the lagging and post on that side from wear, and there is a tendency for the ore to remain in equilibrium between the foot-wall post and the foot wall as large pieces become wedged there, so that that post also is fairly well protected from the wear and tear of the ore as it passes by. As the chute is kept full, and only enough ore drawn

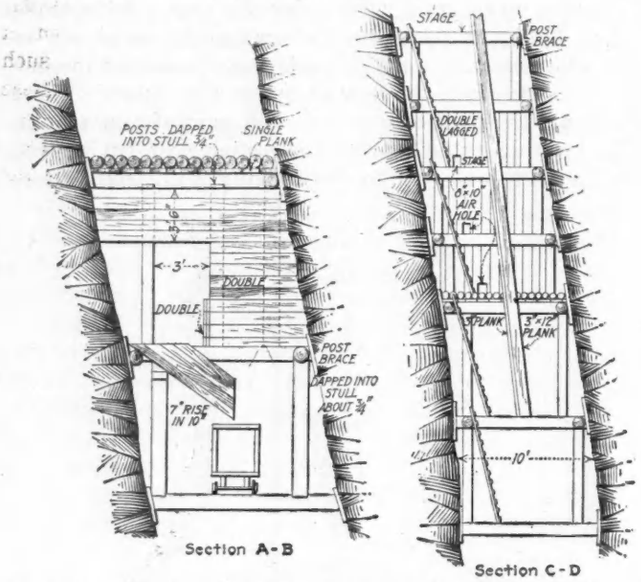


FIG. 2. SECTIONS SHOWING FEED HOLE IN COVER SET AND MANWAY-AND-SLIDE COMPARTMENT OF TRANSFER CHUTE

out at each blasting to make room on top of the last set for the miners to work in, the broken ore banks itself up in the feed hole above the chute mouth at its angle of repose. Then, when the chute is drawn again, the ore toward the center, rather than that along the sides of the feed hole, has more of a tendency to run, as it is the freer to move. Consequently, the ore that is against the top laggings of the feed hole will tend to hang there and thus protect the top of the opening from wear.

Timbers and Boulders Removed at Feed Hole

Any timbers that are blasted out and become buried are allowed to travel down with the ore until they reach the feed hole in the side of the cover set and finally block the opening completely. A hole bored in such a timber and loaded with half a stick of dynamite will shatter the stull so that the chute will run again in a short time. Moreover, the man, while boring this hole, works in the open space of the cover set, where he is protected from the flow of ore, as he can step back if the stick should move and the pile start running suddenly.

In the manway compartment a timber slide and a ladderway are carried up with platforms in the ladderway every 10 ft., to break the fall. The timber slide is carried along the hanging wall, and the ladderway is along the foot-wall side of the compartment, as shown in Fig. 3.

The raises are driven with two super-Leyner drills, and two extra machines are kept in reserve at the bottom of the raise, as the ground is hard. A 6-ft. cut is taken, using a center cut, a machine being mounted on a cross bar in each end of the raise. Three eight-hour shifts worked in the raise that was being put up from the 600 level to connect with workings from the No. 3 adit. This connection makes it possible to drop all the ore from the upper workings to the 900 level and to hoist it through the shaft, so that it can be sent to the crushing and sorting plant before going to the mill.

Slow Progress Made in Drilling Hard Ground

Four men worked on each of the shifts, but, owing to the hardness of the ground, only a cut a day, or 6 ft. of advance, could be driven, taken out and timbered up, as it takes 40 holes to break the ground. The drilling proceeded slowly, and the work of the crew was planned to speed up as much as possible, and bonuses were paid.

Timbers are kept about 6 ft. below the back. The planks that are to be used in lagging up the next set of stulls are piled over the top stulls to cover the manway. As the sides of the manway are doubled-lagged, there are five layers of these 3-in. planks, including

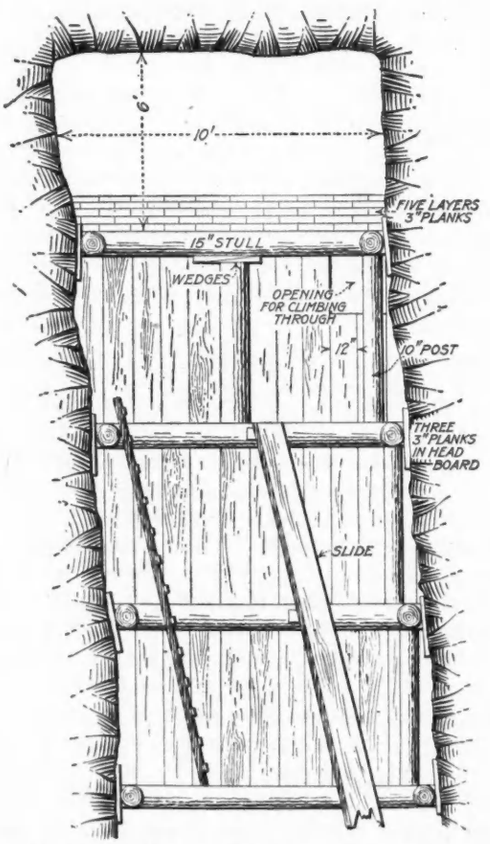


FIG. 3. SECTION THROUGH TOP OF TRANSFER RAISE, HECLA MINE, BURKE, IDAHO

those that go into the stage carried next to the top floor and that are later used in bringing up the timber slide. These planks are piled closely, so as to leave no air space between them. Helper posts are put in under the centers of the top stulls to keep them from being broken. Cross angle braces, running from stull to stull, are also put in near the foot and hanging walls between the top four stulls, to prevent lateral move-

ments of the top stulls when a round is blasted. Short sprags are placed from the stulls horizontally to the sides of the raise, and help hold up the staging on which the men stand while drilling.

The double planks in the sides of the manway are chopped to fit the hanging and foot walls tightly, that the first rush of air after the blast will not get into the manway and lift the planks before they have been loaded with dirt.

When the round is blasted, everything is tight excepting the hole through which the miners crawl after they have spit the fuses. This entrance is provided by sawing off the second plank from the hanging wall at about its middle, and the pieces are used to close the hole. As soon as the round has been blasted, the men pull enough dirt out of the chute to lower the top of the pile, in order that an air hose can be worked through the hole and the gas blown out of the raise. Then the miners get in and pick down the back. This having been done, the ore is removed from on top of the raise and a hole made through the platform to hoist the next two stulls that are to be put in. A sprag is then placed from foot to hanging, over the middle of the timber slide, and the pulley that carries the cable for hoisting the timbers is fastened to it.

Timber Removed When Raise Is Holed Through

When one of these transfer raises is through to the level above, it is emptied, stripped of its timbers and the manway set lagged over with 3-in. planks and poles, as were the other sets at the bottom. Owing to the manner in which the timbers are put in at the bottom of the chute, practically all wear and tear are thrown on the ore itself instead of on the timbers, and there is the further advantage that if a boulder should get into the chute it can be worked out on the floor above the chute mouth and blasted. If the chute becomes blocked, it is not at the chute mouth itself, but at the feed hole in the side of the cover set, and so can be started easily and quickly, and without danger.

Bottom Sets Removed First in Stripping Raise

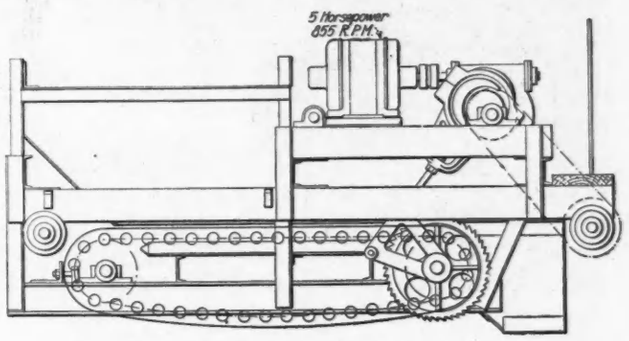
It may be well to warn against a natural mistake that might be made when stripping the stope of timbers. Ordinarily this would be done by beginning at the top and stripping the raising, coming down and lowering the timbers to the level below, which would be the easier way were it not for the fact that, after about 100 ft. of the raise has been stripped of timbers, the miners begin to get nervous lest some slab may loosen up along the walls, no matter how well they may have trimmed them down.

The proper way to strip the raise of its timbers, and to convert it into a transfer chute, is to begin at the bottom, above the cover sets, and take out the manway stulls. Five or six sets are taken out, according to the condition of the timbers and the walls, and broken ore is dumped in for the men to work on. Five or six more sets are then torn out, the timbers are hoisted up to the level above, more broken ore is run in, and the process is repeated until the top is reached. In this way there is little ground open at any one time, and the men can work without fear of impending danger. Unless the headboards have taken such weight from the walls that a few hard blows will knock them out, it will be found easier to chop the stulls off near the foot-wall end than to try to chop out or saw off the headboards. Chopping off the stulls near the ends does not injure them greatly, as they can be sawed off and used again in some of the narrower stopes of that level, and the loss of length of stull is more than made up for by the time that is gained in getting the timbers out.

Variable-Speed Apron Feeder

The ore at the Bunker Hill smeltery is received in four 250-ton bins. From these it is delivered, by an apron feeder, to a belt conveyor that takes it to the Blake crusher. In order to enable the crusher man to attend to the feeding of the ore from the bins, Bradley, Bruff & Labarthe, who designed the smeltery, devised a special type of apron feeder that is self-propelling, and arranged so that the speed can be varied. A switch in the power circuit of the driving motor enables the man at the crusher to stop or start the feeder.

The chute mouths of each receiving bin are equipped with arc gates. A tiller rope, that fastens over a hook on the side of the apron feeder, holds this gate open



VARIABLE-SPEED APRON FEEDER

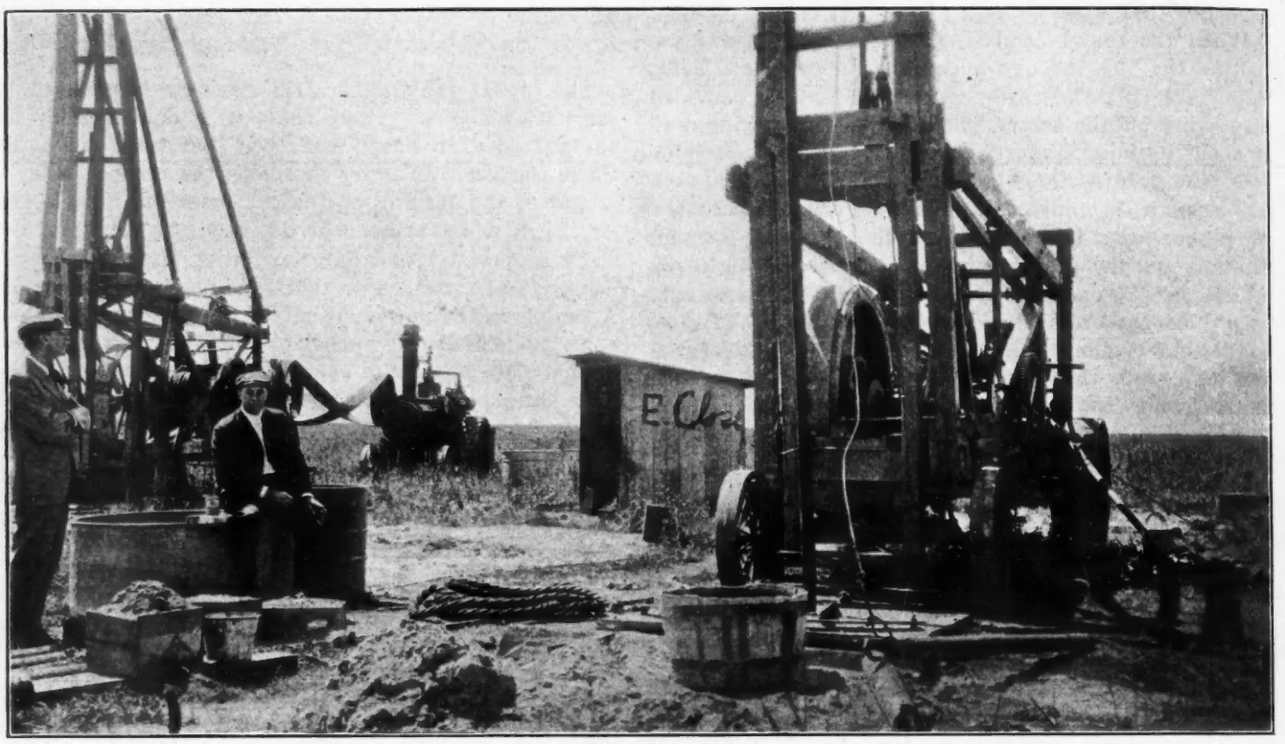
so as to permit the ore to travel freely down the chute to the hopper over the apron belt of the feeder. The rate at which the ore is drawn off depends upon the speed at which the belt of the apron feeder is being operated.

The feeder is driven from a 5-hp. General Electric Type K motor through a shaft and eccentric that actuates the apron drive wheel by means of a pawl carried on a rocker arm. The eccentric is of the variable-throw type, so that by locking the two disks in different positions with respect to one another, the number of teeth that the pawl will be pushed over, and so the distance that the apron belt will be pulled ahead on the return stroke of the eccentric, can be varied according to requirements.

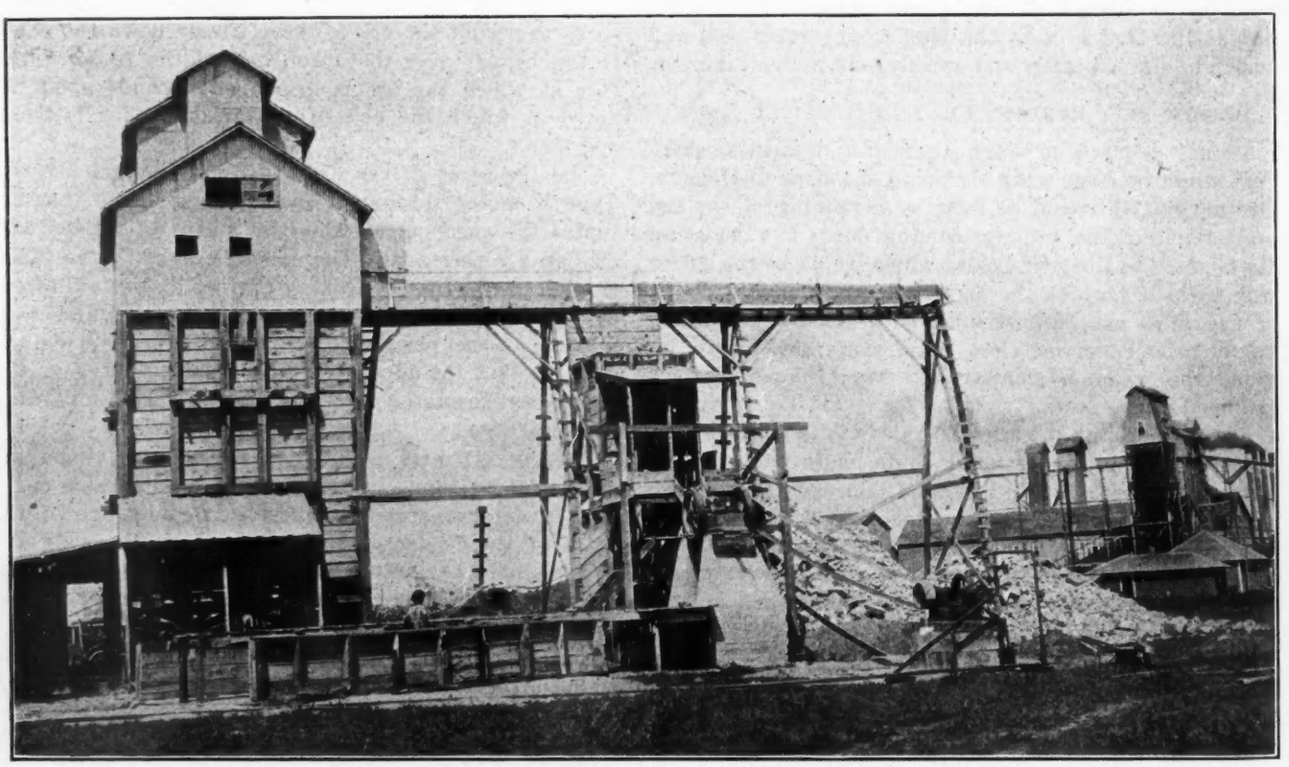
A sprocket wheel mounted on the main driving shaft of the feeder connects by means of a detachable chain belt to another sprocket wheel carried on one of the axles of the feeder carriage. Thus, by throwing the driving sprocket into gear by means of a lever, the feeder can be moved along the track from one chute to another at a speed of 80 ft. per minute.

The adoption of this feeder permits the crusher man to spend practically all his time at the crusher, where, by means of the switch, he can immediately stop the feeder in case anything goes wrong. The feeder has a wide range of application.

