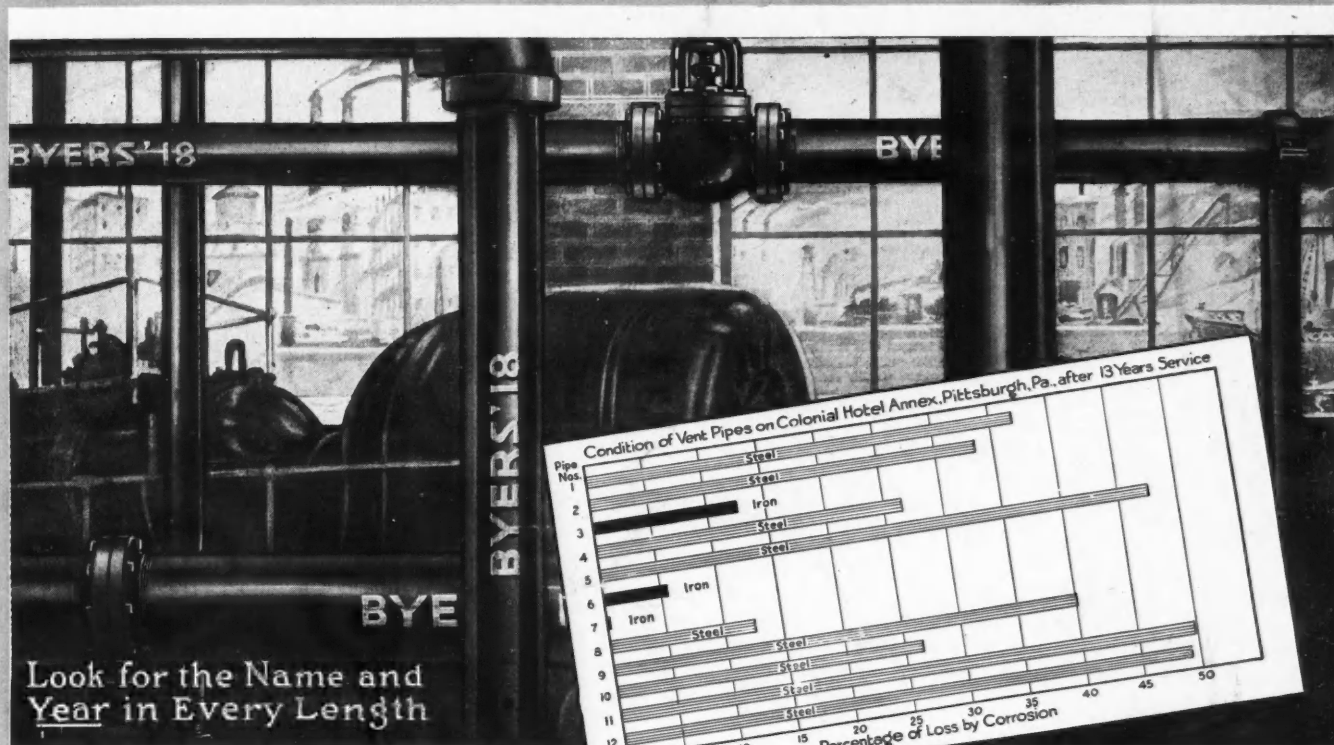


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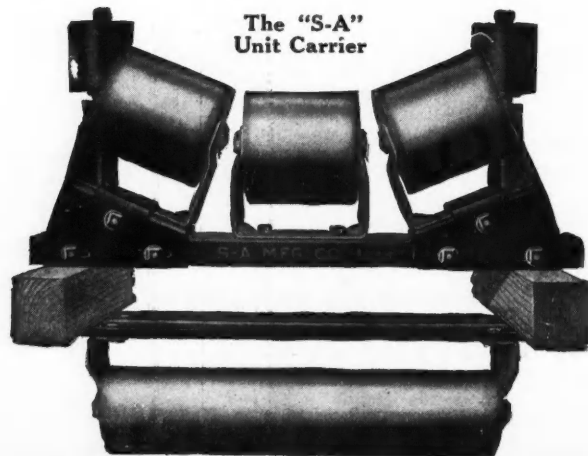
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AN OLD CUSTOM MILL AT SILVER CITY, NEVADA

Co-öperation Among Small Mines

By GEO. J. YOUNG

The suggestion is made that greater success would attend the development of the small mining district if the owners would coöperate, and the need for standard designs for small milling and

mining plants is pointed out. Coöperation in securing geological advice, engineering direction, and metallurgical assistance, and centralized buying, storage and transportation are urged.

MUCH attention may be focused upon the large plant, but the small one usually escapes the consideration that it deserves. The ore-treatment problem that confronts the owner of a small mine is not without its peculiar difficulties. There is, first, the uncertainty as to the size of the orebody. Usually development is not extensive, and the pressure for immediate financial return that follows the discovery and partial development of an orebody is great. The owner of the property, often a practical miner, but sometimes an impractical business man taking a "flier" through the persuasion of a "mining man," wants to see the gold or silver "come out" as rapidly as possible. The result of this entirely natural desire is often the determination to erect a mill before conditions justify the building of one.

A practical millman is consulted, and several pieces of ore are handed back and forth between the interested

parties, and a decision to erect a stamp mill or a "cyanide mill" is made in less time than it takes to tell it. The principal mechanical features of the mill are selected, and, after consultation, perhaps, with a machinery salesman, the purchase of the equipment is made. A practical millwright is employed to erect the mill, and a milling plant quickly appears in more or less close proximity to the mine. The success of the outcome depends upon fortuitous circumstances, but the interesting fact is that not all of such plants are failures. Mistakes are many, but if the ore supply holds out, and the various mill superintendents that succeed one another add a little here and there, rearrange equipment and discard useless machinery, a plant is finally evolved that functions moderately well and that may even prove economical. The result is looked upon as a great success, and the relatively large cost of the achievement and the loss of time are ignored. Many

attempts of this kind, however, result in complete failure.

The small size of the mine, the local character of the enterprise, and the reluctance of the owners of the property to secure proper technical advice are the principal causes for the difficulties described. To some extent at least it can be said that such enterprises are not particularly attractive to the professional engineer, for they often demand a disproportionate amount of work for the fee involved, and sometimes it is difficult to collect the money due for services. Nevertheless the work is of importance, for the success of the small mine contributes to the success of the mining industry as a whole. It is worth while, and needs only intelligent thought and coöperation of the owners of the several mines that grow out of the discoveries made in the

were primitive. It is difficult to conjecture the result of the establishment of a single custom plant of good construction and with proper sampling facilities in a district like the one described, but I venture the opinion that not only would the plant have been a success, but mining would have been greatly stimulated. In this as in other cases the great difficulty would have been the securing of the coöperation of the various mine owners, most of whom were men of small means, and many of whom would have been reluctant to assume a share in a coöperative enterprise.

The second property (Fig. 1) is the Eureka tailings plant, that was operated successfully upon tailings from the early milling operations at Virginia City, and which, before its reconstruction, was a custom mill that had treated Virginia City ores. The illustration is selected

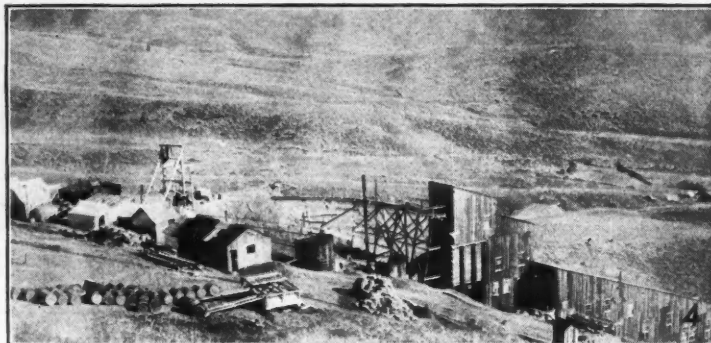
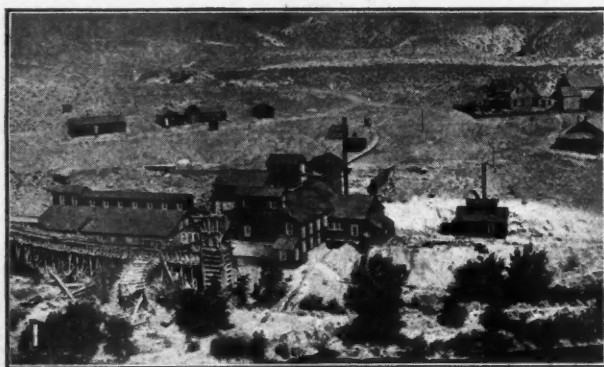


FIG. 1. EUREKA MILL TAILINGS PLANT
FIG. 3. MAYFLOWER MILL, PIONEER, NEVADA

FIG. 2. UNIONVILLE MILL, HUMBOLDT COUNTY
FIG. 4. REX MINE AND MILL, GOLD CIRCLE, NEVADA

vicinity of the first property developed in a small mining district.

To illustrate some of the peculiar conditions that the small mine and milling plant must meet, I have selected six from a number of photographs of Nevada plants given to me by Herman Davis. The first is a small custom stamp mill in Silver City. It is one of three similar plants, all of which are situated close together.

In the vicinity of Silver City are a number of small mines which are worked irregularly by owners, tributers and lessees. The ore is brought down to the mills in large wagons. The haul is down grade in practically every instance. Water power is used generally, as high-pressure water from the Virginia City water system is available. The ores yield 60 to 70% by amalgamation, and the tailings are treated in a small leaching plant which lies below the tailing ponds of all three plants. The ore supply at the time I visited the district was irregular, but sufficient to keep two of the plants in more or less constant operation. Sampling conditions

to show the conditions in the heyday of Virginia City. Many of these custom mills were situated on the Carson River, that they might take advantage of the water-power available there. They were inconveniently placed with respect to the mine, and the transportation of ore to the plants entailed difficulty and expense.

The third plant (Fig. 2) was erected to treat the low-grade silver ores of the Arizona mine, at Unionville. It was erected in 1911, and was planned as an all-sliding plant. A distillate engine was used for power purposes. A hillside site close to the mine opening was selected. The enterprise proved unsuccessful, owing partly to failure to attain the 50-ton capacity planned and also to the low-grade ore, which yielded a recovery less than the aggregate operating costs. Apparently in this instance the conditions were favorable, but the long haul from the nearest railroad point and mistakes in the selection of the milling machinery contributed as much as did the mining difficulties to the lack of success.

The fourth plant (Fig. 3) is the Mayflower mill, at Pioneer, in the Rhyolite district. It was situated close to the shaft's mouth, and is another example of a mill built in anticipation of an adequate ore supply. The company went into liquidation; and in 1910, when the photograph was taken, the mill was being operated by the receiver. Rhyolite was a boom camp, and what its success would have been had it been operated as a cooperative mining camp with a central custom mill it is impossible to say.

The fifth plant (Fig. 4) is the Rex mine and mill, at Gold Circle. The illustration is an excellent one of the type of mushroom camp that sometimes precedes the establishment of a more permanent one. The plant is compactly arranged, and only timber, supplies, and distillate had to be transported the considerable distance that separated it from the nearest railroad point. It was operated by Herman Davis in 1911. The mill contained a five-stamp battery and a tube mill. The ore was treated by cyanidation. The power difficulty was met by the use of distillate engines.

The sixth plant (Fig. 5) is the mill of the Darby Reduction Co., at Mazuma. It is probably the best attempt of those illustrated to provide an adequate plant

In a review of the small-mine problem as a whole, I am impressed with the fact that there has been much wasted effort both in labor and in the unwise purchase and duplication of equipment, not only in the mining end but also in the milling. The solution that suggests itself is that here is a field for the well-trained technical man, both mining engineer and metallurgist, if cooperation among owners of properties can be secured.

The situation finds its parallel in unrestrained competition in business. Team work directed toward the common interest is essential. If mine owners in a small new district would pool their interests and secure the services of a well-qualified mining engineer to direct their exploration and select their equipment, as well as to assist in attracting the necessary capital, I feel sure that a larger measure of success would be attained and a more substantial development of the small district would result. Discovery would be followed in sequence by development that could be first concentrated upon the most favorable part of the mineral area. Facilities for transportation could be arranged, and road improvement that no one individual could attempt might easily be provided for by a cooperative organization. The same organization, if success followed mining op-



FIG. 5. MILL OF THE DARBY (NEVADA) REDUCTION CO., MAZUMA, NEVADA

for a small district. The mill was equipped with an automatic sampler of the Vezin type, ten 1000-lb. stamps, a 4 x 17-ft tube mill, Dorr classifier, amalgamating plates, four agitators and an Oliver filter. It contained practically all of the elements of a successful custom plant and was well designed and constructed. What its success has been and how well it has served the Seven Troughs and Mazuma district I am unable to say, but details of its past history and present position would be interesting. Some one familiar with the enterprise should present it to readers of the *Journal*.

These plants and a number of others suggest that there is an opportunity for some metallurgical engineer to thoroughly standardize the small milling plant along the lines of compactness, good mechanical design, wise selection of crushing and power machinery, minimum labor requirement and simple erection. In a similar manner the mining plant could be designed. A standard prospecting unit that could readily be erected and transported and would serve to maintain a moderate output with a minimum of labor and supervision is easily within the possibilities. Portable buildings of a type suitable for initial operations also merit the attention of the designer.

erations, could readily secure the best metallurgical direction; and ore-treatment facilities could be arranged after a plan that larger companies invariably follow. There are many practical difficulties with cooperative organizations, and probably more in mining than in other industries, but I feel that greater and more satisfactory progress will result from consistent get-together effort among the miners in a small, new district.

It is impracticable to lay down hard and fast rules for cooperation that would apply satisfactorily in any particular case, for each would have its own peculiar conditions. It would, however, seem reasonable to suppose that in the following objectives a working plan could be arranged: I refer to the securing of competent geological advice, mining engineering direction, metallurgical engineering assistance, and buying, storage and transportation organization. In the last-mentioned objective, great economy should result, even if the first three suggestions were impracticable of realization. Though I am not aware of actual examples along the lines suggested, the success of cooperation in the Safety-First movement, as exemplified by the Tonopah Mine Operators' Association or the California Metal Producers' Association, is such as to be distinctly encouraging.

Standardization of Mining Methods

I—Standard Raises

By CHARLES A. MITKE*

Standardization of mining methods is one of the essential factors in the operation of mines for the purpose of insuring maximum production at a minimum cost. The aim of this paper is to describe the arrangement and the methods of timbering the different compartments in several types of raises, and the development of a standard raise.

THE subject of standardization is now receiving much thought and consideration and the details of application to various lines of industry have proved of inestimable value, resulting in an enormous increase in production. The satisfactory results obtained from the standardization of certain special phases of mining work have led to the belief that the working out and adoption of standard methods of operation, suitable for average mining conditions, will be of economic importance in offsetting the increased costs of production, and will prove equally beneficial both to the management and to the worker.

EXPANSION OF OPERATIONS MAKES STANDARDIZATION INCREASINGLY IMPORTANT

The daily work in the average mine consists of a great variety of operations. For years it was the custom, and in fact was considered absolutely necessary, for the superintendent to give his personal attention to all matters of daily routine, and to decide even the minutest details connected with the working of the mine. Under these circumstances, everything was conducive to specialized tasks, and no particular effort was made toward standardization of either operations or supplies. Such a condition, though possible in small mines, was not practicable in larger properties, and as the mines developed and production increased it became impossible for one man personally to supervise every detail. Responsibility was necessarily divided among a number of departments, the heads of which were directly responsible to the superintendent. This development led to individualism, and it became necessary to formulate standardized rules and regulations for the guidance of all the different departments.

NEED FOR UNIFORMITY IMPERATIVE

In the mining department tools and supplies required by the organization had hitherto been purchased according to the individual judgments of the foreman, in consultation with the superintendent. For example, one foreman preferred one type of machine, though another showed a partiality for an entirely different make. He might have his drifts driven larger, or his timbers cut in different lengths, and so on. This necessitated the carrying in stock of a large supply of repair parts for the different machines, steel, and varied miscellaneous supplies and equipment, and extra cutting of timbers both on

surface and underground, all of which contributed more or less toward inefficiency and higher costs. It became evident under such circumstances that there was a great need for uniformity, first of all in the supplies and later in the operations.

As a preliminary step, the question of stope timbers was taken up, and suitable dimensions for the average square set were decided upon and adopted. The same principle was applied to timbers used in other stoping methods, drift timbers, tunnel sets, and similar equipment. Finally, the trend toward standardization was developed to such an extent that practically all the timbers used underground were cut to standard sizes. Efforts were made toward standardizing machines and supplies, but the results were not markedly successful. One company which claimed to have made advances in this direction found upon investigation that there were 28 different types of machines in constant use in its mines and about seven kinds of steel.

The standardization of underground operations also presented a difficult problem. The majority of miners, as a rule, move around a great deal, and in every camp men may be found who have gained their experience in mines where conditions are entirely different from those under which they may happen to be working. Consequently, in order to systematize operations it was found necessary to deviate from the accustomed practice of "telling a man what you want done and leaving the rest to his own judgment," and, as an alternative, to create a new precedent by "telling him what you want done, and then showing him the most approved method of doing it." This rule was especially applicable in teaching inexperienced men how to mine.

DEVELOPMENT OF THE STANDARD RAISE

Raises generally contain several compartments, which are used as manways, timber slides, ore and waste chutes, and for ventilation. In a few exceptional cases a raise is put to one use only, in which event it has but one compartment, and may or may not have any timber, according to the character of the ground through which it is driven. The importance of raising is evident when it is considered that between 400 and 500 raises are continually in process of being driven in the Southwest, at costs ranging from \$3 to \$30 per ft. The extraction of ore and the exploratory work necessary to keep up or increase ore reserves require that approximately this number of raises be kept "running"; and, as a rule, when some are completed others are immediately started.

CHARACTER OF EARLIER TYPES OF RAISES

In the past, raises were driven according to the designs of individual shift bosses and foremen, and exhibited wide diversity of construction, not only in the different camps and mines, but in the divisions of a mine itself. The result was that two raises, side by side, were often entirely different in dimensions and construction. This lack of method proved inefficient and wasteful, as every raise was made a special case,

*Mining engineer, Bisbee, Arizona.

and the men were unable to begin work without minute directions from the foremen and bosses. These bosses, in turn, would have two or three types in mind, and would have one type constructed in one place and another type in the next, and so on. In many of these designs the openings in the landings were so small that the men had difficulty in getting through; and, as there were platforms only about every 50 ft., and in some few cases none at all, this presented a dangerous condition, and one likely to be the cause of serious accidents.

INFLUENCE OF SAFETY-FIRST MOVEMENT

When the Safety-First movement was introduced in the Southwest, about four years ago, some of the first steps toward improving conditions were to cover all chutes and manways, put in more landings, and pass laws determining the distance between platforms in all manways, which reduced the number of accidents, but decreased the workers' efficiency by cutting off the ventilation almost entirely, the chute and manway covers being practically air-tight. In some mines, ventilated by mechanical means and in which the working places had become comparatively cool, the temperature began to increase, and the mines became almost as hot as formerly. It was, therefore, evident that something had to be done in designing chutes, manways, timber compartments and safety guards, to meet conditions which the natural development of the mines had created. This led to the necessity for a standard raise. It was essential that such a raise should combine the utmost safety with the most efficient working conditions, and at the same time admit a maximum of pure air in order to ventilate the mines thoroughly. Inasmuch as safety and ventilation make for efficiency, and efficiency contributes to economy, it was the consensus of opinion that the proposed raise must meet these four important requirements; and that when designed and adopted as the standard the results would be beneficial both to the men and the company.

In the issue of Jan. 18 of the *Journal*, under the caption, "Training a Mining Organization in Efficiency Methods" (Copper Queen Consolidated Mining Co.), an outline was given of the methods adopted by a corporation to encourage members of its operating force to make suggestions and recommendations which might prove of value in the development and operation of its mines. Recognizing the importance and necessity for a standard raise and the possibilities, in the way of suggestions and helpful criticism, that might result from the united efforts of the entire organization, an announcement was made at one of the Copper Queen company's mining conferences to the effect that every one in the organization was to be given an opportunity of working out a design for a standard raise which would comply with the necessary requirements. It was arranged that all suggestions were to be sent to me, and that I was to aid and assist the men in having their individual designs worked out intelligently, so that these could be presented either in the form of models or drawings, accompanied by descriptive papers. The following specifications were therefore drawn up:

SAFETY

1. Inclined ladders are preferred to straight ladders, as there are cases on record where men who have become unconscious through being gassed have fallen on inclined

ladders and remained there until taken to a place of safety, whereas on vertical ladders they would have fallen and suffered severe injuries. Inclined ladders are also easier to climb.

2. A landing in every set. (A set is usually about 8 ft. high.) A man climbing up with tools and supplies is likely to drop something or knock a rock off from the sides of the manway. Should any one be following him, these landings would prevent his being injured by anything falling from above.

3. Manways should be large enough to allow the passage of a man wearing an oxygen helmet.

4. Timber compartment should be of sufficient size to permit an injured man to be lowered through it in a basket.

5. Safety guards, about 3½ ft. high, should be placed around the chute and manway at the top of the raise to prevent men from falling in. Grizzlies, about 8 in. apart, should be put over chutes. These may be rails or large timbers. Small rails or gratings should be laid over timber compartments.

VENTILATION

The area in the timber compartment and manway should be of a size to allow at least 300 cu.ft. of air per min. to pass through for each man in the stope. If there are a large number of men in the stope it will take a proportionately large number of raises to supply the amount of air required.

EFFICIENCY

1. The ladders and landings should be so arranged that men can climb up and down without inconvenience, even when carrying powder and other supplies.

2. The timber should all be of standard size, so that when an order is sent to the sawmill, all timber for the raise may be cut on the surface and then sent down to the place where it is to be used. This obviates the necessity of any sawing underground.

3. The raise set, with few exceptions, should be the same height as the stope set, that the timbering of the raise may match the timbers of the stope, and allow workings from the raise set to be continued into the stope.

4. The bottom of the chutes should rest on solid ground, not on wooden flooring. The solid ground will not give way when ore is dumped on it from above, and it requires only a chute mouth, whereas a wooden chute bottom would need a great deal of repairing.

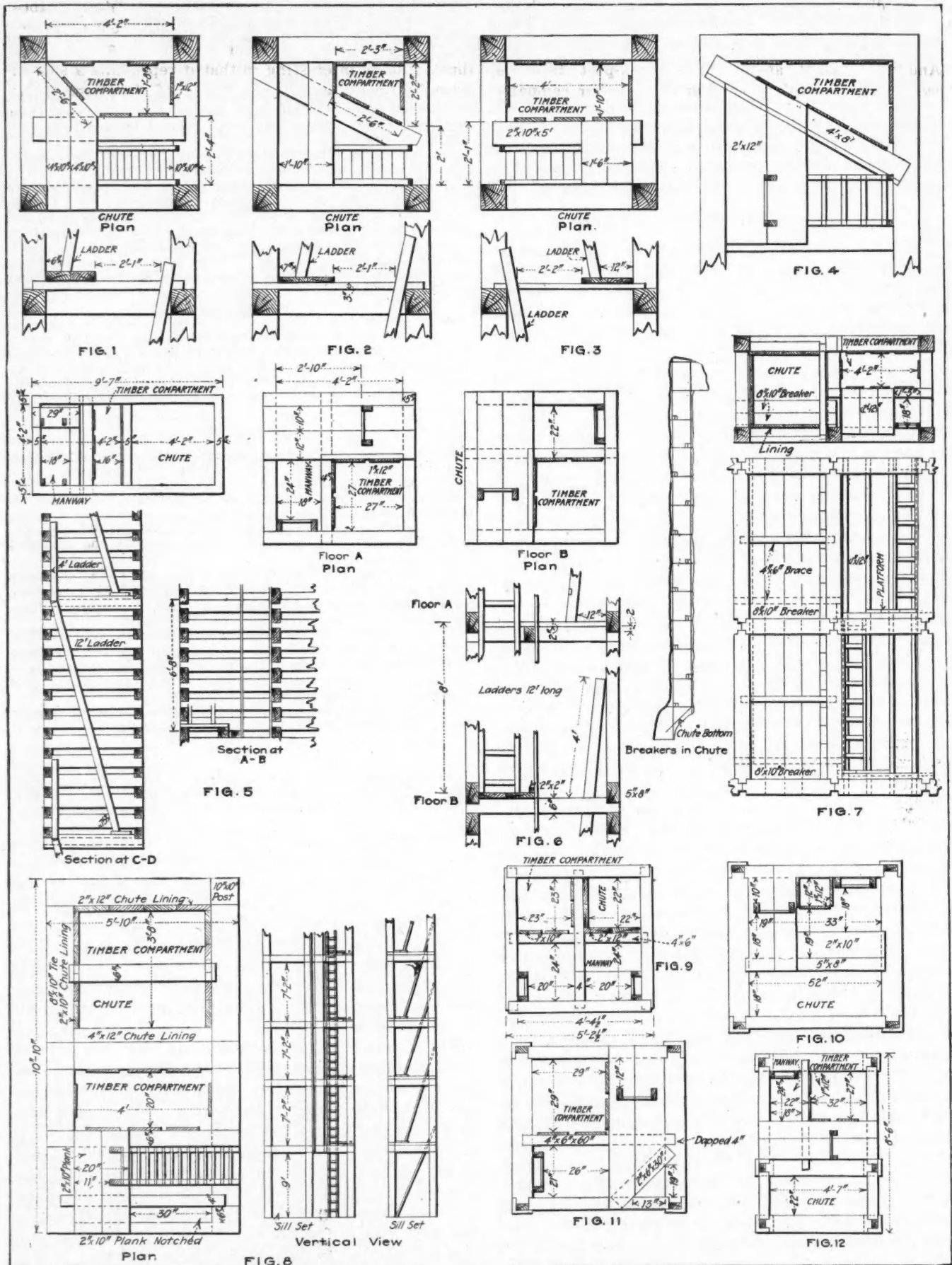
5. The timber compartment should be large enough to allow of timbers being hoisted into the stope.

ECONOMY

As the cost of raising in general is high, varying from \$3 to \$30 per ft., it is important that expenditures for labor, timber, and other requisites be reduced to a minimum.

The working force evinced much interest and enthusiasm over the specifications outlined, and there was no little friendly rivalry between the bosses of the different divisions. At consecutive meetings of the Copper Queen mining conference, the shift bosses presented outlines of their individual plans, which were discussed, the relative merits and defects being brought out, and several ideas set aside for further consideration. A brief description of some of the more important designs submitted follows:

Fig. 1 represents the first attempt at a new type of raise, showing manway and timber compartment. The manway has incline ladders, arranged as shown in both the plan view and vertical section. This plan was worked out by one of the bosses and is designed for a six-post raise. The area of the chute is equal to that of the manway and timber compartment combined, but the drawing of the chute is omitted. The air space, for ventilating purposes, in the timber compartment is 5.2 sq.ft., and in the manway 3.4 sq.ft., making a total of 8.6 sq.ft. Criticism on this raise was that it was somewhat complicated, as the boards in the landings required extra cutting for each floor. It contained an angular timber compartment, and the manway was situated near the chute, which meant that it would al-



TYPICAL DESIGNS FOR RAISES SUGGESTED BY EMPLOYEES

ways be dirty from fine ore working out of the chute. This raise failed from the standpoints of efficiency, economy, and ventilation.

Another attempt at a standard six-post raise is shown in Fig. 2, with a much smaller timber compartment. It is also difficult to make, as miners seldom or never have a full set of carpenter's tools. Another objection is that the timber compartment has an area of only 2.8 sq.ft., and the manway, only 3.5 sq.ft., making a total area of but 6.3 sq.ft. Criticism of this raise showed that the design was inefficient, uneconomical, and imperfect as regards ventilation.