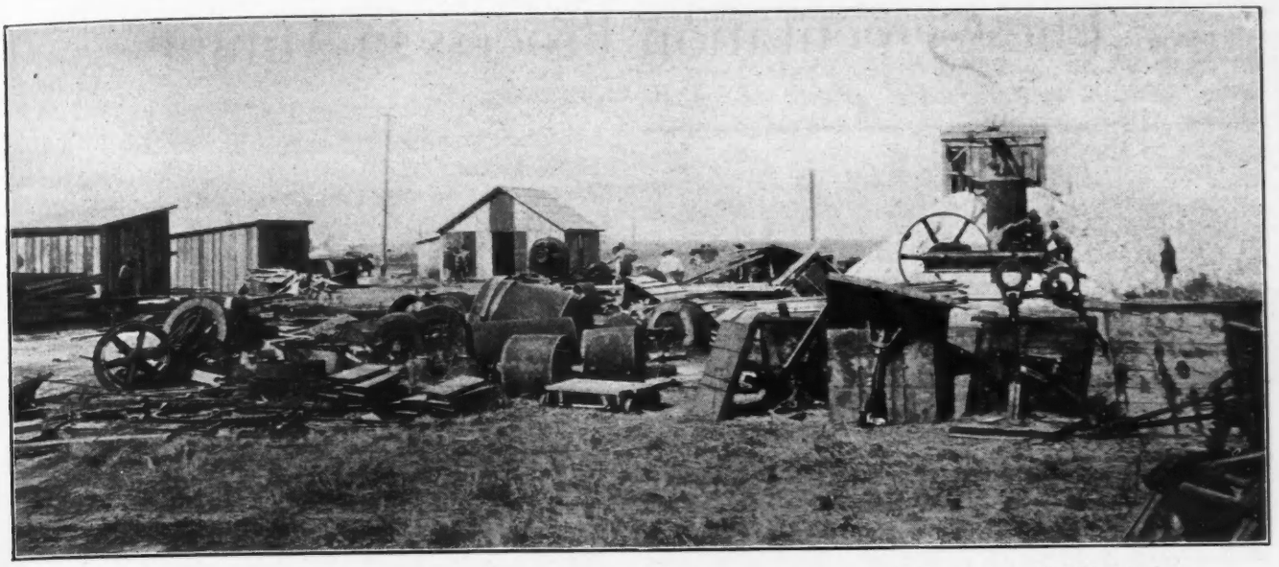
Northeast Oklahoma Lead-Zinc District



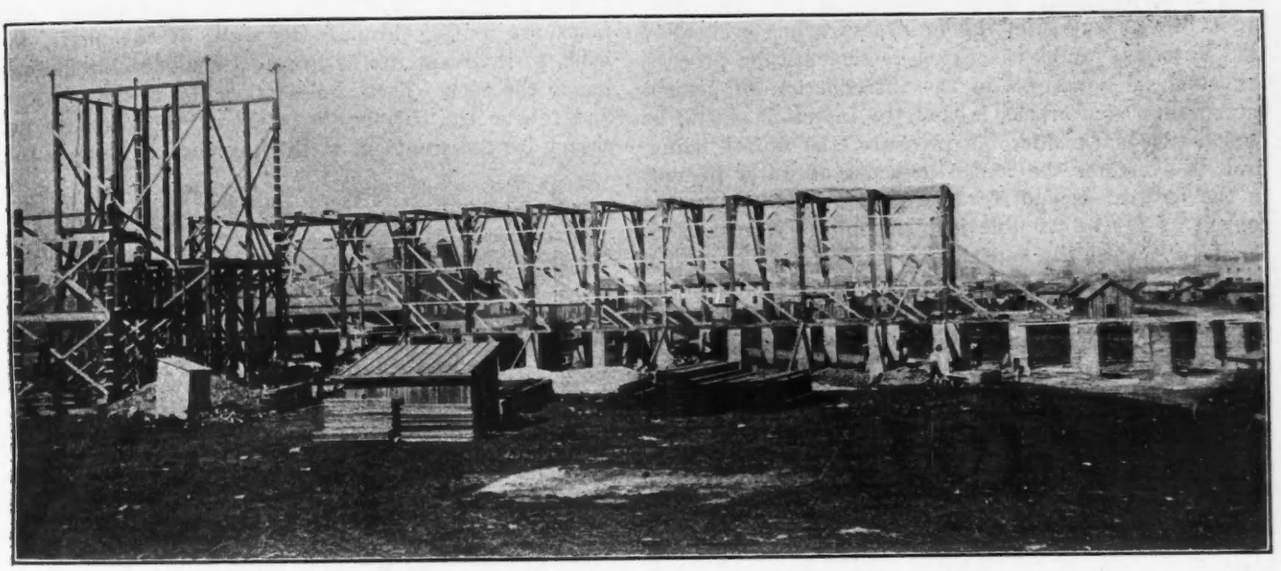
TYPICAL DRILL OUTFIT IN THE NORTHEAST OKLAHOMA ZINC-LEAD FIELD



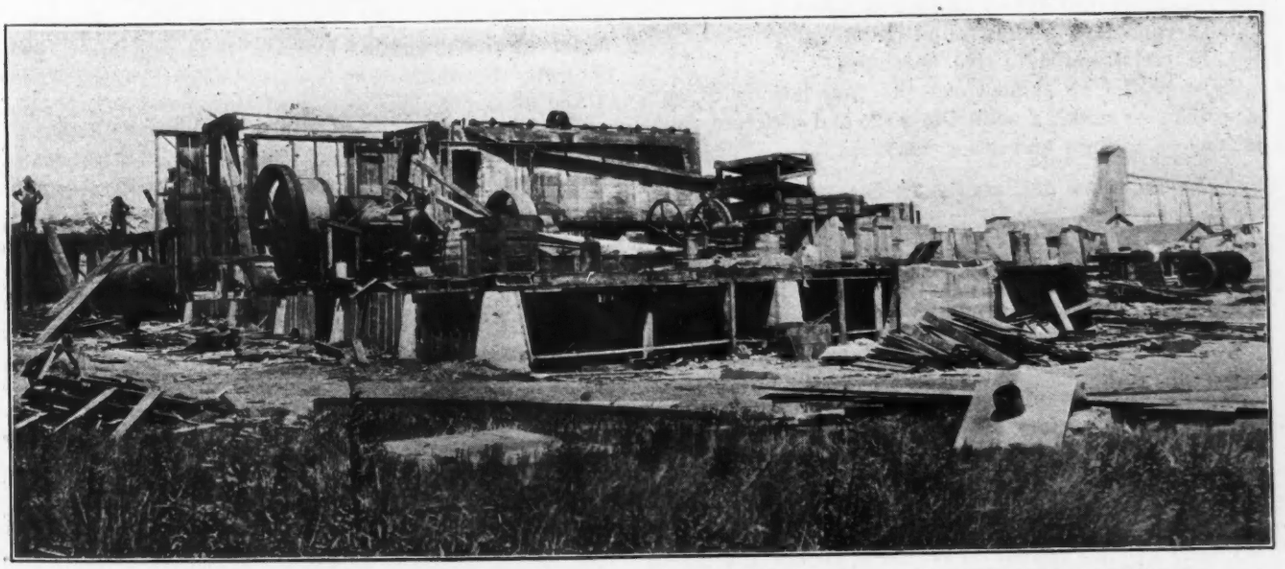
CRUSHER INSTALLED AT SHAFT OF MONTREAL MINE, TAR RIVER, OKLA., TO HANDLE ZINC ORE BOULDERS



MACHINERY FOR 300-TON MILL AWAITING ERECTION AT THE UTOPIA MINE, PICHER, OKLAHOMA



CONCENTRATING MILL UNDER CONSTRUCTION IN THE MIAMI ZINC FIELD



DISMANTLING JOPLIN DISTRICT MILL PREPARATORY TO MOVING IT TO THE PICHER DISTRICT

The Cementation Process in Mining*

By A. H. KRYNAUW

The cost of pumping water in the gold mines of the Witwatersrand district of South Africa is more than $2,500,000 annually. Reduction of this expense by the wider adoption of the François cementation process is suggested, and experimentation has shown that cement under pressure sets extremely rapidly; and it is probable that this may be due to the squeezing out of excess water. Brief descriptions are given of the applicability of the process to a number of phases of mining work.

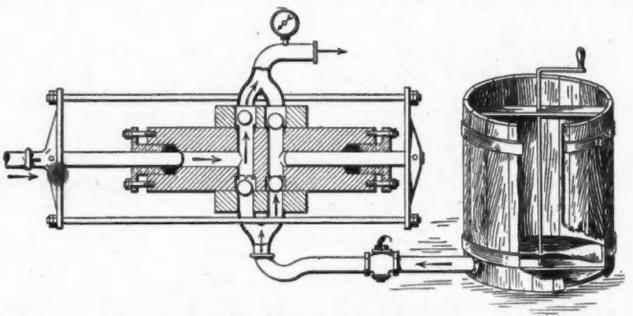
IN RECENT years experience has proved that cement can be introduced, under pressure, into the smallest fissures and cracks in rock strata, as well as into cracks and interstices in masonry and concrete constructions, and made to set there. The practice of introducing cement grout under pressure has evolved to that known today as the François cementation process. An essential condition in the introduction of cement into fissures and cracks is that the injection should be done under a considerable pressure, the object being, first, to overcome the contra pressure of water present in the fissure; second, for the purpose of forcing the cement as far as possible into the minute cracks, and, third, to squeeze the superfluous water from the cavity which is being filled with cement pulp, and thus leave the cement in a condition most suitable for its rapid and efficient setting. In the following instances cementation has been successfully applied:

1. In greatly minimizing water difficulties in shaft sinking or tunneling through water-bearing strata, faults and dikes.
2. In sealing and rendering water-tight the concrete tubbing or lining often used in circular shafts.
3. In sealing open fissures through which water is flowing.
4. In damming back water leaking through broken ground, in the vicinity of faults and dikes.
5. In rendering underground dams water-tight.
6. In rectifying defective boreholes.
7. In rendering impervious the foundations of surface dams or making solid the rock and concrete foundations of engines and other machinery.

Application of Process in Shaft Sinking

The process as applied to shaft sinking consists of a treatment of the strata, through which the shaft is to be sunk, with cement grout, which is injected into the fissures and cracks of the rock mass, thus sealing them and rendering the ground practically free of water. The method of carrying out the work is as follows: A system of drill holes is put down on the periphery of the shaft, and through these holes a thin cement mixture is introduced, which finds its way into the cracks and crevices, rendering them impervious to water.

In shaft sinking, particularly in the case of circular shafts, a lining of ferroconcrete or bricks is generally adopted, and in this connection it frequently becomes desirable to dam back water behind the lining. As this water may be under considerable pressure, the problem is no easy one, unless a process such as the François method is adopted. In this instance a number of weep pipes are built in with the lining, which allows the escape of the water while the lining is being constructed, thus relieving the "green wall" of the water pressure. After allowing the lining sufficient time to set, the weep pipes are in turn connected to the cementation pump, and cement grout is injected behind the lining and into the fissures, in this way sealing them up. Should the lining of the shaft not be of sufficient thickness to permit of a high pressure being applied, the method adopted is somewhat modified in that, before direct injection takes place, one or more release boreholes are drilled through the walls of the shaft, well back, to intercept the fissure at a considerable distance inside the rock. These holes allow the water to escape and relieve the side of the shaft of the pressure necessary for cementation. A thick cement mixture is then



DIAGRAMMATIC SKETCH OF WATER END OF CEMENTATION PUMP, AND MIXING TUB

introduced through the weep pipes, which seals the fissure in the immediate vicinity of the shaft, and when set the final injection takes place through the release holes mentioned. By systematically dealing with all water in shafts in this manner, it is possible to get a perfectly dry shaft.

Sealing of Open Fissures

Generally speaking, the method adopted in dealing with open fissures through which any considerable quantity of water is flowing is to drill two or more release holes at some distance back from the mouth of the fissure, for the purpose of allowing the escape of the water during the time of sealing the opening of the crevice. It is readily understood that unless some system like this is used, the force of the water will wash out the cement grout as fast as it is injected. If, however, the water can find an easier escape through these release holes, it will take that course, and thus permit of the following treatment:

The flow of water from the mouth of the fissure is first restricted by carefully wedging it. Thick cement, with an addition of sawdust when necessary, is then injected through one of the drill holes, and settlement

*Excerpt from the *Journal* of the Chem., Met and Min. Soc. of South Africa, May, 1918, p. 256.

begins on the support offered by the wooden wedges driven into the open end of the fissure. When this cement has set in the area between the release holes and the fissure opening, the final injection takes place directly through the release holes.

Damming Back Water in the Vicinity of Broken Ground

The process adopted for sealing back water leaking through the cracks and crevices of broken ground is similar to that adopted for sealing open fissures, though at times it calls for special care, as the weak nature of the rock tends to burst it out when subjected to pressure while injecting.

Rendering Underground Dams Water-Tight

It has no doubt been the experience of many that, however carefully an underground dam is constructed, a great deal of leakage takes place, more especially when the water is under considerable pressure. In this connection cementation can be particularly successfully used for making the dam water-tight by injecting cement through holes suitably drilled into the construction.

Rectifying Defective Boreholes

Sometimes boreholes for the purpose of obtaining domestic water are required to pass through one or more rock strata containing inferior or corrosive water. In such cases the usual method is to line these boreholes with metal tubes, but these tubes frequently become corroded at the point of contact with the bad water, with the result that they become useless and the good water is polluted. In this case the upper feeders of bad water can be successfully closed off by means of cementation.

Rendering Impervious Foundations of Dam Walls

It frequently occurs that at the site of a dam the rock foundations are of such a nature as to be unsuitable for the purpose of withstanding the pressure of the water behind the dam. This in the usual way is overcome by deep excavations, which consequently greatly increase the cost of the dam. It is intended to treat by means of cementation the pervious rock foundation at a dam site in the Mazoe Valley, Rhodesia, and there is little doubt that the operation will be successful and thus greatly reduce the expenditure on this dam. Briefly, the rock foundation is treated with cement introduced through a system of drill holes. Foundations of engines and machinery generally when ruptured can be effectively strengthened and solidified by cementation work.

Amisk-Athapapuskow Lake District*

The area included in the Amisk-Athapapuskow Lake district is situated 50 miles north of the Saskatchewan River, and consists of about 3300 square miles. The region lies along the edge of a part of the Canadian Pre-Cambrian shield, and one-half of it is underlain by Palæozoic rocks. The general elevation is about 1000 ft. above sea level. The southern part of the district, which is underlain by flat-lying Palæozoic rocks, is level, and any irregularies which may have existed have been practically obliterated by a thick deposit of lake clays. The northern end is free from such deposits and the surface is more uneven. Within the Pre-Cambrian region, the granite batholiths form resistant areas, which stand above the general level and form divides.

The older rocks form the western unit of a great anticline which pitches northwest at 45 or 50°, and on the flank there are remnants of minor synclines. The anticline has been cut off along its axis by an intrusion of gneissic granite, and massive granite has been intruded into the minor folds. Overlying this complex structure, the Ordovician dolomite forms the southern limb of a great low anticline of Palæozoic rocks, whose axis is transverse to that of the Pre-Cambrian anticline. The glacial deposits may be considered as another structural element lying unconformably over both of these.

The deposits of metalliferous minerals are of two kinds: (1) Gold quartz veins and (2) chalcopyrite-sphalerite replacements which carry small amounts of gold and silver. The material of value in the gold-quartz veins occurs chiefly as visible gold, and up to the present samples from the larger veins are not encouraging, but the gold content of small-width veins is commonly quite high. The sulphide deposits consist of pyrite-chalcopyrite-sphalerite-galena mixtures, and those that are largely pyrrhotite, although the important discoveries are of the former type. These deposits are almost solid masses of sulphides, differing only in the amounts and arrangement of the various minerals present. The sulphide deposits differ from the quartz veins in that they represent a replacement of the original rock by sulphides, whereas the gold quartz veins occupy practically the original fissures.

The first discovery of a large body of sulphides was made on the east shore of Flinflon Lake, now the Apex and Unique claims. Outcrops found at the water's edge are so near lake level that trenching is difficult. The deposit lies in a shear zone in Amisk volcanic rocks of the ellipsoidal greenstone type, and a series of trenches across the strike of the ore zone, on the north side of the point upon which the ore outcrops, show 55 ft. of sulphides, 40 ft. of barren rock, and then 30 ft. more of sulphides. Four hundred feet south of these trenches, the sulphide band is unbroken and is 75 ft. in width. Some disseminated material is found on the borders of the main mass of ore, and 800 ft. to the north of the main trenches ore has again been found, but here the lens is narrower. Assuming that the ore found in the most northerly trench belongs to the same lens as that shown by drill holes at the southern end, the deposit is more than 2500 ft. in length. It is probable that the lens or lenses include horses of barren rock, as indicated by the exposures, so that the actual distribution of sulphide may be irregular. The ore is definitely banded and consists mostly of pyrite, with narrow bands of chalcopyrite and zinc blende. All of the sulphides carry gold and some silver.

The group of claims comprising the Mandy mine is situated two miles from the north end of the northwest arm of Schist Lake. The deposit is on the narrow point separating the bay into which Phantom Creek empties from the main arm of the lake. It was discovered late in the autumn of 1915, and optioned to the Tonopah Mining Co. During the winter a diamond drill was

*Abstract of a report by E. L. Bruce, Canadian Geological Survey, Ottawa, Canada.

installed and surface trenching undertaken. The country rock is massive greenstone and chlorite schist, which occurs in relatively narrow bands that strike parallel to the shore of the lake. The ore lens lies in the western zone of schist, protected from erosion by the massive greenstone on either side of it. Mineralization is confined to the schistose zones, the massive greenstone being almost free of sulphides.

The lens of sulphides is 225 ft. long and 40 ft. wide. At the northwest side a two-foot vein continues northward, following the strike of the schist, and at the southwest side there is a similar vein. The ore has a composition similar to that of the Flinflon Lake deposit. The vein to the northwest is mostly pyrite; that to the southeast mostly chalcopyrite. A section across the middle of the lens shows 12 ft. of pyrite on the foot wall, and 12 ft. of high-grade chalcopyrite, 8 ft. of sphalerite and about the same width of pyrite on the hanging-wall side. All the sulphides carry gold and silver, but the value of these minerals alone is not high enough to warrant shipping. However, the segregation of the high-grade copper ore makes it possible to mine and ship that portion of the lens, even though it must bear the excessive cost of hauling by teams 35 miles to Sturgeon Lake, stocking until the opening of navigation, shipping to The Pas and then transshipping to the railway for a long haul to the smeltery.

Water Content and Concrete Strength*

For some time experiments have been in progress at the structural materials research laboratory, Lewis Institute, Chicago, to determine the effect of various quantities of water on the strength of concrete. These experiments have been directed by Duff A. Abrams, professor in charge of the laboratory. Professor Abrams has reduced his experiments to an intelligible form, which is interpreted by the accompanying diagram. This summarizes the results of compression tests on 6 x 12-in. concrete cylinders made in mixes ranging from 1 part cement and 9 parts aggregate, to 1 part cement and 2 parts aggregate, by volume. These mixes represent concretes of all qualities, from the leanest to the richest, which are generally used. The aggregate consisted of a mixture of sand and pebbles graded in size from the finest particles up to 1½ in. Exactly the same grading was used in all experiments.

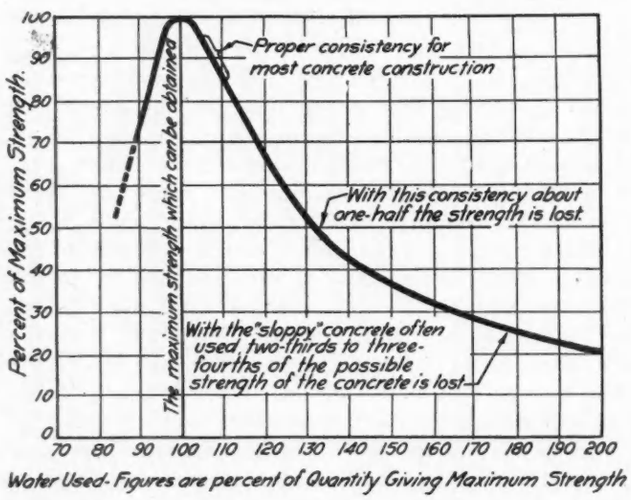


CHART OF WATER CONTENT AND CONCRETE STRENGTH

These tests show that the effect of proportional changes in the mixing water is approximately the same for all mixes of concrete; consequently, a composite curve has been drawn to show the average effect. The vertical distances represent the relative strength of concrete, expressed as a percentage of the maximum which can be secured from a given amount of cement and the same aggregates. The horizontal distances indicate the relative quantity of water used in the mix, considering the amount which gives the maximum strength as 100%. The amount of water which gives the maximum strength in concrete produces a mix which is too stiff for most purposes. It will be noted that the concrete strength increases rapidly with the quantity of water over the range indicated on the diagram. With any further increase in the amount of water, there is a rapid falling off in strength, as indicated by the curve. With an amount of water about double that required for highest strength, the concrete has only about 20% of the maximum strength.

The exact amount of water corresponding to the maximum strength of concrete will vary with the method of handling and placing the concrete. Any method which involves puddling, tamping, rolling or vibration, or the exertion of pressure in any manner, will have a tendency to increase the strength of the concrete, regardless of the amount of water used. However, it is probable that the effect produced by these methods will be more pronounced in the consistencies of approximately maximum strength.

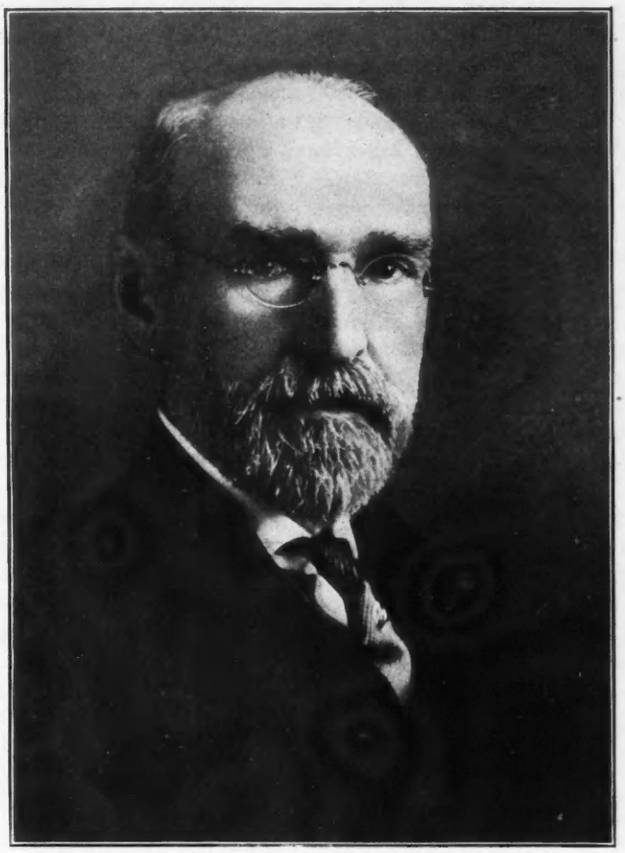
*Abstracted from "Concrete in Architecture and Engineering."

Shaft Sinking by Freezing Process

The freezing process has been successfully employed in sinking two shafts through water-bearing ground at the Llay Hall colliery, Wrexham, England, according to the *Engineer*. Two foreshafts were sunk 12 ft. deep and 31 ft. in diameter and lined with brickwork. Concrete was placed on the bottom after inserting straight vertical guide tubes for 25 boreholes distributed around a circle 26½ ft. in diameter. In the upper strata the holes for the freezing tubes were bored by the rope method, but in the lower and harder ground percussion apparatus operated by a steam cylinder was used. The cold necessary for freezing the water-bearing ground was applied by two distinct groups of machines. The pipes and valves were arranged so that either group of machines could operate on either shaft, or on both simultaneously. Each included a belt-driven ammonia compressor with an independent horizontal steam engine having cylinders 16¾ in. in diameter and 30-in. stroke. A solution of calcium chloride was used as the freezing liquid, and was caused to circulate between the refrigerators and the freezing tubes by means of two plunger pumps. The brine pipe between plant and shaft was insulated with hair felt. The ground was frozen to a depth of 231 ft. in the first and 235 ft. in the second shaft. The diameter of the pit shafts after lining is 18 feet.

Remember the Comfort Fund of the 27th Engineers.

Charles Richard Van Hise



DR. CHARLES RICHARD VAN HISE

THE University of Wisconsin is mourning the sudden death of its eminent president, Dr. Charles Richard Van Hise, who had led its progress during the last 14 years and had been a member of its family, as student and teacher, for 43 years. Geologists, scientists, and mining men join with the university in paying respect to its president, who died in Milwaukee on Tuesday morning, Nov. 19. Dr. Van Hise, who had been president of the University of Wisconsin since 1903, was the first alumnus of the university to become its president, the university's first Wisconsin-born president, and enjoyed the longest term. He was a Wisconsin man in birth, education, life work, and interest. He had been connected with the university faculty continuously since his graduation in 1879, and his entire energies had been devoted to the development of his native state and its university. Besides being a university president, Dr. Van Hise was one of the most eminent geologists of his time and one of the best-known thinkers on public questions, widely known for his many books, treatises, and public addresses. His great interest in geological problems, in conservation, and in regulation was well known throughout the country. In the solving of many of the nation's problems he was called into consultation or sent on special missions by the Government.

Dr. Van Hise was born at Fulton, Wis., on May 29, 1857, son of William and Mary Van Hise. He entered the University of Wisconsin in 1875, was graduated with the degree of bachelor of mechanical engineering in 1879, and later received the degrees of bachelor of science, master of science, and doctor of philosophy. The honorary degree of doctor of laws was conferred upon him by Chicago, Yale, and Harvard universities, and by Williams and Dartmouth colleges. He was instructor in metallurgy at Wisconsin, 1879-83; assistant professor, 1883-86; professor, 1886-88; professor of mineralogy, 1888-90; professor of Archæan and applied geology, 1890-92; professor of geology, and non-resident professor of structural geology of the University of Chicago, 1892-1903; inaugurated president, 1904.

Dr. Van Hise had been a member of the U. S. Geological Survey since 1883; geologist in charge of the division of pre-Cambrian and metamorphic geology and consulting geologist, 1900-08; consulting geologist for the Wisconsin Geological and Natural History Survey, 1897-1903; member of the National Conservation Committee, 1909; chairman of the Wisconsin State Conservation Committee, 1908-15; chairman of the Board of Arbitration for Eastern Railroads and Brotherhood of Locomotive Engineers, 1912; and trustee of the Carnegie Foundation for Advancement of Teaching since 1909. He was a member of the National Academy of Science, Washington Academy of Science, Scientific Society of Christiania, Royal Swedish Academy of Science, Geological Society of America (president in 1908), Geological Society of London, American Philosophical Society, Wisconsin Academy of Science, Arts

and Letters (president, 1893-96), Boston Society of Natural History, American Association for Advancement of Science, (vice president of Section E, 1901, and president, 1916), American Institute of Mining Engineers, Russian Society of Mineralogy, and Geological Society of Stockholm, Cosmos Club, Washington, and University clubs, Madison and Milwaukee.

Dr. Van Hise was the author of the following books: "Archæan and Algonkian," "Principles of North American Pre-Cambrian Geology," "Some Principles Controlling the Deposition of Ores," "A Treatise on Metamorphism," "The Conservation of Natural Resources," "Concentration and Control—a Solution of the Trust Problem in the United States." He was joint author of "Penokee Iron-Bearing Series of Michigan and Wisconsin," "The Marquette Iron-Bearing District of Michigan," "The Menomonee Iron-Bearing District of Michigan," and "Geology of the Lake Superior Region." He was a contributor to many scientific, educational, and economic papers. His latest book, "Conservation and Regulation in the United States During the War," was almost completed when he died.

President Van Hise's greatest work centered in his eminence as a geologist. What his geological work has meant for the state, nation, and world was expressed on the occasion of his death, by William O. Hotchkiss, Wisconsin State Geologist, thus:

> From his student days in the university, Van Hise had been interested in the geology of his native state and the development of its natural resources. His first field work was for the former State Geological Survey in central Wisconsin as an assistant to Prof. R. D. Irving, his teacher and friend. Shortly after, he was associated with Dr. Irving in work for the U. S. Geological Survey on the Gogebic Iron Range of Wisconsin and Michigan. His studies here resulted in the discovery of the fundamental principles of the origin of the iron-ore deposits, and furnished to the iron-mining industry the ideas on which have been based all later work in searching for new orebodies. The value to the mining industry of this work and the succeeding studies of the other Lake Superior iron ranges can hardly be overestimated. The monographs in which his work is presented are the standard reference books of the mining men of this region. He was one of the small group instrumental in getting the Legislature to create the present Geological and Natural History Survey, and had been closely identified with its work ever since its organization. Since 1903 he had been president of its board of commissioners. He interested himself in all phases of geological work in the state, not only in that leading to the development of mineral resources, but just as keenly in the study of the way in which the surface of the state has been carved cut through the ages by the slow-working tools of Nature. It was on his suggestion that the State Geological Survey started the present state highway work and carried it on until the state highway commission was created.
>
> In his later years Dr. Van Hise's interest in mineral resources became more broadly philosophical as his widening experience taught him the tremendous part which these resources had played in the development of civilization. He saw keenly the limited nature of many of these resources and that the welfare of future generations was dependent on their possession. This led him to bend his full energies to the propaganda for wise use and curtailment of waste by the present generation—to the development of conservation in state and nation. Out of his interest in these broader considerations grew most of his many public services.

Probably the most important work of Dr. Van Hise that was interrupted by his sudden death centered in his extensive plans to aid in the reconstruction after the war. His intense interest in the war he was carrying over into enthusiastic plans for comprehensive after-war work, both through the university and through energetic advocacy of the plan of a League of Free Nations to prevent future wars. During the war, he had taken an active and helpful part in its prosecution. He had gone on many missions to Washington and elsewhere in the war's interest.

Among Dr. Van Hise's associates it is well known that he realized the danger of German aggression long before it was realized by the public of his section of the country, and was eager to see the overthrow of the German military autocracy. When America entered the war, he was full of enthusiasm over what he considered the great and almost holy enterprise which the nation had undertaken.

During the summer of 1917 Dr. Van Hise devoted his entire time to work for the Food Administration and other emergency war bodies. He was called to Washington frequently for consultation with almost every one of these special bodies, and delivered war addresses in various parts of the country. In the autumn of 1917 he wrote a series of lectures on food conservation which were used in several hundred colleges. In March, 1918, he made another lecture trip throughout the West in the interests of the war. During August and September he visited England and France as a member of a party of editors who were guests of the British government.

Dr. Van Hise returned to America full of enthusiasm over the plan of a League of Free Nations to insure permanent peace in the future, and was preparing to devote all of his leisure time to furthering the idea and creating sentiment in its support before the peace conference. It was at his instance that the League to Enforce Peace held its nation-wide convention in Madison to support the League of Nations plan. At the convention, Dr. Van Hise in the opening address presented a concrete proposal for the prospective league which has been published and quoted throughout the country.

Iron Ore and Pig Iron in Ontario

During the first nine months of 1918, a total of 154,243 tons of iron ore was shipped from Ontario, according to the Ontario Bureau of Mines. Of this, 84,886 tons was shipped to Ontario points and 69,357 tons outside of the province. In addition to the output of the Algoma Steel Corporation and Moose Mountain, Ltd., shipments were made by the Poe Mining Co. from Palmerston Township, Frontenac County, and by the Canadian Union Iron Mines Corporation, from Drummond Township, Lanark County.

In the production of pig iron, 1,083,456 tons of ore was smelted, but only 87,106 tons was of Ontario origin. Although the tonnage of pig iron produced was slightly in excess of the 1917 figures, the value shows an increase of nearly 50%. Eight furnaces were in blast and were operated by four companies. Steel production was 668,333 tons and was valued at $21,601,144.

Iron-Mining Companies at Lyon Mountain and Standish, N. Y., are deserving of credit in the showing that they have made in securing the coöperation of their employees in the purchase of Liberty Bonds. The Chateaugay Ore and Iron Co., at Lyon Mountain, George E. Bent, manager, employs 400 men, 70% of whom are foreigners. On the first and second issues they subscribed their full quota. To the Third Liberty Loan they subscribed $41,000 or over $100 per man. One workman took $1000 and his wife $2000, paying for the bonds in cash. During the Fourth Liberty Loan drive, half of the men were ill with influenza, but the remainder subscribed to $33,000 in bonds. At Standish, the Northern Iron Co., L. P. Ross, manager, employs 150 men. During the first drive, the men subscribed to $14,000 in bonds; the second, $32,500 and the third, $54,000.

Correspondence and Discussion

Co-operation Among Small Mines

Mr. Young's suggestion in the *Journal of* Nov. 9 that coöperation among small mines would be beneficial in many instances, strikes the writer as the sane solution that should have been applied in a number of instances of failure or inefficiency that have come under his notice, but old Dame Jealousy is the main drawback to the practical application of his thought. In one large camp where I have worked, and where there were a number of mills, I was practically the only mill superintendent who visited and was on good terms with all of the rest. There was no real reason for the attitude of the other mill men; they were all interested in telling me of their experiences and listening to what I could tell them. Several of them had imaginary grievances. Others felt hesitancy about going into any but their own mill; and a general lack of coöperation was always apparent where its presence might have been so useful.

I have quite come to the belief that an engineer's success as a superintendent or manager is only 50% dependent upon book-learning and that the other 50% is due to an acquired knowledge of human nature with a will to curb his own faults and a way to bring out the best in others. Coöperation, not only among those in the same occupation, but evincing the desire and will to work together, goes a long way toward making life more worth the living. I have plenty of opportunity to put this belief into practice in my present capacity as superintendent of a mine and of a boarding house. I say boarding house advisedly, as a mining crew's morale depends more upon the dining room than upon mine conditions. I have done my best to keep liquor out of the camp, but have also done my best to supply good healthy amusements to take the place of the saloon. I am loosing money on the $45 board and room rate, but am glad to do so when I can see the same men going on shift every morning for weeks without a break.

My efforts to keep things neat and clean for the unmarried men were rather resented at first, but we are together on this now, and the demand for clean sheets is as regular as is Saturday night. Taking a hint from the summer hotels where we find professional entertainers, I have found a young man who combines this office with his other duties about the mine, and my investment in his services has been profitable beyond expectation.

I run a truck back and forth between the town and the mine, a distance of a mile and a half, charging enough to pay for oil and gas only. As a result of my theory and its practice, I have almost a full crew, while my nearest neighbor is short handed. Of course, I get a share of those who cannot stand more than a month's prosperity, but I am happy to say that the number of floaters grows smaller and smaller, all through our endeavor to coöperate and make living generally worth while.

And now just one word for the women in the coöperative movement. In the old wide-open State of Nevada the women have been given the vote, with the result that at the last election the state went two to one in favor of prohibition, a conclusive proof of the improved morale and the wisdom of woman suffrage.

Henceforward the work of managers will be easier, production more satisfactory, everyone more efficient, and all more happy. NEVADA SUPERINTENDENT.

Tonopah, Nov. 21, 1918.

Influenza Epidemic in Colorado

Under editorial correspondence in the *Journal* of Nov. 9 occurs a paragraph concerning the influenza epidemic in the Silverton district, to which I beg leave to call your attention. At the time that the epidemic first broke out in Silverton, there were three regular doctors in Silverton and one in Eureka. Within ten days, this medical force had been augmented by an additional doctor in Silverton and two in Eureka, with corresponding increases in the staff of nurses in both towns. Every effort was exerted by the Sunnyside Mining and Milling Co. toward immediate relief of the community and the provision of capable nursing. The additional medical help was maintained until the last vestige of influenza had disappeared.

The paragraph cited above stated that the Sunnyside Mine was closed down. Fortunately, at no time was the mine closed. Considerable attention has always been paid to the welfare of our men, and we have erected modern bunk houses, boarding houses, and an amusement hall. We are now operating with approximately 75% of our normal force, and additional men continue to come into the camp attracted by the high wages and comfortable accommodations.

M. H. KURYLA,
Manager, Sunnyside Mining and Milling Co.

Eureka, Colo., Nov. 23, 1918.

The Adoption of Standards

The series of articles "Standardization of Mining Methods," by Charles A. Mitke, which have recently been appearing in the *Journal*, brings up the question of the definition of standardization and the reason for the adoption of standard practices. Mr. Mitke made himself clear in his first article when he defines standardization and states that "there is absolutely nothing in standardization to preclude innovation." It is not intended, as was stated in an editorial, that standard practice is the "last word."

The fact that standards are advanced in mining practice or in any industry and given publicity as such is most encouraging, for by so doing the progressive

concern sets a mark for the operator who assumes indifference. He must eventually adopt changes which improve his haphazard methods or suffer the consequences, for mining, after all, is a competitive business, and costs, methods, and the manner of labor treatment cannot be unrecognized when a "standard" is set by one company. On the other hand, there is always the inducement to go the other fellow "one better."

Standardization is not a matter of guessing. The conscientious engineer does not base his estimate on one or two factors that may enter in his calculations; it is only after full consideration has been made of all the circumstances involved that his results are expressed. And so a standard should represent the results of a complete analysis and observation.

In the November issue of the *Anode*, the safety publication of the Anaconda Copper Mining Co., Robert J. Fry brings out the following in answer to the query, "Why have a standard?"

> A prescribed standard is not the only way a piece of work could be done. But it is the best way. That is why it is the standard adopted by a company for the men to use. When everyone follows it and does the work in the prescribed way, there is no friction, no interference with the labor of neighboring workmen, and there are no accidents. But when someone tries to make a "short-cut" or do it another way because it could be done that way or looks easier, he not only endangers himself but everyone around him.
>
> Is a standard a "rut"? Must a worker always do the same thing in the same way, with no chance of using his brain? That is another consideration. There are the "short-cuts" or the "other ways" that are not as good as the prescribed standard. There is no foreman, superintendent, or company that will not welcome suggestions to improve the efficiency, ease, or safety with which work may be done. Practical suggestions of this sort can well be made by the men doing the work who are in position to see many things the observer may not. Helping to improve the standard of work is worth thought and effort on the part of the workman, for whatever help or advantage it may bring to others, it most of all helps him to protect his life and limb and his capacity to serve his dependent ones.

Not infrequently we hear of some practice that has existed for a considerable period, a method that has been handed down from year to year merely because no one has taken the trouble to make a sufficient study and discover that there was any fault to be found. And this has been especially true with mining methods in general. Operators accustomed themselves to certain production costs, there was little variation, and it was assumed that the best possible results were being obtained. But the older order is changing, and it is safe to say that much of this change may be attributed to the establishment of "standards" or, rather, to the encouragement thereof. D. E. CHARLTON.

New York, Dec. 2, 1918.

A Neglected Course in Mining Schools

The letter which appeared in the Nov. 30 issue of the *Journal* under the above title touches upon an important point in technical education, but does not consider the practicability of the introduction of such courses into technical schools. During the last decade considerable pressure has been brought upon the management of technical schools, mining as well as other, to introduce practical subjects. Course after course has been added, on the theory that such courses are highly desirable and necessary. The four-year curriculum has been overloaded, and an almost impossible number of hours added. The student can render only a certain return, and the net result of making the curriculum many-sided has been to cause a general thinning out of the effort upon individual courses. Fundamental courses like chemistry, geology, mathematics, physics, and English have had to yield in part to the more highly practical work. It is an open question in the minds of many mature engineers whether this result is desirable.

There appears to be too little appreciation of the fact that thorough grounding in the broad fundamentals of basic subjects and the thorough training in habits of thought and study are in themselves of greater importance than the mere acquiring of information, whether it be of a practical nature or otherwise. Too often the so-called practical subjects are given in a manner that suggests to the observer that the instructor considers his students unable to think even in an elementary way. Certainly a student, after several years at a university, may be expected to have acquired power to work independently. Many of the less important subjects might well be left to individual initiative.

Educators also neglect to consider that many common things are acquired by mere contact with life. The student swims with the current in which the university takes its place as an important incident. A bright-minded student must inevitably acquire polish and have the rough spots worn down by experience.

Having a student divide his training between class room and laboratory and the actual work in mine and reduction plant is no new thing, for it is a well-worn statement that "practice and theory go hand in hand." If too much practical work be introduced into the curriculum, the product of our schools will be as much open to criticism as it was when theory largely dominated. There is a certain halo about practical things that loses its glitter when subjected to close analysis. We must be sure that the practical things are practical.

To turn out successful managers and superintendents in the manner described by Mr. Engineer is highly desirable. He ascribes the non-success of technical schools, in this respect, to their failure to educate students in the "intelligent use of labor." It is an open question in my mind whether the product of our engineering schools has failed in managerial positions. Have they been given sufficient opportunity? What is the percentage of failures?

Now, the understanding of humanity comes from maturity and experience. Is it not expecting too much for a recent graduate to succeed at once in a managerial position? Would we not be unduly optimistic to expect that a few courses in "the intelligent use of labor," or even a large amount of time devoted to pyschology and the "human side," would supplant maturity and experience? After all, a technical graduate must proceed through a series of subordinate positions before he reaches the point where he is qualified to be a superintendent or manager. A graduate who has been taught to think clearly and to observe closely will utilize these subordinate positions to prepare himself for higher ones. Is it the part of wisdom, then, to saddle additional requirements upon the already overloaded curricula of our technical schools? Would it not be better to select a reasonable amount from the bulk of what is considered desirable, rather than to try to half do the whole? TECHNICIAN.

New York, Dec. 1, 1918.

Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

The Situation in Chrome Ore

Recent developments indicate that no portion of the appropriation allowed for the War-Minerals Act will be expended. This became the more certain when, on Nov. 27, Secretary Lane's chromite conference practically reached the conclusion that no steps to aid the domestic chromite situation could be undertaken under the War-Minerals Act. Manganese and pyrites present cases that are parallel, in that a surplus of these minerals exists. The Attorney General has been requested to render an opinion as to the application of the act to such conditions.

Steel manufacturers failed to appear at the chromite conference. Other consumers, including chemical manufacturers, were present, however, but were not disposed to take up additional stocks of chromite. Most of the consumers have supplies sufficient for periods ranging from eight months to a year.

Means of disposing of surplus chrome ores from domestic mines and the alleviation of those who embarked upon their production as a patriotic duty were discussed. It was pointed out that the War Trade Board's restriction of chromite imports could not be extended much longer. All present recognized the objections which would be raised by Congress to a duty high enough to protect the price necessary to allow domestic producers to come out whole. Such a duty, it is stated, would increase the cost of steel by 8% over the pre-war price. The entire cost would be saddled upon the people of the United States, as imported chromite could be used in steel for export and the duty recovered through the drawback provision of the customs regulations. To avoid a possible loss of $1,000,000, the people of the country would be called upon to pay $17,000,000, according to one estimate.

There is no tendency on the part of officials to dodge the moral obligation incurred by the Government in urging the maximum production of chromite. It was pointed out at the conference that some obligation rests with consumers and producers, although due consideration had not been accorded that fact. When brought into conference with Government officials, consumers were emphatic in their declarations that their requirements would be no less than 160,000 tons. Producers were equally positive that the maximum amount of additional chromite that could be made available was 10,000 tons. Performance varied widely from the estimates. The consumers used only 97,000 tons, or 63,000 tons less than their estimate. Producers overshot their estimate by 15,000 tons, with an output of 25,000 tons.

Various means are to be tried by Government agencies to reduce losses as much as possible. Cancelling of restrictions will allow considerable quantities of chromite to go into refractories and into the tanning and automobile industries. Chemical manufacturers will be able to use increased amounts as soon as their export trade can be rehabilitated.

Producers in California are voicing vigorous protests because a company, which advertised for chrome ores at an attractive price, stopped buying when quantity production began to develop. There are also two sides to the matter, as numerous instances are said to be on record where producers failed to live up to contracts.

Shortening the Conservation List

The changed situation arising out of the signing of the armistice makes it possible for the War Trade Board to alter many of its regulations limiting the exportation of certain commodities, it was recently announced. In pursuance of this policy, the board is now revising, as rapidly as possible, its rules of conservation, and the Conservation List will be materially abbreviated. The board is now in a position to grant many export licenses which heretofore have been refused.

For some time the exportation of certain commodities must be carefully controlled, it was stated, because of the general world shortage, but, even for these, licenses will be granted as freely as possible. Exporters have been informed that it may become necessary to regulate the exportation of commodities essential to the rehabilitation of Europe, especially Siberia; and to restrict the exportation of bulky commodities because of the scarcity of shipping. Tonnage continues to be the controlling factor, and, when reconstruction is well under way, it may be necessary to ration certain raw materials.

War Trade Board To Continue

Most of the functions of the War Trade Board will be continued until normal trade can be resumed, it has been announced officially. Control over exports and imports must be exercised, it is pointed out, so that sufficient tonnage may be conserved to supply the needs of troops overseas and to bring them home. In addition, promises and moral obligations in the matter of food and materials for Europe must be carried out.