In Fig. 3 the manway and timber compartment contains the largest area for ventilating purposes among the designs thus far considered, the total number of square feet of air space being 10.1. It is designed for a six-post raise, is easily built, and there are few objections from an operating standpoint. It has a large timber compartment, permitting an injured man to be lowered through it in a basket. There is also room for a helmet man to go up and down the manway after two 1 x 12-in. boards are loosened.

Fig. 4 shows a rather complicated manway for a six-post raise and presents many difficulties from an operating standpoint. The air space in the timber compartment is 4.5 sq.ft., and in the manway 3.6 sq.ft., making a total of 8.1 sq.ft. The helmet men can go up and down the ladders, but the building of this manway would be difficult and expensive. It failed in economy and efficiency.

In Fig. 5 the manway and timber compartment is similar to that shown in Fig. 3, but is designed for a crib raise, whereas Fig. 3 is intended for a six-post raise. The timber compartment contains 5.7 sq.ft. and the manway 5.3 sq.ft., making a total of 11 sq.ft. It is therefore especially advantageous from the standpoint of ventilation, and there is considerable room at the different landings to go from one ladder to another, so that it also fulfills some of the efficiency requirements. Also, most miners are familiar with this type of manway, which is a decided advantage. One criticism was that the ladders were 12 ft. long, which was an objection from the point of view of safety.

Fig. 6 shows another type of manway for a crib raise, with a good-sized compartment for hoisting timber—large enough for a man to be lowered through in a basket. In case of necessity a helmet man with apparatus can climb up and down the ladderway. The timber compartment contains 5.1 sq.ft., the manway 3.3 sq.ft., making a total of 8.4 sq.ft. The ladders are inclined. This raise fulfills the requirements regarding efficiency, as it contains a good traveling manway.

The manway illustrated in Fig. 7 shows all ladders arranged vertically, although they are only one set high. As regards ventilation, there is a total area of 9.6 sq.ft. A novel idea is shown in the chutes, as breakers are placed in each set on opposite sides of the chute (as indicated in drawing on the left in Fig. 7). Any ore which starts from the top will not drop down vertically and form a solid mass in the bottom of the chute, but will strike these breakers, zigzagging from one to the other until it reaches the bottom. A chute of this sort seldom needs punching, as it rarely "hangs up." The manway is easily made, but did not prove popular with the men, although it is used in several other camps.

The square set raise shown in Fig. 8 contains a total air space of 13 sq.ft. It has two timber compartments, and may have either vertical or inclined ladders. The illustration is interesting in that it represents a smaller chute but larger air space. The chief objections raised were high cost of construction and cost of upkeep, as the chute would have a tendency to break, not only on the manway side but on the opposite side, where it would be difficult to make repairs.

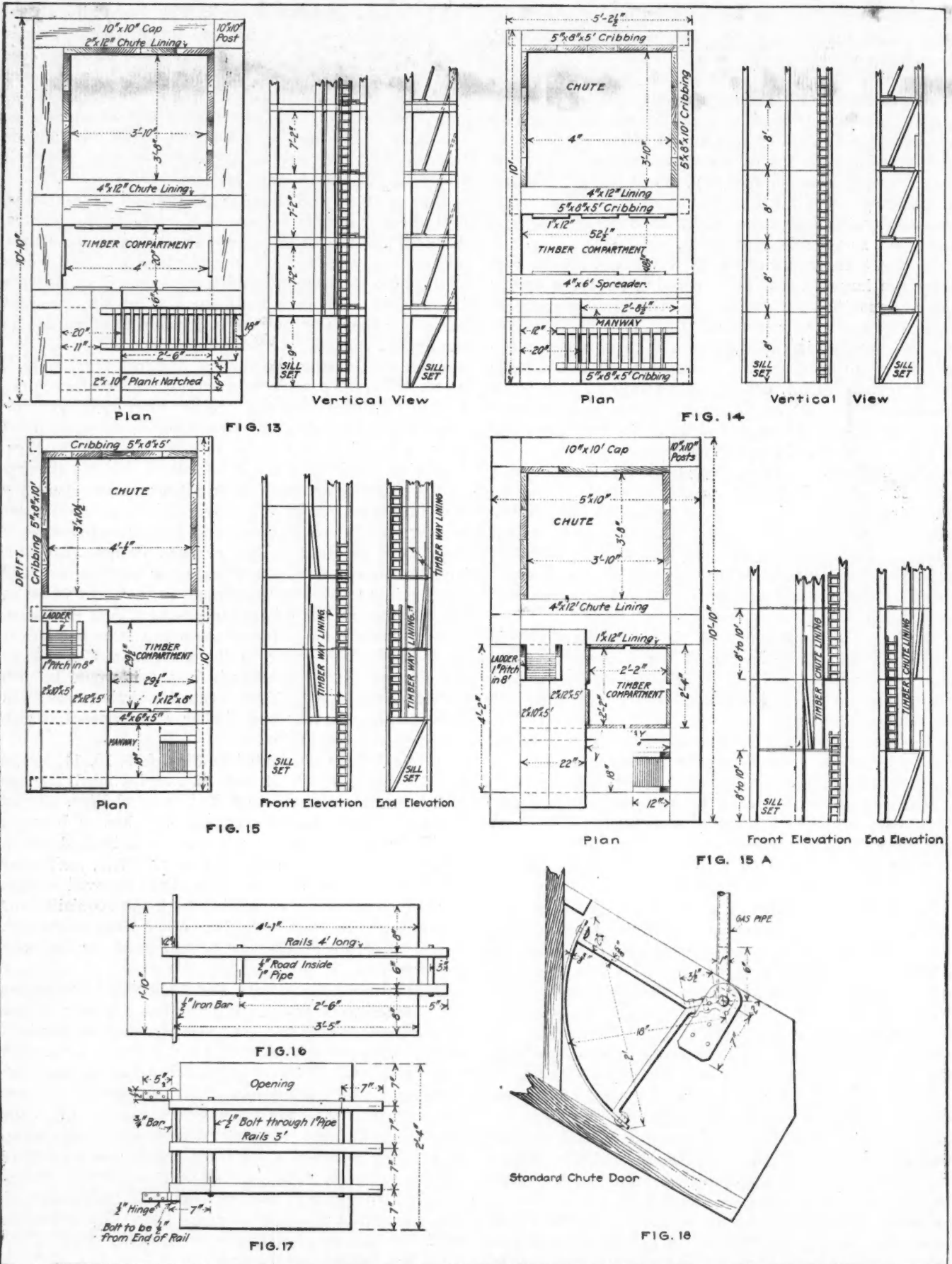
Figs. 9, 10, 11 and 12 are types of small special raises, containing manways, timber compartments, and chutes, designed for use in top slices, small square set stopes, and similar workings. The advantage of small raises of this kind is that they require openings driven through the ground only about half the size of the standard raise, but they also possess a decided disadvantage in the limited capacity of their chutes.

After considering the various designs, Figs. 3, 5, 6, 9, 10, 11 and 12 were selected as representing ideas having considerable merit. Slight alterations and improvements, however, were made to the original plans of Figs. 3 and 5, as may be seen by referring to Figs. 13 and 14. In Fig. 13 it will be noticed that the changes in the manway are such as to allow greater space for traveling, and stronger construction, heavier timbers being used in the manway and timber compartments than were required in the original design (Fig. 3). Fig. 13 also shows a greater area for ventilation. The chief points of difference between Figs. 5 and 14 lie in the fact that in Fig. 14 the ladders have been shortened so as to make it safer for a man going from one ladder to another. According to the design in Fig. 14, he can fall only 8 ft.; whereas in Fig. 5 it would be possible for him to drop 12 ft. Smaller timbers are used between the manway and timber compartment, which improves the ventilation.

Of the designs illustrated in Figs. 6, 9, 10, 11, 12, 13, and 14, Figs. 9, 10, 11 and 12 are intended for use in the special cases mentioned above, and Figs. 13 and 14 are designed to meet conditions when it becomes necessary to construct a manway in a limited space. Fig. 6 was found to have many possibilities, and, after a few minor changes were made, the improved design, Fig. 15, came nearer complying with the requisites for a standard raise than any of the other plans submitted. It was therefore adopted as the standard for the company's mines.

In comparing Fig. 6 with Fig. 15 it will be seen that the changes were slight. Fig. 15 has a larger timber compartment than Fig. 6, and also larger sized openings in the different landings of the manway. Fig. 15A is identical with Fig. 15, with the exception that the latter gives the dimensions of a manway and timber compartment for a crib raise, whereas Fig. 15A is the same design for a six-post square set raise, using 10 x 10-in. timbers. Experience has shown that there are few accidents in a manway of this kind, as it contains all the safety requirements, is satisfactory as regards ventilation and efficiency, and also possesses the following advantages:

1. The ladders are inclined.
2. It is impossible for a man to fall more than one set, which is about eight feet.
3. A man going up the ladder with supplies would not injure any one below, should he drop anything.



TYPES OF RAISES, GRATINGS, AND A DESIGN FOR CHUTE DOOR—FIG. 15 AND 15A ARE RECOMMENDED AS "STANDARD RAISES"

4. The timber compartment is large, allowing an injured man to be taken through in a basket.

5. A man wearing an oxygen helmet can get through all the openings.

6. On top of the raise there are guard rails 3½ ft. high around the chute and manway. A grating, illustrated in Figs. 16 and 17, is put over the timber compartment, and grizzlies of either timber or rail are laid over the chutes.

7. From the point of view of ventilation, the area is sufficient to allow 942 cu.ft. of air per min. to pass through when the air is moving at a velocity of 100 ft. per min., which is sufficient for three or four men in a stope of ordinary size. If the stope is larger and has more men working in it, additional raises should be put up to increase the quantity of air in proportion to the number of men. The extra raises will also give additional chute capacity to take care of the increased tonnage.

8. All timbers are of standard size; therefore no cutting underground is required.

9. The openings through the landings are large and roomy, so that a man may easily pass through them.

10. Timber can readily be hoisted through the timber compartment into stopes.

11. The solid ground is left at the bottom of the chute, so that the ore, which drops 100 ft., will strike on the solid and not wear out any chute bottoms, which must be replaced from time to time. Only a chute mouth is put in, which requires little repair work.

12. The construction of such a raise is economical on account of its simplicity, standard length of timbers and the fact that most miners are more or less familiar with it. It has proved a success at the Copper Queen company's mines, and has also achieved considerable popularity in other camps in the Southwest where it has received a fair trial.

STANDARD GRATINGS FOR TIMBER COMPARTMENTS

Fig. 16 illustrates the style of grating to be placed over timber compartments of the Figs. 13 and 14 type, and Fig. 17 represents the grating for Figs. 15 and 15A. These gratings should both be of standard size (as indicated in the drawings) and made in the company's shops on the surface. When they are taken underground, the only thing necessary is to fasten the hinges to the timbers on the sides of the raise.

STANDARD CHUTE DOOR

A circular chute door is shown in Fig. 18 which is to be used in the chute of the standard raise (Figs. 15 and 15A). This door is convenient and is easily operated with a piece of gas pipe, which is used as a lever. Though the raises, gratings, and door described are given as the standards in their particular line, this does not in any sense imply that they may not be changed should a better way be worked out. They merely represent the best-known and most efficient method at the mines in which they have been installed.

The word "standard" is likely to be misleading in that it has two meanings, its most commonly accepted definition indicating something which has attained a state of perfection and is therefore not subject to change. However, in its application to working methods

it has a much broader interpretation, and it has been defined thus:

"A standard is simply a carefully thought out method of performing a function, or carefully drawn specifications covering an implement or some article of stores or of product. The idea of perfection is not involved in standardization. The standard method of doing anything is simply the best method that can be devised at the time the standard is drawn. . . . Improvements in standards are wanted and adopted whenever and wherever they are found. There is absolutely nothing in standardization to preclude innovation. But to protect standards from changes which are not in the direction of improvements, certain safeguards are erected. These safeguards protect standards from change for the sake of change. All that is demanded . . . is that a proposed change in a standard must be scrutinized as carefully as the standard was scrutinized prior to its adoption. Standards adopted and protected in this way produce the best that is known at any one time. Standardization practiced in this way is a constant invitation to experimentation and improvement."—Morris L. Cooke, Bulletin No. 5, Carnegie Foundation Series.

Personal Injuries in Utah

BY A. L. H. STREET*

The right of alien and non-resident wives and children to recover damages under the laws of Utah for death of their husbands and fathers while engaged in mining in the state, and due to negligence of their employers, is upheld by the U. S. Circuit Court of Appeals, Eighth Circuit, in the case of *Bianco vs. Bingham Mines Co.* (246 *Federal Reporter*, 936), a suit based on death of a miner whose family continued to reside in Italy.

But, reversing a judgment entered by the trial court in plaintiff's favor, and ordering a new trial, the Circuit Court of Appeals holds that error was committed, in the reception of evidence at the trial, tending to show that after decedent was killed through a dangerous condition of a trolley wire, which had been negligently permitted by the employer to exist, as claimed by plaintiff, the wire was reconstructed. "It is the settled doctrine of the courts of the United States," says the opinion, "that in actions for injuries alleged to have been caused by defective machinery, appliances, or places of work, evidence of subsequent alterations or repairs has no legitimate tendency to prove negligence at the time of the accident and is calculated to prejudice the defendant."

Quarry Accidents in the United States in 1916, according to Technical Paper 193 issued by the Bureau of Mines, resulted in 173 fatalities and 13,427 injuries, classified as follows: Resulting in permanent disability, 26; partial disability, 446; other serious, 2194; slight accidents resulting in loss of less than 14 days' time each, 10,761. Reduced to a basis of accidents per 1000 men employed during 300 days, fatalities were 2.26 and non-fatal injuries 175.62. Marble quarrying had the lowest rate of fatalities, 1.16 per 1000, and trap-rock quarrying the highest, 4.45 per 1000. Statistics are given of accidents in the quarries of Belgium, France, Great Britain and Italy, which indicate that the fatalities seldom reach 1.00 per 1000 per year.

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"Sengite," a New Explosive*

By J. P. UDAL

TOWARD the end of last year, when news was received in South Africa that the supply of glycerin for explosives for the mines would have to be curtailed, the staff at the Umbogintwini Factory, of Kynoch, Ltd., gave consideration to the development of an explosive for Rand rock-breaking, with a guncotton base, to take the place of the ordinary nitroglycerin explosive. Tonite is a well-known explosive of this nature, and naturally it was the first to be made, and it was found that, by substituting nitrate of soda for nitrate of barium, which has usually been used for tonite, an explosive of approximately similar strength to gelignite could be produced.

Tonite in its simplest form consists of guncotton well incorporated with nitrate of barium, hydraulically pressed, and afterward dried. In pressing, a recess is left in the cartridge to take a detonator, and it is fired with a detonator in the same way as ordinary gelatinous explosives. Such an explosive, with nitrate of soda in place of nitrate of barium, might be made and applied with satisfactory results as a substitute for gelignite, but research at Umbogintwini showed that it was possible to leave a sufficient proportion of water in the cartridges without appreciably reducing their blasting strength, with the great advantage that the explosive was perfectly safe to handle, as it was so insensitive to shock as to withstand hammering with a steel tool, so that accidents in mining caused by drilling into unfired holes would not occur when this explosive was used. On the other hand, the new explosive cannot be reliably detonated with an ordinary detonator such as is used for tonite or gelignite, but it has been found that it will detonate with absolute regularity if it is loaded in a hole and fired with a primer cartridge of gelignite or gelatin.

The new explosive was licensed for manufacture under the name of "sengite" in January this year. The first four letters of this name are the initial letters of "Substitute explosive—No glycerin," and it has been suggested that the last three letters "ite" mean "in this explosive," but "ite" is the ending which appears to be essential for the name of any new explosive, and without which it will not break rock!

The process of manufacture is to incorporate the various ingredients thoroughly, clean, sieve, blend, and finally hydraulically press them into the shape of the cartridge, under a pressure which is from five to ten tons to the square inch. This requires a set of machines which have to be specially made. For the last four months, several tons per week of "sengite" have been sent to the various mines of the Witwatersrand for use underground, at first experimentally, with the result that, after a month's trial, the industry decided to order it in larger quantities, so that it became necessary to design machinery for this output. Machinery is now being manufactured in Johannesburg to turn out from 5000 to 10,000 cases monthly, and this machinery will be erected at Umbogintwini as it is finished, so that by

July it is hoped that half of this output may be produced and the full amount during the next few months.

Owing to the small quantity which it is yet possible to make, only a few cases weekly have been supplied to each of the various mines on the Rand, and the application of the explosive has been usually to charge holes with alternate cartridges of gelignite and "sengite," the primer cartridge always being gelignite. The regular report which has been obtained, as the result of this work, has been that "sengite" cartridges are, as near as possible, an equivalent for the same weight of gelignite, and the various mines which have reported have expressed their willingness to use it as a substitute when it can be produced.

When loaded in this way, with alternate cartridges of gelignite, the value of "sengite" from a safety point of view is lost, because, if such a hole were drilled into after a misfire, the gelignite would make the charge almost as dangerous as gelignite by itself.

Experiments have been made at the Nourse mines with primers of T.N.T. without any gelignite primer at all, in holes loaded with "sengite" only, and the report is that these show equal results to holes loaded with gelignite. It may be that, from the safety point of view, this can be shown to be an improvement over the firing of the holes with a primer cartridge of gelignite, but, on the other hand, it is quite possible that experience may prove that the single primer cartridge of gelignite does not introduce much extra source of danger, as misfires nearly always occur toward the bottom of the hole, on account of the hole being cut off from the top by an explosion in another hole. At any rate, this is a point which can be found by experience when ample supplies of "sengite" are available, and after it has been largely used without alternate cartridges of gelignite, and with only the primer cartridge gelatinous or sensitive to shock.

The cost of "sengite" is, under present conditions, slightly greater than that of gelignite, and, as long as the present pre-war controlled price of glycerin remains, it is probable that this small extra cost of "sengite" will remain, so that, with this difference in cost, it will be required only in such quantities as will make up for the shortage of glycerin. For the present, therefore, "sengite" may be claimed as an explosive which will provide for this shortage and can be treated as an insurance against a serious shortage of glycerin.

Up to now all the "sengite" made has been of a uniform strength equivalent to ordinary gelignite. A great many other derivatives have been made, and it is found that a series of explosives can be produced containing other ingredients, so that weaker and cheaper forms of the explosive can be made to take the place of the series of gelignites and dynamites down to about the strength of 30% nitroglycerin explosives. For the present, it is considered best to make only the one strength, but with machinery available to manufacture a large output, explosives in great variety can be produced.

*Excerpt from the *South African Journal of Industries*.

Remember the Comfort Fund of the 27th Engineers.

New Mines of the Far East Rand

By A. COOPER KEY

The development of the mines of the Far East Rand will be of immense importance in maintaining the supremacy of the Transvaal as the foremost gold-producing country in the world. Details are given in this paper of the South African government's new leasing system and the method of calculating profit percentage.

FOR a time, at least, the terms made by the government of the Union of South Africa for the leasing of mining ground in the Far East Rand have been settled. More than a year ago four areas were offered to competition. In October, 1917, it was announced that the tenders for two had been accepted—that of Barnato Brothers for South Geduld-Springs, of 2050 claims, and that of Springs Mines, Ltd., for the Rietfontein East area, of 2235 claims. None of the tenders lodged at that time for Rietfontein West was accepted, and the one tender put in for the eastern portion of Geduld, 2526 claims, was also declined. A reoffering of Rietfontein West, with the special proviso that the area was to be worked as an independent company, and not in conjunction with other ground, as was permissible in the earlier invitations, and adopted in the case of Springs Mines, resulted in the acceptance of a tender from the Anglo-American Corporation of South Africa, Ltd.

OVER 6500 CLAIMS LEASED TO THREE COMPANIES

The government has thus leased areas totaling more than 6500 mining claims, two areas for independent exploitation, one of which was in conjunction with Springs Mines. The extent from north to south is about five miles and from east to west three and a half miles. Allowing for the existing Springs Mines, which occupies a portion of the parallelogram, the area actually leased is about 14 square miles.

ONE COMPANY TO PAY 50 TO 65 PER CENT. OF PROFITS TO GOVERNMENT

The government has obtained remarkably satisfactory terms for these areas. In one case, of South Geduld-Springs, the terms were extraordinarily favorable; indeed, in the opinion of some, the royalty is too high to constitute good business. The royalty offered was on the formula.

$$80 - \frac{750}{X}$$

X = percentage of net product to recovery.

On this scale, the government would receive 55% of the profit after allowing for capital amortization when the percentage of net profit to recovery was 30; 59½% when the ratio was 35%, and 61½% when the ratio was 40%. It should be remembered that the tenderer makes himself responsible for the provision of £1,500,000 working capital. He takes all the risk, the government subscribing nothing. But as soon as there is any profit the government begins to share. The importance of the

arrangement outlined will be determined from the fact that the government's share in the case of the Modder Government Areas mine, the first leased under the system, was £238,745 last year. The name of the new company, registered on Feb. 20, is New State Areas Ltd.; and it is estimated that it can pay from 20 to 25%, on the basis of crushing 1,500,000 tons a year, and assuming a recovery of 35s. per ton. Besides the royalty the company has to pay ordinary taxation. This applies to all recent leases except the government gold-mining areas.

COMPARISON OF SCALES OF TWO AREAS TO BE WORKED BY SEPARATE COMPANIES

The Anglo-American Company's offer to Rietfontein West contained a lower scale than the phenomenal one of Barnato Brothers, but still remarkably good from the government's point of view. The formula is $65 - \frac{650}{X}$. At the most probable ratios in actual working, the royalty scale is 11 to 12½% less. These two areas are comparable if the larger area of Rietfontein West be known in future as West Springs, to compensate for the greater depth at which it is expected that the reef series will be struck. Both are to be exploited as separate entities. The following comparison may be made:

COMPARISON OF PERCENTAGE OF PROFIT TO GOVERNMENT

Percentage of Profit to Recovery	Percentage of Profit to Government New State Areas	Percentage of Profit to Government Springs West
10	5	21.7
15	30	32.5
20	42.5	39
25	50	43.3
30	55	46.4
35	58.6	47.4
37.5	60	48.75
40	61.25	49.7
42.5	62.4	50.6
45	63.33	51.3
47.5	64.2	52
50	65	52.8
52.5	65.7	53.2
55	66.4	53.7
57.5	67	54.2
60	67.5	55
65	68.46	55.3
67.5	68.9	55.7
70	69.29	

Assuming that taxation represents 7% of the profits (it is more at present, owing to the special war levy), it will be seen that the government receives no less than half the profits in the case of the New State Areas (Barnato) when the profit ratio is as low as 20% of the recovery, and in the Springs West case when the profit ratio is 30.

WHAT THE GOVERNMENT WILL ACTUALLY RECEIVE

In practice, the ratio is almost certain to be higher. In the case of Government Areas, the percentage ratio of profit is expected to range between 32 and 51; whereas Springs Mine's recent figures indicate 45%. Taking a mean of about 40, it will be seen that in the case of New State Areas the government will receive 61½% of the profit (this, by the way, was the maximum in the case of the first Government Areas), and, in the case of New State Areas, the government will receive ordinary taxation. This would bring the figures up to nearly 70 and over 55%, respectively. Strictly speak-

ing, the percentage royalty is on the net product, i.e., the profit less an annual allowance for amortization (say £60,000 to £75,000). This is deducted from the amount payable, according to scale, and to this extent the capitalist is safeguarded.

COMPARISON WITH VENDOR CONSIDERATION

It may well be asked, is not 45 to 60% of the profits a large proportion to be distributed to government requirements. From what I have heard of conditions in America, I gather that it would be considered entirely unjustifiable. As regards the Rand, I would suggest that it corresponds with the vendor consideration in the old-style company finance. That is now (in the leasing system) entirely eliminated, the only concession being a commission of 5% on the capital.

Whether the shareholder has to give up 60% of his profit to the government or to the vendor promoter, surely matters little. The proportion of capital actually taken by the vendors has varied greatly, and it is not always easy to trace the vicissitudes of reconstruction through which the companies have passed. It must also be remembered that, owing to the increase of total capital by the provision of additional working capital, the relation of original vendor capital to ultimate capital is much less than to the original total capital. Of the Rand Mines subsidiaries, namely, Rose and

East Rand. In Brakpan the vendors' shares represented £328,514 of the original authorized capital of £750,000, that is to say, 55%. In the case of the Geduld rights, in connection with which the late President Kruger was paid £100,000, the vendors received 185,000 shares out of 400,000, equal to 46½%. In that of the Springs Mines, the vendor consideration was 300,000 shares out of 795,000, representing 38%. In these three cases the vendors took on the average 46% of the capital

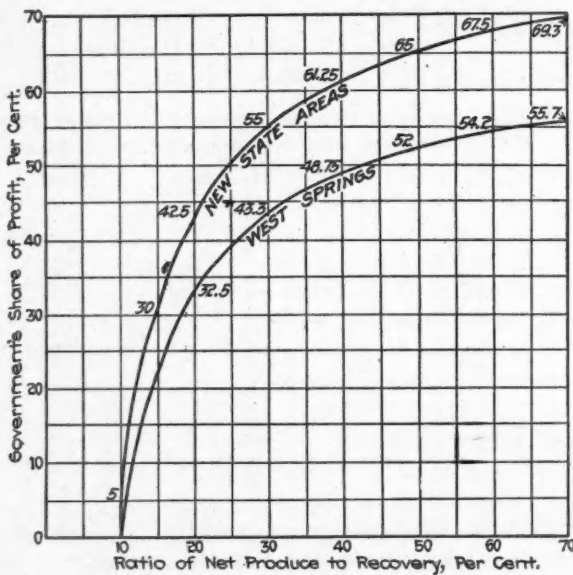


FIG. 1—Comparison of scales of the New State Areas (South Geduld-Springs) 2050 claims. Royalty to government on formula $80 - \frac{750}{x}$ and West Springs, Ltd., (Reitfontein West) 2235 claims, royalty on formula $65 - \frac{650}{x}$. Ordinary taxation also payable in both cases.

Geldenhuis Deep, the vendors usually took half. In the case of Crown Deep, the vendor consideration was 200,000 shares out of 300,000. In the Nourse Deep it was higher, and in the case of the Crown Reef and the Meyer & Charlton the vendor took over 80% of the original capital, and on that of the New Modderfontein nearly as high a proportion.

THE CASE OF ADJACENT MINES

Much of the foregoing is history, and ancient history at that. What has happened in more recent times? Quite pertinently, the illustration will be more of mines in the same district as that of the new leases, the Far

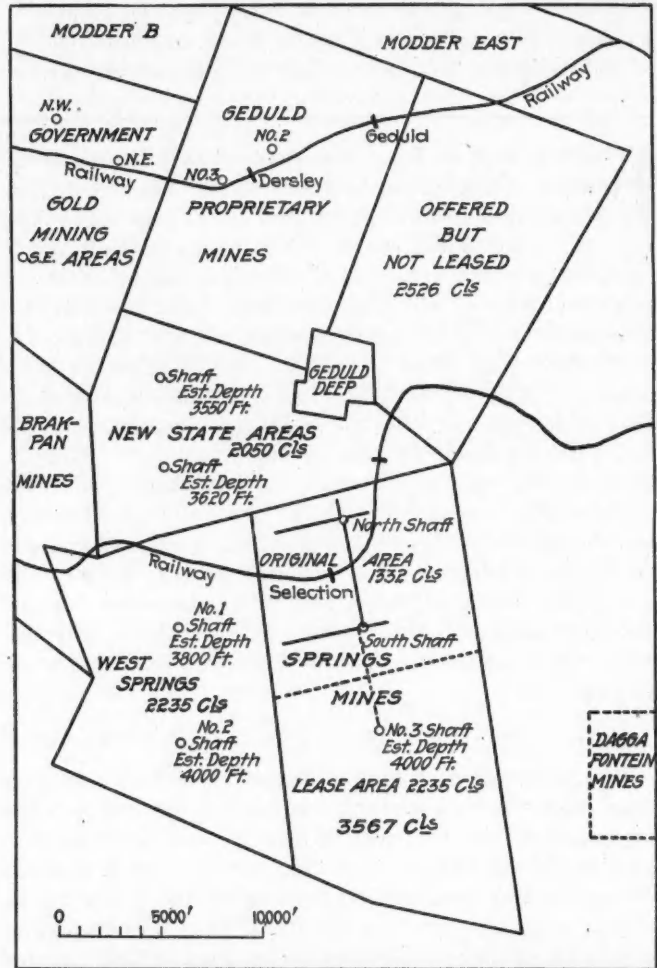


FIG. 2—Two new mines on the Far East Rand (New State Areas and West Springs) and an extension of present Springs Mines recently leased by Union of South Africa government.

for investment in development. This is exactly what the Springs West company has contracted to pay the government when the ratio of profit to recovery is 35%. It is perhaps fair to add that in the case of Modder Deep the vendor consideration was low, only 88,000 shares out of £500,000 capital, approximately 17½%. The property, though remarkably rich, is small, containing only 326½ claims.