Potash Developments Reviewed

In turning over the chemical division to the Department of the Interior, the War Industries Board authorized a statement in regard to potash, that reads in part as follows:

At the direction of the President, the chemicals division of the War Industries Board has turned over to the Department of the Interior the problem of increasing the potash production of the United States. This action was taken in order that an established branch of the Government may permanently set itself to the task of emancipating the American farmer from the grip of Germany's monopoly on the world's supply of fertilizer material.

Before the signing of the armistice, the War Industries Board had already attacked the problem. Chairman Baruch had appeared before a Congressional committee in behalf of an amendment to the revenue bill which would give encouragement to private industries which would undertake the risk of establishing potash production in this country. The chemicals division, on

the other hand, in coöperation with other departments of the Government, had turned its attention to the specific task of extracting potash from waste products. A committee of experts, representing the steel and iron industry of the country and certain scientific departments of the Government, was in process of formation, under the auspices of the chemicals division, at the time hostilities ceased. Its purpose was to determine as quickly as possible the feasibility, from a commercial standpoint, of extracting potash from the fumes of blast furnaces.

The suggestion of extracting potash from blast-furnace fumes is based on the fact that potash in varying quantities is found not only in the iron ores, but in the coke and lime used in reducing the ores. In Alabama, the ores are particularly rich in potash. At present, this potash is allowed to escape during the processes of the blast furnaces. Divided into microscopic particles of dust, it is volatilized and carried off with the waste fumes.

Several methods of saving this potash have been suggested by scientists. Of these the most feasible appears to be the electric precipitation process devised by Dr. F. G. Cottrell, of the Bureau of Mines.

Another method tried out involves the spraying of the gas fumes with water and passing them through moist bags, which retain the potash. This method has been tried in extracting potash from the fumes given off in the manufacture of cement. Its first practical application took place when a cement plant near Redlands, Calif., undertook, in response to neighborhood protests, to cut down the volume of fumes emitted from its chimneys. Other cement plants have tried it, and in the East the Security Cement and Lime Co., at Hagerstown, Md., has been foremost in the recovery of potash from cement dust. Cement mixture contains potash in proportions varying from 1% to 1½%. When calcining cement clinkers, the addition of salt to the coal that is burned in the kiln renders the potash soluble in water.

At Searles Lake, California, potash in water-soluble form has been found in small quantities, and two factories have been established there to extract it. In Nebraska, it has been possible to recover potash in fair quantities from certain alkali lakes in that state. In Utah, C. H. MacDowell (director of the chemicals division of the War Industries Board) himself established a plant at which pure potash is recovered from alunite. Elsewhere experiments have been made in recovering potash from certain byproducts such as beet-root molasses and wool scourings. Other sources of supply being studied are the potash shales of Alabama and Georgia, the green sands of New Jersey, and the leucite deposits of Wyoming. There is, in fact, a considerable development now under way in the production of potash from leucite; and production likewise has been undertaken in Utah from brines contained in salt deposits west of Salt Lake City.

Unquestionably it is going to cost much more to produce potash in Germany and Alsace, says the statement. War taxes, high food costs and other fundamentals will bring this about, so that it will be a long time before European potash is brought to this country at the low cost prevailing before 1914.

Melting of Silver Dollars Continues

Silver dollars to the extent of $137,465,554 were melted by the Treasury under the Pittman Act, up to Nov. 1. The fine silver content weighed 106,192,429.466 oz. Commenting on the melting up of these dollars, the Secretary of the Treasury, in his annual report, said:

In pursuance of the authority of the Pittman Act, the Secretary of the Treasury arranged to sell to the government of Great Britain 200,000,000 fine ounces of silver for the use of the government of India. The bullion resulting from the melting of 1,000,000 silver dollars has been allocated to the Director of the Mint for subsidiary coinage. The demand for the shipment of silver to India was very urgent and far exceeded the current production of the world's mines. By making available the silver dollars lying in the Treasury a difficult situation in India was met. Against delivery of the bullion resulting from the melting of silver dollars, the British government agreed to pay for the silver at the rate of $1 per fine ounce, and, in addition, expenses and value of copper content.

The Pittman Act does not effect any change in the permanent currency structure of the country. Silver dollars are retired and replaced by Federal Reserve bank notes, and when silver dollars are in time recoined, Federal Reserve bank notes are to be retired, thus automatically restoring the original status. Such retirement is rendered possible without friction by the fact that such Federal Reserve bank notes are in all cases secured only by short-term obligations of the U. S. Government.

The Secretary's reference to gold and to platinum is as follows:

The gold monetary stock (coin and bullion used as money) in the United States on Nov. 1, 1918, is estimated to have been $3,079,800,000. The increase since Jan. 1, 1918, amounted to approximately $39,400,000; since the beginning of the European war, $1,192,500,000. The portion of the world's gold monetary stock held by the United States is estimated to be about one-third.

In January, 1918, the facilities of the New York Assay Office were placed at the disposal of the Ordnance Department and the War Industries Board for the receipt and treatment of platinum, to be used by the Government in connection with the manufacture of munitions and in other scientific operations of the War Department. The assay office at New York was designated for the purpose by the Treasury at the request of the War Department, and upon the recommendation of the Bureau of Standards, it being the one institution under the control of the Government where the difficult work of refining platinum metals could be successfully undertaken.

Although the force and the facilities of the New York Assay Office were severely taxed by the extraordinary increase of its regular operations on gold and silver since the outbreak of the war, the work of handling the platinum business of the Government was readily assumed.

Wide publicity was given to the needs of the Government for platinum to be used for war purposes, in response to which approximately 2500 deposits were received during the current calendar year. The gross weight of the deposits approached 55,000 troy ounces, which carried an estimated value of $4,200,000.

The deposits were received in various forms—from Russian and Colombian grains to jewelry and laboratory scrap. They were received from every conceivable source and through various agencies, such as Red Cross societies and national banks.

The metal has been prepared by the New York Assay Office in the form of platinum chloride, sponge, bars, gauze, and wire.

Steel Allocation Stopped

Allocation of steel by the War Industries Board ceased Nov. 30. In future, the Government departments and the Allies will deal directly with the trade. Maximum prices fixed for steel will not be extended beyond Dec. 31, it has been announced, unless the manufacturers should request it. It is regarded as probable that prices on no commodity will be extended beyond the period for which the price was established, unless the industry itself should request such action.

The Federal Trade Commission has instituted an investigation of the cost of production of manganese ore.

January 1 has been set as the date to wind up the affairs of the War Industries Board. It is possible that some of its activities will be continued a month longer, but Feb. 1 is named as the date on which all activities assuredly will terminate.

The ban on the exports of nickel, aluminum, and bonded lead has been lifted by the non-ferrous metal section of the War Industries Board. Action also has been taken which releases nickel and aluminum for domestic uses, which, under the stress of war, were considered less essential.

Washington officials are much pleased that the Engineering Council is to be represented in that city by a commissioner. Many of those connected with Government engineering services are of the opinion that the work should be coördinated. It is understood that this is one of the matters which the resident commissioner of the Engineering Council will strive to bring about.

November Mining Dividends

Dividends disbursed in November, 1918, by 18 United States mining and metallurgical companies making public reports amounted to $9,301,339, as compared with $9,697,493 paid by 27 companies in November, 1917. Canadian and Mexican companies paid $1,785,514, as compared with $1,509,226 in November, 1917. Dividends by holding companies amounted to $170,000 in November, 1918, none having been reported for the corresponding month last year. New Cornelia paid its initial dividend of 25c. a share.

United States Mining and Metallurgical Companies	Situation	Per Share	Total
Am. Zinc, Lead & Sm., pfd	U. S.	$1.50	$120,810
Anaconda, c.s.z	Mont.	2.00	4,662,500
Barnes King, c.g	Mont.	.10	40,000
Caledonia, l.s	Ida.	.03	78,150
Chief Cons., l.s	Utah	.12½	110,528
Cresson Cons., g	Colo.	.10	122,000
Golden Cycle, g	Colo.	.03	45,000
Homestake, g	S. D.	.50	125,580
Internat. Nickel, pfd	U. S.-Can.	1.50	133,689
Iron Cap, c	Ariz.	.25	36,203
Miami, c	Ariz.	1.00	747,114
Mohawk, c	Mich.	2.00	200,000
Nevada Wonder, g.s	Nev.	.10	140,840
New Cornelia, c	Ariz.	.25	351,225
New Jersey Zinc	U. S.	4.00	1,400,000
United Eastern, g	Ariz.	.05	68,150
United Verde Ex., c	Ariz.	.75	787,500
Utah Apex, c	Utah	.25	132,050
Canadian and Mexican Companies			
Amparo, g.s	Mex.	.04	80,000
Asbestos Corpn., pfd	Que.	1.25	50,000
Coniagas, s	Ont.	.25	200,000
Granby Cons., c	B. C.	2.50	375,000
Greene Cananea, c	Mex.	2.00	1,000,000
McIntyre Porcupine	Ont.	.05	180,514
Holding Companies			
St. Mary's Min. Land, c	Mich.	1.00	160,000
White Knob Cop., pfd	Calif.	.05	10,000

The totals for the first eleven months of the year are as follows: Mining and metallurgical companies, $144,458,531; holding companies, $1,898,438; Canadian, Mexican, Central American and South American mines, $21,404,254.

Recognition of Technical Engineers

The following letter was recently sent to the Director General of Railroads:

Hon. William G. McAdoo, November 20, 1918.
Director General of Railroads,
Washington, D. C.

SIR:

Your connection with the construction and management of railroads in years gone by, as well as your present directorship, have unquestionably made you familiar with the essential functions in the construction, maintenance, development, operation and management of railroad systems performed by the professional civil, mechanical, and electrical engineers of various ranks and their technical assistants. Such knowledge must be possessed, also, at least in a general way, by your present staff. Nevertheless, a number of engineers have brought to the attention of Engineering Council the fact that, upon scanning the schedules in "Wages of Railroad Employees" and supplements thereto, no mention is found of the men performing engineering services under the Director General of Railroads. This numerically small but functionally most important group of employees is ignored; they fall under "not otherwise provided for."

There may be reasons of which Engineering Council is not informed; but it seems more likely that the failure to accord to the technical engineers suitable classification is due to accident, or even to the oversight which too often is the reward for quiet industrious modesty, in competing with insistent organized demands.

Specifically it is requested that all technical engineers be given suitable separate classification, with rates of compensation in accord with their duties and the expense to which they have been put for their education and their training in preparation for their present duties and responsibilities. In many cases these technical men are now receiving less pay then men whom they direct, for whom they are responsible, and upon whom there are made no such demands for personal qualifications, expensive education, and previous training.

Without disparagement to any other class of railroad servants, and for the good of the service, Engineering Council, representing the great national engineering societies, having 35,000 members in all branches of the profession, asks early action upon the classification and compensation of civil, mechanical, and electrical engineers and their technical assistants in the staffs of the railroads. Engineering Council feels assured that, having thus been brought to your attention, the matter will be properly adjusted.

Respectfully,
ALFRED D. FLINN,
Secretary, Engineering Council.

Engineering Council and the White House

The following correspondence will be of interest to engineers:

The President, November 15, 1918.
The White House,
Washington, D. C.

SIR:

I am advised that you have under consideration the appointment of a Reconstruction Commission to develop a comprehensive program for the nation's conversion from a war to a peace basis.

As chairman of Engineering Council, I respectfully ask that you consider the appointment of at least one engineer upon this commission, basing my recommendation upon the fact that all construction and practically all manufacturing is under the management of engineers.

Engineering Council is an organization of national technical societies of America, created 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. It represents the four great national engineering societies, comprising over 35,000 members, including practically all the prominent engineers of the country.

It may be pertinent to add that the personnel of Engineering Council, consisting of 24 members, is without exception men who occupy prominent positions as administrators of engineering problems or undertakings.

Respectfully submitted,
(Signed) J. PARKE CHANNING,
Chairman.

The White House, November 20, 1918.
Washington.

MY DEAR MR. CHANNING:

I have your letter of November 15th, which Mr. Rickard has been kind enough to hand me. You may rest assured that I realize what a service engineers can render in reconstruction problems from time to time. We are handling reconstruction questions just now by a process of consultation between existing instrumentalities, which I hope will prove useful and effective.

Cordially and sincerely yours,
(Signed) WOODROW WILSON.

Mr. J. Parke Channing,
Engineering Council,
29 West 39th St., New York.

Engineering Societies Employment Bureau

Chairman Channing of the Engineering Council recently presented a report of an informal and unofficial conference held at his invitation Nov. 20, at which he presided, attended by the four Founder Secretaries, representatives of committees on employment, American Engineering Service and the Secretary of Engineering Council.

There was a free and general discussion. All agreed that some form of employment activity was necessary and should be conducted by the societies represented. Important reasons were given for the establishment of a central bureau where greater possibilities for proper publicity, through advertising and other means, and greater independence in suggesting names of engineers for engagements, would be feasible. It was agreed that the activities of societies represented in

Engineering Council could be combined to advantage and conducted by the Council, although each society might still find it desirable to do more or less in the employment line for its own members.

It was agreed that the proposed employment activities could best be inaugurated and directed by the four Founder Secretaries, acting as a Board of Managers, reporting to Engineering Council. It was also the consensus of opinion that the activities should not be confined to members of the four Founder Societies, and that no distinction should be made between members and non-members. Charges for services were discussed, and it was concluded to leave this matter for later determination. It was pointed out that if regular fees were charged, incorporation under state laws would become necessary and a bond would have to be furnished. It was determined that the work be started on the basis of no charge. All agreed emphatically that the work should be started immediately.

It was the sense of the meeting that Engineering Council should establish at once an Engineering Societies Employment Bureau, of which the four Founder Secretaries should be appointed the Board of Managers, with Walter V. Brown as secretary in immediate charge; that letterheads and other printed matter required should bear the names of the supporting societies, and that suitable appropriation should be made by Engineering Council for beginning this work. On the question of constituting the four secretaries a Board of Managers, the secretaries, at their own request, refrained from voting. It was the consensus of opinion that the war work of American Engineering Service, having come practically to an end, the committee should be abolished at an early date. It was the sense of the meeting that Mr. Brown, as secretary of the proposed Engineering Societies Employment Bureau, should communicate at once by letter with all engineering societies in the country, also with managers, chief engineers, and other officials of corporations and governmental bodies employing engineers, and that such communications should thereafter be repeated periodically. Suitable and wide publicity should also be given to the services which Engineering Societies Employment Bureau would be prepared to perform for engineers and employers and clients of engineers.

It was decided that there should be established at once, and maintained, lists of engineers desiring employment or change of employment, together with such information about each individual as would be necessary for the purpose.

Engineering Societies Employment Bureau is especially necessary in this period of readjustment, or reconstruction, upon which the country is just entering. One of its most important functions will be to aid engineers who have been in military service to find suitable engagements upon their return to civilian life. It has already been announced in the newspapers that the Industrial Relations Branch of the Chemical Warfare Service at 7th and B Streets, N. W., Washington, D. C., has undertaken such services for chemists who have been in war work, the office mentioned being under the direction of Major Allen Rogers. To aid this activity, information has been gathered by the American Chemical Society through questionnaires sent out by Major F. E. Breithut, of the Chemical Warfare Service.

Comfort Fund Crosses $19,000 Mark

Nineteen thousand and still moving up. The final boost needed to push the Comfort Fund for the 27th Engineers to the new high level was given by some of the Backus & Johnston men at Morococha, Peru. "A few of the boys working here at an altitude of 15,000 ft., who like a smoke, contributed a few dollars to buy smokes for the boys over there," runs the message accompanying the gift. The contribution was made after the armistice was signed, showing that the donors properly realized that the men would need such comforts for some time to come.

Nineteen thousand received, but most of it spent. Friends should bear that in mind. The total contributed is a little over $11 for each man in the regiment throughout an entire year. When translated into smoke and other comforts, it appears exceedingly modest.

HOW THE COMFORT FUND STANDS

Previously acknowledged	$18,492.77
C. M. Eye	10.00
C. A. Burdick	5.00
Mining and Metals Section, National Safety Council	125.00
John Herman	10.00
Lane Pearl	5.00
W. L. Gibson	5.00
C. M. Fenton	10.00
Charles Le Vasseur, monthly	5.00
B. N. Jackson	10.00
H. A. Johann	10.00
Mrs. A. B. Emery, Messina, Transvaal	10.50
A. C. Stoddard	5.00
Robert E. Tally	25.00
Nelson P. Hulst	20.00
Lawrence Addicks	20.00
R. R. Boyd	25.00
E. R. Varela	5.00
W. J. Olcott	25.00
J. E. Clennell	10.00
C. M. Eye (monthly)	10.00
A. H. Hoffman	10.00
Francis Drake	25.00
Employees of Sociedad Minera Backus y Johnston del Perú	176.29
Total	$19,054.56

Make your checks payable to W. R. Ingalls, treasurer of the Association of the 27th Engineers.

Lake Superior Iron-Ore Shipments

The Lake shipping season for the Michigan and Minnesota iron ranges is complete for the year, and supplies at the consuming points are said to be sufficient to meet the furnace demands during the winter. According to *Iron Trade Review*, November shipments are between 4,500,000 and 5,000,000 tons, so that the total Lake shipments for 1918 will be about 61,500,000 tons, a decrease of 1,000,000 from last season.

Demand for ore tonnage has been less acute since the signing of the armistice. Some consumers have not been as insistent for Lake tonnage as was indicated at the opening of the month, so that the November total will not represent the maximum capacity of the Lake fleet. Grain shipments have been heavy.

The meeting to be held Dec. 11 at Washington, at which time the ore producers will present costs and average selling prices to the American Iron and Steel Institute and the War Industries Board to consider the question of Government price regulation for the first quarter of 1919, will have little effect on the ore trade. No ore is shipped by Lake from the Lake Superior district during the first quarter, so that price adjustments for that period have little meaning. Whether 1919 ore is sold in a controlled or an open market, a late buying movement is expected. This belief is based on the assumption that consumers will prefer to wait until industrial conditions can be more clearly analyzed.

Editorials

Price-Fixing

THE American Economic Association has a committee to consider the subject of price-fixing, Prof. T. N. Carver, of Harvard, being its chairman. This committee is confining itself to the general economic principles that are involved. In this connection Professor Carver has issued the following statement:

Certain sinister interests are now actively propagating medieval economic ideas in this country. Imported lecturers are spreading these ideas, magazines are publishing them, organizations dominated largely by men from backward countries are adopting them as parts of their platform, and, in some cases at least, Government officials with their ear to what they suppose to be the ground are espousing them.

For centuries before 1776, medieval governments were trying to fix prices. Much of the economic discussion among the pre-Adamites, the precursors of Adam Smith, was concerned with the question of *justum pretium*, or just price. What is a just price and how can it be determined? was a great economic problem of those times when governments were bossing everybody in all the affairs of life. The great liberal movement of the latter part of the eighteenth century and the early nineteenth century swept all these subtleties away and began to trust the people to arrange these matters for themselves in the free atmosphere of the open market. This liberating of enterprise and industry from the hampering influence of gangs of office-holders, anxious to enlarge their authority, was followed by the greatest burst of prosperity that the world has ever known. In cases of government-fostered monopoly, some kind of price- or rate-fixing is still necessary. It may be necessary in war time to extend the authority of office-holders still further. But there is now an illiberal movement in all the liberal countries to make this extension of the authority of the office-holder permanent.

The committee appointed by the American Economic Association adopted with practical unanimity a series of resolutions that are economically sound and are in the main adverse to the theory of price-fixing, but we do not think they go far enough; indeed, we think that they have overlooked some fundamental principles, which we have repeatedly discussed and may express as follows:

1. A fixed price, either in time of peace or war, may be maintained in a market monopolized either by a buyer or seller, or both, without great danger if intelligently adjusted from time to time to conform to conditions of supply and demand; but the fixing of a price by a buying monopoly is more dangerous than by a selling monopoly. The fixing of a price between a buying and a selling monopoly becomes simply a matter of mutual agreement. [Examples of these several conditions are to be found in aluminum and nickel, in peace as well as war; in wheat; and in tin.]

2. In an unmonopolized market, the fixing of a restrictive maximum price and the maintenance of the market price at that figure signify that there is not enough of the commodity, and demand must be rationed. [From the date of the fixing of the price for copper in the United States, in September, 1917, there was no day when any seller would sell any copper for less than the fixed price, for the reason that at no time could all the demand be filled. On the other hand, the fixing of a maximum price for high-grade zinc was effective only so long as the supply of it was limited. The arbitrary liberalizing of the specifications for this class of metal increased the supply overnight, and the market price immediately receded below the fixed maximum.]