THE PROPHETS CONFOUNDED

It was frequently said that the government would never again get such good terms as those secured in the Government Areas (Modderfontein) lease. But the prophets have been proved wrong. The New State Areas lease is from 15 to 20 points better than the first essay in leasing, even on the scale and not allowing for ordinary taxation, which the new company has to pay and from which the first concern was exempt. At 30% ratio, the Anglo-American (Rietfontein West) is 7½% better than the Modder Government Areas scale as

amended. At 40 it is about 2½% higher; at 45 (a ratio hardly likely to be realized in actual practice) the scales cross, and at the 60% ratio the Government Areas scale gives 4½% more. These "high altitudes" of the scales are more or less academic.

AN ANOMALOUS SCALE REVISED

The revision of the Government Areas scale, which, after much debate, was agreed to in March past, removed the jumps in the scale at 20, 33½ and 49% ratios, and substituted two scientific formulas:

(a) Up to 36.17% ratio of product to recovery —

$$y = 5.467 + 1.06487 \times \frac{53.66}{x}$$

(b) Above 36.17%

$$y = 82.5 - \frac{1446.81}{x}$$

x = ratio of net profit to recovery. y = royalty payable percentage of profit.

The original scale had the effect of penalizing the contractors when higher profits were secured by more efficient working, i.e., lower working costs. It actually paid to manipulate the grade (by adding poor development rock), so as to keep the ratio below 33½%! The new scale (given here for completeness) is:

PRESENT SCALE OF PAYMENTS TO GOVERNMENT

Percentage of Profit to Recovery	Percentage of Profit to Government
10	10.75
15	17.86
20	24.08
25	29.94
30	35.62
35	41.20
37.5	43.90
40	46.33
42.5	48.45
45	50.35
47.5	52.04
50	53.56
52.5	54.87
55	56.19
57.5	57.30
60	58.39
62.5	59.3
65	60.24
67.5	61
68.08	61.25
70	61.25

The above payments are free of ordinary taxation on mining.

The third area, Rietfontein East, was dealt with on a different basis, by conjoint working with an existing mine, and amalgamating 1332 claims owned with 2236 claims leased. For five years from January, 1918, the company is to pay 5% of its profits; thereafter payments are to be made according to the formula

$$y = 55 - \frac{1175}{x}$$

with a minimum of 12½% royalty, applicable to profits from the entire area, not merely that contributed by the government:

PROFITS PAYABLE FROM REITFONTEIN EAST

Ratio of Net Profit to Recovery, Per Cent.	Government's Participation, Per Cent.
30	15.8
35	21.4
40	25.6
45	28.9
50	31.5
55	33.6
60	35.4

Making allowance for the relative areas of unworked ground, I estimate that at 50% ratio the government will receive about 53% of the profit from the leased

area taken. This is practically the same as with the Government Areas and a point higher than in the case of Springs West.

The West Springs, Ltd., is the name of the company formed to deal with the contract awarded to the Anglo-American Corporation of South Africa, Rietfontein West. It will have a capital of £1,400,000, wholly guaranteed by the corporation; and 400,000 shares are to be paid up fully on registration, half of which will be offered for subscription to the public of South Africa.

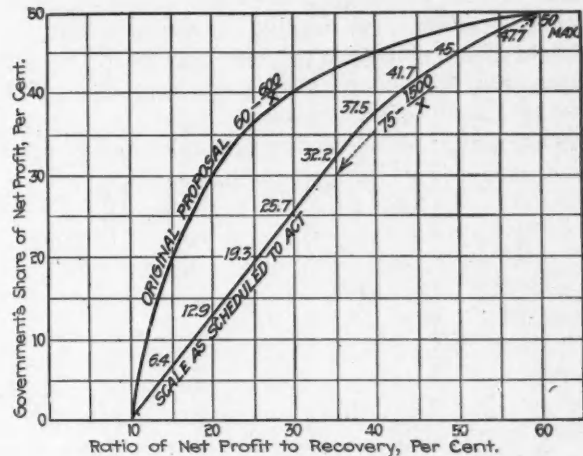


FIG. 3.—Additional areas to constitute, with the Mynpacht, "a workable mining proposition." Comparison of scales as scheduled in act, and as originally proposed. Scale shows the minimum royalty payable.

The depth to the reef will, it is estimated, be 3800 ft. in the northern shaft and 4000 ft. in the southern. By an arrangement with Springs Mines, mining through the northern shaft and western drives of that company's mines is to be permitted, the consideration being an option over 150,000 shares at 22s. 6d. for two years, or one year after the declaration of peace, whichever is the later. It is expected that this arrangement will save considerable capital outlay and two years' time. Large ore reserves in the northeastern portion of the ground can be opened up by the time the West Springs shafts are down to the reef, a matter of about four years.

NEW PROVISIONS OF THE MINING LEASES ACT

Apart from the leasing of these three compact, self-constituted areas, fresh legislation has just been adopted for dealing with the cases of owners of mineral lands whose areas, granted under the Gold Law, are not sufficiently extensive to warrant exploitation, in consequence of the high capital expenditure involved, by empowering a Mining Leases Board to lease additional areas. Application is to be made for such additional area at the same time that the principal commission (or mynpacht) is applied for. A minimum royalty on scale is stipulated for, determined by reducing the amount specified in the scale until it reaches the same proportion that the leased area bears to the joint area. The governor-general is to be satisfied that the combined area constitutes a workable mining proposition. If approved by both houses of Parliament, a lower scale may be agreed to. Under the Transvaal Gold Law the owner had the right to locate one or more mynpachts, but the Mining Leases Act permits one only. This may prove inconvenient in certain contingencies. The minimum

royalty is in the crucial part of the scale (that is, over 35%) on the formula

$$75 - \frac{1500}{x}$$

This scale, especially in the lower ranges, is much more favorable to the lessor than that originally proposed by the government, which was on the formula

$$60 - \frac{600}{x}$$

The scale adopted is similar to that of the Government Areas as amended after a deduction of 8% to allow for taxation now payable in addition, but from which the Government Areas was exempt. The draft proposal was from 3 to 4% lower than that of the Anglo-American (West Springs).

The minimum royalty as now scheduled in the act is:

ROYALTY EXACTED BY GOVERNMENT	
Percentage of Profits to Revenue	Percentage of Profits Payable to Government
10 and under.....	Nil.
12.....	2.6
15.....	6.4
20.....	12.9
25.....	19.3
30.....	25.7
35.....	32.2
40.....	37.5
45.....	41.7
50.....	45.0
55.....	47.7
60 or over.....	50.0

The new act stipulates that persons sinking boreholes shall notify the Mining Commissioner of their intention, and declare the results within one year of completion. Relief is provided for holders of prospecting licenses who prove that they have expended not less than £1 per claim per month on development work.

In 1922 or 1923 it is to be expected that these companies will be producing gold in substantial quantities, and making good profits. Expansion is necessary, as it has been estimated that by that time only 33 of the present Rand companies will still be working, and some of those may have been forced to close down by the ever-increasing war costs.

Roaster Charge Belt Feeder

By C. T. RICE

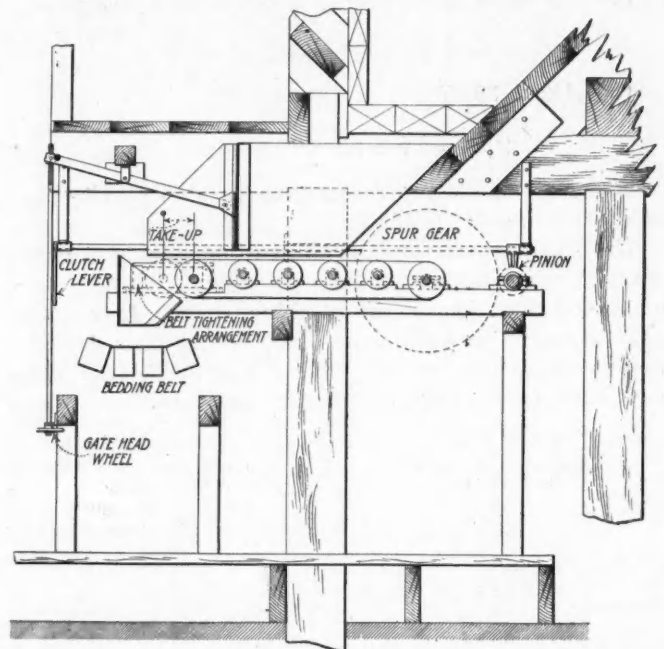
The idea of making up a lead-roaster charge by means of a series of feeders that bed the product from different bins on a conveyor belt seems to have originated at the International Smeltery at Tooele, Utah, where challenge feeders are used—a type that does not permit of close adjustment and gives trouble when certain parts begin to wear. This method of bedding was utilized when the Northport smeltery was remodeled for treating Cœur d'Alene lead ores; but as it was necessary to install the system with bins already built, the type used does not equal the one shown in the accompanying drawing. This was designed by Bradley, Bruff & Labarthe for use at the primary ore bins of the Bunker Hill smeltery in proportioning the roaster charge.

The feeder is of the ordinary belt type and the drive is by spur wheel from a line shaft. The driving spur is carried loosely on the line shaft, and it is thus in constant mesh with the spur wheel of the feeder belt. Connection is made with the line shaft by means of a clutch at each feeder; and an operating lever extends out in

front of the bedding belt, so that the spur wheel can be easily thrown in or out of gear.

The feed hopper at the bottom of the bin is fitted with a vertical slide gate at the front, the opening of which can be closely regulated by a lever and hand wheel. As all the ore which goes to the primary bins has been crushed to pass a 4-mm. trommel, and as the feed belt is kept tight, the amount of ore taken from a bin may be easily and closely regulated.

The method used at the Bunker Hill smeltery in proportioning the roaster charge is to draw a predeter-



BELT FEEDER FOR BEDDING ROASTER CHARGE

mined number of units of 20 lb. of product per 15 sec. from the several bins. In order to set the feeder to give the right amount, the discharge during 15 sec. is caught and weighed on a small platform scale, moving the slide gate up or down by means of the hand-wheel and screw-nut arrangement until the right gate opening is obtained.

La Rose Mines, Ltd.

The eleventh annual report of La Rose Mines, Ltd., that for 1917, contains the following information with reference to output:

WEIGHT AND VALUE OF LA ROSE MINING CO., LTD., SHIPMENTS, 1917

	Tons	Ounces Silver, Per Ton	Net Value
Silver-cobalt-nickel ore.....	188.71	651.84	\$94,844.21
Low-grade silver-cobalt-nickel ore.....	125.16	89.31	12,353.97
Nuggets.....	0.53	21,621.15	8,640.80
Concentrates.....	1,186.78	280.57	235,634.70

The production of silver for the year amounted to 437,337 oz. Net profit on production was \$71,372.42. The increased price of silver—82.94c. per oz., as compared with 64.89c. per oz. in 1916—was offset largely by increased operating costs. Ore milled during the year amounted to 44,450 tons, the average assay of which was 8.75 oz. per ton. Extraction by concentration is given as 83.30 per cent.

Lime for Fluxing Purposes sold in the United States in 1917 amounted to 209,976 short tons, according to a bulletin of the U. S. Geological Survey.

Taxing the Prospector

BY T. O. McGRATH*

The present Income Tax Law and Treasury Department rulings governing the collection of income taxes make no distinction between mines in development and mines on a producing basis. This results in taxing the net returns from development ore as income, before it is known whether or not such amounts will be income or capital returned.

In order to bring this matter before the Treasury Department, a meeting was held at Phoenix, Ariz., on Oct. 12, 1918, which was attended by representatives of about 30 mines in the course of development, and the following resolution was adopted and forwarded to the Secretary of the Treasury:

Whereas, The present Federal acts imposing an income tax upon mining companies, and the Treasury Department's rulings governing the collection of the income tax, do not make any distinction between income received by producing mines that have developed sufficient ore to guarantee the return, or to warrant a belief in the return, of the original capital invested in the business to the business, as well as a profit above the return of the original investment, and the income received by prospect and development mines that have not developed sufficient ore to guarantee the return, or the reasonable belief in the return, of the original capital invested in the business to the business; and

Whereas, The said Federal acts and the Treasury Department's rulings do not protect the prospect and development mines that would not be able to make shipments of ores encountered in development work without paying an income tax upon the amount that receipts from shipments of ore encountered in course of development work exceed the operating expense; and

Whereas, Under the present Federal acts and Treasury Department's rulings, investors will not be found to prospect and develop mineral ground, requiring a number of years' investment without any interest return, that has not an assured tonnage of ore sufficient to guarantee a return of their investment, as they would not be able to make shipments of ores encountered in development work without paying an income tax upon the return of their principal under the proposed new revenue bill at the rate of 18% if undistributed, and 12% if distributed as dividends, and other charges,

Now, therefore, be it resolved, That the Treasury Department, in revising Regulation No. 33 governing the collection of the income tax imposed by acts of Sept. 8, 1916, as amended by the act of Oct. 3, 1917, and as will be amended by the present tax legislation now pending, include under Article No. 172 of the present issue of the Regulation No. 33 (which article sets forth the method of determining the depletion deduction and the method of arriving at the mine valuation) a paragraph covering the method of determining the depletion deduction against returns from prospect and development mines as follows:

"The net returns from prospect or development mines shall not be considered income subject to income tax until the total net earnings, plus the total net value of the ore in sight, shall be equal to or greater than the investment in mine property and mine equipment, plus a reasonable rate of interest on the actual investment, provided such net returns are set aside as depletion reserves for the return to stockholders of the original investment in the mine property and mine equipment, or for further development of, or for reinvestment in, the mine property.

"Any mine so setting aside its net returns from prospect or development ores shall, at the end of any year when the net value of the ore reserves plus the net earnings to date shall be equal to or greater than the sum total invested in the mine property and mine equipment, plus a reasonable rate of interest on the actual investment, submit to the Commissioner of Internal Revenues a statement showing (a) the total investment in mine property and equipment; (b) the total tonnage mined and developed; (c) the total net value of the developed ore in the mine; (d) and the total net earnings from development ore that have been set aside as depletion reserves.

"From this statement there shall be determined the actual depletion reserves chargeable against past earnings, and the depletion reserve account shall be reduced to the proper amount, by a transfer of the difference to the surplus account as earnings, and upon this amount of earnings there shall be levied the proper income taxes according to the years in which the earnings accrued."

*Auditor, Shattuck-Arizona Copper Co., Bisbee, Arizona.

In submitting the foregoing to the Secretary of the Treasury, attention was drawn to the difference between a mine in the prospect stage and one that has reached a point of constant and profitable production. Comparisons were also made between commercial enterprises in general and the business of prospecting and of developing mines.

It is apparent that the Treasury Department should make a distinction between the producing mine that will return the original investment with interest, and the development mine that obtains a net return from development ores shipped intermittently or more or less continuously during a taxable year, but which has not sufficient ore in sight to guarantee the return of the original investment, or a reasonable belief in its return.

The fact that the Government has seen fit to make an appropriation of \$50,000,000 to be used to assist the development and production of the rare metals is conclusive evidence that there is no desire to hamper or discourage the development of the commoner metals—including copper, lead, gold, and silver. All of these are essential to the winning of the war, and reserves are being more rapidly exhausted under the stimulation of high prices, and the high pressure of production of the past few years, than at any time heretofore, and the development of deposits has been curtailed by high wages, high prices of materials and shortage of labor.

I believe that the mining industry should present the Secretary of the Treasury with the facts to support the statements that, though the loss of the income tax receipts to the Government from taxing development mines would be small, the injustice of taxing the net returns of the prospect and development mines will prove a great loss to those unable to stand such a loss, and be the means of discouraging the already lagging avocation of prospecting. If the facts can be presented in that proper manner and form, I believe that the development mines will get the relief desired.

Moore Filter Litigation

An important legal action, which has been long pending, will soon be settled in the Western Australian courts, states the *Chemical Engineering and Mining Review*. The Moore Filter Co., of New York, is proceeding against the Great Boulder Proprietary Co. for alleged infringement of W. A. patent No. 4566, covering the use of movable frames on slime filters. The Great Boulder Co., in common with many of the other Western Australian mining companies, has used the Ridgway filter for many years, and if the action succeeds a large sum will be due for back royalties. The companies affected have formed a committee to see the matter through. From a legal aspect there is the prospect of a long and expensive suit, and from the technical point of view the case will not be without interest. One unusual feature of the suit is that the patents have expired and the claim is only for the recovery of back royalties. The plaintiffs ask for a commission to fix the amount due.

In *Isolated Regions* the Blake type crusher is usually preferred on account of simplicity of design and ease of repair. In large plants, and where facilities exist for effecting complicated repairs, the gyratory is generally adopted in preference to the swing-jaw type of crusher.

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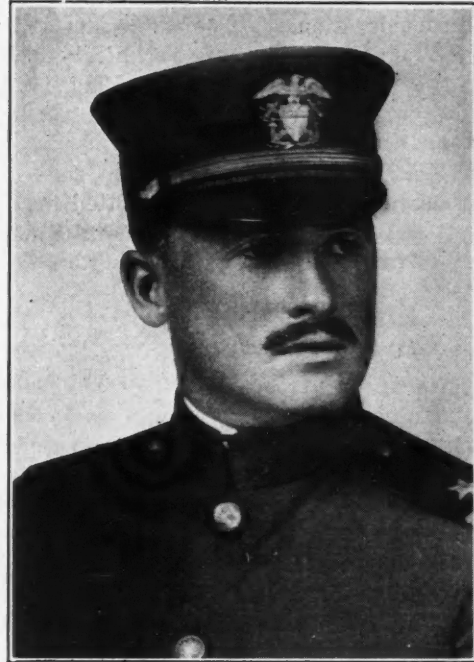


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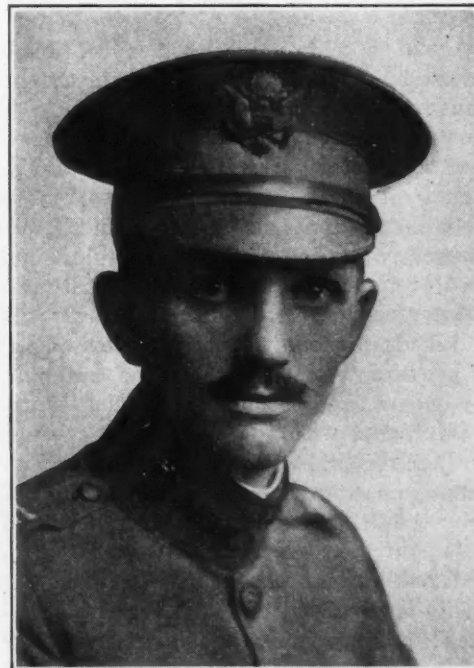
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(Quartermaster's Department)

Military Problems Awaiting Improvement

THE Inventions Section of the General Staff of the United States Army has submitted to the War Committee of Technical Societies the following problems requiring scientific and inventive talent for solution.

The War Committee, therefore, transmits this request of the General Staff to its membership and requests that the engineers of America give them serious thought and consideration.

War Committee of Technical Societies,
3549 New Navy Bldg.,
Washington, D. C.

Washington, D. C.,
October 9, 1918.

Ideas and suggestions should be submitted to:
Inventions Section, General Staff,
Army War College, Washington, D. C.

PROBLEM NO. 1 LIAISON PROBLEM

In operations of our troops fighting in France, all have seen the necessity of perfecting liaison between different elements of the command. This is especially true as regards liaison between elements of the front-line troops and between front-line troops and elements further to the rear.

Our infantry advances in spite of the most serious resistance offered by the enemy, and the losses suffered are necessarily heavy. These losses can be lessened by increased artillery activity. Liaison between the infantry is now maintained, in so far as is practicable, by sending forward with the infantry a large artillery liaison personnel, well equipped with the material of liaison—telephones, wire, flags, projectors, rockets, radio, etc.

This personnel is charged with sending back information whereby fire may be directed on the hostile elements causing losses to our troops.

The system of liaison, using the above, does not always give satisfactory results. The enemy's fire frequently cuts off the infantry, and cuts regimental commanders from the units in the front lines. Wire is almost immediately cut by shells; optical signaling becomes impossible on account of smoke and dust, and frequently is interfered with by fog; runners become disabled or killed; pigeons go astray; radio is interfered with by enemy stations, and the antennæ are destroyed by enemy fire; ground telegraph is limited in range, and interfered with.

The War Department is desirous of finding a new means of communication whereby closer liaison may be maintained by the different elements of a command.

A device for this purpose should be small and compact, without antennæ exposed to shell fragments; it should be easily transported by one man, or at the most by three men; it should be capable of being set up quickly, and not present a target to the enemy; it should operate, over a distance of at least five miles and be certain of action.

It is believed that the War Department is in possession of the latest developments in so far as radio, telephony, signaling devices and similar apparatus are

concerned, but is now seeking for something that is an improvement over all these devices. So far as known, nothing of the kind exists at present, but it is believed, with the inventive genius of the country concentrated along these lines, something desirable may be developed which will be of the greatest assistance in winning the war.

PROBLEM NO. 2

AN AVIATION PROBLEM

On night bombing expeditions and even in the day time, when passing through fog or clouds, an airplane, like a ship, is guided entirely by a compass. Some of the new instruments designed for this work are beautiful examples of the instrument-maker's skill, but, unfortunately, when placed where the aviator can see them, they are directly between him and the engine, a position which greatly affects their accuracy.

If a compass could be placed near the outer end of a wing, or at the rear end of the fuselage, it would be practically outside of the magnetic influence of the engine, but at present there is no way to read a compass in either of those positions.

What is needed is some device or arrangement whereby a compass can be mounted far enough away from the engine to be outside of its magnetic influence and still be so arranged that it can be easily read by the aviator.

PROBLEM NO. 3

A BETTER FIRE-CONTROL GEAR FOR FIXED MACHINE GUNS ON AIRPLANES

The forward machine gun on an airplane is fixed and fires between the propeller blades in the direction in which the machine is headed at the time of firing.

The function of a fire-control gear is to control the fire of an aircraft machine gun shooting through the propeller so that no shots will be fired when the blades of the propeller are in a position where they are in danger of being struck. This is done usually by a cam attached to the crankshaft or geared to the propeller which sends an impulse by mechanical or hydraulic means to the trigger mechanism of the gun only when the propeller is in a safe position for the gun to be fired. This impulse trips the trigger and a shot is fired. As gears are now designed, two impulses are given to the gun every time a blade of the propeller is in a certain position with reference to the bore of the gun.

Fire-control gears are of two types, hydraulic and mechanical. The advantages and disadvantages of each type are listed below:

HYDRAULIC GEAR

Advantages:

1. Allows gun to be placed in any position with reference to the engine, inasmuch as the hydraulic pipe line can be bent.

Disadvantages:

1. Difficult to fill and take care of. Requires a good deal of special training and experience to get good results. Many small parts to get out of adjustment. Difficulty from leaking.

2. Lag in impulse due to time taken by hydraulic wave to pass down pipe line. This causes a wide dispersion of shots for changes in the r.p.m. of the propeller. Shots fired at low r.p.m. fall too near one blade of the propeller and shots fired at high

r.p.m. too near the other blade; thus the safety margin is cut down and r.p.m. at which the gun may safely be fired is limited.

3. At low r.p.m. the impulse changes from a pressure wave to a simple hydraulic action and the gear cannot then be depended on.

MECHANICAL GEAR

Advantages:

1. Action always positive and certain.
2. No lag of impulse in transmission.
3. Easily taken care of and adjusted.

Disadvantages:

1. Position of gun limited with reference to the engine, as it is difficult to send impulse around corner.

2. In case where impulse is transmitted by rods, difficulty is encountered from whip.

3. Wear in rods and cams affects timing.

Disadvantages of both types of gears:

1. In both types of gears the principal drawback is the dispersion of shots between zero speed and maximum speed, which limits the type of propeller used and limits the safe firing speeds. This is greatest on hydraulic gears.

2. Rate of fire of gun dependent on r.p.m. of propeller. For example, if machine gun is designed to shoot 800 shots per minute and the propeller is turning over at 400 r.p.m., or 800 impulses are given per minute, the gun will fire on every impulse and the rate of the geared gun will be 800 shots per minute. If the propeller is turning at 500 r.p.m., or giving 1000 impulses per minute, the gun cannot use every impulse, but will use every other impulse, and the rate of fire will be only 500 shots per minute or the efficiency will be decreased. This is an important disadvantage of the present system.

The ideal fire-control gear:

1. Maximum rate of fire is obtained at all r.p.m. of the propeller.

2. The time of impulse is advanced as the propeller speed increases, so that shots at maximum speed will fall in the same position with reference to the blades of the propeller at the plane of the propeller as shots at zero speed.

3. Easily placed at any position with reference to the engine.

4. Simple to take care of and adjust.

It is obvious that if the first advantage is obtained, the second must be sacrificed, but a better combination of the two is desired than that which we have at the present.

The problem which presents itself is to devise a fire-control gear which incorporates the above advantages. The solution seems to lie in an electrical system.

Calculations must be based on the following data:

Distance from muzzle of gun to plane of propeller varies from 3 to 6 feet.

Maximum propeller speed, 1600 r.p.m.

Rate of fire of airplane machine gun, 1200 shots per minute.

PROBLEM NO. 4

SPECIFICATIONS FOR NEW REAR SIGHT DESIRED FOR THE UNITED STATES RIFLE, CALIBER 30, MODEL OF 1917

It is desired that designs be submitted for a new rear sight for the United States rifle, caliber 30, model of 1917. The present rear sight is not regarded as entirely satisfactory, wholly because the rifleman cannot readily bring the point of impact of the shots to coincide with the point of aim. The present sight can be adjusted only for hundreds of yards of elevation, it not being possible, for example, to adjust it between 400 and 500 yd.; also, there is no lateral or windage adjustment.

It is desired that the new sight have adjustments whereby the rifleman can readily bring the point of impact to coincide with the point of aim, as was true with the rear sight on the United States rifle, caliber 30, model of 1903 (Springfield). It is not necessary, however, that the lateral or windage adjustment of the new sight have as extended a movement as that on the rear sight of the Model 1903 rifle, a movement of 0.25 in. being sufficient. If this much cannot be obtained, sights which permit of a movement of 0.20 in. on either side of the zero may be submitted.

In connection with the elevation adjustment, an adjustment by means of a strong micrometer screw may

be submitted, but this is not necessary. If a micrometer screw is inserted, it should be in addition to the ordinary slide adjustment, and the graduations thereon should read so as to permit of a vertical movement of the point of impact of 1 in. at 100 yd., 2 in. at 200 yd., and so on. In other words, the adjustments should be for minutes of angle.

The lateral or windage adjustment should preferably be actuated by a screw as on the rear sight on the Model 1903 rifle, but may be actuated by a slide and clamp. The graduations of this adjustment should be equivalent to 4 in. for every 100 yd. of range. If a screw is used to adjust, then one revolution of the screw should either move the adjustment over one graduation on the scale or over four graduations.