3. The maintenance of a restrictive maximum price above the natural market price, with a view to preventing an excessive advance, is a deterrent of expansion in producing capacity, that may be highly dangerous. [The idea of the restrictive maximum price under these conditions is to prevent what in trade parlance is called a "runaway market." Now, such a condition is usually produced by reckless buying of frightened consumers, who usually overbuy, and the natural correction is very swift. But rarely there is an unusual and maintained advance based upon some extraordinarily powerful condition, as there was in zinc in 1915. This was based on deficient smelting capacity, and so stimulated the building of new works that we doubled the zinc production of the United States in a little more than a year—a stupendous and effective feat that would have been impossible with a restrictive maximum price within the limit that anybody could have conceived.]

4. The fixing of maximum prices under conditions when they will be effective owing to inadequate supply (see Art. 2) does not take cognizance of the organization of modern wholesale trade upon a contract basis, rather than a spot basis, and therefore causes disturbances and injustices at the times of institution and discontinuance, and at the times of changes in the meanwhile. [Serious troubles in copper have been experienced on this account.]

The consideration that the price-fixing of commodities directly required by the people, such as fuel and foodstuffs, may be defended on the ground of preventing social unrest, with the consequence of having to ration the people. (This is Mr. Hoover's position.) In this connection it may be remarked that the effects of price-fixing in the United States were masked by the wonderful exhibition of the crusading spirit by our people; while, on the other hand, price-fixing in Great Britain was largely that of a national buying monopoly, which purchased goods abroad and distributed them among the people at fixed prices, often at a loss, the taxpayers paying the difference as part of the war expense.

Surplus Supplies at High Cost

WITH the conditions, artificial and necessary, existing in warfare and industry, it was inevitable that some people should be caught with surplus supplies upon the termination of the war. Statements published last week of immense quantities of clothing, blankets, etc., in the hands of our War Department exhibited the general state of affairs to be found in governmental warehouses, and in the case of governments such an accumulation was precautionary and unavoidable. A similar or analogous position was to be expected with many branches of private business that were supplying

the governments. The sudden advent of the armistice prevented any general anticipatory curtailment of production and reduction of stocks. There was bound, therefore, to be serious losses incurred by persons caught long of the market, carrying supplies at high cost that immediately became unsalable, or erecting plants for new production that would have no opportunity to produce and return the money risked in them.

Among the major metals, fortunately, the houses were fairly clean. The copper producers had no stock of refined though they held a good deal of blister. However, they profited on their stocks when the market rose in 1915, and they will neither excite nor expect any great sympathy if they lose on them in 1919. The lead producers were in a similar position. The zinc producers had some accumulation, but they had been carrying it and trying to get rid of it for a year. The tin producers were bare, but tin consumers were long through reckless overbuying earlier in the year. The tin merchants generally got out of the market, on general principles, last spring, when the price was highest.

In some of the ores and minor metals, on the other hand, the situation is quite different. In tungsten everybody—producers, importers, smelters, and manufacturers—appears to be over-stocked. At a meeting held by representatives of these interests last week they drew very long faces. Similarly do the producers of chrome ore and manganese ore feel aggrieved. Some of these people are imploring governmental relief, hoping to get it under the mischievous War-Minerals Bill that was signed on Oct. 5, 1918. The purpose of that bill was to stimulate the production of some of these minerals that were supposed to be in scant supply. As things turned out, no artificial stimulus was necessary. It is claimed, however, that Government officials made promises that led people into making investments for production on which they have lost, or are going to lose, money, and therefore ought to be indemnified.

Let us examine how much merit there is in this contention. The War-Minerals Bill was the baby, born in 1917, fathered by some well-meaning but rather hysterical gentlemen in the Department of the Interior. They secured the presidential endorsement, making it an Administration measure, and thereby disarmed friendly, experienced criticism to a large extent. They said, "We have got to have such legislation in order to win the war." Their critics therefore could only say, "We think you are mistaken, but the Administration is responsible for the conduct of the war, and if it must have this legislation, so be it"; and their efforts were therefore confined to framing the bill in the least harmful way. In the prolonged hearings on the bill in Congress it was said emphatically by numerous advisers that the high prices for chrome ore, manganese ore, etc., would be such a natural stimulus of production that there would soon cease to be any shortage of them, and that opinion was expressed repeatedly in this paper, in which there was extensive discussion of the subject. We deprecated severely the legislation from the beginning.

Now, as far back as last summer the markets for these minerals began to exhibit an easier tone. Long before the bill was passed it was clear that there was no particular need for it except to give authority to the Government to spend more of the people's money. The bill was signed and became a law on Oct. 5. Within 10 days thereafter the War Industries Board issued notices that the supplies of manganese ore, chrome ore, and pyrites had become so ample that people were advised not to enter upon further investments for their production. Considerably before that the situations in the respective markets had become so easy that no one of any market-sense could have been under any illusion.

If, therefore, any officials in the bureaus made promises or held out hopes of assistance to producers or adventurers, not only did they go counter to competent advice but also they did what they had no authority to do. For they did not even know that a law would be enacted, or, if so, what it would be. The House had passed a bill. The Senate had struck out everything after the enacting clause and written in a totally different bill. The two bodies had to go into conference over the matter, and it was near the end of September before it was settled.

It is true that high officials of the Government asked certain concerns to enter upon plans for producing some substances, giving no guarantees and making no promises, but appealing only to their patriotism. Some of these concerns were so induced to expend large sums of money for which they have had no return, and they will neither get nor expect any. They took a business chance of making large profits, influenced more or less by the spirit of patriotism, and, having lost, say nothing about it. The U. S. Steel Corporation took exactly the same chance, uninfluenced by any motives of patriotism, when it built the great Donora zinc smeltery in 1915-16. Other adventurers who built zinc works later lost more or less of their principal when the market declined. There has been nothing unusual in taking such commercial risks during the last four years. But if the unnecessary and belated War-Minerals Bill were made the vehicle of reimbursement for anybody, the people would be right in protesting against such misuse of their money. At the conference in Secretary Lane's office, Nov. 27, no assurances were given, but it was said that the opinion of the Attorney General would be obtained respecting the legality of using the appropriation carried by the War-Minerals Bill as a sort of indemnity fund.

Dodging the Issue

THE whole subject of readjustment reverts fundamentally to the question of wages. During the war wages rose to weird figures. It was all like an adventure in Wonderland. These fancy wages were not earned, that is, not in the economic sense. They were met out of taxpayers' money—the taxpayers patriotically gave it up and cheerfully saw it wasted for the sake of the great cause.

Now, the wage earners are demanding that the preposterous rates be maintained. The Administration is saying that wages must not come down until the cost of living has been reduced. This is merely dodging the issue, and does not get anywhere.

The cost of living cannot come down until the cost of labor has come down, for it is the high cost of labor

that makes the high cost of living. Real readjustment cannot be started until this is recognized, for the people are unable to buy goods for peaceful purposes at war prices, which represent stupendous wastes.

Washington probably knows this as well as anybody, but apparently has visions of effecting an easy readjustment, which means the bringing about of a gradual recession of prices for everything in about the same ratio, so that nobody will suffer from irregularities. This is impossible of realization.

The simple and honest policy for Washington would be to look facts squarely in the face and tell the truth to the people. The primary problem is to discontinue the manufacture of ammunition and get the working men and women away from the powder mills, cartridge factories, etc. Let Felix Frankfurter and his colleagues cease uttering meaningless generalities and send their emissaries to the munition plants with some plain talk like this: Men and women, the Government is going to stop this work mighty quick, and you ought to find other jobs as soon as you can. Go back to the farms. Go back to domestic service. Go back to the trades in your home cities. Workers are needed for such purposes right now. Get what jobs you can, and do not expect to get as much as you have been earning lately, for there is nothing now that can pay it.

This is the inevitable, economic beginning of the readjustment. The more it is postponed the harder will conditions be. The dilatoriness of the politicians is simply creating a fester. The maintenance of superfluous production even in the case of the basic commodities is going to develop more troublesome conditions later, although the commodities themselves will eventually be needed. If nature were allowed to take its course there would be some suspensions of operations, and consequent idleness of men, now. If high-cost stocks of goods are piled up, there will be more extensive closings when the day of reckoning comes. They will be because market prices will not leave any margin for anybody, neither capitalist nor laborer. Wages can't be drawn out of wage fund that does not exist.

Stop the Waste

WITH the war ended nearly four weeks ago, the United States Government continues to squander material on making munitions and other war supplies, to squander coal in providing power for such mills and factories, to squander labor, to squander the taxpayers' money.

Was there ever such industrial and financial waste? Was there ever such economic madness? It would be cheaper by far, correctly says the *Sun*, to pay for every unfilled contract and stop at once every wheel of the war machinery. For our labor and for our natural wealth, now both being criminally wasted in prodigious quantity, it would be sounder and better to take care of the labor as well during its movement from the useless, worthless war work, to useful, essential peace work.

It does not even help producers to have this dump for their goods, least of all the producers of basic commodities like the metals. They should be indemnified promptly for losses on cancelled contracts into which they entered with good faith, incurring expense, but with such indemnification it will be better for them to carry the stocks than let the Government do so. The accumulation of metals by the Government, for example, will be an incubus upon the markets, a threat, that will weigh upon them until a disposition of the accumulations is made.

When the Boys Come Home

OF COURSE lawbreakers should not be applauded, and far be it from us to intimate approval of lawlessness. Yet we cannot escape seeing something humorous and encouraging in the recently exhibited attitude of the soldiers here toward the disingenuous socialists. While the kindly socialists of Russia and Middle Europe are having things their own way, the gentle socialists of New York, when they desire to get together to meditate and converse upon plans of robbery and rapine, find it necessary to appeal for police protection lest the soldiers "treat 'em rough." If Trotzky, in his present murderous surroundings, could have seen the line of policemen and provost-guards sweating to stave off the infuriated soldiers who were seeking to tear off the red neckties and badges and otherwise manhandle his erstwhile colleagues and present well-wishers, he would have congratulated himself upon getting out of New York while the going was good. And we should imagine that Bill Haywood might feel the cockles of his heart warming up in the happy thought that he is safely in jail. We begin to get a line on what the boys will think when they come home.

BY THE WAY

There is nothing new, not even welfare and safety work. In 1683, the inside of assay balance cases was painted green, because, as Sir John Pettus wrote, "the fire is hurtful to the eyes, and by this colour they are again quickened and refreshed."

Litigation is probable at Bisbee, Ariz., in the Federal court over a plan to organize a mining company with the name of Charlie Chaplin, the movie star. The ground to be operated by the proposed company is near the White-Tail Deer property of the Copper Queen. The suggested naming will be opposed before the State Corporation Commission by part owners of the property, resident in Montana.

John Hays Hammond, in a letter to New York *Times*, asks: "Would it not greatly facilitate an equitable settlement of the political and economic issues to be considered at the peace conference if the Allies should stipulate that, before the conference met, there should be created a tribunal to sit as a criminal court for the trial of those responsible for the unspeakable atrocities committed during the war by Germany and her allies?"

More camouflage. New York headlines recently announced an "$80,000 Clean-up, or $500 a Ton." This was not to lure investors into buying the newly popular gold stocks, but simply to inform the public that the 155 tons of waste paper dumped by way of confetti

from office windows during the first peace celebration had cost $80,000 to remove. Here is an item that H. P. Gillette should put down in the next edition of "Cost Data." The cost of removing a two- or three-inch deposit from a large and irregular area might be useful to some.

Our Vancouver contemporary has swallowed "'Wilsonium" hook, line and sinker, along with that rare gas "vivious." But why did the discoverer of this new element pick on the President in naming it? It is so obviously a jest that another name would have been more patriotic and proper. Why not "creelium," seeing that publicity was the chief end sought? "Creelium and vivious" sound every bit as good as "wilsonium and helium," and the matter is one of sound more than of chemistry.

A tablet in honor of the employees of the Granby Mining and Smelting Co. who entered the service is to be placed in the company's office at Vancouver. The memorial stands over four feet high and is of Corinthian design in fumed oak. A scroll at the top displays in colors, with the Maple Leaf, the Union Jack, Canadian Ensign and Old Glory entwined. In the center are depicted the Canadian regimental flags lying on General Wolfe's tomb in Westminster Abbey while the men are fighting in France. Below this is a glass cabinet containing the honor roll, a Morocco-bound book divided into six sections representing the company's plants at Anyox, Alaska, Cassidy, Grand Forks, and Phœnix, and the Vancouver office. Over 400 employees served under the colors.

"It must not be supposed from the general character of the population that Virginia City was altogether destitute of men skilled in scientific pursuits," wrote J. Ross Browne in 1861 of his trip thither. "There were few, indeed, who did not profess to know something of geology; and as for assayers and assay offices, they were almost as numerous as barkeepers and grogeries. A tent, a furnace, half a dozen crucibles, a bottle of acid, and a hammer generally comprised the entire establishment; but it is worthy of remark that the assays were always satisfactory. Silver, or indications of silver, were sure to be found in every specimen. I am confident that some of these learned gentlemen in the assay business could have detected the precious metals in an Irish potato or a round of cheese for a reasonable consideration."

"Times 'as changed, m'son; times 'as changed," quoth Cap'n Dick. "Wy, dam-me, used to be as 'ow tha 'ol bloody crew at tha mine wuz 'appy, well content an' satisfied, an ussen didn't 'ave to 'alf try to keep things gawin'. But this 'ere prosprus business—wy, dam-me, man never naws wheer she's gawin' to stop. Las' bloody time these 'ere wobblies called strike, dost thee think any o' my men were in on un? No, m'son. Never a bloody one, and tha bal kep' gawin' jus' like one o' these 'ere jack'ammer drills. But this mornin', I tell'e I 'ad a scare. I wuz in tha h'office, pilin' in tha diggin' clos,' w'en all o' a sudden I 'ears gert growl h'outside. Dam-me, thinks I, wot's gawin' on. An h'out I gaws. 'Ere wuz 'alf tha 'ol bloody mine standin' raound an geekin', firs' to one then to h'other. 'Wot's trouble?' sez I, an up spoke Jan Trembath. 'Cap't,' sez 'e, 'we 'ave complaint to make.' 'Let's 'ave un,' sez I. 'We naws, Cap'n,' sez 'e, 'that thee's always on lookh'out for h'our comfort an welfare, but, in this 'ere h'instance, thee 'ast fallen daown 'orribly. 'Ere we are drivin' h'our bloody h'outomobiles to tha mine, jus' to work for thee, an' dam-me, when she rains we've got naw place to putten but h'out in tha wet. Bloody near time we 'ad some sort o' shanty 'ere, isn't un?' So, dam-me, m'son, we'se buildin' one o' these 'ere gayrages for tha boys. Wot's think on un?"

Owners of polonium and niobium mines, or, better still, prospects, should get in touch with the lawyer who wrote the following to a firm in Houghton, Mich.:

Can you get for me for sale any good zinc or zinc sulphide mines or prospects anywhere? I have buyers. You know what Mark Twain once said of mines. "A hole in the ground surrounded by fools." I can't sell a poor property, and if I try, it will only hurt us both.

Here is a list of mines I want: Cobalt, tungsten, fluorspar, cadmium, platinum, magnesia, chrome iron, magnetic iron, antimony, silica, quicksilver, kieselguhr, potash, alum, iron pyrites, sulphur, nickel, lime, gypsum, copper pyrites, radium-bearing ores, asbestos, pumice, glass sand, mica, graphite, cinnabar, talc, kaolin, plaster, magnesite, bismuth, soapstone, vanadium, niter, onyx, hematite, molybdenum, cement, feldspar, arsenic, zinc sulphide, zinc, chalcedony, corundum, emery, umber, ocher, lead, lead vanadate, iron, copper, garnet, molybdenite, wulfenite, pitchblende, uraninite, barium, columbite, or niobium, polonium, palladium, molybdenite, strontium, selenium, uranium, tin, sienna, thallium, crooksite, pyrrhotite, ferberite, emerald, opal, beryl, etc.

This list is given for business and not for show.

Don't forget good zinc, zinc sulphide, and iron pyrites mines or prospects; prospects preferred because mines are usually sold because they don't pay, else some inherent defect or other reason is given for selling.

"I think this lawyer," says a member of the firm, "instead of swallowing Blackstone got a dose of Dana's Mineralogy by mistake."

The romance of the Yukon was never better illustrated than in the career of William Scouse, who was lost en route from Alaska when the "Princess Sophia" sank on Oct. 25 last, with all on board. Scouse was a real "sourdough" and was the one to raise the first bucket of "pay" on the famous Eldorado Creek. It was in February, 1896, that with William Sloan, Jack Wilkinson, and Thomas Flack, all of Nanaimo, B. C., he set out for the Northland, to see its wonders, as well as to prospect the country, about which little was known at the time. Outfitting at Juneau, the party crossed the Chilkoot Pass into the Stewart River country, where they prospected for most of the summer without success. Running short of supplies, they decided to work into the Yukon, where rich deposits had just been discovered on Bonanza Creek. When they reached this creek, all the ground had been staked, and they turned aside to Whipple Creek, later to be known as the Eldorado. On Sept. 7, 1896, Scouse staked No. 14 Eldorado and other claims were located by the rest. Before these had been proved, the partnership was "stony broke," as Sloan expressed it, and the day the first gold was hoisted saw them step to a condition of comparative affluence. When the four Nanaimo men separated after their success, they agreed to meet again on the 25th anniversary of the Eldorado strike, all being alive, however far they might have to travel, to celebrate the days of their pioneering. Scouse's death makes the first break in the partnership.

Personals

Have You Contributed to the Association of the 27th Engineers?

E. A. Julian, of Goldfield, Nev., recently visited the Ash Peak mine, west of Duncan, Arizona.

Dr. H. B. Patton has recently completed oil investigations in Arizona, west of Phoenix.

J. K. Turner has gone to Oatman, Ariz., to inspect the property of the Oatman United Mines Co., for which he is consulting engineer.

Ray L. Dimmick has been examining the Catherine gold mine at Pyramid, Mohave Co., Ariz., for the Arizona Pyramid Mines Company.

Prof. J. C. Gwillim, Queen's University, Kingston, Ont., has been granted leave of absence for a year, which he will spend in Western Canada.

Charles A. Randall has recently been appointed manager of the Dome Lake Mining and Milling Co., Ltd., the former manager, **A. H. Brown,** having resigned.

Whitman Symmes, manager of the North-end Comstock mines at Virginia City, Nev., has been elected president of the several companies under his management.

Capt. Henry Smeddle, of the 15th Battalion, B. E. F., has been awarded the Military Cross and has been promoted to second in command of the 25th Battalion.

C. T. Orr, of Webb City, Mo., president of the American Zinc Institute, and **H. I. Young,** of Carthage, also an official of the Institute, have just recovered from influenza.

S. Ford Eaton, superintendent of the Guomoco Mining Co. of Colombia, is spending his vacation in New York. He will stay at the Rocky Mountain Club until Jan. 1.

George F. Kunz has been appointed representative of the American Institute of Mining Engineers, on the Engineering Council, succeeding **Benjamin B. Lawrence,** resigned.

E. B. Thornhill has resigned as manager of the New York office of the General Engineering Co., to become research engineer with the Chino Copper Co., Hurley, New Mexico.

L. R. Robbins, mining engineer and geologist for the Tonopah Belmont Development Co., Tonopah, Nev., has been promoted to be mine superintendent of the company's Tonopah property.

Chester A. Fulton has closed his office in Havana, Cuba, to become superintendent of the Carlota mine of the Davison Sulphur and Phosphate Co., near Cumanayagua, Province of Santa Clara.

J. R. Bartlett, foreman of the Lexington mine of the Anaconda Copper Mining Co., has been appointed foreman of the Tramway mine, to fill the vacancy caused by the promotion of **E. M. Norris.**

G. H. Dudley, formerly at the Morenci branch, Phelps Dodge Corporation, has returned to Arizona from the Organ district, New Mexico, and will operate a leased mining property near Metcalf.

Lieut. Col. Joseph Hyde Pratt is commanding officer of the 105th Engineers. This is the engineer regiment of the 30th Division, which was fighting with the British when hostilities ceased.

J. W. Powell, vice-president of the Bethlehem Steel Corporation, was elected vice-president of the National Society of Naval Architects and Marine Engineers at an annual meeting held in Philadelphia.

Dr. James L. McKee, formerly chief chemist for the British Explosives Co., whose plant at Trenton, Ont., was recently destroyed by fire, has received an appointment at Queen's University, Kingston, Ontario.

W. B. Plank, mining engineer with the U. S. Bureau of Mines, has arrived in Birmingham, Ala., to take charge of the Bureau's work in that state. He will have headquarters at the station at West End, Birmingham.

J. C. McNabb has resigned as testing and metallurgical engineer for the Consolidated Arizona Smelting Co., Humboldt, Ariz., to become assistant smeltery superintendent with the Missouri Cobalt Co., Fredericktown, Missouri.

Col. William B. Thompson has resigned as president of the Inspiration Consolidated Copper Co., and is succeeded by **C. F. Kelley. John D. Ryan,** who resigned from the board to become associated with the Government, was elected a director.

Edward P. Scallon has resigned as superintendent of the United Verde Extension Mining Co., Jerome, Ariz., to become general superintendent of mines of the Quinn interests, operating on the Cuyuna and Mesabi iron ranges of Minnesota.

Edgar Rickard is acting food administrator of the United States and is in full charge of food affairs, **Herbert C. Hoover** having retired, although the title of the position continues with him. Mr. Hoover is in Paris, directing the food distribution of the world.

Richard Kingdon has returned to Jerome, Ariz., where he will resume his duties as superintendent of the United Verde Extension Mining Co. He left there nearly a year ago, and has spent several months at a tungsten mine in Sonora, Mexico, of which he is part owner.

N. H. Emmons has resigned his position with the Air Nitrates Corporation. He has established himself in Lynchburg, Va., as consulting engineer in mining and other work in connection with metallurgical and chemical processes in that section. Temporarily, his address will be 309 Madison St., Lynchburg, Virginia.

A. H. Howe, of Goldfield, Nevada, for many years secretary of Goldfield Consolidated Mines Co. and vice-president and a director of the banking firm of John S. Cook & Co., of Goldfield, has severed his official connections with all Wingfield interests, and will devote his attention chiefly to operation of the Wall Street Copper Co., Luning, Nevada.

Frank P. Botsford, general superintendent in the Eastern district for Pickands, Mather & Co., at Gilbert, Minn., on the Mesabi Range, has been transferred to the Western district, with headquarters at the Bennett mine, Keewatin. **L. C. David,** his assistant, is general superintendent, and **David C. Cavan,** of the Bangor mine, is assistant superintendent.

Edmund Newton, formerly at the Lake Superior station of the U. S. Bureau of Mines, recently registered at the office of the American Institute of Mining Engineers, New York. Others who registered during the week were Arthur C. Adair, of Camp Meade, Md.; S. J. Kidder, general manager, Mogollon Mines Co., Mogollon, N. M.; Thor. Warner, Phoenix, Ariz.; H. E. Emslaw, Grand Haven, Mich.; Lieut. Col. William H. Lanagan, San Francisco; Major W. Frank Lewis; Lieut. S. G. Garrett, U. S. N. R. F.; Lieut. Henry B. Taylor, and Lieut. Arthur K. Adams.

Obituary

George A. McLeod, formerly of Spokane, Wash., but in recent years of Vancouver, B. C., died in the latter city in October.

Burt Stearns, secretary-treasurer of the Stearns-Roger Manufacturing Co., died in Denver, Colo., on Nov. 25, aged 32 years.

Edwin Harper, superintendent of the International Nickel Co.'s refinery buildings, Port Colborne, Ont., died on Nov. 28 of pneumonia, aged 26 years.

B. H. Dosenbach, consulting engineer for the Butte & Superior Mining Co., and for the D. C. Jackling interests, died Nov. 26 of pneumonia following an attack of influenza.

Frederic A. Hale, Jr., mining engineer, died of pneumonia, following an attack of influenza, at Goodsprings, Nev., Nov. 18. He was born in Denver 31 years ago. For the last seven years he had resided in Goodsprings, where he became superintendent and manager of the Yellow Pine Mining Co. Mr. Hale was a member of the American Institute of Mining Engineers.

Howard Weidener Du Bois, who died Nov. 10, 1918, was born Sept. 16, 1868. He was a graduate of the Central High School, Philadelphia, Penn., and a member of the class of '92 of Lehigh University. He did some special work at Princeton in 1893. His work in connection with mining began about 1895, when, in partnership with Charles T. Mixer, he established an assay laboratory at Ispheming, Mich., but he continued to reside in Philadelphia. From 1896 to 1904 he was professor of applied mathematics at the Central High School, Philadelphia. During this period he spent many of his summer vacations in mining and geological exploratory work. From 1905 until his death, he was engaged in work of this sort in this country, but his principal activities were in British Columbia and Alaska. In connection with work in British Columbia, he constructed a rather large hydraulic development, embracing dams, ditches, and wooden-stave siphons delivering water under high head. He also conducted the exploration and development of a copper property in Alaska and made a prolonged study of fluctuation methods in connection with the treatment of ore. He spent the summer of 1918 in Alaska in connection with work upon this property, and had returned from the property only a short time before his death. In 1897 Mr. Du Bois married Miss Frances C. Higbee, of Philadelphia. Mr. Du Bois will best be remembered by many of his friends for his interesting lectures on engineering subjects. He collected large numbers of photographs and pictures illustrating the fauna of British Columbia and Alaska, and his lectures were replete with facts of interest both to engineers and the general public. In this way he did much to popularize mining science. He was a member of the Engineers' Club of Philadelphia, Engineers' Club of New York, American Institute of Mining Engineers, Mining and Metallurgical Society of America, the City Club of Philadelphia, the Lehigh Club of Philadelphia, the Princeton Club of Philadelphia, American Society of Political and Social Science, the Photographic Society, the Geographic Society and the National Geographic Society. He is survived by his widow, a son and daughter.

Societies

American Mining Congress will hold a conference of members and the board of directors at 29 West 39th St., New York, on Dec. 10, beginning at 10 a. m., at its annual meeting.

American Society of Mechanical Engineers. A meeting was held in New York Dec. 3, at which Mortimer Elwyn Cooley was elected president. Charles T. Main, the retiring president, has sailed for Europe as representative of the society with regard to reconstruction work. Charles M. Schwab and Orville Wright were made honorary members.

American Institute of Mining Engineers, Washington Section, will hold its annual dinner, Dec. 6, in the cafeteria of the Interior Department. M. F. Chase, of the War Industries Board, will speak on reconstruction; C. K. Leith, of the Shipping and War Industries boards, will discuss international features of certain minerals; Edgar Rickard will have as his subject, "Peace and Food"; and Chester Naramore, of the U. S. Bureau of Mines, will talk on reconstruction problems in the petroleum industry.

New Patents

United States patent specifications listed below may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

Molybdenum and Its Alloys, Process of Obtaining. James A. Holladay, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., Niagara Falls, N. Y. (U. S. No. 1,281,961; Oct. 15, 1918.)

Oil Shales—Oil Extracting and Refining Apparatus. Emil T. Erickson, Salt Lake City, Utah, assignor to Rainbow Petroleum Products Co., Utah. (U. S. No. 1,281,320; Oct. 15, 1918.)

Phosphates, Treatment of. Ellis C. Soper, Chattanooga, Tenn., assignor to Armour Fertilizer Works, Chicago, Ill. (U. S. No. 1,281,681; Oct. 15, 1918.)

Platinum from Sands and Ores, Process of Extracting. Russell Thayer, Philadelphia, Penn. (U. S. No. 1,281,878-9; Oct. 15, 1918.)

Smelting—Crucible Holding Apparatus. Charles J. Goehringer, Cincinnati, Ohio. (U. S. No. 1,280,712; Oct. 8, 1918.)

Smelting—Device for Heating Metal-Casting Molds. Alfred Charles Atkinson, Wellington, New Zealand. (U. S. No. 1,280,631; Oct. 8, 1918.)

Tunnel Drier. George Hillard Benjamin, New York, N. Y. (U. S. No. 1,280,642; Oct. 8, 1918.)

Washer for Gravel, etc. Raymond W. Dull, La Grange, Ill., assignor to the Raymond W. Dull Co., Chicago, Ill. (U. S. No. 1,280,688; Oct. 8, 1918.)

Editorial Correspondence

SALT LAKE CITY—Nov. 29

The Taxation of Mines Amendment to the constitution of the State of Utah, voted on Nov. 5, was adopted by the following vote, as finally reported: Of a total of 56,773 votes cast on this measure, 35,337 were in favor of the amendment and 21,436 against it. The amendment was thus carried by a majority of 13,901 votes. It was defeated in Carbon, Piute, Salt Lake, Summit and Tovell counties. Juab County, in which the Tintic district is situated (also in part in Utah County), went for the amendment by a small vote, for which the agricultural interests in this section were responsible.

The Three Per Cent. Net Proceeds Tax on Mines, as associated with the $1 occupation and privilege tax, has been made the subject of a protest by the Salt Lake Copper Co. This company, in a communication to the State Treasurer, said: "We herewith hand you $1 in currency and a certified check on the First National Bank for the sum of $1428.96 in payment of the occupation and privilege tax of $1 and 3% on net proceeds of $47,632 for 1917, amounting to $1428.96, a total of $1429.96, as determined by the State Board of Equalization and assessed against the undersigned. But you are hereby notified that the undersigned claims that said tax of 3% on net proceeds, amounting to $1428.96 is illegal; that the statute under which the same is assessed is unconstitutional and void, and this payment is made under protest, and the undersigned will institute suit against you to recover the same." The Carbon Fuel Co. sent a messenger with a dollar, in payment of the occupation and privilege tax, to the State Treasurer, who refused to accept it, because $4382.70, assessed by the State Board of Equalization as the company's 3% net proceeds tax, was not offered with the dollar. This company will resist the net proceeds tax, and other Utah mining companies will also fight it, so that the question as to whether the statute under which this tax is assessed is unconstitutional or not should soon be determined.

Two Bingham Canyon Properties, and possibly three, may be consolidated, if present efforts succeed. They are the Utah Metal and Tunnel, Utah Consolidated, and Utah Apex companies, which at present are involved in questions of extra-lateral rights. The Utah Consolidated recently brought suit against the Utah Apex, claiming $500,000 for the illegal extraction of ore from veins or beds that apexed on the latter's property. The Utah Apex then sued the Utah Consolidated for $1,750,000 on the grounds that the veins apexed in its territory. The Utah Metal and Tunnel and the Utah Consolidated also had some questions of apex to be settled. It is understood that these questions between the two latter companies were investigated by representatives of both companies, and that the findings of the investigators were that the Utah Metal and Tunnel really had apex rights to the veins (or beds) in question and, in consequence, the Utah Consolidated agreed to purchase them. The Highland Boy limestone, as is pretty generally known, apexes in part in Utah Metal and Tunnel territory and dips about 50° north into the Utah Consolidated. Whether the Utah Metal and Tunnel apex rights have been definitely acquired by the Utah Consolidated is not known, but it is understood that these rights were desired by the latter company, in connection with its suit against the Utah Apex. The two latter properties are reported to be considering plans for a consolidation. If this is to be effected, it is reported that 75% of Utah Apex's 528,000 shares of stock outstanding must be willing to enter a merger. There has been considerable activity in this stock recently on the market, it having advanced from 1¼ or 1½ to around $4 a share. It is not improbable that the litigation between these companies may be settled out of court. Whether the Utah Metal and Tunnel would be included in the proposed consolidation is uncertain.

WALLACE, IDAHO—Nov. 29

The Capacity of the Bunker Hill Smeltery and Refinery at Kellogg, Idaho, will be almost doubled by the additional buildings and equipment now being provided. These improvements have been in progress for several months, but difficulty in getting machinery and material during the war delayed their completion. It is expected that this trouble will soon be obviated. The company will then be in position to treat all its own ore and possibly to take additional custom business. It is now handling the output of the Hecla mine, but little if any other custom ores. The foundation has been built for a 72-ft. addition to the furnace building, which will provide room for two additional blast furnaces. Two more Dwight-Lloyd sintering machines have been added recently, and preparation is being made for two more, making nine altogether. The blower house has been enlarged and a Connersville blower of 15,000 cu.ft. capacity installed. A new compressor room has been completed, and a Sullivan two-stage compressor of 1100 cu.ft. capacity added. This will be supplemented by a Laidlaw-Dunn-Gordon compressor, to be used as an auxiliary. A 72-ft. addition is also being made to the lead refinery. A new softening furnace has been built, and two desilverizing kettles will be added. Two additional railroad tracks are being built south of the sampling mill, and new bins are being constructed. One of these tracks will extend through the plant, to facilitate handling equipment. Building this track necessitated moving the machine shop, and a larger and more complete one is being built. For coarse crushing, an 18 x 30-in. Blake crusher has recently been installed. These improvements indicate that the Bunker Hill company anticipates a period of prosperity for the mining industry with the coming of peace.

BOISE, IDAHO—Nov. 29

National Potash Co., of Boise, is planning to sell the rights to use a process for recovering potash from feldspathic rocks on a royalty basis. E. B. Sherman, an officer of the company, states that the company may adapt the portland cement factories at Concrete, Colo., or Devil's Slide, Utah, for this purpose, by adding filter presses and evaporators similar to those used in the manufacture of common salt.

TUCSON, ARIZ.—Dec. 2

Indictments in Bisbee Deportation Cases were quashed by Judge William W. Morrow, of San Francisco, in a decision filed on Dec. 2 in the U. S. District Court. Twenty-five individuals were involved, including capitalists, mine operators, public officials, and citizens of Bisbee. The charges on which citizens of Bisbee were indicted resulted from the deportation from Bisbee on July 12, 1917, of 1186 striking copper-mine workers and their alleged sympathizers. The indictments charged conspiracy to deprive citizens of the United States of their constitutional rights.

DENVER—Nov. 29

Female Millworkers were among the interesting experiments tried by Colorado operators during October and the early part of November, in an effort to overcome the labor-shortage. The Golden Cycle Mining and Reduction Co., which treats a large part of the output of the Cripple Creek mines in its plant at Colorado Springs, was hard hit by the labor shortage. Many of its employees left to enter military service, and it became difficult for the management to get enough competent help to operate the plant. It was decided to employ women in the plant as an experiment. In many respects the venture was a success. In certain positions the women became very competent and took serious interest in their work. Among the positions filled successfully by women were accounting, assaying, ore testing, oiling machinery, and keeping certain units in adjustment. One of the amusing features of the experiment was the tendency of some of the mill women to devote the bulk of their time to cleaning house, and to try to clean up the dust and dirt, but they eventually gave up this task as hopeless. The women received a suitable wage plus a bonus for accomplishing certain results.

Reconstruction following the war, and its probable influence on the mining industry, is occupying the thoughts of Colorado mine operators, more especially those interested in the production of gold. If any mining men ever seriously entertained the hope that a bounty on new gold would be conceded by the authorities at Washington, this hope has now been dismissed. It is now assumed that the prices demanded for steel, powder, cyanide, and other mining supplies will gradually drop to a peace basis, thus decreasing to some extent the present high charges for these necessities. Further, the release of thousands of skilled miners from the Army, from munition plants, and other war activities in which high wages prevailed will increase both the supply of labor available for mining and also the efficiency of that labor. This readjustment in the labor situation will help mining, even if no immediate change be made in the scale of wages or in the hours per day. During the last year, labor in the mines has averaged only 50 to 60% of the pre-war efficiency, thus adding greatly to the cost. It is hoped that as the cost of supplies decreases, and as the efficiency of labor increases, many of the low- and medium-grade mines of the state, that were forced to close down, will gradually be able to resume operations. Another factor in the cost of mining in Colorado, which will receive considerable thought and attention during the period of reconstruction, is mine taxation. One of the radical proposals that has been made by more than one mining man is that the greatest stimulus mining could receive would be the complete removal of mine taxation for a period of five or ten years. This proposal has been defended on the ground that it is not entirely selfish on the part of the mine operators, but that the resulting increase in mining activity, with its consequent influx of population and demand for supplies of all kinds, including agricultural products of the state which could be disposed of in home markets in larger quantities and at greater profit than if they were shipped long distances into other states, would more than compensate all other interests for their small proportion of increased taxation resulting from the shifting of the burden temporarily from the shoulders of the mining industry. It has always been true in Colorado that the state is never so prosperous as when mining is flourishing. There is no more certain way to make it flourish than to reduce or eliminate taxation temporarily. However, such a radical proposal is not likely to receive consideration from Colorado's lawmaking bodies, which for some time have been controlled by agricultural interests, to the detriment of mining interests. If the former interests, now in power in the state, could appreciate the certain advantages of liberal coöperation with the latter, the benefits would be mutual.

HOUGHTON, MICH.—Dec. 2

Reduction of Present Wage Scales in Michigan is improbable in 1919. Returning soldiers have been promised old positions back. Little if any reduction in copper mining and milling costs is expected, according to leading mining men of the state. They believe that reconstruction work in Europe will call upon American industry to exert itself to the utmost, and, with the return of hundreds of former miners and trammers, an increase in production is looked for.

Labor Situation continues to improve. A stamp-mill superintendent said yesterday: "This is the first time in four years when I had men apply for work and had no work to give them. I told them to go the mine." The mines are putting on men steadily and mill tonnages are increasing. Moreover, the general efficiency of labor is improving. The return of Michigan men from other states is noticeable and continuous. The mines have not, however, secured all the men needed. Trammers are particularly in demand.

JOPLIN, MO.—Nov. 30

Although Bad Conditions in Zinc Ore Market are being met with persistent efforts to remedy them, numerous mines are closing down, temporarily or permanently, and the output of the district is steadily being curtailed. During the last week, the Coahuila Lead and Zinc Co., which has been operating for a number of years northwest of Duenweg, removed its mules from the ground and closed. It was one of the largest sheet-ground producers in the camp and one of the last to quit. The Athletic mine, situated near by, is now the

only sheet-ground mine still operating in the Duenweg camp, and it is reported that it will close as soon as the present supply of coal is exhausted. It is owned by the Athletic Mining and Smelting Co., which has a smeltery at Fort Smith, Ark., and this may enable it to keep going. In the Oklahoma camp, the Montreal mine, one of the most noted producers, was closed during the week, but only temporarily. Just now the ground in this mine is said to be looking as good as ever, but the owners dislike to exhaust the ore deposits at prevailing ore prices. All the big companies, the Picher, the Skelton, the Golden Rod, and the St. Louis, are operating short shift or only a part of their plants.

Inability of Mine Operators to Coöperate has long been the bane in the Joplin district. Recently an agreement was made whereby all mines agreed not to sell their ores for the week, in order that some agreement might be made with the smelters as to allocation. On the eve of this agreement, however, the manager of one of the largest producers in the field was ordered by the owners of the property to sell 1000 tons at the market. There was nothing else for him to do, and the sale broke the plan completely, so that there was almost as much selling as in ordinary weeks. Such incidents always make it harder to arrange an agreement another time. It is considered that one of the most trying features of mining in this field is the fact that owners in many cases are non-residents and cannot be made to understand conditions as they exist.

TORONTO, ONT.—Nov. 29

The Mining Industry of Cobalt is being badly handicapped by the prevalence of Spanish influenza, from which several deaths have occurred this week. A number of extremely critical cases are under treatment at the hospitals. Among the victims was Norman Creyk, formerly of Toronto, secretary of the Grodwards Company.

A National System of Employment Offices will be established by the Canadian government to secure work for the labor released by closing down munition plants and demobilization of the army. These will be coördinated through the Department of Labor. Local offices will be opened in every important industrial center. In the larger cities, there will be separate offices for skilled and unskilled workers. These offices will report daily to a provincial clearing house the number of workers unplaced and the positions vacant, and the clearing houses will endeavor to fill vacancies in one locality with unabsorbed workers from other places, for whom jobs cannot be found in their own neighborhoods. In addition to these provincial clearing houses, there will be two Federal clearing houses, one for Eastern Canada, probably at Ottawa, and another having jurisdiction over the western provinces, which it is proposed to establish at Winnipeg. When the provincial clearing houses report a shortage or a surplus of labor for which they cannot provide within their own borders, the Federal clearing houses will take up the work in the larger area assigned them. By this system the government hopes always to have on hand accurate information as to the demand and supply of labor in all parts of the country, the extent to which private industries are absorbing those thrown out of work, and the volume of public employment that must be provided to take up any surplus. The organization will be administered by a body to be called the Employment Service Council of Canada, of which the Federal Department of Labor will appoint three members, two of whom will be women, and the provincial governments one member each. The Soldiers' Civil Reëstablishment Department, Great War Veterans, Canadian Manufacturers' Association, Labor Congress, Railway War Board, the railway brotherhools, and the Canada Council of Agriculture will also be represented. A provincial advisory council will also be appointed in each province.