It is strongly desired that this new rear sight be capable of being placed on the present receiver of the Model 1917 rifle without any modification of the receiver whatever. That is, it should fit between the two rear sight guards on top of the receiver, and be secured thereto by the rear sight joint bolt. If this is not possible, then the rear sight should be capable of being fitted to rifles in the hands of troops by such simple operations as could readily be made by mechanics in the field.

The cost of construction is a serious item. A satisfactory rear sight can easily be designed which will conform with all the above requirements, but its construction will be so complicated that its cost will be prohibitive. No rear sight the cost of which is not prohibitive, and which retains the present desired principle of aiming (a large aperture in a small disk), has yet been presented.

A design is desired in which, when the leaf is laid flat, a battle sight similar to that on the present sight is presented in position for aiming. This battle sight should be of sufficient height for firing at 300 yd. That is, the point of impact and point of aim should coincide at 300 yd. When the leaf is turned up vertical it should permit of elevation adjustment for 100 yd. to 1500 yd. at least.

Ability of the new sight to stand rust and to be readily cleared of dust and mud are very desirable. No fragile parts should stand above the guards of the receiver. All screws used for adjustment should be strong enough to stand the handling which the soldier will give them under service conditions.

The reasons for thus writing the specifications for this new sight are as follows:

AIMING PRINCIPLE

The present aiming principle as seen on the sight for the Model 1917 rifle is believed to be correct. Any peep sight should be as near the eye as possible, and still avoid injury to the eye from recoil. The principle of a large aperture and small disk, the Lyman sight, is correct for a military sight. Such a sight can be used for rapid fire, and for fire against a poorly defined target or one in a poor light. A small aperture with a large disk is better for target shooting, but with such a sight the rifleman cannot find his target quickly if it be not in one set position, as in target shooting; he cannot see to aim at poorly defined targets, nor in poor lights; and he cannot keep a moving target constantly in view.

The rifleman is taught to aim in a normal manner, with the top of the front sight held just below the bull's eye or target at "6 o'clock." With a little practice he has impressed on the retina of the eye a picture of the sights correctly aimed. His eye retains a memory of this picture, and he is able to reproduce this picture exactly, and with great accuracy in aiming. If at any time this picture is incorrect, the error stands out so apparent that the rifleman is at once aware of it and corrects the error. Thus the rifleman when aiming normally aims consistently, the same for every shot, and a small group of shots results—this is accuracy. Accuracy therefore results when the rifleman is able to aim normally, that is, when with a normal aim the group of shots, that is the point of impact, will fall on the point of aim. If, however, it is not possible to bring the point of impact to coincide exactly with the point of aim, through the inability to so adjust the sights, it will be necessary for the rifleman to aim other than normally. Thus, if he is firing at 500 yd., and the rifle requires an elevation of 535 yd. and a lateral deflection of 20 in. to hit the center of the bull's-eye, and owing to the construction of the sight he can only adjust the near sight to 500 yd. elevation, and no deflection, then it will be necessary for him to aim, not normally, but about 15 in. above the bull's-eye and about 20 in. to one side. In practice he must estimate where these measurements will come on the target, and then estimate that he is holding off this much. The picture of the normal sighting which has been impressed on the retina of his eye is of no use to him. He must see his sights aligned differently practically every time he fires at any range, and if in addition a varying wind is blowing he must sight differently at every shot. It has been determined conclusively that if a skilled rifleman fire at 200 yd. a series of ten shots with normal aim, he will attain with the service rifle and good ammunition a group all shots of which will be contained in a circle approximately five inches in diameter. If, however, instead of aiming normally, he is required to aim as nearly as he can estimate eight inches below the bull's-eye and five inches to its left, then his group of successive shots, instead of being contained in a small circle about five inches in diameter, will require a circle about ten inches in diameter to contain them—that is, his error is just about double. We therefore see the desirability of a sight the adjustments of which are such that the rifleman can readily bring the point of impact to coincide with the point of aim at any range.

It is of course known that no two rifles ever shoot exactly alike, and that no two riflemen ever aim exactly alike; hence it is practically impossible to ever set the sights correct for every man or, indeed, for any particular man. Every rifleman must sight in his own rifle.

ZERO

It is impossible to set the sights for zero for any particular man, or even for the average man. By means of the triangle aiming exercises conducted at 100 yd., it has been found that when the rifle is held absolutely immovable and sights not moved, riflemen will bring a bull's-eye into line very differently. Almost every man will do it slightly differently. The maximum error among riflemen of national reputation, as determined

at the Small Arms Firing School at a range of 100 yd., was found to be about 12 in. That is, if an attempt be made to set the sights of a rifle at zero at the armory, these sights may be found to be as much as 12 in. out of correct alignment for a good shot at 100 yards.

PROBLEM NO. 5

PYROTECHNIC SMOKE SIGNALS

It is desired to secure, if possible, a suitable chemical substitute for red saxony arsenic now used for the manufacture of yellow smoke signals. The characteristics of such a chemical are that it should produce the effect required, that it should be procurable in large quantities, and that it should be perfectly stable in combination with other chemicals, such as potassium chlorate. The effect desired is a rather deep orange yellow. There is no objection to the use of dyes should these give the effect required and be procurable in large quantities at a reasonable price.

A suitable formula for a red smoke signal is also a desideratum. The effect required is a pronounced and positive shade of red. As in the case of the yellow smoke signal, chemicals composing it should be readily procurable and should be stable. Since, however, the requirements for this signal are considerably smaller than for the yellow smoke signal, a greater latitude may be allowed in selecting slightly less readily available and higher priced material for this signal.

The smoke signals outlined above are displayed from rockets, Very cartridges, Viven-Bessiere cartridges and 35-mm. cartridges. The rockets now used by our forces weigh about two pounds, with an approximate length of eighteen inches. The V-B, Very cartridges, and 35 mm. cartridges have an average length of about six inches, with a diameter, respectively, of two inches, 25 mm. and 35 mm. The V-B cartridges are thrown from the rifle grenade discharger, and the Very cartridges and 35 mm. cartridges from the 25 mm. signal pistols.

Should any person accredited by the Inventions Board become interested in the two pistols outlined above, this office would be very glad to give all the information in its possession.

It should be noted that "Auramine" has already been tried as a dye for the yellow smoke signal and that "Paratoner" has been used in the red smoke signal.

PROBLEM N. 6

An improved hand grenade is wanted with the following characteristics:

SYNOPSIS OF DESIRABLE QUALITIES FOR IDEAL RIFLE GRENADE AND IMPACT GRENADE

1. RIFLE GRENADE

1. Simplicity of construction and operation.
2. Light weight (under 20 oz.)
3. Safety.
4. Sureness of explosion.
5. Long range (between hand grenade and trench mortar).
6. No damage to rifle from use.
7. Should require no special ammunition.
8. Adaptability for use as hand grenade as well as rifle grenade.
9. Designed to secure maximum fragmentation and hold maximum amount of explosive.
10. Should not require special tromblon or discharger.
11. Detonators inserted separately.

2. IDEAL IMPACT GRENADE

1. Must explode no matter what the angle of impact.
2. Must explode on soft ground as readily as on hard ground.
3. Safety.

4. Simplicity of construction and operation.
5. Fit easily in the hand.
6. Light weight (not over 22 oz.)
7. Be adaptable for use in grenade thrower with safety.
8. Should permit rough handling.
9. Weather-sound and flash-proof.
10. Detonators inserted separately.

PROBLEM NO. 7

IMPROVEMENT IN CABLE BRACES FOR AÉROPLANES

The present method of attaching the ends of cables to turn buckles and anchorages is by bending the end of a cable around a protecting liner and wrapping the overlapping end with brass wire, which is afterward soldered.

This is an unsatisfactory, wasteful and expensive method. If some very simple method of anchoring cable ends could be devised, it will greatly speed up the production of aircraft.

Safety Laws and the Responsibilities Of Operators

BY CHESLA C. SHERLOCK*

Statutes have been enacted in practically all the states of the Union requiring that mine owners and operators shall take precautions to protect the life and limb of miners, and imposing penalties in case the laws are ignored or violated. Frequently a miner is injured because his employer has been guilty of a violation of mining statutes. The question as to the right of the injured miner to sue his employer for a violation of the mining acts, when such right is not expressly conferred by the statute itself, naturally arises.

Ordinarily, a private individual has no right to bring an action seeking to compel another person to obey the laws of the state or nation. Such action is, properly, within the province of the officers of the commonwealth. But the rule is modified in many instances, particularly with regard to certain mining statutes. In the case of the Sloss-Sheffield Steel and Iron Co. *vs.* Sharpe (161 Ala., 432), the Alabama court held that evidence of a violation of the mining statute of that state is evidence of negligence *per se*, which makes the disobedient mine operator liable in damages to a workman in his mine who is injured, while at work, by an explosion of gas; and the court further held that no other proof of negligence was necessary. The decision means that disregard of the duties imposed by these statutes constitutes actionable negligence; and, if such negligence should be the proximate cause of injuring a person in the protected class, a liability for the injury would follow unless nullified by a defence recognized as good in law.

In the case of the Jellico Mining Co. *vs.* Walls (160 Ky., 730), the Kentucky court held that the operator of a mine who fails to obey the Kentucky statute—which requires that there be supplied and circulated through mines 100 cu.ft. of pure air for each worker, and forbids working places to be advanced further than 60 ft. beyond the air openings—is negligent and answerable in damages to a miner injured, while at work at a point beyond the statutory distance limit, by noxious gases there prevalent and too subtle to be noticeable.

In Illinois, in a number of cases, it has been held repeatedly that disobedience of the state statute on the

part of a mine owner or an operator is negligence *per se*, and upon the mere showing of such violation the employee may recover for the injuries sustained by reason of such violation. It will be noted that it is not necessary for the Legislature especially to confer the right upon the injured party to bring legal action under the statutes.

In the case of Ryan *vs.* Manhattan Big Four Mining Co. (145 Pac., 907), the Nevada court held that the inadvertent failure of a mine owner, through ignorance of the existence of a statute—which in the case under review, makes it unlawful, upon a pain of fine or imprisonment, to sink or work through any vertical mining shaft of a depth greater than a stated number of feet unless it is provided with an iron-bonneted safety hoisting cage for raising and lowering the employees—no more excuses him from liability for injury to an employee, consequent upon his neglect to obey the statute, than would wilful disobedience and conscious violation of it.

In Richardson *vs.* El Paso Consolidated Gold Mining Co. (51 Colo., 440), the Colorado court held that the failure of a mine owner to obey a statute commanding all abandoned mine shafts, pits, or other excavations, dangerous either to man or beast, to be securely covered or fenced, rendered him liable in damages for the death of a child who fell into a shaft which was insecurely covered, while lawfully at play. This statute was at one time attacked upon constitutional grounds, but the court held that it had been enacted under the police power of the state for the protection of its citizens, and that it was therefore not subject to attack upon that point.

In the Nevada case mentioned, the court defined the procedure to be observed in determining just what circumstances made it possible for a workman or miner to recover in cases of this nature. It held that to entitle a workman in a mine to recover from his employer for an injury sustained—upon the ground that the latter had negligently disobeyed a statute enacted for the former's benefit—the plaintiff must indeed not only prove that the statute was violated by the employer, but also that such violation of the statute was the proximate cause of the injury. If, however, the culminating catastrophe could not and would not have occurred except for the violation of the statute, that violation should be deemed the proximate cause of the injury, notwithstanding there may have been one or more intervening agencies that were operative to produce the result.

In the same case, the court also held that a miner, merely by entering upon and continuing in the employment of a mine owner who has neglected to obey a statute providing for certain kinds of hoisting cages, does not assume the risk of injury in ascending or descending the shaft without such cage. The only risks which he assumes are those which are unavoidably incident to the employment, and not such as are due to the master's own negligence and violation of an express statute. The abolishment of the doctrine of assumption of risk in all states except Alabama would not affect the right of the workman to bring an action for damages, but would only heighten the mine owner's degree of liability, inasmuch as it would deprive him of even this defensive material.

*Box 604, Des Moines, Iowa.

Correspondence and Discussion

Labor's Best Friend

The quotations from *Wage Earner* which were printed in the Oct. 19 issue of the *Journal* ought to be read by every man and woman who earns a salary, or works by the day, whether they be union or non-union. The suggestions are valuable for every worker. I do not mean by this that every laborer lacks knowledge as to who is his best friend, but, rather, that many do not know, and others, in the flush of union prosperity, are likely to forget. Each paragraph of that quotation contains food for thought and brings to the front the question: "To whom should I be most loyal when the interests of both are at stake—who should stand first, my union or my employer?" There are times when the question is not easy to answer, but give it thought. Do not jump hastily to one conclusion or the other; use your best judgment in reaching a conclusion, and then stick to that judgment. Get away from the idea that your society or union can make jobs. Drop the notion that you are more a part of your union than you are a part of the mine plant. Use the union for those purposes it is intended to serve, and cultivate the idea that you are a part of the big works, the smooth running of which depends as much on your coöperation as does the smooth running of the hoist on the little pinion wheel. Remember, however, that if one kicks up a rumpus he must look for the same treatment that a pinion wheel gets when it loses two or three teeth. In considering oneself a part of a big machine, it is advisable to remember that parts are replaceable.

With the idea in your mind that you are doing important work in a big industry, and that there is no job that is not essential in the plant, you just naturally take an interest in your work—you can't help but boost it along. The day that the crew makes a record in shaft sinking, you are happy, whether you are in that crew or not, for the record was made in "your mine." When you can think of the plant and the management as a sort of a mother to you, and play the game fair, then when the question comes, "Who is my best friend?" you will have no trouble in answering.

Don't let the money question stand at the front all the time; there are others of equal importance. Wholesome working conditions underground, and a wholesome place in which to live on the surface—good food, good schools, and decent recreation for yourself and family—high wages will not buy; they come from your best friend when you play the game square with him. It is not hard to get a raise when the conditions are ripe, and it's wonderfully tempting when you know that, as in milking the old cow with her head tied down to the rack, if you squeeze just a little bit harder you will sure get a little bit more. But cows have been known to kick if handled too roughly, even though they had their heads tied down, and that was what happened in one Western mining camp recently.

Owing to the advance in price of many necessities, trammers were raised from \$2.75 to \$3, and a little later to \$3.25. This came without any effort—simply as a matter of justice; but it came so easy that one best friend said: "You must ask for another quarter." They got it. With war taking the best men away, production lagged, high wages would not keep it up, and when still another quarter was asked for, the other best friend said "Nothing doing. I have given you more and more, and for each advance I have received less. I have to quit." Things looked a little gloomy for a while, both for the trammers and for the mine. After a time another conference was held, and the trammers thought they might do a little more if they could get a little more pay. Their best friend was agreeable to the suggestion, but stipulated that it would be by contract, and that every man would be paid according to the dirt that he moved. This meant a conflict. The union did not approve of contracts. The manager asked for a fair day's work. A decision had to be made. It was finally decided to go to work on contract, with the result that tramping costs were reduced 30% and the trammers are earning an average of \$5.50 per day, instead of \$3.50 per shift.

Only one difficulty has arisen, that of keeping the machine men on their jobs, paying \$4.25 per shift. All the machine men want to work as trammers. F. F. S.
New York, Oct. 26, 1918.

The Riddell-Davison Grate

I noticed in the *Journal* of Oct. 12 an interesting description of the Trail finger-grate for D. & L. machines, in the course of which reference was made to the Riddell grate.

Mr. C. M. Warner, Australasian superintendent of the Dwight & Lloyd Co., has just called on me in Washington, having arrived last week from two years' metallurgical work in the Australian field, and he brings such an interesting report of the performance of the Riddell-Davison grate at Port Pirie that I understand it is his intention to write up for you an article showing the design of grate and cleaner that is giving such notable results as a labor saver on that side of the water.

The R-D grate bar is really a far different proposition than Mr. Rice has in mind, judging from his reference to it in the article on the Bunker Hill & Sullivan smeltery. Having his attention focused on the grate bar itself, Mr. Rice did not know, or he overlooked, the real function of the R-D system, i. e., the action of the stationary auxiliary scraping tool which effectively removes all sinter from the slots and keeps them free and open without the periodic cleaning of a pneumatic chisel.

Coming at a time when we are bringing the R-D bar to the attention of D. & L. plants the world over—it has been circularized by the D. & L. company, although the

latter has absolutely no interest in its licensing other than the increased efficiency it brings to the machine—Mr. Rice's incomplete reference has been a bit of a surprise. I know, however, that it was quite unintentional, arising purely from lack of full acquaintance with the real R-D system.

Briefly, the facts as to the R-D system are these: A continuous elevated slot is provided over the entire length of the machine, through which a plow, disk, or rake device can drag or cut, effecting a thorough clean-up of the slot at each pass. The R-D grate bar alone, on many charges, so facilitates the discharge of sinter by its peculiar shape that there have been long periods when no auxiliary cleaning was resorted to at Port Pirie. This, however, is another story, the real point of the new R-D bar being that it provides opportunity for the continuous entrance of a positive stationary cleaning tool. It is this feature only that makes the R-D system unique—the depression of webs and (or) elevation of slot—no matter how accomplished so long as the resulting structure of the old or new bar permits the continuous entrance of a cleaning tool *below the top surface* of grate.

The R-D system has some outstanding advantages which mean much to the industry in these times of labor shortage and need for increased efficiency of men and tools. This style of grate, with its auxiliary cleaner, eliminates all labor in cleaning and increases appreciably the general efficiency of the D. & L. operation. There is an actual increase of some 25 to 30% in air space over standard grates of same slot width, and this suction area is kept 100% effective by the un-failing duty of the cleaning tool. The tendency to breakage of the pallets and grates arising from the sudden drop at the discharge end of the D. & L. machine can be appreciably lessened by this new system, which does not require a heavy jolt or drop of pallet for the discharge of sinter.

A recent improved design of this new bar has been standardized in malleable casting, at St. Louis, and will soon be ready for distribution by the Missouri Malleable Iron Co. Arrangements are being made also for supplying in ordinary cast iron at another central foundry.

Washington, D. C., Oct. 29, 1918. G. C. RIDDELL.

Valuation of Ore Reserves

The accompanying letter was received some time ago from a young engineer who has assisted me in sampling on several occasions. It was answered and forgotten until recently, when I ran across practically the same thing in a report that I was examining. The questions asked and the answers given are almost too simple to be of general interest, and yet there may be some among the younger engineers who should be cautioned respecting inaccurate or careless statements, statements that may be regarded by the less charitable as willful misrepresentations. The letter is as follows:

I have recently made an examination of an old property in the San Juan district of Colorado. The sampling was very carefully done, and I thought that my calculations and estimates of value had been computed with equal care, but my report has been severely criticised as misleading or useless. I appeal to you as to how far wrong I have gone.

A typical block of ground sampled at 10-ft. intervals gave the following result: 39-in. wide, 0.04 oz. gold, 7.2 oz. silver, 1.66% lead, 2.01% copper, 1.35% zinc.

In determining the value of this ore I used the following figures: gold \$20 per oz., silver \$1 per oz., lead 8c. per lb., copper 26c. per lb., and zinc 9c. per lb., i.e., the approximate market

price of the refined metals at the time of making the report. This gave the ore a gross value of \$23.48 per ton.

I know, of course, that the ore cannot be sold for this price, although fair rates could be obtained from the smelters, after concentration. In order to give my employers some idea of the present value of the ore, I made a calculation, calling the result "market value." This was based upon 100% of the gold value, 90% of the silver, 75% of the lead, 60% of the copper and 50% of the zinc—what I estimated could be recovered from the ore. The market value then became \$16.74 per ton, the market value of the block being approximately \$175,000.

Though realizing that various charges will be made against the ore in course of treatment and that all of the metals, gold excepted, may sell within a year at half the price I have used, I was not prepared for the letter from my employers telling me that the engineer for parties whom they were trying to interest in the property had said, "Such ore has very little, if any, commercial value, and if by 'market value' the writer means commercial value, he had grossly exaggerated the value of the ore and of the property." If I am wrong, can you tell me wherein I blundered?

To the foregoing I answered substantially as follows:

"I would be inclined to agree with your critic in that the value of the ore has been grossly exaggerated; indeed, it is quite a serious question as to whether such an ore can be worked at any profit under normal conditions.

"The sampling of a mine has for its primary object the discovery of what the ore contains. When this has been determined, a second point arises of equal importance. What profit may be derived from working the ore?

"There is certainly no misrepresentation in the statement that the combined value of gold, silver, lead, copper, and zinc is \$23.48 per ton, but, on the other hand, such a statement is entirely valueless further than to indicate that valuable metals are present to an extent that probably warrants an attempt to determine whether the ore has a commercial value. One might logically include sulphur because of its value in the manufacture of sulphuric acid, and iron because of its value as a flux; but, carrying this line of reasoning a little further to include lime and alumina, it can be seen that one approaches absurdity and that the figure \$23.48 per ton has little to do with the value of the ore. Off-hand, and without knowing the composition of the ore, I doubt if it could be sold as mined to any smelter at a price sufficient to pay freight and smelter charges. I am very sure that it would not fetch \$16.74 per ton. The total values cannot be reduced by any arbitrary factors to obtain a result that will approximate that at which the ultimate products may be marketed.

"To ascertain the value of this ore one should, after sampling, determine the method of concentration best suited to it, and, by laboratory tests, learn the losses incurred and the composition of products. Jigs and tables with this ore would probably give complex concentrates for which the smelters would pay but a small price, and one would find himself obliged to separate the various valuable constituents by selective flotation or other method. Then and not until then is any 'market value' ascertainable. Not until one has secured his final results can he give his client any suggestion as to the value of the deposit. When this stage of the investigation has been reached—when the engineer knows approximately the composition of each product, what was lost in making the product, and approximately what each step will cost, when he has learned through the smelter schedules the value of each product—he can give his client the information that was sought, the profit that can be made out of the ore reserves."

New York, Oct. 25, 1918.

ENGINEER.

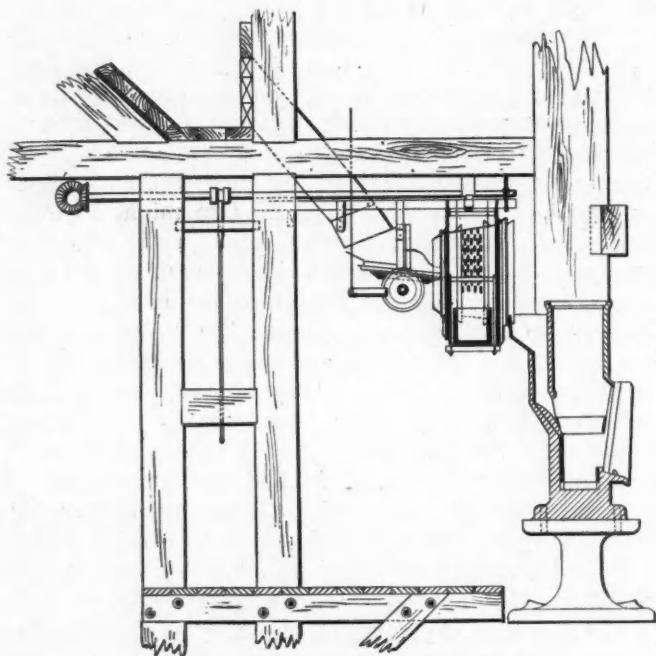
Details of Milling and Smelting

Bypassing Fine Ore From Stamp-Mill Feed Chute*

BY E. H. JOHNSON

For some years the device shown in the accompanying illustration has been used on the Rand for the purpose of deflecting that portion of the ore which was finer than the screen on the mortar box, and sending it direct to the tube mills.

The device consists of a bell-mouthed trommel 1 ft. 9 in. long and 2 ft. 2 in. in diameter at the narrow end, and 2 ft. 6½ in. at the wide end, and operates as a revolving perforated chute between the Challenge feeder and the mortar box. The screening on the trommel is a perforated plate with holes ¾ x 1½ in., and the material



STAMP-MILL FEED TROMMEL

passing the screen falls into a launder passing outside the kingpost into the launder leading to the tube-mill cones. The effect on crushing is not only to eliminate from the mortar box the material fine enough for tube milling, but also avoids the cushioning effect on the stamps caused by this material. The trommels are driven through an intermediary shaft from the line shaft and revolve at 16 r.p.m. The maintenance cost is light, the perforated screen (¾-in. plate) lasting nine months, and the only other parts requiring renewal are the small supporting rollers. The rate of feed is, of course, governed entirely by the Challenge feeder.

This device is now superseding the fixed gizzly which was often built in the bottom of the feed chute but which failed except where a very dry ore was being milled.

*Excerpt from the *Journal of the Chem., Met. and Min. Soc. of South Africa.*

Simplifying a Zinc-Box Clean-Up*

The following method of cleaning up zinc boxes in cyanide plants has proved to be economical and successful: A light trommel, either circular or hexagonal in section, and about 18 in. in diameter by 3 ft. to 3 ft. 6 in. long, is constructed, and covered with battery screening of 600 holes per square inch. This is mounted on a tank, or water-tight box, so that, when the latter is filled with water, part of the trommel body is immersed. The water should contain a little sulphuric acid—sufficient to show action on zinc. Charge the trommel about one-third to half full with zinc from the extractor box, and revolve it by hand several times to allow the gold slime and very fine zinc to pass through the screening into the tank. Lift the trommel with its zinc contents and transfer to a similar tank filled with water. Give it a few revolutions to remove traces of acid from the zinc, which is then returned to extractor box. The advantages of the method are that clean zinc is always returned to the extractor boxes, less zinc is destroyed during the clean-up, and eventually a higher grade of gold slime will be obtained.

Notes on Amalgamation Practice†

BY H. WARD

The mercury question opens up an important discussion, especially to those who realize the importance of recovering as much gold as possible at the mill. I would appeal to millmen to always keep in view the importance of their percentage of the total "recovery," especially during this critical period.

Mercury loss with a higher percentage of extraction by amalgamation should not exceed 0.10 oz. per ton milled with a plate area of from 1.25 to 1.5 sq.ft. per ton crushed. My experience is that a large plate area is necessary when from 68 to 72% of the total gold recovered can be recovered by amalgamation.

Some plants seem to be arranged to pass as much gold as possible to the cyanide works. This, in my opinion, is bad practice. All pulp leaving stamp and tube mills should pass over an amalgamated surface of sufficient area, the higher recovery being of considerable help and guidance to the management as to daily grade of ore to mill.

Loss of mercury through steaming plates should be a thing of the past, as this is absolutely unnecessary. Proper dressing and daily scrapes will prevent any accumulation, except what can be recovered by hard scraping and scouring at the end of the month. I can call to mind plates which had not been steamed for

*Abstracted from 1918 Report of the Rhodesia Munitions and Resources Committee.

†Abstracted from the *Journal of the Chem., Met. and Min. Soc. of South Africa.*

three years. After that period only 7 oz. of gold was available per plate of 9 ft. 6 in. by 5 ft. This is not in accordance with the theory advanced as to the locking up of gold on plates. These plates had recovered 70% of the total gold obtained during this period.

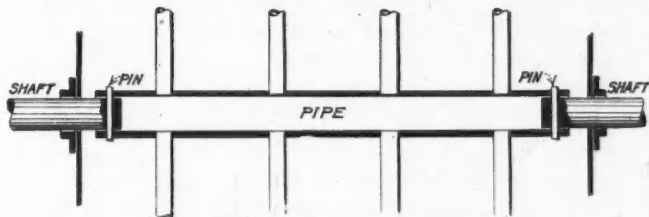
Assuming that mercury will become more difficult to obtain, I am of opinion that corduroy is the best substitute.

Replacing Oliver-Filter Shafts

BY ALGERNON DEL MAR*

In the *Journal* of Aug. 3, F. Dean Bradley, in an article entitled "Filter Adjustments at Packard Mill, at Rochester, Nev.," mentions the difficulty of replacing the worn paddle shafts in the packing glands of an Oliver filter, and says that the drum must be taken out to withdraw the shaft.