RIO DE JANEIRO, BRAZIL—Nov. 12

Plans for Developing Brazil's Iron Deposits are to be undertaken by the British government and the Rothschilds jointly, according to the announcement made in the London cables immediately after the armistice was signed, which has aroused much interest. These iron deposits, recognized by the outside world as of prime importance only in recent years, have been under negotiation by several strong interests. A project was made to extend the railroad from the port of Victoria to the iron district and to electrify it so that shipments might be begun on a scale of 10,000 tons daily, or more, to the English iron centers. State concessions were granted and a control of the stock of the railroad was purchased. The syndicate concerned in this plan had secured control of several billion tons of iron ore averaging from 69 to 70% metallic iron. The transportation problems had been investigated under the direction of the late James J. Hill, and the whole project accepted as feasible by some of the strongest financial interests in Europe and America. All activities were necessarily suspended by the war, except the geological and field investigations, which have been continued under the direction of a staff of American engineers. The present announcement is accepted as authentic, and the beginning of the actual work is expected to follow soon.

Plans for Electrical Smelting of Manganese Ores of the interior districts have been under consideration for some time and a concession has been secured by local interests in connection therewith. The technical and commercial phases of the matter have been under investigation by Frederick T. Snyder, of Chicago, and Kirby Thomas, of New York, for the Brazilian interests, and reports and a proposition have been submitted.

The Mining News

ALASKA

KENNEDY & CONWAY (Skagway)—Developing copper property near Haines, Alaska.

ARIZONA

Cochise County

INFLUENZA curtailed output of Johnson-Dragoon district greatly during last month. Thirty deaths in Johnson up to Nov. 18 out of 300 population; dead mostly Mexicans.

Graham County

LAUREL CANYON (Safford)—R. V. Dey, of New York, has appealed to Federal court for return of property, now leased by G. M. Ruff and A. H. Chlarson.

Mohave County

LEVIATHAN (Yucca)—Work resumed upon large deposit of molybdenum ore.

Pima County

CABABI (Tucson)—Old Spanish silver mine, 45 miles southwest of Tucson, leased from Cababi Mining Co. by S. G. McWade, a former manager.

DAILY-ARIZONA CONSOLIDATED (Tucson)—Suit for $20,000 by Joseph Chapman and C. F. Hagedorn dismissed in Superior court on payment of sum by company.

NATIONAL TUNGSTEN (Tucson)—Property, with that of Emery-Whitcomb Tungsten Co., in Arivaca district, under foreclosure suit for $25,100. Plaintiff is James H. Emery, of Elmhurst, Illinois.

Pinal County

MAGMA CHIEF (Copper Creek)—Operations closed at Superior and company's name transferred to Sombrero Butte property in Copper Creek district.

SUPERIOR ARIZONA (Superior)—Thomas Gray, lessee, shipped four carloads of 50% manganese ore to Chicago. Joint concentrator being planned to permit working lower-grade orebodies.

Yavapai County

SILVER BELT (Humboldt)—Will install 100-ton ball mill, with flotation unit.

DUNDEE-ARIZONA (Jerome)—Pumping resumed in Dundee shaft, now bottomed at 720 ft. in shattered quartz porphyry, carrying iron and manganese oxide. Dundee ground hitherto supposed to have been drained to level of Extension tunnel, which shaft passes at 960 feet.

JEROME VERDE (Jerome)—Production from Maintop workings is main activity. Diamond drilling being continued northeast of Columbia shaft.

UNITED VERDE EXTENSION (Jerome)—Portal end of 12,000-ft. haulage tunnel connected with east drift from Texas shaft, which will be used only for ventilation or hoisting men.

Yuma County

HUDSON (Quartzsite)—Gold strike near New Water Springs in northern Yuma County reported by Messrs. Brimly, Johnson and Hudson.

CALIFORNIA

Nevada County

GOLDEN CENTER (Grass Valley)—Unwatering of shaft resumed after delay due to influenza. Will explore this and old Peabody property at 1000-ft. depth.

Plumas County

FEATHER RIVER GOLD (Nevada City)—Five-mile water-ditch nearing completion and two-mile road constructed. Extensive operation in view.

UNITED STATES S. & R. (Portola)—Has developed good copper ore on its property next to Walker ground.

WALKER (Portola)—Development work being pushed by Anaconda Copper Mining Co. Drift on lowest level in 700 ft. from shaft and in ore. Tunnel, 3500 ft. long, from mill to mine, well under way. Large compressor installed. Company has realized $198,319 net from 2354 tons of concentrates shipped, in addition to profit on high-grade shipments.

Shasta County

BULLY HILL COPPER (Winthrop)—New 150-ton flotation plant recently placed in operation. Installed in old smelting building.

Sierra County

SIXTEEN TO ONE (Alleghany)—Rushing completion of 10-stamp mill.

BRANDY CITY (Brandy City)—Completing installation of new equipment and enlarging dam.

COLORADO

Boulder County

HORSFAL (Boulder)—Main shaft sunk from 300 to 550 level. Dip of vein has changed from 68 to 75° in this distance. Charles Oliver is superintendent.

WANO (Jamestown)—Mill running two shifts on fluorspar. Eight tables in operation. About three cars of concentrates being shipped per week. One carload of gold telluride ore produced from new shoot on 100 level.

CROSS (Lakewood)—Wolf Tongue tungsten property has installed new 120-gal triplex pump to raise water 400 ft. to mill supply reservoir. Driven by a 20-hp. motor. Four-inch pipe line, 1700 ft. long, laid to take water to Cross mill. More than 40 men employed at mine and mill. N. G. Olsen is superintendent.

MARSH LONG (Magnolia) — Lessees shipping tungsten ore regularly to Red Sign and Grimm mills.

Dolores County

POINDEXTER (Rico) — Reopened by David Swickheimer. New shaft sunk 50 ft. and will continue to 120 ft., where first blanket vein will probably be cut.

RICO (Rico)—Extensive development planned for winter. Power line being built to Group tunnel, where new compressor will be installed. Work also resumed at Syndicate tunnel.

San Juan County

GOLD KING LEASING (Gladstone)—Additional men being sent to this property, now operated by Gold King Extension Mines Co., of which W. Z. Kinney is general manager. Company plans to operate all winter.

SAN JUAN TUNGSTEN (Silverton)—Organized to lease North Star mine and mill. Development work in progress where

tungsten ore has been opened. Mill being remodeled and placed in condition for treatment of tungsten ore. M. de Golyer is manager.

Summit County

MID-WEST (Breckenridge)—Installing hoist for sinking shaft to sulphide zone.

QUANDARY QUEEN (Breckenridge)—New milling plant of this Denver company nearing completion. Company operating in upper Blue River district.

SILVER KING (Breckenridge)—New pump installed to handle water struck in crosscutting on 195 level. Will crosscut seven veins encountered.

WELLINGTON (Breckenridge)—Milling plant running steadily and making regular shipments of lead and zinc concentrates.

CLIMAX MOLYBDENUM (Climax)—Reported to have taken over entire property of Molybdenum Products Co. Will operate latter's mine and mill with its own.

Teller County

DANTE (Victor)—Being developed by Big Toad Gold Mining and Milling Co. Diamond drilling from bottom of 600 level of No. 1 shaft to sample unexplored ground. Mill treating 75 tons of Dante ore per day.

WIDE AWAKE (Victor)—Raven Hill property being developed under lease by Porter Hedges. Drifting on Wide Awake vein.

IDAHO

Shoshone County

WASHINGTON (Burke)—Crosscut 775 ft. long reached vein at depth of 350 ft. Work suspended until spring on account of heavy snow.

INTERMOUNTAIN (Iron Mountain, Mont.)—Report for year ended Sept. 30 shows net loss. Branch railroad, 12 miles long, built by old company, too expensive to operate. Track iron sold and removed; roadbed to be used as motor truck road for transporting concentrates to main line.

NABOB CONSOLIDATED (Kellogg)—William Beaudry, manager, announces that 150-ton mill will be built at once. Control owned by Stewart Mining Co. Shipping lead-zinc ore.

TARBOX (Saltese, Mont.) — Crosscut from winze, sunk 200 ft. from 800 level, cut vein of lead-zinc-copper ore. Will drift west to get under main body. Construction of mill considered. Richard Daxon, manager, Wallace, Idaho.

KENNAN (Wallace)—Stripped tungsten vein for 70 ft.: average width, 12 ft. Ore is scheelite. Shaft being sunk on vein to prospect it further. Company owns large acreage, which includes several gold veins of proved value and extension of productive lead-silver-zinc veins. Winter work will be confined to tungsten.

SUCCESS (Wallace)—Developing orebody on 1600 level. Shows increase in lead as compared with zinc. Motor trucks being used to deliver concentrates to railroad. Mill running one shift.

MAINE

Hancock County

DOUGLASS (Blue Hill)—This old property being operated by A. S. & R. Co. Mining and milling 100-150 tons copper sulphide ore per day and shipping concentrates by schooner to Perth Amboy, N. J. Development work in progress. Ellsworth, railroad shipping point.

MICHIGAN

Copper District

HANCOCK CONSOLIDATED (Houghton)—Shipping 700 tons of rock per day. Have put on 30 more men and will increase force steadily. Expect to reach 1000 tons daily by spring.

ISLE ROYALE (Houghton)—Main pump house at Huron dam completely wrecked by dynamite. Operations of mine not interfered with.

MAYFLOWER-OLD COLONY (Houghton)—Shaft work continues slowly, labor being difficult to obtain, owing to isolation. Sinking at low cost, time apparently being negligible. Small force engaged, chiefly farmers. Hoist and other equipment second hand, being largely bought from other Fay properties.

NEW ARCADIAN (Houghton) — Will probably resume exploration work in spring. Keeping water out of workings at comparatively slight cost.

ST. LOUIS (Houghton)—Calumet & Hecla has no present intention of opening this property.

SENECA (Houghton)—Shaft now 1600 ft. deep. Sinking breaking local record. Expect to cut footwall of Kearsage lode at 1730 ft., shaft having to go 400 ft. to reach it. Ten hammer drills at work.

WINONA (Houghton)—New flotation plant will handle 600 tons daily. Machinery on way and will be set up as men are obtained, concrete foundations being in place. New process expected to solve problem of saving more of flake copper. Labor shortage acute, but improving slightly. Rock tonnage over 300 daily.

MISSOURI

Joplin District

McGEE (Duenweg)—New mill completed on Boston-Duenweg land. Mine operating at 120 feet.

SIMS & BOND (Duenweg)—Sinking second shaft for air at mine in heart of Duenweg camp. Good output obtained with hand jigs for eight months. Output, when increased, will be sent to custom mill.

KUSTERER (Webb City)—Completed new custom mill on Boston-Duenweg land at Duenweg.

MONTANA

Jefferson County

LEGAL TENDER (Clancy)—Old 500-ft. shaft unwatered to 200 level. Drifting begun.

ECONOMY (East Helena)—New mill almost completed.

ANGELICA (Wickes)—Making daily shipments from Mount Washington tunnel.

Silver Bow County

ANACONDA (Butte)—Within week from time armistice was signed, company received word to suspend manganese shipments to Steel Corporation, automatically stopping manganese mining at Emma property of Butte Copper and Zinc Co. Condition may prove temporary, but it is said that management has no false hopes, admitting that South American manganese can probably be imported at price lower than Butte production cost.

NEVADA

Lyon County

NEVADA-DOUGLAS (Ludwig) — Production increasing from company's mines, especially from Western Nevada mine, near Mason, where it was doubled. Considerable development work planned in Ludwig mine, including sinking from 800 level.

MASON VALLEY (Thompson)—Ore receipts for week ended Nov. 20 were: Nevada-Douglas, 1331 tons; Bluestone, 2029 tons; Mason Valley, 2492 tons; miscellaneous, 454 tons. During same period four cars blister copper shipped.

Nye County

TONOPAH SHIPMENTS for week ended Nov. 23 was 8310 tons, having a gross milling value of $137,870. Producers were: Tonopah Belmont, 1919; Tonopah Mining, 2100 (for two weeks); Tonopah Extension, 2350; West End, 983; Jim Butler, 139; Montana, 170; Tonopah Divide, 300; MacNamara, 400; Rescue, 53; and miscellaneous, 96.

CYANIDE to the amount of $750,000 has been contracted for by the Nevada Mine Operators' Association for use during coming year.

TONOPAH DIVIDE (Tonopah) — Installation of electrically driven surface plant completed. Development work being pushed. Main shaft will be sunk to water level, estimated at 700 ft. To expedite this work, auxiliary hoist has been installed at 370-ft. level. Ore shipments to Goldfield Consolidated mill average 200 tons weekly. Dumps said to contain 3000 tons of $30 ore.

TONOPAH EXTENSION (Tonopah)—Dry tons milled in October, 9867 tons. Production of gold bullion, 1124 oz.; silver bullion, 122,076 ounces.

TONOPAH MINING (Tonopah)—Milled 11,460 dry tons in October. Production of gold bullion, 1004 oz.; silver bullion, 106,050 ounces.

NEW MEXICO

Grant County

BONNEY (Lordsburg)—Shipped 12 cars high-grade ore to Copper Queen smeltery in November. Working 50 men. Has installed new drill equipment. J. P. Porteus is superintendent.

LAST CHANCE (Lordsburg)—New 50-ton concentrator and flotation plant started satisfactorily. B. Prescott, superintendent.

NORTH CAROLINA

Macon County

MOODY MICA (Franklin)—Property in Burning Town hills sold to Philadelphia interests for $60,000. Has produced about $40,000 worth of mica during last year, mostly from one pocket, opened last December. C. E. Bonesteel, who controls a large group of properties in locality, is negotiating a syndicate for operation.

OKLAHOMA

Joplin District

OMAHA (Hockerville, Kan.)—New shaft in lead ore. Mill which was begun several months ago and abandoned will now probably be completed.

MIAMI METAL (Miami)—Rebuilding of Buffalo mill on lease northwest of Picher almost completed. Will start by Dec. 15. Dump gives good assays.

FEDERAL (Picher)—Paying all expenses from good lead ore and stock-piling 12 tons of zinc blende per day.

LA SALLE (Picher)—New mill started Dec. 2, after successful work with hand jigs for several months. W. L. Kirby is superintendent.

ALEXANDER (Tar River)—New plant to have Standifer jigs, invented by Miami mining man. Jigs of this type, already in use at Missouri Mule mine, said to be giving satisfaction.

OREGON

Jackson County

RAINIER MERCURY (Gold Hill)—Erecting another unit of mercury retorts at Utah group of cinnabar mines, 12 miles north of Gold Hill.

COPPER LODE (Upper Applegate district)—Charles Lillie, of Los Angeles, Calif., and E. W. Liljegram, of Medford, Ore., equipping this copper property.

TEXAS

Burnet County

SOUTHWESTERN GRAPHITE (Burnet)—Has purchased flotation equipment to treat graphite dust. Present mill, started last spring, employs Huff Electrostatic method for treatment of graphite ores without preliminary concentration. Capacity 200 tons.

WISCONSIN

Zinc-Lead District

CONSOLIDATED LEAD AND ZINC (Benton)—New shaft down 120 ft., and crosscutting begun on Charles Smith land one mile south of Benton. Charles Lawyer, Platteville, Wis., is manager.

CONNECTING LINK (Cuba City)—Has purchased 100-ton Gilman mill at Linden and will move plant to Coulthard lease at Cuba City. Anton Zwack, Dubuque, Iowa, is president and manager. New property to be Connecting Link No. 2.

HARVEY LEASE (Cuba City)—Charles Wolfe has bought Lawrence mill at Hazel Green to equip new prospect on Harvey land north of Connecting Link. Four churn drills at work on tract, and shaft being sunk.

KISTLER & STEPHENS (Platteville)—Churn drill on Purl Goke farm has struck what appears to be continuation of Blockhouse range to east.

British Columbia

CANADA COPPER CORPORATION (Greenwood)—Smeltery shut down on Nov. 26. Installation of reverberatory not considered, reports to the contrary being incorrect. Work concentrated on erecting mill at Allenby to treat ores from Copper Mountain mines.

SNOWSTORM (Yale District)—International Diamond Drill Contracting Co. awarded contract by Minister of Mines of British Columbia for 10,000 lineal feet of diamond drilling on this group of claims in Highland Valley.

Ontario

COBALT SHIPMENTS during week ended Nov. 27 were 12 cars, containing 948,739 lb. Shippers were: Buffalo, 329,800 lb.; Mining Corporation, 151,200; McKinley Darragh, 149,539; O'Brien, 128,855; Peterson Lake, 102,045; and Dominion Reduction, 87,300. In same week, Mining Corporation was only bullion shipper, with 99 bars containing 99,008.68 fine ounces.

HARGRAVE (Cobalt)—Has decided to close mine.

MINING CORP. OF CANADA (Cobalt)—Ophir management notified option will be dropped Dec. 14. Ophir interests said to have arranged for continuing work.

BURNSIDE (Kirkland Lake)—Installing mill equipment and expect to start by Jan. 1.

The Market Report

SILVER AND STERLING EXCHANGE

Nov.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Dec.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
28	.....	....	48⅜	2	4.7585	101⅛	48⅜
29	4.7560	101⅛	48⅜	3	4.7580	101⅛	48⅜
30	4.7580	101⅛	48⅜	4	4.7575	101⅛	48⅜

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

Nov. Dec.	Copper Electrolytic	Tin Spot.	Lead N. Y.	Lead St. L.	Zinc St. L.
28	...	..	....	....	..... 8.10
29	*26	†	8.05	7.75	@8.15 8.10
30	*26	†	8.05	7.75	@8.15 8.10
2	*26	†	7.05	6.75	@8.15 8.10
3	*26	†	7.05	6.75	@8.15 8.10
4	*26	†	7.05	6.75	@8.15

*Price fixed by agreement between American copper producers and the U. S. Government, according to official statement for publication on September 21, 1917, and July 2, 1918.[1]

† No market.

The above quotations (except as to copper, the price for which has been fixed by agreement between American copper producers and the U. S. Government, wherein there is no free market)[1] 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 the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

The quotations for electrolytic copper are for cakes, ingots and wirebars.

We quote electrolytic cathodes at 0.05 to 0.10c below the price of wirebars, cakes and ingots.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis.

[1] *See reservation in text of review of copper in next column in this issue.*

LONDON

Nov. Dec.	Copper Standard Spot	Copper Standard 3 M.	Copper Electrolytic	Tin Spot	Tin 3 M.	Lead Spot	Lead 3 M.	Zinc Spot
28	122	122	137	295	290	40½	39½	54
29	122	122	137	290	285	40½	39½	56
30	...	...	...	...	...	...	...	...
2	122	122	137	275	270	40½	39½	56
3	122	122	137	275	270	40½	39½	56
4	122	122	137	(a)	(a)	40½	39½	56

(a) Not received at time of going to press.

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at $4.7515: £29½ = 6.2576c.; £54 = 11.4545c.; £110 = 23.3333c.; £125 = 26.5151c.; £260 = 55.1513c.; £280 = 59.3937c.; £300 = 63.6362c. Variations, £1 = 0.2121205c.

Metal Markets

NEW YORK—Dec. 4, 1918

The War Industries Board intends practically to dissolve on Jan. 1, 1919.

Orders have been issued to each department of the Government prohibiting the resale of raw material in competition with private producers unless serious deterioration would result from storage or unless their release would meet a pressing public need.

In most of the markets there has been no buying. The chief features of this week were the reduction in the price for lead on Dec. 2, and the announcement on Dec. 3 of the price at which the U. S. Steel Products Co. would distribute its purchases of tin.

Copper—There was no business and no demand during the week. Producers continued to ask 26c. per lb. Since the beginning of December no new orders have been received from the Government, and upon instructions the filling of old orders has been held in abeyance. What will result from this suspension is at present unknown.

Previous to the beginning of December we have been quoting the price of 26c. for copper as "fixed by agreement between American copper producers and the U. S. Government," saying further "there is no free market." It is uncertain whether the price of 26c. is now to be regarded as being fixed by the producers only as a price asked, or whether under the terms of the agreement of Nov. 15 between the War Industries Board and the copper producers, the 26c. price is still to be regarded as being fixed by agreement between those two parties. We continue this week to represent it according to the latter interpretation, as we have been doing since September, 1917, but we reserve the right to make whatever correction in the representation since Dec. 1 we may deem proper after more deliberate consideration.

John D. Ryan has been elected chairman of the board of directors of the Anaconda Copper Mining Co. He has also been elected president of the United Metals Selling Company.

Copper Sheets—The base price of copper sheets is 35½c. per lb. Copper wire is quoted at 28½c. per lb. f.o.b. mill, carload lots.

Tin—The War Industries Board has authorized the U. S. Steel Products Company, the distributing agency for tin in this country, to sell pig tin in lots of not less than 25 gross tons at 71½c. per lb Pacific Coast ports, and at 72½c. at New York and Chicago to consumers, dealers, and jobbers, and announcement to this effect was made on Dec. 3. These prices are to rule for December and January. Dealers can resell in lots of five gross tons or over to consumers or jobbers holding purchase licenses at a profit not to exceed 2½ per cent.

It is understood that the U. S. Steel Products Co. has already advanced about $16,000,000 against purchases of tin, the amount being between 10,000 and 12,000 tons. Little if any of this tin is supposed yet to have arrived in this country. On the other hand, there is supposed to be about 20,000 tons on hand in this country, especially in the hands of manufacturers who overstocked. The London quotation of £270@275 corresponds to 57¼@58½c. Reflecting the value of tin in Singapore, the metal ought to be bought there and delivered here at about 58@59c. In fact, dealers in Batavia and Australia are offering freely to sell December-January shipments, which would probably be February-March arrivals, at prices that would figure about 60c. here. Restrictions against dealings in those primary markets through any but the sole accredited agent apparently have been removed. However, this does not help matters in this country, for the reason that import licenses cannot be obtained.

Previous to the announcement by the War Industries Board, there was business in this market of resale lots of Banka, Chinese, Lamb & Flag, and A. S. & R. Co. refined, at 68¾@70c., but since the announcement the market has stiffened, there being less desire to resell. However, business was done today at 71¼ cents.

Lead—The lead producers unitedly on Dec. 2 reduced the price to 7.05c., New York, and 6.75c., St. Louis. Business continues to be allocated through the Lead Producers' Committee. The reduction in price resulted in bringing in a few small orders, but, speaking generally, no material stimulation of demand is yet perceptible. However, production is being curtailed in almost every important district, the curtailment probably averaging as much as 20% on the whole, with the prospect that the December production will fall under 40,000 tons.

In the meanwhile, lead manufacturers are not in a very happy situation, owing to the backing up of lead on their hands through the cancellation of orders. In many cases they do not yet know to whom to look for adjustments, whether to their customers or to branches of the Government. Such difficulties will no doubt be ironed out satisfactorily in the course of time, but in the meanwhile there is naturally more or less vexation.

The lead production of Mexico is estimated to be going on at present at the rate of about 8000 metric tons per month, compared with a maximum of about 11,500 last summer. Operations in Mexico have been undergoing curtailment since about the end of October.

Zinc—There was some further small inquiry by galvanizers, but this did not amount to much, either in quantity or significance. In general, the market was conspicuous by the absence of buyers, and quotations for the week are only nominal. Producers are endeavoring to establish a market for January-March contracts, which are freely offered at 8c., while there have been bids of 7¾c., which have not been accepted. Producers continue delivering spelter to the Government on contracts previously made.

High-grade spelter is unsalable, and nobody knows what it would fetch. Stocks are accumulating, and producers desire to sell, but naturally do not care to show their hand in the absence of any real demand.

The zinc-ore producers of Oklahoma, Kansas, and Missouri instituted a plan of allocation on Nov. 29, so that the purchases of ore by the smelters under the joint agreement may be distributed among the participating mine operators. In other words, it is aimed to equalize curtailment of production.

The Oklahoma Ore Storage Association announced that the Picher warehouse would be ready to receive ores on Dec. 1 and that contracts had been let for the erection of warehouses at Douthat and Cardin. This association proposes to advance 90% on ore deposits, accepting the warehouse receipts as collateral on two, four, or six months' time, borrowers having the option to redeem at any time.

Large Western ore producers are finding it difficult to market their product. In some cases they have not been able to arrange smelting contracts at all, smelters being unwilling to take chances in buying ore under present conditions. Some ore producers have found that their only way of disposing of their ore was to consign it to smelters for treatment, proceeds to be accounted for after sale of the product, less a stipulated smelting charge.

Our advices from Europe are that Belgium's zinc-smelting plants are not materially damaged as a whole.

Zinc Sheets—Unchanged at $15 per 100 lb., less usual trade discounts and extras as per list of February 4.

Other Metals

Aluminum—Unchanged at 33c. per lb., but restrictions for domestic use and export have been removed by the War Industries Board.

Antimony—This market became dull, there being scarcely any demand except from consumers who wanted to buy small lots. We quote spot at 8½@8¾c. There is no quotation on futures.

Bismuth—Metal of the highest purity for pharmaceutical use is quoted at $3.50 per lb. for wholesale lots—500 lb. and over.

Cadmium—Quoted at $1.50@1.75 per pound.

Nickel—Market quotation: Ingot, 40c.; shot, 43c.; electrolytic, 45c. per pound. Restrictions for export and domestic use have been removed by the War Industries Board.

Quicksilver—The market was dull and weaker. We quote California virgin at $120@123, while Mexican has been offered as low as $115. San Francisco telegraphs $115, weak.

Silver and Platinum

Silver—Market for silver continues unchanged at $1.01⅛ per oz. 999 fine as the New York official. The London price, now 48⅜d., is rather higher than the parity of the New York price. Owing to the decline in insurance rates overseas, reduction in the English quotation may soon be looked for. Lack of shipping facilities from San Francisco to the Orient may make New York the port of departure for bullion shipments to the East in the near future.

Mexican dollars at New York: Nov. 28, —; Nov. 29, 77½; Nov. 30, 77½; Dec. 2, 77½; Dec. 3, 77½; Dec. 4, 77½.

Platinum—With an unrestricted market once more, there developed immediately a brisk demand, and sales were made at $105@106.

Iridium—Very scarce. Osmiridium has sold at over $200.

Palladium—Unchanged at $135, same as the Government price was.

Zinc and Lead Ore Markets

Joplin, Mo., Nov. 30—Blende, per ton, high, $75.70; basis 60% zinc, premium, $75; Class B, $65@55; Prime Western, $45@42.50; calamine, basis, 40% zinc, $40@35. Average selling prices: blende, $49.75; calamine, $38.41; all zinc ores, $48.63.

Lead, high, $102.75; basis 80% lead, $100; average selling price, all grades of lead, $99.75 per ton.

Shipments the week: Blende, 5656; calamine, 617; lead, 1370 tons. Value, all ores the week, $441,650. Shipments eleven months: Blende, 437,920, calamine, 21,043; lead, 70,128 tons. Value all ores 11 months, $30,011,390.

Sellers have slipped by the schedule and buyers have slipped by it until it was worn pretty thin this week, schedule buyers refusing to buy any more ore on a schedule price unless a better agreement could be reached, and they bought no ore this week. This week's shipment of blende represents all of last week's purchases of those buying on a schedule, but only 75% of those purchasing outside the schedule. Outside buying last week was about 1800 tons. This week it will approximate 2100 tons. News from a meeting in St. Louis today has not been received at this writing, and as the agreement on premium grades expires Dec. 21, it may be necessary to combine a new agreement on these grades. One of the largest producing companies sold 1000 tons on Wednesday on $45 basis, and it is reported that this company has withdrawn from the agreement and will sell only on the open market.

Platteville, Wis., Nov. 30—Blende, basis 60% zinc, highest settlement price reported $75; base price for premium grade $75; base price for high-lead blende $47.50 per ton. Lead ore, basis 80% lead, $96 per ton. Shipments reported for the week were 2278 tons blende, 186 tons galena, and 240 tons sulphur ore.

For the year to date the totals are 116,001 tons blende, 7527 tons galena and 39,229 tons sulphur ore. During the week 1912 tons blende was shipped to separating plants.

Other Ores

Chrome Ore—No market. Everybody overstocked. Western producers willing to talk business at lower figures than previously.

Manganese Ore—No market.

Molybdenum Ore—Some dealers report no sales, no offers and no inquiries. Charles Hardy mentions a transaction of ore of 80% grade at 87½c. per pound.

Tungsten Ore—No change from the situation reported last week.

Other Minerals

Pyrites—Spanish pyrites is quoted, subject to the raising of the embargo, at 17c. on the basis of 10s. ocean freight, buyers to pay war risk and insurance. Restrictions still continue. It is predicted that they will be removed before the end of the year.

Ferroalloys

Ferroalloys—There is no market on ferromanganese or spiegeleisen, buyers being entirely absent and showing no disposition to be attracted by small cuts from former prices, which were $250, delivered, for 70% ferromanganese and $75, furnace, for 16% spiegeleisen.

MONTHLY AVERAGE PRICES OF METALS

Silver	New York			London		
	1916	1917	1918	1916	1917	1918
Jan.	56.775	75.630	88.702	26.960	36.682	44.356
Feb.	56.755	77.585	85.716	26.975	37.742	42.792
Mar.	57.935	73.861	88.082	27.597	36.410	43.620
April.	64.415	73.875	95.346	30.662	36.963	47.215
May.	74.269	74.745	99.505	35.477	37.940	48.980
June.	65.024	76.971	99.500	31.060	39.065	48.875
July.	62.940	79.010	99.625	30.000	40.110	48.813
Aug.	66.083	85.407	100.292	31.498	43.418	49.077
Sept.	68.515	100.740	101.125	32.584	50.920	49.500
Oct.	67.855	87.332	101.125	32.361	44.324	49.500
Nov.	71.604	85.891	101.125	34.192	43.584	48.969
Dec.	75.765	85.960	.....	36.410	43.052	.....
Year.	65.661	81.417	.....	31.315	40.851	.....

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 925 fine.

Copper	New York		London			
	Electrolytic		Standard		Electrolytic	
	1917	1918	1917	1918	1917	1918
Jan.	28.673	23.500	131.921	110.000	142.895	125.000
Feb.	31.750	23.500	137.895	110.000	148.100	125.000
Mar.	31.481	23.500	136.750	110.000	151.000	125.000
April.	27.935	23.500	133.842	110.000	147.158	125.000
May.	28.788	23.500	130.000	110.000	142.000	125.000
June.	29.962	23.500	130.000	110.000	142.000	125.000
July.	26.620	25.904	128.409	119.913	140.409	134.913
Aug.	25.380	26.000	122.391	122.000	137.000	137.000
Sept.	25.073	26.000	117.500	122.000	135.250	137.000
Oct.	23.500	26.000	110.000	122.000	125.000	137.000
Nov.	23.500	26.000	110.000	122.000	125.000	137.000
Dec.	23.500	.....	110.000	.....	125.000	.....
Year	27.180	.....	124.892	.....	138.401	.....

Tin	New York		London	
	1917	1918	1917	1918
January	44.175	85.500	185.813	293.227
February	51.420	92.000	198.974	311.525
March	54.388	(a)	207.443	318.875
April	55.910	(a)	220.171	329.905
May	63.173	(a)	245.114	364.217
June	62.053	(a)	242.083	331.925
July	62.570	(a)	242.181	360.347
August	62.681	(a)	243.978	380.900
September	61.542	(a)	244.038	343.905
October	61.851	(a)	247.467	335.543
November	74.740	(a)	274.943	323.550
December	87.120	.....	298.556	.....
Av. year	61.802	.....	237.563	.....

(a) No average computed.

Lead	New York		St. Louis		London	
	1917	1918	1917	1918	1917	1918
January	7.626	6.782	7.530	6.684	30.500	29.50
February	8.636	6.973	8.595	6.899	30.500	29.50
March	9.199	7.201	9.120	7.091	30.500	29.50
April	9.288	6.772	9.158	6.701	30.500	29.50
May	10.207	6.818	10.202	6.704	30.500	29.50
June	11.171	7.611	11.123	7.511	30.500	29.50
July	10.710	8.033	10.644	7.750	30.500	29.50
August	10.594	8.050	10.518	7.750	30.500	29.50
September	8.680	8.050	8.611	7.750	30.500	29.50
October	6.710	8.050	6.650	7.750	30.500	29.50
November	6.249	8.050	6.187	7.750	30.500	30.60
December	6.375	.....	6.312	.....	30.500	.....
Year	8.787	.....	8.721	.....	30.500	.....

Spelter	New York		St. Louis		London	
	1917	1918	1917	1918	1917	1918
January	9.619	7.836	9.449	7.661	48.329	54.000
February	10.045	7.814	9.875	7.639	47.000	54.000
March	10.300	7.461	10.130	7.286	47.000	54.000
April	9.459	6.890	9.289	6.715	54.632	54.000
May	9.362	7.314	9.192	7.114	54.000	54.000
June	9.371	8.021	9.201	7.791	54.000	54.000
July	8.643	8.688	8.473	8.338	54.000	54.000
August	8.360	8.985	8.190	8.635	54.000	54.000
September	8.136	9.442	7.966	9.092	54.000	54.000
October	7.983	8.801	7.813	8.451	54.000	54.000
November	7.847	8.491	7.672	8.141	54.000	54.100
December	7.685	.....	7.510	.....	54.000	.....
Year	8.901	.....	8.813	.....	52.413	.....

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Pig Iron, Pgh.	Bessemer‡		Basic‡		No. 2 Foundry‡	
	1917	1918	1917	1918	1917	1918
January	$35.95	$37.25	$30.95	$33.90	$30.95	$33.95
February	36.37	37.25	30.95	33.95	30.95	33.95
March	37.37	37.25	33.49	33.95	35.91	33.95
April	42.23	36.15	38.90	32.95	40.06	33.95
May	46.94	36.20	42.84	33.00	43.60	34.00
June	54.22	36.36	50.05	33.16	50.14	34.16
July	57.45	36.60	53.80	33.40	53.95	34.40
August	54.17	36.60	50.37	33.40	53.95	34.40
September	46.40	36.60	42.24	33.40	48.58	34.40
October	37.25	36.60	33.95	34.40	33.95	35.40
November	37.25	36.60	33.95	34.40	33.95	35.40
December	37.25	.....	33.95	.....	33.95	.....
Year	$43.57	.....	$39.62	.....	$40.83	.....

‡ As reported by W. P. Snyder & Co.

STOCK QUOTATIONS

N. Y. EXCH.†	Dec. 3
Alaska Gold M.	4⅛
Alaska Juneau	1⅛
Am. Sm. & Ref., com.	83
Am. Sm. & Ref., pf.	108
Am. Sm. Sec., pf., A.	93⅛
Am. Zinc	12⅝
Am. Zinc, pf.	39⅝
Anaconda	66⅛
Batopilas Min.	1⅛
Bethlehem Steel	64⅛
Butte & Superior	21
Butte Cop. & Zinc	8⅛
Cerro de Pasco	35⅛
Chile Cop.	20⅛
Chino	38⅛
Colo. Fuel & Iron	38⅛
Crucible Steel	56⅛
Crucible Steel, pf.	90
Dome Mines	12⅛
Federal M. & S.	12
Federal M. & S., pf.	39⅛
Greater Nor., ore ctf	31⅛
Greene Cananea	49
Gulf States Steel	68⅛
Homestake	92
Inspiration Con.	48⅛
International Nickel	32⅛
Kennecott	36⅛
Lackawanna Steel	70
Mexican Petrol.	160⅛
Miami Copper	25⅛
Nat'l Lead, com.	64⅛
National Lead, pf.	104
Nev. Consol.	18⅛
Ontario Min.	7⅛
Ray Con.	22
Republic I. & S., com.	76⅛
Republic I. & S., pf.	99⅛
Sloss-Sheffield	46⅛
Tennessee C. & C.	15
U. S. Steel, com.	96⅛
U. S. Steel, pf.	112⅛
Utah Copper	79⅛
Va. Iron C. & C.	58

BOSTON CURB*	Dec. 3
Alaska Mines Corp.	‡.12
Boston Ely	.80
Boston & Mont.	.15
Butte & Lon'n Dev.	.48
Calaveras	1⅛
Chief Con.	3⅛
Contact	‡.05
Corbin	‡.25
Cortes	.15
Crown Reserve	.20
Crystal Cop.	‡.30
Eagle & Blue Bell	2⅛
First Nat. Cop.	2⅛
Houghton Copper	.30
Intermountain	‡.05
Iron Blossom	.55
Iron Cap	.16
Majestic	.26
Mexican Metals	.27
Mines of America	‡1⅛
Mojave Tungsten	.10
Nat. Zinc & Lead	.10
Nevada-Douglas	‡.39
New Baltic	1
New Cornelia	16⅛
Oneco	.20
Pacific Mines	‡.35
Rex Cons.	‡.05
Yukon Gold	1

SAN FRAN.*	Dec. 2
Alta	.03
Andes	.05
Best & Belcher	.02
Caledonia	.01
Challenge Con.	.03
Confidence	.10
Con. Virginia	.12
Gould & Curry	.01
Hale & Norcross	.03
Jacket-Cr. Pt.	.03
Mexican	.05
Occidental	.40
Ophir	.05
Overman	‡.01
Savage	‡.02
Sierra Nevada	.11
Union Con.	.18
Utah Con.	.01
Belmont	3.80
Jim Butler	.40
MacNamara	.23
Midway	.12
Mont.-Tonopah	‡.13
North Star	.08
Rescue Eula	.08
West End Con.	1.25
Atlanta	.07
Booth	.23
Comb. Frac.	‡.02
Florence	.18
Jumbo Extension	.20
Kewanas	.09
Nevada Hills	.02
Nevada Packard	.36
Round Mountain	.21
Silver Pick	.08
White Caps	.14

COLO. SPRINGS*	Dec. 3
Cresson Con.	4.93⅛
Doctor Jack Pot	.04⅛
Elkton Con.	.07⅛
El Paso	.20
Gold Sovereign	‡.02
Golden Cycle	1.74
Granite	.17
Isabella	.07
Mary McKinney	.08⅛
Portland	1.08
United Gold M.	.15⅛
Vindicator	.41

BOSTON EXCH.†	Dec. 3
Adventure	‡.60
Ahmeek	77
Algomah	.30
Alloues	47⅛
Ariz. Com.	13⅛
Arnold	‡.20
Bingham Mines	‡9
Bonanza	‡.20
Butte-Balakiava	‡.35
Calumet & Ariz.	67⅛
Calumet & Hecla	460
Centennial	‡13⅛
Copper Range	45⅛
Daly West	‡2⅛
Davis-Daly	5
East Butte	11⅛
Franklin	‡14⅛
Granby	‡79
Hancock	‡7
Hedley	‡12
Helvetia	‡.20
Indiana	‡.60
Isle Royale	25⅛
Keweenaw	‡1
Lake	‡5⅛
La Salle	‡3
Mason Valley	3⅛
Mass	‡5
Mayflower	3⅛
Michigan	3⅛
Mohawk	55⅛
New Arcadian	1⅛
New Idria	‡13
North Butte	13
North Lake	‡.40
Ojibway	‡1
Old Dominion	40
Osceola	55
Quincy	‡67⅛
St. Mary's M. L.	42
Santa Fe	‡.50
Seneca	13⅛
Shannon	3⅛
Shattuck-Ariz.	‡16⅛
So. Lake	‡1⅛
So. Utah	.10
Superior	6⅛
Superior & Bost.	3⅛
Trinity	3
Tuolumne	.80
U. S. Smelting	47
U. S. Smelting, pf.	46⅛
Utah Apex	3⅛
Utah Con.	8⅛
Utah Metal	1⅛
Victoria	‡2⅛
Winona	.75
Wolverine	21
Wyandot	‡.50

N. Y. CURB†	Dec. 3
Big Ledge	1⅛
Butte & N. Y.	.50
Butte Detroit	.02
Caledonia	.33
Calumet & Jerome	.50
Can. Cop. Corpn.	2⅛
Carlisle	‡2
Cashboy	.07
Con. Ariz. Sm.	1⅛
Con. Coppermines	6⅛
Goldfield Con.	.30
Goldfield Merger	.09⅛
Greenmonster	‡⅛
Hecla Min.	‡⅛
Howe Sound	4⅛
Jerome Verde	‡.50
Louisiana	‡⅛
Magma	28⅛
Marsh	.03⅛
McKinney-Dar-Sa.	.48
Milford	‡.75
Mother Lode	.35
Nixon Nevada	.35
Ohio Cop.	.75
Rawley	‡12⅛
Ray Hercules	3⅛
Richmond	‡.56
Rochester Mines	.32
St. Joseph Lead	14
Standard S. L.	‡
Stewart	.16
Success	.10
Tonopah	‡3⅛
Tonopah Ex.	2⅛
Tribullion	‡⅛
Troy Arizona	‡.10
United Eastern	4⅛
United Verde Ext.	‡35⅛
United Zinc	‡⅛
Utica Mines	‡.08

TORONTO*	Dec. 3
Adanac	.09
Bailey	.03
Beaver Con.	.38
Chambers Ferland	.10
Coniagas	‡3.00
Hargraves	.02
Kerr Lake	5.75
La Rose	31⅛
Lake Shore	.90
Min. Corp of Can.	‡2.50
Nipissing	8.50
Peterson Lake	.08
Temiskaming	.31
Wettlaufer-Lor.	.03
Davidson	.65
Dome Exten.	.24
Dome Lake	.18
Hollinger	6.25
McIntyre	1.75
Newray	.12⅛
Porcu. Crown	.20
Teck-Hughes	.25
Vipond	.20
West Dome	.12

* Bid prices. † Closing prices. ‡ Last quotations.