Will Anthony, the mill foreman at the Techatticup



SECTIONAL VIEW OF FILTER SHAFT

mine, Nevada, evolved a suitable method which is of more than passing merit. Two short pieces of shaft are used to protrude through the stuffing boxes, and on these ends is pinned a piece of iron piping that will make a close fit. The paddle blades are all bolted to the pipe. If a shaft wears and needs renewal, all that is necessary is to take out the two pins that hold the pipe to the shaft, and pull out the short pieces of shaft. New ones are put in, pinned to the pipe, and all is ready. Those installing such a filter would do well to make this change at the outset, for with gritty ores the packing glands certainly give much trouble.

The Economy of Cork Inserts†

Cork inserts are as much an economy factor as other devices that stop belt slip, for their principal function is to stop all avoidable slip, and, by so doing, save considerable coal and money. If 2000 tons of coal, costing \$3 per ton, are burned during a year, and the over-all belt slip amounts to 8%, the cost of the belt slip in terms of the coal pile alone is \$480.

To compute the cost of belt slip, it is first necessary to find the percentage of slip. That is, if a driven pulley rotates only 95 times while it should rotate 100 times, the proportion of belt slip is 5%, or

$$\frac{100 - 95}{100} = 5\%$$

Multiplying the determined ratio of slip by the number of tons of coal burned per year, and then by the cost of the coal per ton, gives the yearly cost of belt slip, for example, $2000 \times \$3 \times 0.08 = \80 .

However, to arrive at the actual and accurate cost is

*Mining engineer, 1424 Alpha St., Los Angeles, California.
†Copyright, 1918, by W. F. Schaphorst, Tribune Bldg., New York.

not easy. It is plain that more than \$480 is lost in such a plant as I have mentioned, because coal is not the only thing lost. Belts wear out more rapidly where they are permitted to slip than where this is prevented, and the cost of slip on this account can be approximated. Assume, for example, that with cork inserts a plant manages to keep its belts going for 10 years. The first cost of the belts is, say, \$5000. The average cost, then, is \$500 per year. Without cork inserts the belts year out in eight years, and the average cost is \$625 per year. This would mean a saving of \$125 per year, or \$1250 in 10 years. As these figures will not apply to every plant, this formula may be used and the reader can substitute his own conditions:

Dollars saved with cork inserts, from a belt cost standpoint only, equal

$$\frac{(Nc - N) K}{N}$$

where

- Nc = Life of belt in years with cork inserts;
- N = Life of belt in years without cork inserts;
- K = First cost of belt in dollars.

The cost of lost product must also be considered. The value of cork inserts appears again here, and the problem can be approximated mathematically, as, for example, in the plant to which reference was made, where over-all belt slip is 8% and where the output should be worth, without slip, \$2000 per day. With 8% slip it is evident that the machines are running 8% too slowly, and the product is, therefore, diminished by 8%, and the daily output is approximately \$2000 — $(\$2000 \times 8\%) = \1840 .

To make the formula clearer, and to enforce this cost on the mind of the plant owner, I have thrown it into this form: Dollars output lost per day =

$$\frac{1 - S}{D} - D$$

where

- D = Present daily output in dollars;
- S = Per cent. of belt slip.

Thus, if the present daily output amounts to \$1500, and if the over-all belt slip is 10%, there results after substituting in the formula

$$\frac{1500}{1 - .10} - \$1500 = \$1667 - \$1500 = \$167.$$

A loss of \$167 per day is considerable, and may mean the ruin of a small plant, unless discovered and rectified. This "product loss" is often saved by speeding up the driving engines or motors to the extent that after belt slip is deducted the final speed is what it should be. That method is better than none at all, but it is only a makeshift. The best practice is to eliminate all belt slip.

Inefficient methods of production result in increased costs. Where belt slip is permitted, the product frequently suffers on that account. The loss cannot be figured mathematically, because it is too uncertain. It may vary from a trifling to a serious amount. To reduce this loss to the minimum, belt slip must be completely eliminated. By so doing, all machines are driven at uniform speeds. There is no bunching here and thinning there. Production is uniform, day in and day out, which is the ideal condition, further emphasizing the value of cork inserts.

Events and Economics of the War

In desperate plight through internal disorder and military reverses, Austria-Hungary agreed to the armistice terms submitted by the Italian leader, General Diaz, and dropped out of the war on Nov. 3. Trent and Trieste were occupied by Italy. In the rout of the Austrian forces, 300,000 prisoners were taken and 2200 guns. Socialists are said to rule in Vienna. A Magyar republic was proclaimed in Hungary by Count Karolyi.

Previous to the Austrian collapse, Turkey had signed an armistice effective Oct. 31, giving the Allies absolute military domination over her affairs; questions as to territory were not considered in the terms granted. The Serbs have reoccupied Belgrade, their capital, and have recovered all their former territory. In Bulgaria, King Boris abdicated after reigning for 30 days; a peasant government has been set up at Tirnova.

The German front between the Meuse and the Aisne was pierced on Nov. 1 by Pershing's men, who advanced 10 miles in the first two days and threaten to cut the enemy's main supply line. The progress of the Allies in Belgium continued. Representatives of the Entente nations convened in Versailles during the week.

In the United States the report of Charles E. Hughes on his investigation of the aircraft situation was made public on Oct. 31. The President transmitted the Allies' message to Germany, and notified the latter to apply to Marshal Foch if an armistice were desired.

Certifying Advisors Named

Van. H. Manning, Director of the U. S. Bureau of Mines, the certifying advisor for the metal-mining and metallurgical industries (excluding iron and steel), announces the organization of district certifying advisors in the metal-mining sections of the country, to have charge of the furloughing to the industries of indispensable men who have enlisted in the U. S. Army.

Mr. Manning urges that the officials of the companies confer with their district certifying advisor to see that their industries, so essential in obtaining war material, are protected. Mining companies, he says, should consider it their patriotic duty to attend actively to this at once.

The district certifying advisors appointed are as follows: For the State of Washington, Conrad Wolfe, 217 Symons Bldg., Spokane; for Oregon, Harold N. Lawrie, Oregon Bldg., Portland; for California, Edwin Higgins, care of California Metal Producers' Association, San Francisco; for Idaho, Frederick Burbidge, Wallace; for Montana, John Gillie, Butte; for Utah, Walter Fitch, 304 Boston Bldg., Salt Lake City; for Nevada, Walter S. Palmer, University of Nevada, Reno; for Arizona, Dr. L. D. Ricketts, Warren, Ariz.; for New Mexico and western Texas, John M. Sully, Santa Rita, N. M.; for South Dakota, W. J. Sharwood, Lead; for the Missouri, Kansas-Oklahoma zinc district, Percy B. Butler, Joplin, Mo.; for the southeast Missouri lead and

Kentucky fluorspar district, H. A. Buehler, Rollo, Mo.; for Alabama, Clarence E. Abbott, 1405 Minnesota Ave., Bessemer; for Tennessee, Wilber Nelson, Nashville; for Georgia, S. W. McCallie, Atlanta; for Virginia, Thomas S. Watson, Charlottesville, Va.; for the Wisconsin lead and zinc district, W. O. Hotchkiss, Madison, Wis.; for the Michigan, Wisconsin and Minnesota iron ranges, George H. Crosby, Duluth, Minn.; for the Michigan copper range, Frederick I. Cairns, Houghton, Mich.; for northern New York and New England, Lewis W. Francis, Witherbee, Sherman & Co., New York. For southern New York, New Jersey and Pennsylvania, the name of the advisor will be announced later; in the interim, inquiries from that district should be addressed to the U. S. Bureau of Mines.

All matters pertaining to furloughs for the return to industry of men enlisted in the Army should be addressed to the district certifying advisor in which the particular plant is situated. Application forms and information concerning the operation of this particular organization can be obtained through the various district advisors.

Fuel Supply Adequate

The country's fuel supply for the coming winter is adequate and well distributed, according to a statement issued on Oct. 26 by the U. S. Fuel Administrator. Continued coöperation by the public and all agencies, however, is required. Stocks on hand are larger than ever before—also the needs. For the country at large, the average coal supply is enough for eight weeks. The Administration is ahead of its program regarding deliveries of anthracite, as shown in the following table:

ANTHRACITE ALLOTMENT AND DELIVERIES

States	Allotment for Year Beginning Apr. 1, 1918, in Tons	Delivered Oct. 1
New England	10,331,000	5,537,779
Middle Atlantic	31,314,754	15,246,331
Virginia	102,400	73,640
Western	3,481,945	1,835,398
Northwestern	2,374,000	1,701,561
Canada	3,602,000	1,963,700
Export (chiefly Newfoundland and Cuba)	51,930	29,742
Totals	51,258,029	26,388,151

By the zoning system, coal has been supplied throughout the United States from the nearest available mines, and cross-hauls have been eliminated. During the six months beginning Apr. 1, 1918, 38,000,000 tons more of bituminous coal was produced than ever before, with fewer workers. Operation of less essential industries without curtailment of fuel supply would have seriously reduced available stocks. The oil and natural-gas situation will probably be somewhat acute because of the increasing demand for oil and decreasing production of gas. The present coke supply is slightly less than the maximum demand of blast furnaces and war industries.

Reconstruction Conference Called

Plans for assembling at Atlantic City, N. J., on Dec. 4, 5, and 6, the members of the more than 300 industrial war-service committees, for a war emergency and reconstruction conference, have been announced by the Chamber of Commerce of the United States. The main purpose of the conference will be the determination of practical methods whereby industry may cooperate still more closely with the Government through a more centralized plan of organization. This probably can be best accomplished by the creation of a federation of all the war-service committees, it is said. Questions of reconstruction will also be taken up.

It is evident that, however far away or near the end of the war may be, it is necessary to begin to outline a general program of organizing business for the period of reconstruction. Single industries, acting individually, can scarcely hope to prepare on the scale that will be necessary. Speakers who will appear at the conference include Secretary of Commerce Redfield, A. C. Bedford, James A. Farrell, and Paul Warburg.

French Industry and the War

The invasion by the German army of the coal-mining basin of the Departments of Nord and Pas-de-Calais has compelled more intensive production of coal in the center of France, writes Pierce C. Williams, Commercial Attaché at Paris. Likewise the occupation of the rich iron-mining and steel-melting region of Meurthe-et-Moselle has caused a great increase in the manufacture of steel around Lyon and St. Etienne. As a direct result, the industrial center of gravity of France is no longer in the northern and eastern sections but in the central and southern.

This fact lends importance to the news that U. S. Army engineers are in agreement with French experts in holding that, by the expenditure of a reasonable amount of money, Nantes-St. Nazaire, on the Atlantic seaboard, can be made the leading port of entry of France and a rival of Bremen and Hamburg for the trade of Switzerland and central Europe. St. Nazaire is at the mouth of the Loire, and Nantes is 32 miles up the river.

In the addition to the advantages of excellent port facilities, a double-track road reaching the center of France, and ample ground for factory sites, the Loire basin is near to the Segre iron-ore deposits, which are now being exploited, and which form the basis for a future prosperous iron and steel industry, as well as insure export cargo. At Chateaubriant, near Nantes, are other deposits as yet untouched. The chief export from Nantes-St. Nazaire before the war was Segre iron ore, which went to Holland for delivery to German blast furnaces. The quantity exported, however, was never large, and exports have fallen to almost nothing since the war began.

For many years after peace comes, and perhaps permanently, the central departments of France will constitute the workshop of the country, according to Mr. Williams. In consequence, an enormous quantity of imported raw materials, such as pig iron, lumber, and steel products, must flow to this section of the country from the Atlantic seaboard.

Women in Chemical Work

The British Ministry of Munitions has issued a circular containing a list of processes in which women are successfully employed in connection with various industries, according to a bulletin of the Chemical Alliance. It is stated that the possibility of using female labor on some of the operations scheduled depends on local circumstances, such as plant layout, locality, and type of labor available. Among the industries listed are chemicals, explosives, gas, and mineral-oil refining.

The operations performed by women have been classified as follows: A, simple laboring operations; B, operations requiring care, intelligence and resourcefulness; C, skilled operations; and D, dangerous operations, or those requiring resistance to unpleasant conditions, such as heat, dust, and fumes. Among the sections of the chemical industry in which women are employed are the following:

Fertilizers—Grinding slag in cake mill, BD; grinding phosphate in Kent mill, BD; mixing guano, AD; general laboring, A.

Laboratory—Research chemists, C; routine testing, C; laboratory attendants, B; controlling chemical laboratory, C; acting as chemist in charge, C.

Oleum—Unloading pyrite, attending breaker, AB; hauling broken pyrite, weighing charges of pyrite or sulphur, AB; charging and attending sulphur burners, B; sampling and testing, C; grinding and calcining magnesium sulphate, AD; impregnating granulated anhydrous magnesium sulphate with platinum chloride, B; filling, sealing, and packing carboys, AD; general laboring, A.

Sulphur—Melting crude sulphur, A; breaking out sulphur from sulphur beds, A; emptying sublimers, dressing flowers of sulphur, A; preparing molds for roll sulphur, B; removing from molds after casting, A; general laboring, A.

Sulphuric Acid—Feeding and attending pyrite breaker, A; screening pyrite, A; weighing out charges, B; charging furnace (or burners), B; controlling valves on de-arsenicating plant, C; filling, sealing and packing carboys, AD; sampling and testing, C; coking Kessler concentrators, BD; helping on cascade concentrators, BD; operating Gaillard tower concentrators, BD; feeding Kessler producers, including hoisting and wheeling material, B; pumping vitriol over Gay Lussac and Glover towers, B; working iron oxide briquette plant, B; general laboring, A.

Tungsten—Crushing, screening, and packing, A.

Zinc Distillation—Making fireclay molds and condensers, B.

Gold Notes for China

To facilitate foreign trade, China has authorized certain banks, to be named by the Peking government, to issue gold notes. Until gold coin is ready, the notes will be used only for domestic circulation and for drawing bills of exchange, and will not be convertible until then. Gold equivalent to the amount of the notes issued will be reserved, and the standing amount will be announced every 10 days.

The organization of the Currency Bureau consists of nine articles. It belongs to the direct control of the Premier and supervises the currency system covering the whole country. It will have one controller, one president, and one adviser. The office of controller will be assumed by the Minister of Finance, and the adviser will be hired from abroad. The Currency Bureau will be organized on a 10-year basis, and the chiefs of the Chinese government mint printing office, and the supervisors of banks will be placed in control.

Fuel Administrator Garfield has authorized an average wage increase of \$1 per day for anthracite miners, effective Nov. 1. The new scale insures a rate of 42c. per hour and up, for surface laborers, to \$6.63 per day for contract miners.

Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

Potash and the War-Minerals Act

Rather than place all war minerals under the control granted by the War-Minerals Act, it is believed that authority to use the powers of the act will be given only in cases where the War Industries Board advises that there is a shortage. At present there are acute shortages in potash, arsenic, zirconium, and vanadium. Investigation of these shortages, and efforts to stimulate domestic production, probably will be undertaken under the powers conveyed in the act. As the Department of Agriculture is interested in the potash and arsenic situations, it will be a party to such efforts to increase production as are found to be necessary. The Geological Survey also will be represented, and the work, it is expected, will be under the direction of the Bureau of Mines.

Question has been raised as to whether the language of the War-Minerals Act does not preclude any regulation of war minerals of which there is no shortage. If this interpretation should be sustained, it would prevent any action with regard to such minerals as chromite, manganese and pyrites, of which there is now overproduction. The question has been referred to legal authorities for determination.

With unmistakable signs of an insistent demand for potash from Maine to Florida, the Department of Agriculture is insisting that more potash must be made available for fertilizing purposes. Prior to the war, German propaganda had brought about an excessive use of potash, in the opinion of W. W. Mein, Assistant Secretary of Agriculture. Since the war, the high price of potash has caused the fertilizer companies to discourage its use, and most of the fertilizer recently marketed has contained no potash. Mr. Mein advises that sufficient potash be used to reach the mean between these extremes. One of the striking facts brought out by Mr. Mein's investigation is that there is 40,000 tons of potash in Southern and Western warehouses, and that additional stocks are being put into them at the rate of 500 tons a day. It is held that this supply should be absorbed, but it is realized that when the farmers make a general demand for potash this small surplus will be absorbed quickly.

Domestic sources of potash, which will be considered in the campaign for stimulating production, are as follows: As a byproduct from blast furnaces; as a byproduct of cement plants; as a primary product from insoluble minerals, such as greensand and alunite, and as a primary product in natural salts and brine.

Prof. C. B. Lipman, of the University of California, is now in Washington conferring with officials on the potash situation. He is particularly hopeful of a considerable production of potash from Searles Lake. He points out, however, that the uncertainties of the international situation are discouraging to an industry which requires the large capital expenditures needed in the development of potash.

Arbitrators Favor Eight-Hour Day

Commenting on the decision of Henry Ford, in his capacity of umpire, in the labor dispute between the Wheeling Mold and Foundry Co. and the International Association of Machinists, Frank P. Walsh, of the War Labor Board, said:

Mr. Ford found for the straight eight-hour day. More and more we are coming to this. The actual and not the basic eight-hour day is essential. The decision of Mr. Ford will give impetus to this tendency.

Every arbitrator who has been called by the National War Labor Board has decided in favor of the eight-hour day. These arbitrators are drawn by lot from a panel selected by the President. They include some of the largest employers in the country. The first was Otto M. Eidlitz, the builder. Judge Clark, of the Supreme court of North Carolina, who reached the same conclusion, considered the matter from the standpoint of the business of war productions, of the welfare of the workers, and of the general prosperity.

In addition, the board has put the basic eight-hour day into effect in many industries. Therefore it is my hope that this question is being finally settled and that the practice may become uniform.

Gold Substituting Platinum

The report of Secretary Lane's gold committee has been completed and is now being reviewed by Hennen Jennings, the chairman. It is to be made public at the earliest possible moment.

Plans for regulating the use of gold in the arts are being discussed by the War Industries Board. The restrictions which have been placed upon the use of platinum have caused numerous users to turn to gold. This has resulted in a rapidly increasing commercial use of gold, which has reached a point that, many believe, calls for prompt regulatory action.

About 3500 licenses have been issued to users of platinum. Applications are being received at the rate of 300 per day, most of them coming from jewelers. Few applications have been received from chemical laboratories. As it is known that practically every chemical laboratory in the country comes under the platinum regulation, it is believed that the necessity of applying for licenses has not been impressed upon those in charge.

Gold Committee Appointed

A committee to study the gold situation has been appointed by the Secretary of the Treasury. It consists of Albert Strauss, Vice-Governor of the Federal Reserve Board; R. T. Baker, Director of the Mint; Emmet D. Boyle, Governor of Nevada; Edwin F. Gay, of the War Trade Board, and Pope Yeatman, of the War Industries Board. As Mr. Baker is in Nevada and does not expect to return to Washington until Nov. 15, no meeting of the committee is expected prior to that date.

Experiments with the Jones process for the beneficiation of manganiferous iron ores are in progress at the Lake Superior station of the Bureau of Mines.

The Long Reach of the Comfort Fund

It would be a sorry policy to leave our men in the ditch after they have taken the last one from the Germans. Even though peace be declared tomorrow, it may be a year or more before the troops are returned from abroad, and in this period smokes and other comforts will be as greatly appreciated by the mining regiment as they have been in the past. The time to remember the 27th Engineers is now, and the way to do it is through the Comfort Fund.

The Comfort Fund has a longer reach than the individuals for whom it acts, and it has been able to furnish the miners abroad with those comforts for the purpose of supplying which it was established. Whether this shall continue, it is up to the regiment's friends to decide, and the only way to decide it in the regiment's favor is by sending in a contribution today.

A letter recently appeared in the *Tribune* in which the writer, a resident of Cambridge, England, urged that Americans establish a fund to be spent abroad for the benefit of American soldiers. The letter reads in part:

We know the Americans are properly supplied with the necessities of life, but they are too far from their families to receive the little packages of comforts that help soldiers to feel that they are not entirely cut off from home circles and that serve to lessen the loneliness of the camp and the trench. Transatlantic mails are now very slow, and we understand that packages have in any case been practically prohibited.

The men are not likely to complain, but there is risk that when they see home packages arriving for their British comrades, and none for them, they may feel a wee bit homesick.

The situation described is at once recognized and remedied by the Comfort Fund. Money can be cabled to agents abroad, even though packages may not be sent or else may be lost in the sending.

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
Total	\$18,792.77

Make your checks payable to W. R. Ingalls, treasurer of the Association of the 27th Engineers. Because of the work involved in administering the Comfort Fund contributions are acknowledged only by publication in the *Journal*.

Molybdenum in Norway

A limited company for the purchase and operation of the "Knaben" mines in Fjotland, Norway, is being formed in Christiania, says *Commerce Reports*. These are molybdenum mines, and they have belonged since 1905 to an English company, the Blackwell Developing Corporation.

The plant comprises "Knaben" mines 1 and 2. Number 1 has been worked intermittently since 1885. Mine No. 2 is, however, the main one. The plant is in working order, and an ore zone of large size has been discovered. The head office of the new company will be in Christiania.

Foreign Trade in Metals and Ores

Imports and exports of the more important metals and ores, as reported by the Department of Commerce for September, 1918, and the figures for September, 1917, as finally revised, are as follows:

IMPORTS, SEPTEMBER, 1917, and 1918		
(In pounds, unless otherwise stated)		
Metal and Ore	September, 1917	September, 1918
Antimony ore, contents	1,475,335	
Antimony matte, regulus or metal	5,609,906	6,201,579
Copper:		
Ore, contents	10,308,267	4,253,028
Concentrates, contents	2,971,254	4,936,050
Matte, regulus, etc., contents	3,613,346	1,639,732
Imported from (in part):		
Canada	2,536,556	2,168,703
Mexico	5,056,161	4,892,799
Cuba	4,742,302	2,736,644
Chile	2,969,790	768,970
Peru	494,977	35,744
Colombia	170,881	
Venezuela	922,200	
Unrefined, black, blister, etc.	21,409,698	37,570,650
Refined, in bars, plates, etc.	620,752	1,472,451
Old, etc., for remanufacture	752,254	103,516
Composition metal, copper chief value	13,997	16,548
Lead:		
Ore, contents	959,428	5,202,110
Bullion, contents	10,458,447	17,905,345
Imported from (in part):		
Canada	160,828	5,475,572
Mexico	11,013,899	17,622,554
Pigs, bars and old	1,559,196	13,163
Pyrites, long tons	80,844	50,651
Imported from:		
Spain, long tons	48,327	4,349
Canada, long tons	32,517	43,623
Zinc:		
Ore, contents	7,888,290	4,030,201
Imported from:		
Canada	964,000	598,800
Mexico	6,924,290	3,431,401
Blocks or pigs, and old	29,055	7,762
Manganese ore, long tons	36,755	72,685
Imported from (in part):		
Cuba, long tons	5,843	12,664
Brazil, long tons	26,472	50,414
British India, long tons	4,100	2,775

EXPORTS OF COPPER, LEAD AND ZINC

(In pounds)		
	September, 1917	September, 1918
Copper:		
Ore, contents	380,100	132,242
Concentrates, contents	64,584	42,716
Unrefined, black, blister, etc.	2,017,838	
Refined, in ingots, bars, etc.	60,601,803	73,302,985
Exported to, (in part):		
France	37,484,619	8,938,231
Italy	9,871,457	15,564,737
Russia	2,989,074	
United Kingdom	7,221,518	45,975,753
Canada	2,306,067	2,668,470
Composition metal, copper chief value	1,179,589	3,548
Old and scrap	4,347	
Pipes and tubes	470,899	327,325
Plates and sheets	2,817,476	1,166,832
Wire, except insulated	665,035	665,332
Lead:		
Pigs, bars, etc., produced from domestic ore	8,692,397	8,097,118
Pigs, bars, etc., produced from foreign ore	1,595,945	9,389,476
Exported to (in part):		
Denmark	1,921,566	
Canada	1,830,482	3,045,633
United Kingdom	324,800	11,061,754
Argentina	46,386	224,000
Japan		2,351,316
France	447,969	
Brazil	246,430	358,400
Zinc:		
Dross	4,313,501	2,366,669
Spelter:		
Produced from domestic ore	13,620,119	10,513,200
Produced from foreign ore	39,249,110	3,794,068
Exported to (in part):		
France	16,467,576	3,287,303
Italy	7,137,059	1,908,298
United Kingdom	24,725,657	5,661,518
Canada	1,109,072	340,167
Mexico	341,595	502
Japan		3,009,924
In sheets, strips, etc.	3,877,704	1,893,699

Spassky Copper Mines.—The general manager cabled about Oct. 1 that the new government in Siberia has ordered the company's mines and properties to be handed back, and that the company's representative has again taken over the control and management. Of the copper stocks, amounting to about 1000 tons, one-third has been pledged for an advance by the Siberian government of one million rubles. The new Siberian government has accepted the company's claim for compensation in connection with the temporary nationalization of the property. Work at the properties has already been resumed on a restricted scale.

Chronology of Mining, October, 1918

Oct. 1—Increase of 25c. in the base prices of Lake Superior iron ores effective. Eight-hour basic day effective for U. S. Steel Corporation employees.—Regulations for licensing platinum became effective.

Oct. 2—Henry R. Merton & Co. announced voluntary liquidation, owing to the fact that they were refused a license under the Non-Ferrous Metal Industry Act.

Oct. 5—War-Minerals Bill signed by the President.—Explosion of a Government shell-loading plant at South Amboy, N. J.—Peace overtures renewed by Central Empires.

Oct. 9—Utah Apex Mining Co. filed suit to restrain Utah Consolidated Mining Co. from mining ore on contested ground.—American Metal Co. surrenders holdings in Consolidated Interstate-Callahan Mining Co. and cancels smelting contract with that company.—Important A. I. M. E. meeting at Milwaukee, at which tin conservation was discussed by members, representatives of the government and of many large firms.

Oct. 12—Northern Minnesota devastated by forest fires, resulting in heavy loss of lives and property and retarding iron-ore output.

Oct. 14—British Treasury fixed maximum price of 48½d. per oz. for silver.

Oct. 15—Fuel Administrator Garfield approves of wage increase for anthracite miners.

Oct. 20—Outstanding licenses for importation of tin revoked by War Industries Board.

Oct. 25—Loss of Canadian-Pacific steamer "Princess Sophia," which foundered in the Lynn Canal, west of Juneau, Alaska, with all on board, including many mining men.

Oct. 28—Official announcement of the continuation of 26c. per lb. for copper until January 1.

McIntyre Porcupine Mines, Ltd.

The annual report of the McIntyre Porcupine Mines, Ltd., operating at Schumacher, Ontario, Canada, covers operations for the year ended June 30, 1918. During this period, 178,327 tons of ore was treated, containing gold and silver valued at \$10.05 per ton. Bullion valued at \$9.61 per ton of ore treated was recovered. Mining costs amounted to \$3.2563 per ton, primary crushing and ore transport cost \$0.1487, and milling \$0.9039.

The company has spent approximately \$300,000 in additional plant and equipment during the last two years. Amalgamation is not practised, and, owing to the fouling with base metal in the course of treatment (all-cyanidation) and in spite of a comparatively heavy outlay for refining (over 11c. per fine oz. recovered) the bullion shipped has averaged only about 834 fine, in gold and silver, during the year. Marketing charges are to be reduced by a drastic modification of normal practice—by the adoption of the Miller chlorine process—and a fine gold (999) will be produced. The necessary equipment is now being installed; and the economic results obtained by the production of fine gold, as compared with ordinary high-grade bullion, will be awaited with interest.

Ore reserves as of June 30, 1918, were estimated at 459,276 tons, containing gold and silver of a total value of \$9.80 per ton.

Tin Smelting in Northern Nigeria

BY R. T. HANCOCK*

Tin smelting in Northern Nigeria, an art long practiced by natives prior to the British occupation of the country, though only on a small scale, as the jealously guarded secret of a few families, has been revived. The appearance of tin in the form of thin rods, cast in molds formed by placing straws in damp sand, caused the officials of the Royal Niger Co. to penetrate the then unknown North in search of their source. After the British occupation of the country, the furnaces were ordered by the government to be destroyed, but they have recently been rebuilt, and are running with their former crews and under the supervision of the Department of Mines.

Alluvial tin ore was purchased from the smaller mine operators—none of the larger concerns operating being asked to tender—at about £180 a ton, metallic tin in England being then quoted about £320. The ore carries an average of 72% metal, and a yield of about 72% of the theoretical content is obtained in smelting. A ton of ore, therefore, produces about half a ton of metallic tin. The whole of the output is taken by the government engineering workshops for babbitt metal, solder, and similar uses. The net saving to the government is considerable, as the expense of shipping the ore to England and its return as metal is avoided.

No alluvial tin ore from Nigeria reaches the United States, there being a penal export duty on any shipment not consigned to British smelters.

Spain's 1917 Mineral Production

The mineral production of Spain, excluding some of the non-metallic products, is given in the accompanying table, which has been compiled from data which appeared in the Sept. 24th issue of the *Revista Minera*:

1917 MINERAL PRODUCTION OF SPAIN

	Metric Tons	Value in Pesetas
Anthracite	324,756	12,366,866
Antimony ores	502	629,400
Argentiferous lead ores	13,218	52,962
Asbestos	110	11,000
Asphalt	1,817	21,370
Bismuth ores	13,900	7,456
Bituminous coal	5,042,213	240,486,675
Clay	4,245	60,295
Copper ores	83,501	13,967,663
Copper pyrites	1,817,839	47,511,900
Fluorspar	250	7,000
Garnet	2,667	93,345
Gold ores	50	650
Graphite	1,980	5,100
Iron ores	5,551,071	39,625,578
Iron pyrite	376,918	19,491,604
Kaolin	1,220	34,760
Lead ores	240,368	61,528,830
Lignite	637,841	23,450,120
Manganese ores	57,474	2,099,121
Manganiferous iron ores	50	400
Quicksilver	18,705	3,505,322
Salt	309,413	1,840,862
Silver ores	96	78,270
Sulphur	84,979	7,904,605
Tin ores	77	105,800
Tungsten ores	546	1,644,284
Zinc ores	123,485	9,151,438

Henry R. Merton & Co. has issued a circular, dated Oct. 2, stating that in consequence of the refusal by the Board of Trade to grant it a license under the Non-Ferrous Metals Industrial Act, it has decided to go into voluntary liquidation. It is understood that the Central Mining and Investment Corporation has already acquired the controlling interest in one of the Merton subsidiary industrials.

*With Nigerian Tin Corporation, Jos, Northern Nigeria, Africa.

Crystalline Quartz Wanted

The Naval Consulting Board desires to obtain prompt information regarding available deposits of crystalline quartz for certain urgent naval use. Crystals should plainly show location of crystal faces, should be free from internal flaws, cracks or bubbles, and should weigh from one to six pounds. Coloring matter in crystals is not necessarily detrimental, but water-clear crystals are preferred. Probably fifty tons or more of suitable crystals will be ultimately required. If you know of any promising deposits and have small samples, communicate with Lawrence Addicks, of the Naval Consulting Board, No. 6 Church St., New York.

Tin in Nigeria

At the recent meeting of the Nigerian Tin Corporation, Oliver Wethered, chairman of the company, said:

"The company's tin production is materially increasing. There has been a serious shortage of native labor and supplies of all kinds, but an improvement of these conditions can be looked for. The price obtained for the tin was a remunerative one, in spite of the greatly increased cost of everything, including royalty, freights, and insurance. There has been an almost daily persistent shading of a pound per ton for the last few weeks, due, it is said, to the buying of tin by the Allied governments through one channel. If this control had limited speculation and brought down the figure in a healthy and legitimate way, no producers of tin would complain, but I found a widespread fear that in the laudable pursuit of cheap tin we might find our great national asset of the control of some 70% of the world's tin production placed in jeopardy, and even seriously affected. We are confronted today with a price for our output which has no relationship whatever to supply and demand, but is entirely subject to whatever may be the whims or the intentions of the man or men who are regulating this matter on principles unknown to the public; and whose actions, so far as we know, are not disclosed except by their effects. I think I am right in saying that the first attempt to bring tin under the control of the government was made by the institution of a committee of the Board of Trade, known as the rubber and tin exports committee. I do not know that the names of the members have ever been published; at all events, I cannot find them, and I do not know that they have any formal constitution or any published regulations. Apparently they are acting with such discretionary powers as somebody or other vested in them.

The procedure of that committee apparently did not meet with the entire approval of those who wanted to force down the price of tin regardless of and without consultation with those who produced the tin, or, at all events, those who produced tin in the British Empire. Therefore, the Minister of Munitions, in the exercise of his power under the Defence of the Realm Regulations, declared in December of last year that tin was a metal required for the production of war material, and therefore coming under the Defence of the Realm Regulations. This led to control of speculative dealings in the metal and to drastic change in the regulations. But the regulations have been modified still further, and what tin producers are to get is now to be determined by an

Inter-Allied Executive Committee. I am not able to say how far the control of tin by this executive committee affects adversely Nigerian tin, but I can speak with some confidence of the biggest factor in the world's tin production—namely, the Federated Malay States, with which I am largely concerned. I say emphatically that this committee has practically created a monopoly in the tin market. It has placed large profits in the hands of a small number of privileged dealers, and, speaking generally, they have deprived the tin producer of the benefits of his efforts, while unnecessarily benefiting intermediaries at the expense of the producer.

"I do not know what right any body of men has got to say what shall be the price we shall receive for our produce unless they balance it (as it has been done in the case of agriculture) by putting a maximum upon the price of what the tin producer has to buy. The present control of the tin metal market is not in the national interest, and the objects desired could have been obtained without inflicting the injustices which at present are borne by those who produce and sell tin. The Nigerian Chamber of Mines is taking the matter in hand, and the Cornish Chamber of Mines is doing so also, and as vice-chairman of the F. M. S. Chamber of Mines I may tell you that we, too, are taking action."

Russo-Canadian Corporation

Last December, shareholders of the Irtysh, Kyshtim, and Tanalyk companies agreed to vest the control of their properties in a new concern, the Russo-Canadian Development Corporation, says the *Statist*, so as to obviate any possibility of paramount influence being obtained by German interests through the purchase of shares of the English companies on the London market. The control of the three English companies remains unaltered, the method adopted being to issue to them a series of debentures secured upon and entitled to the whole of the profits of the Russian companies, which own and work the properties. Apart from these debentures, the Russo-Canadian Development Corporation has an authorized capital of \$15,000,000 divided into \$5,000,000 7% non-cumulative preferred stock and \$10,000,000 in common stock, both in shares of the denomination of \$5. All of this capital has been issued, and to ensure continuity of control, the common stock will be vested in a voting trust consisting of 15 members, including the directors and engineers of the three Anglo-Russian corporations. It will be understood that the corporation is intended to be a powerful supporter of Anglo-Russian mining interests.

Much depends, of course, upon the future internal conditions and the government of Russia, particularly of Siberia. Those responsible for the management of the group—and they are known to be well informed—consider that with the advent of Allied assistance the outlook can be regarded with confidence, and that a rapid return to normal working conditions in Siberia and the Urals can be anticipated. Steps are consequently being taken with a view to resuming operations at the properties at the earliest date possible.

Pure Crystalline Calcite ground to an impalpable powder is now being placed on the market as a substitute for commercial chalk.

Editorials

The End in Sight

THE Great War draws nearer to its close. Six weeks have seen Bulgaria, Turkey, and Austria pass definitely out of it, with Serbia regained and the Turkish armies destroyed. The main Austrian army was in peril, and Austria herself is disintegrating, with the separation of Hungary and Bohemia and the approaching establishment of the kingdom of the Serbs, Croats, and Slovenes. Germany maintains resistance on the Western front while the terms for her are being drafted, but the Allied power on that front alone is increasing every day and the entire south of Germany is about to become open to invasion by the Italians, the Czechs, and to the great British and French armies liberated by the cessation of hostilities with Bulgaria and Turkey, which may be sent up the Danube now that the Black Sea has become open. The latter development affords also easy access to Russia, the lack of which was for three years a sad drawback to Allied efforts.

Besides this external military situation, there is every reason to believe that internal affairs in Germany are desperate. With man-power depleted, essential supplies exhausted, and finances in chaos, unconditional surrender to superior power cannot long be delayed.

The Gold Question

THE appointment by the British Treasury of a commission, headed by Lord Inchcape, to survey the gold question and listen to the appeals of the gold miners of the British Empire for aid, is the first official action in this important matter. Following this, Secretary McAdoo appointed a committee consisting of Albert Strauss, member of the Federal Reserve Board; Raymond T. Baker, Director of the Mint; Emmet D. Boyle, Governor of Nevada; Edwin F. Gay, representing the War Trade Board, and Pope Yeatman, representing the War Industries Board.

The gold question has therefore acquired an official status. It is, however, rather a question for the decision of economists and financiers than for gold producers and mining engineers, although the latter may give valuable evidence as to gold resources, and the producers may make unchallenged representations respecting the disappearance of their profits and the merit of their claim for relief from taxation.

But in claiming aid for the maintenance of normal production and profits, the cost of production has nothing to do with the case, except as to how much the aid ought to be. The only sound ground for such a claim is that gold, if it had been left free, would now be at a premium, of which gold miners have been arbitrarily deprived. In neutral countries gold is at a premium. In Great Britain and America it has disappeared as currency, its exportation is forbidden, and its industrial use is limited; wherefore its true status is obscured.

If the quantity doctrine of money be accepted, the plight of the gold producers is just what it ought to be. If gold be at the root of inflation, the automatic curtailment of gold production is what ought to happen as the true corrective. If the gold producers are being arbitrarily deprived of a premium, so much the better. But, as we have previously pointed out, that doctrine is vigorously challenged, and the simple fact that the governments want more gold is distinctly in evidence.

Standardization of Mining Methods

ONE of the great needs of the mining industry at the present time is the working out and adoption of standardized methods, in order to:

1. Lower the cost of prospecting and development work, which, of course, ultimately means lowering the cost per pound of metal produced. If drifts, raises, and winzes can be driven for less money and at greater speed (without a reduction of wages or "speeding up" the men), it will be possible not only to produce more metal with the same expenditure of money, but large bodies of low-grade material, which cannot be mined profitably under present conditions, will become commercial ore.

2. It is essential that attention be paid to prospecting and development work, in order to maintain present production, to say nothing of the great need of increasing the output.

3. As there is now a great shortage of labor, and as in all probability this will continue for some time, it is absolutely necessary to standardize operations and plan the work ahead in order that the efforts of every man may count. This does not necessarily mean "speeding up," or "more work per man per day" (although the latter is highly desirable), but it is important to effect a concentration of labor where it will be productive of the greatest results.

When the war broke out in 1914, prospecting and development work was dropped by practically all companies. Later, when the price of metals went up, labor troubles set in, and the process of "finding ore" was neglected again, while the major efforts were directed toward maintaining production. Some of the larger mines which had good ore reserves in 1914 have made a steady production, but at the expense of their ore reserves, which have been considerably depleted. For instance, to quote an extreme case, in one division of a large mine in southern Arizona, 300 men were employed daily four years ago, producing 10,000 to 14,000 tons of ore each month. This record has now dropped to 165 men per day and 5000 to 7000 tons monthly, the decrease being due largely to the postponement of prospect and development work, which is rapidly shortening the apparent life of the mine. In the future, therefore, it is important that the cost of finding ore be reduced to a minimum, in order that this necessary expenditure

shall yield as great an addition to the ore reserves as possible.

In this number we publish the first of a series of seven articles by Charles A. Mitke, dealing with the standardization of mining methods, with a view to economy. Mr. Mitke is an engineer of experience, and has attacked his subject with enthusiasm. Each article deals with a single phase of mining practice.

It is evident that in the growth of the metal-mining industry each individual mine will develop to a greater or less extent a certain degree of standardization in its various operations. Ground-breaking, timbering, raising, shaft-sinking, and other features of mining practice follow in a general way what past experience has shown to be more or less effective.

Formerly managers of mines allowed their foremen to establish much of the detail of mine operation; and intelligent, experienced foremen have done much not only for the individual mine, but for the industry as well. In some cases mining practice has followed, as a mere duplication, the procedure instituted by another mine. No attempts are made in these cases to establish a practice that is peculiarly adapted to the mine in question. The net result has been the growth of practices that are more or less local in character, although the migratory miner has done his share in transplanting the good as well as some of the bad features of mining practice from one locality to another.

The past and present decade have witnessed a steady progress in good engineering. A first-class manager now places upon his staff the duty of studying mine conditions and the working out of methods that are safe, economical, and peculiarly adapted to the mine in his charge. Materials, tools, and appliances are also carefully studied, and only those which stand the test of the mine conditions and meet with the prime requirements of safety and economy are retained.

Standardization implies preliminary experimentation, careful consideration of observations, and selection. It does not imply that the standard practices at one mine are necessarily the best for another, although often some features can well be adapted by another mine. Mr. Mitke presents the results of his thought and his selection in a helpful spirit, rather than with the idea of saying the last word. We feel that many of our readers will benefit greatly from his articles. Some may differ with Mr. Mitke, and thus be prompted to contribute suggestions along the lines he has taken, as well as on others. The subject is worthy of the attention of mining engineers at any time, but under present conditions it is extremely important, as large output, safe operation, and economy in labor and materials are vital. We hope that these illuminating and suggestive articles will be studied not only by the operating heads of mines, but also by their foremen and shift bosses, upon whose intelligence and initiative so much depends.

United War Work Fund

MORE money is needed. You are going to be asked to subscribe again. The war is not over. Our people have just contributed to a huge Liberty Loan to help bring the war to a successful conclusion. We have invested our money in equipment for our soldiers. We are now asked to give our money for the upbuilding

of the morale of that army. No war has ever been fought with as clean an army as America has sent to the Old World. General Pershing has said that every hut that is established adds 10 men to a quota of one hundred.

The task of upholding the morale of the Army should peace be declared tomorrow is even greater than that during the war. Under the inspiration of patriotic purpose, men forget their petty vices and put into their work the enthusiasm and the self-sacrificing spirit that come from high ideals. It is human after a great crisis to let down. Should peace be declared tomorrow, it would be human for men to let down. If our men and boys are to come back fit for the work of the world which will face them on their return, if they are to take a vital part in the tremendous tasks of reconstruction which face us in this country after the war, they must come back clean and whole; they must come back with the same moral courage to meet the problems of commercial life that they have learned counts for so much in military life.

To set forth these self-evident facts is simply to state the fundamental value of pushing this campaign for United War Work to a successful conclusion. Presidents and generals, business men and soldiers, have only words of commendation for what has been accomplished. May each individual take to himself a part of the moral responsibility of the world and see that he does his part in the drive that starts on Nov. 11. The money that you subscribe is not for any one organization; it is for all of the agencies that are so efficiently performing a vitally necessary work. It is to be equitably divided.

At the front, on the transports, or in the cantonments, the Y. M. C. A., K. of C., Y. W. C. A., the Jewish Welfare Board and the Salvation Army are working to keep men clean for the work of the world. These admirable societies are worthy of your support, and you can get behind them by making your subscription a generous one.

Taxing the Prospector

IN ANOTHER column we publish an article containing a resolution adopted and forwarded to the Secretary of the Treasury by representatives of about thirty mines, all of which are in the development stage. The distinction between mines that are in the development stage and mines that have passed this condition is not easy to make. In many instances a mine is in process of development while ore is being mined and milled, and continues in this condition until almost worked out. Outside of the notable exceptions of the porphyry copper mines, certain iron mines of Minnesota, and a few metal mines, the delineation of the limits of the orebodies that have been discovered cannot be made without the expenditure of an unreasonable amount of money. By first partly developing, and then continuing the development as the mine is worked, there is a reduction in the gross amount of capital required. Without this arrangement many smaller properties would find it difficult to operate. To tax the net returns of such mines, in the manner proposed under the income-tax laws, is a questionable procedure, and, if this is done, the miners will be discouraged.

The resolutions adopted at Phoenix propose the plan of setting aside as not taxable the net returns from prospect or development mines until the net returns from the ore, plus the calculated expectant returns from blocked-out ore reserves, equal the total investment. Due allowance of a fair rate of interest on the invested capital is also to be made. To define "ore in sight" and to settle upon a "fair rate of interest" are apparently the only difficult points in the proposed plan. We believe that both terms can be equitably interpreted. The plan has considerable merit, for it sharply discriminates between the taxable and the non-taxable mine. It also insures, as far as it is practicable to do so, the return, to the investors, of the capital invested.

The last paragraph of the resolutions is not entirely clear, but we presume that the term "earnings" is established by the following equation:

["Earnings (or surplus account) = (Net ore-returns + calculated expectant returns for blocked-out ore) — (invested capital + interest on invested capital)."]

The proposal to tax the "earnings" that accrue each year after having been determined in this way is eminently fair. The simplicity of the basic plan commends itself to us, and we believe that it is worthy of considerable discussion. The practicable operation of the proposed plan is not without its obvious difficulties. Naturally, much must be left to the management of each property, but the supervision will be in the hands of the Department of Internal Revenue; and, if that department will exercise its control through competent technical men, a satisfactory outcome may be expected.

The Tin Control

THE international tin control has become an almost perfect example of a buying monopoly. Large sources of the world's tin supply are within the British Empire, but especially within its colonies. Practically the whole of the world's consumption is within the Allied countries, wherein but little tin is produced. The control of the metal is exercised by centralizing the buying through one agent in Singapore, another in Batavia, another in Hong Kong, and another in Australia. These agents are in each case well-known firms of tin merchants, who thus acquire a privileged character. It might be considered preposterous that rude hands should thus be laid on the Chinese and Dutch markets, but the answer is that licenses for the importation of tin into Great Britain and America will not be granted for any except what is purchased by Mitsui & Co. and Maclaine, Watson & Co., respectively.

The Bolivian, Nigerian, and Cornish tin that is smelted in Great Britain comes, of course, into the jurisdiction of the Ministry of Munitions. The Bolivian tin smelted in the United States will similarly fall under the power of the War Industries Board, though no proclamation about this has yet been made, and our producers have been left free to sell on their own terms. Nor has any arrangement been published governing the purchase of Bolivian tin ore. Finally, nothing has yet been made known as to what the controlled price of tin is going to be.

These developments have created a good deal of dissatisfaction. Numerous tin merchants have been put out of business, while a few large houses have been favored by their appointment as official buyers. Resent-

ment respecting this is natural. The placing of the entire tin business of the United States in the hands of a subsidiary of the United States Steel Corporation, the largest consumer of the metal, is severely criticized as the conferring of a national prerogative upon a private and very much interested party. The delay in making and publishing the terms as to price, purchase of ore, etc., is irritating and apparently is inexcusable. Great indignation over the whole assumption of the business is expressed not only by the merchants who have been dispossessed, but also by the producers in Cornwall, Nigeria, and Malaya, whose grievance is that they have been deprived of a free market.

In a cataclysm such as has afflicted the world during the last four years, private rights have had to be overridden. Many persons have had to be injured, not only in the war zone but also in remote places. Those who have lately been injured in their tin business may class themselves in the latter category. The real question is whether the tin control is going to secure more or less tin than heretofore. The experience with controlled industries in this country has been that generally they have yielded less. Those which have been left free to respond to natural factors have been the ones that have improved in production. The future of tin supply will depend a great deal upon the intelligence of the control. In our opinion some inept and even dangerous persons have a hand in it. Of one thing we can be certain, viz., the tin business has been stupidly managed from the time when the conditions of acute shortage first began to exhibit themselves.

In an old French palace at Versailles a notable group of men is gathered. General Foch, Lloyd George, Georges Clemenceau, Baron Sonnino, Admiral Benson, General Bliss, Colonel House, and representatives of other nations of the Allies are in conclave. Their task is a weighty one. They will either settle the present strife, or will order it to go on until the occupation of German lands by the Allied armies crushes further resistance. The successful fulfillment of an ideal is in the air. Justice stands forth, not blindfolded but with flashing eyes and uplifted sword. The choice to Germany is limited to two things—she may stop the struggle and devote herself to the giant task of reparation for her crimes against civilization, or she may prolong the existing strife to her own extinction. There is no alternative. The meeting is the climax of more than four years of bloody strife and human woe. Will the war end? Will justice prevail? Our faith is in the Allied Council and in the armies of the Allies.

The exigencies of the war and the readiness to overcome them are aptly shown by the substitution of a new high explosive in place of the gelnignite manufactured for and used by the gold-mining companies of the Transvaal. In place of a nitroglycerin base, a gun-cotton base, well impregnated with sodium nitrate, is to be used. By leaving a certain proportion of moisture in the mixture, an explosive not only effective in blasting but safe to handle is produced; and the insensitiveness of the explosive has been overcome by the use of a primer cartridge of gelnignite. There is apparently no advantage in cost, but there is a saving in the amount

of nitroglycerin used in the local factories; and this, in view of the pronounced shortage of glycerin, is an important consideration.

BY THE WAY

Western mining camps are often afflicted with a wave of legal controversy over titles to mineral ground. In a small mining town one of the leading citizens met a prospector who owned a claim that was in dispute. "Well, Pat," he said, "I see your claim is in litigation." "In litigation!" said Pat. "Some one has misinformed you. It's not in litigation; it's in blue lime and porphyry, and damned hard porphyry at that."

When the war began in 1914 a man named Godfrey Jones, a coal miner in Wales, enlisted as a private. He soon became a non-commissioned officer, and a little later earned a commission. At Saloniki he showed such conspicuous courage that he was awarded the Distinguished Service Order. The other day Colonel Jones, still serving with his countrymen and in command of Welsh soldiers, was made a brigadier general. The miner now outranks the heir to the British throne.

In a certain gold-mining district which shall be nameless in consideration of its spotless reputation at the present time, a boom was in progress. A "prospect" had developed into a hole in the ground, sometimes mis-called a mine; and from this hole had been extracted a number of specimens of glittering quartz spotted with real yellow gold. These were carefully boxed and sent to the far-distant center where the business end of mining was carried on. A company was floated without delay, and there was no trouble in raising more than enough money to build a mill, which was erected in haste, and turned a "sleepy hollow" into a busy township. At last the plant was completed, and the glad tidings were telegraphed to the head office. An ominous silence followed the announcement; and the board of directors, growing restive under the absence of news, sent a telegram asking when the mill was to start. The reply was laconic: "When you return the mine."

Samuel Untermyer, who advocates Government ownership of public utilities, says there is no socialism in that policy. That is true, says the *Wall Street Journal*. There is only an inevitable and increasing inefficiency. The postoffice is not socialistic. It is merely stupid, and Mr. Burleson is rapidly reducing what was a few short months ago the best telephone service in the world to the level of incompetence of the department over which he presides. There is no war necessity involved in this change for the worse, and the same may be said of the railroad service we are receiving under Government management. Where it was cheap and efficient it is now dear and inadequate. Wages are based not upon the value of the services given but upon a ransom scale. The effect of this, indeed, has been so serious elsewhere that England is already considering, so far as her politicians dare, the disfranchisement of employees in government-owned utilities, for the protection of the rest of the people, so that liberty shall not die out into a sterile bureaucracy.

A Joyous Story

Silence.
A white-hot sun.
A boiling atmosphere.
A hot breeze.
A distant mountain range.
A joshaway here and there.
A burro.
A trudging prospector—
On and on.

A rocky, white-seamed reef.
The prospector trips and falls
Over a white rock.
His hand clutches a quartz fragment.
He arises.
He looks long at the piece.
He throws it down.
He rubs his eyes.
He picks the piece up again.
He fumbles in his pocket.
He spots a glass on the piece.
He jumps into the air.
He waves his arms.
He yells.
He dances.
He talks to the burro.
He builds a monument of stones.
He sets stakes.
He writes a location notice.

Silence.
A burro and a man fast disappear
Across the alkali flat
Toward the Santa Fe.

A crash and a roar.
A clank of bells.
A honk of horns.
A swirl of auto.
A crash of truck.
A scare-faced man.
A 75-story building.
An office.
A sleek, fat man.
A hat-in-hand prospector.
A piece of quartz.
A map, a story.
An agreement.
A check.
A bank—money in hand.

Honk-honk!
Back to the desert.
Back to the reef.
An auto truck.
A shaft begins.
Ten buildings appear.
Streets and a town.
A saloon.
Red's bar.
Miners stroll up the street
Ping! Pank!
Chuck-a-chuck! bang, blast, bing!
The vein is deep and rich.
A mill springs up.
Wells Fargo's agent.
Doré bars galore.
The stock is high.
Dividends pour forth.
Stockholders smile.

Riverside Drive.
The Angelus.
An apartment house of degree.
Opulent wealth.
A twelve-cylinder car in shining splendor
Rubs tires with the curb.
In the doorway a figure appears.
Top hat, gloves, spats, cane, cutaway,
Shiny shoes, sweet-smelling cigar.
Tim Kelly,
Stockholder,
Wealthy mine owner.
Honk-honk!

Personals

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

John T. Chapman has moved his office from Joplin, Mo., to Baxter Springs, Kan.

M. H. Wasler, a chemist of Reno, Nev., is equipping a laboratory at Batesville, Arkansas.

Edwin J. Collins, of Duluth, Minn., is examining copper properties near Salt Lake, Montana.

Fred Hellmann and F. S. Shaw are making a visit of inspection to the various Guggenheim mines in Mexico.

Albert J. Houle, formerly professor of metallurgy at the Michigan College of Mines, has been visiting in Miami, Arizona.

Frank H. Skeels, recently with the Success Mining Co., Wallace, Idaho, has been ordered to Camp Humphreys, Virginia, for training.

Frank Blackwell, formerly engineer at the Newport mine, Ironwood, Mich., is assisting in teaching at the Michigan College of Mines.

George C. Stone, formerly of the New Jersey Zinc Co., has been added to the staff of the non-ferrous metals section of the War Industries Board.

E. D. Gardner has been appointed a mining engineer on the staff of the U. S. Bureau of Mines, and will be placed in charge of one of the Western rescue cars.

B. R. Seeber, formerly superintendent of the Winona Copper Co., of Michigan, has resigned. He is succeeded by Gustav Arthur Braun, chief engineer of the Victoria Copper Mining Company.

L. Reinecke and H. L. Smith, of the Geological Survey of Canada, have returned to Ottawa, after investigating the mineral resources along the Pacific Great Eastern Ry. in British Columbia.

Bennett E. Bates, who recently resigned as general superintendent of the Cubo Mining and Milling Co., Guanajuato, Gto., Mexico, has passed his examinations for a commission in the engineers.

Arthur Yates, lecturer on mining at the Royal School of Mines, London, is assistant officer-in-charge, Ministry of Munitions, controlling the output of a mining district in the north of England.

E. B. Jones, until recently superintendent of the H. W. Johns-Manville Co., of Asbestos, Que., Canada, has been appointed instructor for the Student's Army Training Corps, at the Michigan College of Mines.

Robert Marsh, Jr., formerly general mine superintendent of the Nevada Consolidated Copper Co., Ely, Nev., who enlisted in the aviation service last year, has reached the rank of major after successive promotions.

Willis Werner was recently appointed chief chemist of the Republic Iron and Steel Co., Youngstown, Ohio, to succeed T. J. Davies. He will have charge of the blast furnace and the openhearth laboratories.

J. Austen Baneroff, professor of geology at McGill University, has returned to Montreal, after spending some time in the region of Anyox, B. C., on geological work for the Granby Consolidated Mining, Smelting, and Power Company.

F. J. Longworth, smeltery superintendent for the Canada Copper Corporation at Greenwood, B. C., has accepted the position of superintendent of the Tennessee Copper Co.'s smeltery at Copperhill, Tenn., succeeding T. W. Cavers, resigned.

John F. Coats, of the engineering staff of the Granby Consolidated Mining, Smelting, and Power Co., has returned to headquarters at Vancouver from a visit to Idaho. Palmer J. Cook is superintendent of the company's Midas mine, in Alaska.

T. E. Mitchell, who recently resigned as manager of the Burma Mines, Ltd., at Namtu, Burma, on account of ill health, was in San Francisco on Oct. 26, en route to London. Mr. Mitchell has been with the company for four and a half years.

Charles Legrand, consulting engineer for the Phelps Dodge Corporation's Copper Queen reduction works at Douglas, Ariz., accompanied Walter Douglas, president of the corporation, on his recent visit to Morenci, Ariz., and Tyrone, New Mexico.

M. F. Fairlie has been placed in charge of the mines of the Mining Corporation of Canada, hitherto managed by Charles E. Watson, who met his death in the "Princess Sophia" disaster. Mr. Fairlie was recently manager of the reduction works of the company.

A. G. Langley, provincial resident mining engineer, with headquarters at Revelstoke, B. C., has been appointed to represent the provincial government at the pending inquiry into the rates charged by the Consolidated Mining and Smelting Co. of Canada for the treatment of custom ores at the Trail smeltery.

Leslie Urquhart recently returned to London from a prolonged visit to Russia, during which his associates in London completely lost track of him. Mr. Urquhart, who is considered one of the highest of British authorities on Russian industrial affairs, returned with rather favorable reports respecting the situation of the Anglo-Siberian mining companies.

Arthur J. Baldwin, vice president of the McGraw-Hill Publishing Co., is one of a party of trade paper publishers and editors which sailed on Oct. 26 for England on a tour of inspection of British industry under war conditions. Others in the party are H. C. Parmelee, of "Chemical and Metallurgical Engineering"; Floyd W. Parsons, editor of "Coal Age"; and W. W. Macon, of "Iron Age." The trip will take six weeks and will include a visit to the battle areas in France.

Obituary

Thomas Feigh, of Duluth, Minn., died recently in Chicago. He owned the fees of many mines in Michigan and on the Cuyuna Range, in Minnesota.

Morgan S. Baldwin, son of Arthur J. Baldwin, vice president of the McGraw-Hill Publishing Co., died on Oct. 9 from wounds received in battle Sept. 29.

Daniel E. Bruce, mining engineer and graduate of Nevada University, died of influenza recently at the Mare Island Navy Yard, where he had been in the service. He was 27 years old.

Fredrick Lee Crouch, general manager of the United Zinc Companies, Joplin, Mo., died recently in Joplin. He had been with the company eight years and manager for the last four years.

Capt. James Alexander, owner of the Engineer mine, near Atlin, B. C., was lost, with Mrs. Alexander, on the "Princess Sophia," on Oct. 25. He fought in the Boer War, where he won his title, and at its close went to Alaska.

Robert Lee Downing, of Keewatin, Minn., general superintendent for the western district of Pickands, Mather & Co., died Oct. 27 of Spanish influenza. He was a graduate of the Michigan College of Mines in the class of 1906.

Malcolm M. Stuart, mining engineer and a graduate of the Colorado School of Mines, died recently in Butte, Mont., of Spanish influenza. At the time of his death he was in the employ of the Clark interests at the Elm Orlu property. He was 36 years old.

George O. Randolph, mining engineer of Cobalt, Ont., who accompanied Charles E. Watson, manager of the Mining Corporation of Canada, on his trip to the Yukon and was lost on the "Princess Sophia," was a graduate of the Michigan College of Mines, 1907, and was for a time employed by the corporation as manager of its property in Rickard Township.

Clarence S. Verrill, mining engineer, was among those lost on the "Princess Sophia." He was a son of Prof. A. E. Verrill of Yale, and a graduate of Yale himself. Mr. Verrill had had 20 years' experience in the mining sections of Colorado, California, Idaho, and British Columbia. He had been an assistant to John Hays Hammond in the latter's work on the Independence mine, at Cripple Creek. It was he who held the option under which the Surf Inlet mine in British Columbia, was recently bought by the Tonopah Belmont Development Company.

Charles E. Watson, of Cobalt, Ont., manager of the Mining Corporation of Canada, was one of the passengers lost on the steamship "Princess Sophia," wrecked on Oct. 25, off the Pacific Coast. He left Cobalt several weeks before, to examine a mining property in Alaska in the interests of the company. Mr. Watson was formerly manager of the Cobalt Townsite mine. Subsequently he was appointed to the position he held at the time of his death. He was a brother of R. B. Watson, a director of the Nipissing Mining Company.

Col. William Hamilton Merritt, a mining engineer and metallurgical expert, died at

Toronto, Ont., Oct. 26, from influenza. He was born at St. Catharines, Ont., and was graduated from the Royal School of Mines, London, England. He was sent to the Paris Exposition by the Canadian government to study matters relating to engineering, and was a member of the royal commission chosen to investigate the mineral resources of Ontario. Colonel Merritt saw active service in the Canadian Northwest rebellion in 1885, and served with distinction through the Boer War. Upon the outbreak of the present war, he did much to advance the cause of aviation.

Howard S. Lee, mining engineer, died of influenza at Silverton, Colo., on Oct. 25, aged 38 years. He was born in Golden, Colo., and was a graduate of Leland Stanford University. At the time of his death he was associated with the United States Smelting, Refining and Mining Exploration Co. Mr. Lee entered the employ of the company 10 years ago and had managed several of its properties and, until recently, was general manager of the Leadville unit, the large unwatering project undertaken on Fryer Hill three years ago. He had just been appointed assistant to A. P. Anderson, chief consulting engineer of the company, and had expected to leave soon for headquarters in San Francisco. He was a member of the Sigma Nu fraternity and of the American Institute of Mining Engineers.

Societies

International Mining Convention will be held at Vancouver, B. C., Jan. 8 to 10, 1919, under the auspices of the Vancouver Chamber of Mines.

Mining Circle of El Paso has been recently organized at El Paso, Texas, with the purpose of promoting interest in mining and allied industries, and has now a membership of more than 80. The headquarters of the society are at the University Club. Meetings are held monthly.

Arizona Mining Men's Association was organized on Oct. 12 at a meeting in Phoenix for the purpose of promoting interest in the mining industry. About 40 members were enrolled. Charles P. Reininger was elected president; W. W. Lawton, secretary; Cleve W. Van Dyke and Edward Bush, first and second vice presidents; and W. S. Humbert, treasurer. Fifteen directors were chosen, representing nearly every district in the state, as follows: J. J. Hannigan, T. O. McGrath, William McDermott, E. C. Harrison, Dave Morgan, J. E. Harper, W. B. Twitchell, E. A. Gillespie, W. J. Graham, John Fowle, A. Smith, Murray Day, E. Rosenberg, Ezra Thayer, and D. W. Hall. A committee was appointed to draft a constitution and by-laws.

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.

Compressed Air, Centrifugal System for Making. Robert V. Morse, Ithaca, N. Y. (U. S. No. 1,280,276; Oct. 1, 1918.)

Crucibles, Heating Device for Metal Melting. George L. Fort, Kansas City, Mo., assignor to Fort-ified Manufacturing Co., Kansas City, Mo. (U. S. No. 1,279,682; Sept. 24, 1918.)

Drill, Rock. Milford Shingler, Ashville, Penn. (U. S. No. 1,280,092; Sept. 24, 1918.)

Drilling Apparatus. George H. Gilman, Claremont, N. H., assignor to Sullivan Machinery Co., Boston, Mass. (U. S. No. 1,279,532; Sept. 24, 1918.)

Furnace, Recuperator. William H. Stubblebine, Allentown, Penn. (U. S. No. 1,279,932; Sept. 24, 1918.)

Furnaces, Charging Devices for. James Hundley, Middleport, Ohio. (U. S. 1,280,037; Sept. 24, 1918.)

Heat Treatment of Castings of Special Steels. Federico Giolitti, Turin, Italy, assignor to Società Anonima Italiana Gio. Ansaldo & C., Genoa, Italy. (U. S. No. 1,279,533; Sept. 24, 1918.)

Tunnel Mold Form. Howard B. Loxterman, Pittsburgh, Penn., assignor to Blaw Steel Construction Co., Hoboken, Penn. (U. S. 1,279,561; Sept. 24, 1918.)

Zinc, Furnace for Treating. Leopold Van Gulck, Uplands, Swansea, Wales. (U. S. No. 1,280,593; Oct. 1, 1918.)

Editorial Correspondence

SALT LAKE CITY—Oct. 29

Ore-Smelting Furnaces in Salt Lake Valley and vicinity at the end of October were as follows: United States Smelting Co. had five lead furnaces in blast at Midvale; American Smelting and Refining Co. had five at Murray, and the Garfield copper smelter of the A. S. & R. had six reverberatory furnaces and two blast furnaces in operation. A recent cloudburst at Garfield washed a quantity of gravel and boulders into the plant, and necessitated considerable cleaning up around the tracks and upper part of the furnaces. At the International smelter, at Tooele, the lead section was running five furnaces and was operating at nearly full capacity. Two reverberatory furnaces were in blast here, treating copper ores. Shortage of labor at most of the plants has held back operations. Ore-shipment conditions are favorable at this season, and a fair tonnage from Utah, Nevada, Idaho, and surrounding states is being received.

DENVER—Oct. 29

The Influenza Epidemic in Colorado is interfering seriously with important mining operations. Among the large enterprises that have been forced to shut down are the American Metal Co.'s molybdenum properties at Climax and the United States Smelting, Refining, and Mining Exploration Co.'s Sunnyside properties at Eureka, near Silverton. It is reported that more than 100 men have left the Sunnyside recently through fear of the disease, and that about 40 employees of the company are ill at the mine boarding house. The mining camp of Silverton is one of the greatest sufferers. It is said that of about 1200 inhabitants, more than 400 are victims of the epidemic, and more than 35 deaths are recorded. Only one doctor is now available in the town to look after the sick. During the last two weeks miners have left the camp in large numbers for Ouray, Boulder, Idaho Springs, and Georgetown have also been hit by the plague, and in the first-mentioned city many deaths are recorded. Although reports have been published to the effect that the epidemic has passed its crisis here, medical authorities admit that it is far from being under control.

WALLACE, IDAHO—Oct. 27

Production of the Coeur d'Alene Mines is seriously curtailed through the shortage of labor, and this has been further accentuated by the prevalence of influenza. Practically all work by development companies, which is usually an important factor in the mining activity of the district, has been suspended, partly on account of labor shortage and partly on account of the present high cost of mining. For the same reason, there is nothing in the way of new mill construction or the expansion of present plants. Everything waits for the conclusion of the war, and the feeling prevails that when that time comes, after allowing for a period of readjustment, there will be a mining revival that will rival that remarkable period just preceding the entrance of America into the war.

YELLVILLE, ARK.—Oct. 29

Smelters in the North Arkansas Region, for the first time in the history of the zinc-mining industry here, are inquiring for prices and available tonnage on carbonate and silicate zinc ores, and never before have operators been asked to set a price, as formerly the buyers made the offer. Manufacturing chemists are also making strong bids for this class of ore, some offers being as high as \$48 per ton for 40% ore. For the last six weeks, the entire output of the Zinc, Ark., camp has been bringing \$40 per ton for 40% ore f.o.b. shipping point. The grade of these ores ranges from 40 to 49% zinc, and they contain no iron, lead or sulphur. The demand seems to be centered entirely on this class of ore, there being little or no demand for jack. In the Zinc camp, large bodies of tallow clay lie with and adjacent to the orebodies, which carry from 14 to 37% metallic zinc. Samples of this clay are now being submitted to manufacturing chemists with a view of determining if it cannot be utilized in the manufacture of various products of which zinc is the essential ingredient.

Interest in Manganese Mining in the Batesville district is slowly increasing and much new development is promised for the winter months. The deposits of crude wash ore which run from 5 to 25% disseminated through the clay gangue are being treated extensively and soon most of the tonnage will consist of concentrates of this class of ore. Besides the washing plants now under construction and those completed, there is machinery on the ground for six new ones, and others are contemplated. Steam-shovel operations are becoming more extensive. In June only two shovels were working in the entire region; now there are at least a dozen. The ideal washing plant for the district has not yet been constructed, and it is likely that no one type plant will be built that will answer the needs of all, as different classes or ores will require different treatment. The first plants consisted of log washers only, and these showed a great loss in the fines. Jigs have been added to the log-washer equipment, and a better saving has been made, although still greater saving can be effected with the addition of tables. It is the opinion of operators that some grades of the ore can be saved better without the log washers, and this is particularly true of the softer ores.

DULUTH, MINN.—Nov. 1

Mines Near Nashauk are reducing their summer's activity. The Hawkins mine has ceased operations at the concentrating plant, but will do considerable stripping during the winter. The Harrison mine has also closed, but will use six shovels on stripping. Winter activities have started at the Lone Pine; the La Rue will be kept busy with repair and underground operations; the Crosby plant is now closed, but 100 men will be employed in underground mining and exploration, and the York and Pearson mines anticipate a busy winter with repair and development work.

Royalties From State-Owned Iron Mines will exceed \$1,000,000 during 1918. There are 22 mines, and approximately 2,300,000 tons was forwarded during the months of July, August, and September, which produced an income of \$575,000. The largest producer was the Missabe Mountain, which shipped 581,991 tons during the last three months, which netted \$145,498 in returns to the state. The Leonidas was second, yielding \$103,699. These royalties are turned into the state school funds, excepting those from the Majorca mine, near Coleraine, which total \$38,548 for the last three months and revert to the state university fund. Madera mine, near Hibbing, has been exhausted, and the lease held by R. B. Whiteside and associates cancelled. The mine was a small one, yielding in all only 195,000 tons of ore.

GOLD HILL, ORE.—Oct. 29

Manganese Mining is a new industry in the Lake Creek district, actual development work having been begun since late in 1917. Both Government and state engineers have reported favorably on the quality and quantity of the ore in these deposits. Since early in 1918 the Manganese Metals Co., of Tacoma, Wash., has been operating a 20-ton mill on the property, which has been producing 45% manganese concentrates. Since this company began work, the known limits of the manganeseiferous area have been extended by prospectors, and a number of claims have been located. Though the extent of the workable orebodies has not yet been demonstrated, there is evidently sufficient ore in the district to warrant extensive operations.

Chrome Producers of southern Oregon and northern California met in Grants Pass recently and organized the Oregon Chrome Producers' Association, which will affiliate with the Pacific Coast Chrome Producers' Association, recently organized in San Francisco. These organizations were brought about by the fact that there is no market for the sale of chrome. Operators have been induced to develop chrome deposits in this region on the theory that the production would be paid for at least at the prevailing prices of last summer, and, owing to the fact that there is no market, hundreds of the operators have been unable to get back money already

invested. These associations will select capable men to present the Pacific Coast chrome interests to the authorities at Washington. It is not the object to protect operators in developing new properties, but only those who are already in the field, to save them from further loss. Frank S. Bramwell and O. S. Blanchard, both of Grants Pass, were elected president and secretary respectively of the local association. Questionnaires are being sent out to chrome producers, as to situation of their mines, the quantity and quality of ore, and money invested, and the data will be forwarded to the authorities at Washington.

TORONTO—Oct. 31

The Premier Langmuir Barite Mine, situated in Langmuir Township, 20 miles southeast of the Porcupine gold field, is now producing barite steadily, the ore being mined from a vein averaging four to six feet in width. Mining costs are low, owing to the soft nature of the deposit. The ore is treated by a mill of 30 tons daily capacity, the crude ore being first crushed, after which it is passed into a drier, and, having been subjected to the required heat, goes to a roller mill, where it is reduced to the desired fineness. The process is dry throughout. Native silver occurs in one of the walls of the Keewatin formation inclosing the barite vein, which will be recovered as a byproduct.

The Gold-Mining Industry of the Yukon, already hard hit by the war, for which the territory has contributed about one-tenth of its total population, will be seriously affected by the loss of the ill-fated steamer "Princess Sophia" on Oct. 25, on which 343 persons perished. Two-thirds of the passengers were from Dawson, including many mining men, the more prominent being Walter Barnes, an extensive hydraulic operator at Lovat Gulch, in the Klondyke, and his brother Allen Barnes, of Vancouver; Fred Steinburg, who had large mining interests in the Stewart River country, and William Scouse, of Seattle, a pioneer of the Eldorado Creek district. Many others were connected with enterprises more or less closely associated with the mining industry, and their untimely deaths will be a severe blow to the prosperity of the territory.

VICTORIA, B. C.—Nov. 1

Arrivals From the Klondyke state that the remarkable exodus of miners from the North is due to the fact that the Government has exempted prospectors from remaining on their claims during the war. It is asserted that there will be just as great a rush back to the Yukon in the spring, providing peace is declared in the interim.

The Cariboo District of British Columbia and its gold-producing possibilities have been reported upon by B. E. McKay, of the British Columbia branch of the Dominion Geological Survey. The district already has a gold output aggregating \$65,000,000 and notwithstanding the heavy increase in the cost of mining operations and the comparatively low or standard price of gold, production is going on steadily. Mr. McKay predicts that in many parts of the country there will be much gold recovered, but does not look for this development until after the war, when labor becomes more available. With men looking for employment, and equipment cheaper and more readily secured, he declares that the ground will be made to yield richly, the use of hydraulicking, dredging, and drag-line scraping making this possible, where, in the old days, it would have been considered impracticable. Lack of transportation facilities, he says, is holding back development, there being areas in the vicinity of Keithley and Harvey creeks which lack even the rough-est of wagon roads.

JUAREZ, MEX.—Oct. 26

Three American Mining Men are being held for a ransom of \$50,000 by Epifanio Holguin, a Villa leader, near Villa Ahumada, Chihuahua. The men, E. F. Knotts, D. B. Smith, and a Mormon prospector named Timney, were seized while at the Eruption mine, 83 miles south of the international boundary. Efforts are being made to secure their release.

The Mining News

ARIZONA

Cochise County

HELEN DOME (Courtland)—Operations have been resumed on property under a lease to purchase.

COMMONWEALTH (Pearce)—Making regular shipments of silver ore. Considerable new development under way.

Gila County

RAY CONSOLIDATED (Hayden)—J. A. Carter, of Los Angeles, has begun work on the compressor plant and concrete reservoir near the old pumping plant. Clamplitt & Moss, of Los Angeles, have a contract to sink 10 new wells, which will replace the old surface wells.

SOMBRERO BUTTE (Hayden)—The suit of this company vs. the Copper States Mining Co., in which adverse claim was laid to certain mining properties in the Bunker Hill mining district at Copper Creek, was recently decided in favor of the plaintiff. The case was the outgrowth of the settlement of the estate of G. F. Jewell, a well-known Copper Creek miner, who was murdered in 1916.

Mohave County

EMERALD ISLE (Kingman)—A precipitation unit has been added to the equipment, increasing the production by 2000 lb. daily.

Pinal County

ARIZONA HERCULES (Kelvin)—New concentrator now handling about 1200 tons daily and producing copper at the rate of 500,000 lb. per month. By the end of the year the mill will be handling 1500 tons daily. Plans are already under way to double capacity.

MAMMOTH DEVELOPMENT (Mammoth)—Old Mammoth mill has begun treatment of molybdenite ores, hauled by motor truck from the Mammoth mine, at Schultz. H. Pomeroy is in general charge.

MUSSER (Mammoth)—Flotation mill being overhauled for operation on molybdenum tailings, under the management of W. W. Pierce.

COPPER BUTTE (Ray)—Development by the original company through the old lower tunnel has opened a large tonnage of shipping ore. Shipments have been increased from three to six cars weekly.

COPPERFIELD (Ray)—Sinking in progress and preparations being made to ship at the rate of three cars a week.

RAY HERCULES (Ray)—Mill town of Belgravia, two miles from Kelvin, hereafter will be known as Hercules.

SILVER DIP (Ray)—Lease has been given to Joplin interests, which will do additional development through the shaft.

Santa Cruz County

CONSOLIDATED ARIZONA (Patagonia)—Developing through two shafts, 500 ft. apart, and installing new sinking machinery. W. J. Mitchell is superintendent.

MORNING GLORY (Patagonia)—Installed compressor plant. Shipping copper ore.

Yavapai County

DUNDEE ARIZONA (Jerome)—Shaft being sunk five feet a day is now in quartz porphyry. Vein matter was cut at 156 ft. and dips toward Jerome Verde ground. Latter company drilled to point near Dundee line and failed to cut ore.

GREEN MONSTER (Jerome)—Contact cut near station on 930 level. Drifting in both directions in porphyry and diorite, speckled with pyrite. Little water has been struck.

Yuma County

ARIZONA ENTERPRISE (Bouse)—Started to sink two shafts. Property, equipped with new headworks and compressor, is situated about 11 miles south. Dan McGlone is in charge.

CARMELITA (Wenden)—Shaft sunk 60 ft. At 400-ft. point a 200-ft. crosscut will be driven to the vein. Second vein has been cut by a 105-ft. crosscut from the bottom of the 200-ft. shaft. George Waymire, of Kansas City, is in charge.

COLORADO

Boulder County

TUNGSTEN PRODUCTS (Camp Loveland)—Has taken over and reopened the old Carrie Nation mill. Plant now in use for concentration of both company and custom ores. N. W. Head has been appointed superintendent.

NILS DESPERANDUM (Sunshine)—Recent development has opened a shoot of milling ore. Trial shipment has been made.

Clear Creek County

CHAMBERLAIN SAMPLER (Idaho Springs)—Plant, which has been in operation for the last 30 years, discontinued receiving ore on Oct. 26, and has been closed. Shortage of labor is given as the reason for closing. This is the last of the Chamberlain Ore Co.'s samplers to close. The Georgetown and Black Hawk plants closed some time ago. Ore which was formerly shipped to the Idaho Springs sampler will now be received by the Argo Reduction and Ore Purchasing Company.

Lake County

FANNY RAWLINGS (Leadville)—Surface plant destroyed by fire Oct. 20. Company is going to rebuild and will install new electric hoisting equipment. A 50-hp. hoist and motor, together with cables and other accessories, will be purchased. W. C. Frost is superintendent.

San Juan County

SPANISH INFLUENZA is responsible for 42 deaths in Silverton during the last week of October, and more than 400 citizens are suffering from the disease. Miners have left the county in large numbers, and mining is all but demoralized. The epidemic is not yet under control.

IDAHO

Boundary County

IDAHO GOLD & RUBY (Leonia)—J. M. Schnatterly, president, has announced that the hydraulic plant will begin operations in January. Company has 2500 acres of placer ground and quartz claims. A 56-ton steam shovel is digging a canal.

Shoshone County

MARSH (Burke)—Plans to raise development fund from sale of stock and surplus equipment with which to explore vein on tunnel level, as cost of further sinking now is prohibitive.

SUCCESS (Wallace)—Body of ore seven feet thick has been opened on 1600 level, and equally good showings are reported on the 1400 and 1500 levels. Mill is running one shift.

INTERSTATE-CALLAHAN (Wallace)—Long crosscut from No. 6 level has cut Nipsic vein at depth of 1000 ft. below upper workings and shows considerable lead-silver ore.

MICHIGAN

Copper District

FRANKLIN (Demmon)—Opening stopes on 30 level north; ground in Pewabic amygdaloid.

QUINCY (Hancock)—Extending both mills for installation of more Wilfley tables.

AHMEEK (Kearsarge)—To rebuild shaft from sixth level to surface, and expect to complete work in two months.

COPPER RANGE (Painesdale)—Receiving Isle Royale stamp sand to be used in filling old stopes and to make working platforms for the men.

WINONA (Winona)—To sink King Philip No. 1 shaft deeper.

NEVADA

Esmeralda County

GREAT BEND (Goldfield)—Development on 370 level has opened oreshoot stoped on 160 and 265 levels. Three veins are exposed on company ground, but so far work has been largely confined to middle one, which is opened for 1000 ft. east of main shaft. J. K. Turner is consulting engineer, and L. L. Dellinger is superintendent.

Lyon County

M'CONNELL (Mason)—Regular shipments of fair-grade copper carbonate ore being made to Thompson smeltery. Property in limestone belt west of Mason, but development work not extensive.

UNEVIDA GOLD (Mound House)—To install large metal flume to divert part of the water. Sands will be worked to recover amalgam and quicksilver lost from old Virginia City mills. Sand is to be lifted by centrifugal pumps and run through sluices fitted with Hungarian riffles and coca matting.

EMPIRE NEVADA (Yerington)—Large tonnage low-grade copper carbonate ore developed by churn drilling some years ago, when it was under option to the General Development Co. Leaching experiments by the sulphuric acid process have proved that the ore is adapted to this process, as the gangue is altered granitic porphyry, no lime being present.

Nye County

MONITOR-BELMONT (Belmont)—Operated under bond and option by Nevada Wonder Mining Co. Old county courthouse has been used as a clubhouse and dormitory for employees.

CONSOLIDATED SPANISH BELT (Tonopah)—Drift being extended on tunnel level to drive under Earnst stopes 600 ft. to east on levels above, where ore was of good grade. All lower workings drained, making old work accessible. Expected shipments will be made soon. Concentration tests have given excellent results.

TONOPAH EXTENSION (Tonopah)—Receipts from mine and mill operation during September were \$112,190.50; current expenses, \$79,483.95; leaving an operating profit of \$32,706.55.

WISCONSIN

Zinc-Lead District

CONNECTING LINK (Cuba City)—Now operating 150-ton mill, which is model mill of entire district. New mill to be erected soon will be of 100 ton daily capacity.

ZINC HILL (Cuba City)—New shaft completed, and 100-ton mill recently constructed has been placed in operation on property formerly known as the Little Dick. Charles Wolfe is manager.

FIELD MINING AND MILLING (New Diggings)—Indefinitely closed, owing to unfavorable mining conditions. Property produced the highest value of concentrates of all mines in the district during 1916 and 1917, making an annual production of 10,000 tons, assaying 40 to 44% metallic zinc from 6% ore. Milling was started in June, 1915. In January, 1917, made a hoisting record of 20,000 tons.

LITTLE PLATTE (Platteville)—Mining and milling operations started on the James Tracey land, six miles west of Platteville, the site of the Old Mexico. A 75-ton mill has just been completed. Raymond Piquette, of Platteville, is general manager.

OLIVER IRON MINING (Shullsburg)—Prospect drilling being continued on the John Lyons lease, 3½ miles south of Shullsburg. Mulcahy mine temporarily closed, and prospect drilling resumed on this tract.

CANADA

British Columbia

CANADA COPPER CORPORATION (Princeton)—Railroad grade completed from mine to Princeton. Machine shops completed and foundation for 2000-ton concentrator in place.

DELTA COPPER (Skeena)—Installing new plant in preparation for winter operations.

ECHO SILVER-LEAD (Slocan)—Will begin production of ore early in November at mill of Standard Silver-Lead Co., which Echo has leased for six months. Installing two-bucket tramway. Ore been opened on three levels for 1000 ft. in all.

SILVER BELL (Slocan)—Large quantities of supplies and equipment have been secured for the continuation of operations by R. F. Green and Sam Green, owners.

The Market Report

SILVER AND STERLING EXCHANGE

Oct. Nov.	Sterling Exchange	Silver			Nov.	Sterling Exchange	Silver		
		New York, Cents	London, Pence				New York, Cents	London, Pence	
31	4.7550	101½	49½	4	4.7550	101½	49½	49½	
1	4.7550	101½	...	5	4.7550	101½	49½	49½	
2	4.7550	101½	...	6	4.7550	101½	49½	49½	

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

Oct. Nov.	Copper		Tin		Lead		Zinc
	Electrolytic	Spot	N. Y.	St. L.	N. Y.	St. L.	St. L.
31	*26	†	8.05	7.75	8.05	7.75	@8½
1	*26	†	8.05	7.75	8.05	7.75	@8½
2	*26	†	8.05	7.75	8.05	7.75	@8½
4	*26	†	8.05	7.75	8.05	7.75	@8½
5	...	...	...	...	...	...	...
6	*26	†	8.05	7.75	8.05	7.75	@8½

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

† 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) 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.

LONDON

Oct. Nov.	Copper			Tin			Lead			Zinc
	Spot	3 M.	Electrolytic	Spot	3 M.	Spot	3 M.	Spot	3 M.	Spot
31	122	122	137	334	334	29½	28½	28½	54	
1	122	122	137	334	334	29½	28½	28½	54	
2	122	122	137	334	334	29½	28½	28½	54	
4	122	122	137	...	...	29½	28½	28½	54
5	122	122	137	...	...	29½	28½	28½	54
6	122	122	137	...	...	29½	28½	28½	54

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 American 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—Nov. 6, 1918

The free markets continue to show the handwriting on the wall that the trades find no difficulty in interpreting.

Copper—Governmental orders show no abatement, the copper producers being pressed urgently for deliveries, as heretofore. The October production was consid-

erably less than that for September, but just how much less is not yet known. The bad conditions produced by the influenza epidemic are now improving.

Copper Sheets—The base price of copper sheets is 36c. per lb. Copper wire is quoted at 28½@29½c. per lb. f.o.b. mill, carload lots.

Tin—The physical situation in this country is without any doubt distinctly easier, stocks, especially of Straits, being ample for immediate purposes. This results from the curtailment of tin consumption for non-essential purposes. Tin of 99% grade has been sold at 74c., which is an index of the present value of tin, but, for reasons that are well known, there is nothing that can be characterized as a market.

A statement issued last week by the War Industries Board adds but little to what was previously known, except that the United States Steel Products Co. "will distribute at cost to the consumers, jobbers, and dealers in the United States who hold purchasing licenses" the tin that it has acquired by purchase. "No selling price has been announced on the tin that has been purchased by the Inter-Allied Tin Executive and allocated to the United States, but this price will probably be announced between now and Dec. 31, 1918."

This means an international buying monopoly in the interest of consumers, and a distribution of the purchases among consumers. There is no competition and no market anywhere in the world, and no price except the arbitrary one at which the executive will take in tin. American smelters seem so far to have been let alone, but they are not in a position to make a market. The matter of Bolivian ore does not seem to have been touched upon, but at present that is under the domination of the British smelters, who, in turn, are under the domination of their government.

The following is a paragraph translated from the "Boletin Comercial" of Oruro, Bolivia, which merits attention:

"There is a large stock of tin concentrate in New York. The smelters are not buying. Cables from New York advise shippers here not to buy tin for export. The smelters in Liverpool buy all the tin concentrate that reaches that port. As the result of this, the liquidation of the lots sent to England is rapid. Producers of tin in Bolivia for more than a month past have given orders that their tin should be shipped to Liverpool. The United States market does not offer any security either as regards price or prompt sale. There are lots of concentrates remaining unsold for more than six months."

The stock of tin in Hong Kong on Jan. 1, 1918, was 1500 long tons. The quantity imported into Hong Kong from Yunnan during the first six months of 1918 is estimated at 6000 long tons.

Lead—Producers are oversold, and the general situation is rather tight again.

Zinc—During most of the week there were no inquiries worth mentioning, and, on the other hand, there being no pressure to sell, the quotation of the market was mainly nominal. November spelter is scarce, or looks to be, but December is easily available. Some sellers are interested in placing contracts for January and later delivery, but buyers will not become interested. This market in its dullness is for the moment reflecting the general bewilderment. Nobody wants to buy except for immediate requirements. Today there were a few small orders from Western galvanizers. Brass special was offered at 8.60c., November shipment. Intermediate sold at 10½c., New York. High-grade is worth about 11½ cents.

The failure of smelters, except one, to buy ore in the Joplin market last week under the new agreement was due only to the fact that the latter had not really gone into effect. The majority of smelters had assented to it, but several important concerns have not yet signed. The terms of the agreement will probably be more generally effective this week.

The Burma Corporation, in combination with Tata & Co., is going to build a zinc smelter and sulphuric-acid works near Calcutta. The plant will be operated more or less in conjunction with the iron and

steel works of Tata & Co. The enterprise has been backed by the Indian government by the promise of a loan of £200,000.

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.

Antimony—This market exhibited demoralization, the quotations on spot at the close ranging from 10 to 11c., a decline of fully 2c. from the previous week. We quote 10½c. as an average. Everyone who had any antimony to sell was trying to get rid of it, while buyers were conspicuous by their absence. The fact that the market declined below what is considered by some authorities to be the present average cost of production makes no difference.

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.

Quicksilver—We quote \$125@127.50. San Francisco telegraphs \$120.

Silver and Platinum

Silver—Nothing of interest has occurred in the silver market since our last report. Prices are unchanged. Shipments to London for the week ending Nov. 2 were 975,000 ounces.

Mexican dollars at New York: Oct. 31, 77½; Nov. 1, 77½; Nov. 2, 77½; Nov. 4, 77½; Nov. 5, —; Nov. 6, 77½.

Platinum—Unchanged.

Zinc and Lead Ore Markets

Joplin, Mo., Nov. 2—Blende, per ton, high, \$78.46; basis 60% zinc, premium, \$75; Class B, \$65@60; Prime Western, \$50@52.50; Calamine, basis 40% zinc, \$38@40. Average selling prices, blende, \$54.84; calamine, \$40; all zinc ores, \$54.40.

Lead, high, \$103.38; basis 80% lead, \$100; average selling price, all grades of lead, \$99.48 per ton.

Shipments the week: Blende, 9167; calamine, 297; lead, 1313 tons. Value, all ores the week, \$645,400.

Only one smelting company's agent met the producers' agreement on the new schedule of zinc-ore prices, based on 60% zinc and the average price of spelter as quoted by the "Engineering and Mining Journal." Other purchasing agents cut prices \$2.50 per ton below last week's price and the new schedule price.

Platteville, Wis., Nov. 2—Blende, basis 60% zinc, highest settlement price reported, \$73.25. Base price for premium grade, \$75; base price for high-lead blende, \$52 per ton. Lead ore, basis 80% lead, \$100 per ton. Shipments reported for the week were 1728 tons blende, 116 tons galena, and 329 tons sulphur ore. For the year to date the totals are 107,551 tons blende, 6667 tons galena, and 38,105 tons sulphur ore. During the week 2580 tons was shipped to separating plants.

Other Ores

Antimony Ore—Although England is paying 7s. 6d., or about \$1.75 per unit, and thus is obtaining the supplies from South America that used to come hither, the quotation in this market is only about \$1 per unit, which is scarcely more than nominal. There are reported to be supplies of antimony ore in warehouses in New York, which have been unsalable for some time.

Chrome Ore—Unsalable, while stocks of ore shipped East on consignment seem to be accumulating.

Fluorspar—High-grade fluorspar, free from silica, is quoted at \$30 to \$35 per ton of 2000 lb.; for furnace use, less than 10% silica, \$21@22 per ton f.o.b. Colorado points.

Manganese Ore—Supplies seem to be ample, and new selling contracts are difficult to effect.

Molybdenum Ore—No sales reported. Market lifeless.

Pyrites—Unchanged.

Tungsten—There is little or nothing doing in the tungsten market this week. Buyers are marking time. A few sales of high-grade wolframite were made at from \$25@26 per unit, and other prices are nominal.

Iron Trade Review

PITTSBURGH—Nov. 5

Reports thus far available from steel companies indicate that production of both pig-iron and steel ingots in October was at least as heavy a rate as in September, actual output being more, on account of the extra day in the month. The influenza epidemic is, generally speaking, on the wane, but men are still succumbing, and few who have caught the disease have yet returned to work.

A general plan for the cancellation of war contracts has been drawn up at Washington, and submitted for examination and criticism by holders of large contracts. According to this scheme, which seems to meet general approval, all goods manufactured at the time of cancellation will be accepted and paid for. Work on all material in process will be discontinued. Material in process will be valued at cost plus pro rate of profit, and become the property of the Government at that valuation. The term will be construed liberally, to include material provided for the purpose of filling the contract, even if no work has been done on it. The Government will then have the alternative of selling it back to the original owner, or of selling it elsewhere, according to prices obtainable.

The steel trade hopes that Government control of prices and distribution of steel will continue after the cessation of hostilities, for the protection of the industry, but only for the shortest possible period.

Pig Iron—The market is absolutely flat. Current production is well taken up by deliveries on contracts and allocations, but consumers show no disposition to inquire for next year's deliveries. The familiar "waiting market" has succeeded the period in which furnaces refrained from quoting for next year's deliveries upon the hint of the War Industries Board that such transactions would not be favored. No offerings at cut prices are made, and the market is quotable at the set maximum limits: Bessemer, \$35.20; basic, \$33; No. 2 foundry, \$34; malleable, \$34.50; forge, \$33. f.o.b. furnace, freight from the Valleys to Pittsburgh being \$1.40, and from six detached furnaces somewhat less. W. P. Snyder & Co. report average prices realized on sales of Valley iron during October at \$35.20 for bessemer and \$33 for basic. The average quotation on No. 2 foundry in October was \$34. Basic and foundry were advanced by the War Industries Board \$1 a ton for deliveries after September 30.

Steel—The market is practically stagnant, as surplus production of unfinished steel of all mills is allocated to other mills. Middlemen under the regulations cannot act as merchants in unfinished steel, but may, it is understood, conduct brokerage operations, collecting commission from the seller. There is, however, no such business offered. When cancellations of war-steel contracts begin, there is likely to be a great deal of business in partly finished steel. The market remains quotable at the maximum limits: Billets, \$47.50; sheet bars and small billets, \$51; slabs, \$50; rods, \$57.

Ferro-Alloys—Ferromanganese is quiet, large consumers finding themselves covered fully as far ahead as they wish. Small consumers are occasionally in the market for small prompt lots. The market has not declined, but it is fully expected the next change will be in that direction. We quote 70% ferromanganese at \$250, delivered, and 16% spiegeleisen at \$75, furnace.

Coke—Influenza has seriously curtailed production of coke in the Connellsville region, and shipments of raw coal have declined even more than those of coke. Byproduct operations are maintained only with difficulty, but no important shortages

of coke are reported by blast furnaces. The Fuel Administration continues its efforts to increase coke production and to bring about a further improvement in quality. With the easier coal situation, now developing, it may be possible to meet more fully the requirements of byproduct plants as to the exact character of coal furnished. In a number of cases it has been impossible to give byproduct plants the coal best suited to their requirements.

MONTHLY AVERAGE PRICES OF METALS

Table with columns for Silver, New York, and London, and rows for months from Jan to Dec and a Year total.

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Table for Copper with columns for New York (Electrolytic, Standard) and London (Electrolytic), and rows for months from Jan to Dec and a Year total.

Table for Tin with columns for New York and London, and rows for months from Jan to Dec and a Year total.

(a) No average computed.

Table for Lead with columns for New York, St. Louis, and London, and rows for months from Jan to Dec and a Year total.

Table for Spelter with columns for New York, St. Louis, and London, and rows for months from Jan to Dec and a Year total.

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

Table for Pig Iron, Fgh., with columns for Bessemer, Basic, and No. 2 Foundry, and rows for months from Jan to Dec and a Year total.

† As reported by W. P. Snyder & Co.

STOCK QUOTATIONS

Table of stock quotations for N.Y. EXCH. and BOSTON EXCH. listing various companies and their prices.

Table of stock quotations for BOSTON CURB* and N.Y. CURB† listing various companies and their prices.

Table of stock quotations for SAN FRAN.* listing various companies and their prices.

Table of stock quotations for COLO. SPRINGS* listing various companies and their prices.

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

Current Prices—Materials and Supplies

IRON AND STEEL

SHEETS—Quotations are in cents per pound in various cities from warehouse, also the base quotations from mill:

	Large Mill Lots	St. Louis	Chicago	San Francisco	New York—Current	New York—One Yr. Ago
Blue Annealed						
No. 10	4.25	5.52	5.52	6.55	5.52	9.50
No. 12	4.30	5.57	5.57	6.60	5.57	9.55
No. 14	4.35	5.62	5.62	6.70	5.62	9.60
Black						
Nos. 18 and 20	4.80	6.32	6.32	7.30	6.32	9.80
Nos. 22 and 24	4.85	6.37	6.37	7.35	6.37	9.85
No. 26	4.90	6.42	6.43	7.40	6.42	9.90
No. 28	5.00	6.52	6.52	7.50	6.62	10.00
Galvanized:						
No. 10	5.25	6.97	6.97		6.87	
No. 12	5.35	6.97	6.97	7.85	6.82	
No. 14	5.35	6.97	6.97	8.00	6.97	
Nos. 18 and 20	5.65	7.17	7.17	8.15	7.27	11.40
Nos. 22 and 24	5.80	7.32	7.32	8.30	7.32	11.55
No. 26	5.95	7.47	7.47	8.45	7.47	11.70
No. 28	6.25	7.77	7.77	8.75	7.77	12.00

STEEL RAILS—The following quotations are per gross ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Pittsburgh		Chicago	
	Current	One Year Ago	Current	One Year Ago
Standard bessemer rails	\$55.00	\$38.00	\$65.00	\$38.00
Standard openhearth rails	57.00	40.00	67.00	40.00
Light rails, 8 to 10 lb.	3.13*	83.00	3.13*	68.00
Light rails, 12 to 14 lb.	3.07*	82.00	3.09*	67.00
Light rails, 25 to 45 lb.	3.00*	75.00	3.00*	65.00

* Government price per 100 lb.

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

	Pittsburgh		San Francisco
	Current	One Year Ago	Current
Standard railroad spikes, 1/2-in. and larger	\$3.90	\$5.00	\$4.50
Track bolts	4.90	6.25	5.50
Standard section angle bars	3.25	3.65	4.45

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

	Mill, Pittsburgh	New York—Current	New York—One Yr. Ago	St. Louis	Chicago	San Francisco	Dallas
Beams, 3 to 15 in.	\$3.00	\$4.27	\$5.25	\$4.27	\$4.27	\$5.25	\$5.05
Channels, 3 to 15 in.	3.00	4.27	5.25	4.27	4.27	5.25	5.05
Angles, 3 to 6 in. 1/2 in. thick	3.00	4.27	5.25	4.27	4.27	5.25	5.05
Tees, 3 in. and larger	3.00	4.27	5.30	4.27	4.27	5.25	5.05
Plates	3.25	4.52	10.00	4.52	4.52	5.50	5.28

STEEL SHEET PILING—The following price is base per 100 lb. f. o. b. Pittsburgh, with a comparison of a month and a year ago:

	Current	One Month Ago	One Year Ago
	\$4-5	\$4-5	\$4.50

RIVETS—The following quotations are per 100 lb.:

	New York		Chicago		San Francisco	Dallas
	Current	One Year Ago	Current	One Year Ago	Current	Current
Hot pressed square	\$2.50*	List	\$1.25	\$1.65	\$0.98	\$2.00
Hot pressed hexagon	2.50*	List	1.05	1.50	.78	2.00
Cold punched square	2.50*	List	.75	1.25	1.00	1.50
Cold punched hexagon	2.50*	List	.75	1.25	1.00	1.50

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham	Denver
Solid	16c.	14c.	15c.	16c.
Hollow	24c.	25c.	...	28c.

PIPE—The following discounts are for carload lots f. o. b. Pittsburgh, basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

Inches	Steel		Inches	Iron	
	Black	Galvanized		Black	Galvanized
1/2, 3/4 and 1	44%	17%	1 to 1 1/2	33%	17%
1 to 3	48%	33%			
	51%	37%			

Inches	Steel		Inches	Iron	
	Black	Galvanized		Black	Galvanized
2	44%	31 1/2%	2	26%	12%
2 1/2 to 6	47%	34 1/2%	2 1/2 to 4	28%	15%
			4 1/2 to 6	28%	15%

Inches	Steel		Inches	Iron	
	Black	Galvanized		Black	Galvanized
1/2 and 3/4	40%	22 1/2%	1 to 1 1/2	33%	18%
1 to 1 1/2	45%	32 1/2%			
	49%	36 1/2%			

Inches	Steel		Inches	Iron	
	Black	Galvanized		Black	Galvanized
2	42%	30 1/2%	2	27%	14%
2 1/2 to 4	45%	33 1/2%	2 1/2 to 4	29%	17%
4 1/2 to 6	44%	32 1/2%	4 1/2 to 6	28%	16%

Note—National Tube Co. quotes on basing card dated Apr. 1. From warehouses at the places named the following discounts hold for steel pipe:

	New York	Black Cleveland	Chicago
1/2 to 3 in. butt welded	40%	43%	41.9%
3 1/2 to 6 in. lap welded	56%	39%	37.7%

	New York	Black Cleveland	Chicago
1/2 to 3 in. butt welded	28%	28%	26.9%
3 1/2 to 6 in. lap welded	25%	25%	23.9%

Malleable fittings, Class B and C, from New York stock sell at list plus 15%. Cast iron, standard sizes, 5%.

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York—Current	New York—One Year Ago	Cleveland—Current	Cleveland—One Year Ago	Chicago—Current	Chicago—One Year Ago
Hot pressed square	\$2.50*	List	\$1.25	\$1.65	\$0.98	\$2.00
Hot pressed hexagon	2.50*	List	1.05	1.50	.78	2.00
Cold punched square	2.50*	List	.75	1.25	1.00	1.50
Cold punched hexagon	2.50*	List	.75	1.25	1.00	1.50

* List plus.

Semifinished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	40%	50%
Chicago	50%	50%
Cleveland	50-10%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
1/2 by 4 in. and smaller	30%	40-10%	37%
Larger and longer up to 1 in. by 30 in.	15%	20-5%	25-5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:			
New York	\$2.50	List	Chicago \$2.50
For cast-iron washers the base price per 100 lb. is as follows:			
New York	\$5.00	Cleveland \$4.25	Chicago \$4.50

CONSTRUCTION MATERIALS

ROOFING MATERIALS—Prices per ton f. o. b. New York or Chicago:

	Carload Lots		Less Than Carload Lots	
Tar felt (14 lb. per square of 100 sq. ft.)	\$64		\$65	
Tar pitch (in 400-lb. bbl.)	21		22	
Asphalt pitch (in barrels)	40		45.50	
Asphalt felt	72.50		77.20	

PREPARED ROOFINGS—Standard grade rubbered surface complete with nails and cement costs per square as follows in New York and Chicago:

	1-Ply		2-Ply		3-Ply	
	e.l.	l.e.l.	e.l.	l.e.l.	e.l.	l.e.l.
No. 1 grade	\$1.45	\$1.70	\$1.85	\$2.10	\$2.25	\$2.50
No. 2 grade	1.30	1.55	1.65	1.90	2.00	2.25

Asbestos asphalt-saturated felt (14 lb. per square) costs \$5.35 per 100 lb. Slate-surfaced roofing (red and green) in rolls of 108 sq. ft. costs \$2.40 per roll in carload lots and \$2.65 for smaller quantities. Shingles, red and green slate finish, cost \$5.75 per square in carloads, \$6.00 in smaller quantities, in Philadelphia.

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	\$5.75	\$7.75	\$6.50	\$6.25	\$8.00	\$7.25
Assorted	5.90	7.75	6.50	6.40	8.25	7.50

BAR IRON AND STEEL—Per pound to large buyers at mill, Pittsburgh:

Iron bars	3.5c.	Steel bars	2.90c.
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COAL BIT STEEL—Warehouse price per pound is as follows:

	New York	Cincinnati	Birmingham	St. Louis	Denver	Chicago
	\$0.12	\$0.16 1/2	\$0.18	\$0.19	\$0.18 1/2	0.16 1/2

HOLLOW TILE—

	4 x 12 x 12	8 x 12 x 12	12 x 12 x 12
St. Paul	\$0.055	\$0.11	\$0.162
Cincinnati	.07275	.1361	.1834
Kansas City	.0786	.15	.205
Seattle	.09	.173	.30
Los Angeles	.0668	.12	.20
New Orleans	.125	.195	.29

LUMBER—Price per M in carload lots:

	8 x 8-In. x 20 Ft. and Under				12 x 12-In.	
	Y. P.	Fir	Hemlock	Spruce	Y. P.	Fir
Cincinnati	\$39.00		\$38.00		\$43.00	\$42.00
Kansas City	38.00	40.50	\$40.50	\$38.50	43.00	42.50
Seattle	24.50	24.50	24.50	24.50	24.50	24.50
St. Paul		52.00	48.00	48.00		60.00
Denver	43.00	35.50				40.00

	1-In. Rough, 10 In. x 16 Ft. and Under			2-In. T. and G. 10 In. x 16 Ft.	
	Y. P.	Fir	Hemlock	Y. P.	Fir
Cincinnati	\$45.00		\$41.00	\$44.00	\$40.00
Kansas City	45.50	\$54.75	54.75	52.25	60.00
Seattle	24.50	24.50	24.50	24.50	24.50
St. Paul	62.50	45.00	43.00		48.50
Denver	43.25	34.50	34.50	35.00	33.00

NAILS—The following quotations are per keg from warehouse:

	Mill	St.		San
	Pittsburgh	Louis	Dallas	Francisco
Wire	\$3.50	\$4.37	\$4.75	\$4.32
Cut	4.00	6.50		4.47

PORTLAND CEMENT—These prices are for barrels in carload lots, including bags:

	Current	One Month Ago	One Year Ago
New York	\$4.00	\$3.35	\$2.22
Jersey City	3.64	2.99	2.16
Boston	3.67	3.59	2.37
Chicago	2.45	2.45	2.21
Pittsburgh	2.55	2.55	2.31
Cleveland	2.72	2.72	2.44
Denver	3.67	3.67	3.20

LIME—Warehouse prices:

	Hydrated per Ton		Lump per 300-Lb. Barrel	
	Finished	Common	Finished	Common
New York	\$16.50	\$13.50	\$2.70	\$2.45
Kansas City	22.00		2.35*	2.20*
Chicago	18.00	17.50	1.80*	1.10*
St. Louis	22.00	16.00		1.75
Boston	22.00	18.00	3.45	3.15
Dallas	16.50			
San Francisco	20.00			2.15
St. Paul	25.00	19.00	1.60*	1.50*
New Orleans		16.45	1.97	1.93
Cincinnati	14.20			11.95†
Denver	26.25	13.20		2.40*
Los Angeles	22.00		18.00†	14.50†
Seattle	25.00			2.50†

* 200-lb. barrels. † Per 180-lb. barrel. ‡ Per ton.
Note—Refund of 10c. per cloth bag, amounting to \$2 per ton.

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Raw per barrel	\$1.61	\$1.23	\$1.75	\$1.30	\$1.65	\$1.27
5-gal. cans	1.76	1.33	2.90	1.40	1.85	1.37

WHITE AND RED LEADS in 500-lb. lots sell as follows in cents per pound:

	Red				White			
	Current	1 Year Ago	Current	1 Year Ago	Current	1 Yr. Ago	Dry and	Dry
100-lb. keg	Dry 14.00	In Oil 14.50	Dry 13.25	In Oil 13.50	In Oil 14.00	In Oil 13.00		
25- and 50-lb. kegs	14.25	14.75	13.50	13.75	14.25	13.25		
12½-lb. keg	14.50	15.00	13.75	14.00	14.50	13.50		
5-lb. cans			15.25	15.50	16.00	15.50		
1-lb. cans					17.00			

MINING AND MILLING SUPPLIES

HOSE—

	Fire			50-Ft. Lengths 85c. per ft. 40½%
	First Grade	Second Grade	Third Grade	
Underwriters' 2½-in. Common, 2½-in.				
1-in. per ft.	\$0.60	\$0.35	\$0.30	

Steam—Discounts from List
First grade..... 25% Second grade..... 30% Third grade..... 40%

LEATHER BELTING—Present discounts from list in the following cities are as follows:

	Medium Grade	Heavy Grade
New York	40%	35%
St. Louis	40+5%	35%
Chicago	45%	40+5%
Birmingham	35%	35%
Denver	40%	30%
Cincinnati	40-10%	40%

RAWHIDE LACING—40-5% off list.

MANILA ROPE—For rope smaller than ½-in. the price is ½ to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: ½-in., 8 ft., 1-in., 6; 1-in., 4½; 1-in., 3½; 1½-in., 2 ft. 10 in.; 1½-in., 2 ft. 4 in. Following is price per pound for ½-in. and larger, in 1200-ft. coils:

Boston	\$0.34½	Denver	\$0.35½
New York	.36	Kansas City	.34
Cincinnati	.33½	San Francisco	.32
Chicago	.33	Seattle	.34
St. Paul	.34	St. Louis	.34

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	\$0.99
Asbestos for high-pressure steam	1.76
Duck and rubber for piston packing	1.10
Flax, regular	.99
Flax, waterproofed	1.21
Compressed asbestos sheet	1.10
Wire insertion asbestos sheet	1.30
Rubber sheet	.66
Rubber sheet, wire insertion	.99
Rubber sheet, duck insertion	.55
Rubber sheet, cloth insertion	.25
Asbestos packing, twisted or braided and graphited, for valve stems and stuffing boxes	1.21
Asbestos wick, ½- and 1-lb. balls	.75

REFRACTORIES—Following prices are f.o.b. works, Pittsburgh:

Chrome brick	net ton	\$175.00
Chrome cement	net ton	75.00
Clay brick, 1st quality fireclay	per 1000	50.00-55.00
Clay brick, 2nd quality	per 1000	35.00-40.00
Magnesite, raw	ton	30.00-35.00
Magnesite, calcined	ton	32.00-35.00
Magnesite, dead burned	net ton	32.00-35.00
Magnesite brick, 9 x 4½ x 2½ in.	net ton	110.00-125.00
Silica brick	per 1000	50.00-60.00

Standard size fire brick, 9 x 4½ x 2½ in. The second quality is \$4 to \$5 cheaper per 1000.

St. Louis—High grade, \$55; St. Louis grade, \$40.
Birmingham—Fire clay, \$50; silica, \$50; magnesite, \$110; chrome, \$165.
Chicago—Second quality, \$25 per ton.
Denver—Silica, \$35 per 1000.

RAILWAY TIES—For fair size orders, the following prices per tie hold:

	Material	7 In. x 9 In. by 8 Ft. 6 In.	6 In. x 8 In. by 8 Ft.
Chicago	Plain	1.48	1.37
San Francisco	Douglas Fir—Green	1.35	.96
San Francisco	Douglas Fir—Creosoted	2.70	1.92

Prices per tie at Missouri mills; St. Louis prices about 25c. higher:

	Untreated A Grade White Oak 6x8x8	Red Oak Treated A Grade 6x8x8
No. 1	\$0.59	No. 1 \$0.36
No. 2	.77	No. 2 .53
No. 3	.90	No. 3 .72
7x9x8 treated white oak		1.05
7x9x8 treated red oak		.87

FLOTATION OILS—Prices of oils for flotation, in cents per gallon, in barrels:

	Chicago	Denver
	New York	In Car-Lots
Pure steam-distilled pine oil, sp. gr. 0.925-0.94	\$0.60	\$0.76
Pure destructively distilled pine oil	.60	.55
Pine tar oil, sp. gr. 1.02-1.035	.35	.65
Crude turpentine	.45	.60
*Hardwood creosote, sp. gr. 0.96-0.99	.23	.42

* F.o.b. Cadillac, Mich.

COTTON WASTE—The following prices are in cents per pound:

	Current	One Year Ago	Cleveland	Chicago
White	11.00 to 13.00	13.00	16.50	12.00 to 16.50
Colored mixed	8.50 to 12.00	10.00	13.00	11.50 to 14.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

Cleveland	13½ x 13½	13½ x 20½
Chicago	\$52.00	\$38.00
	48.00	50.00

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25 lb. keg for black powder:

	Low Freezing		Gelatin		Black Powder*
	20%	40%	60%	80%	
New York		\$0.31½	\$0.38½		\$2.50
Boston	\$0.25½	.28½	.35½	.42½	2.50
Cincinnati	.19½	.23	.29½	.42½	2.45
Kansas City	.21½	.27½	.34½	.44½	2.55
Seattle	.19½	.25½	.32½		
Chicago	.19½	.23½	.34	.44	2.45
St. Paul	.20	.27½	.34½	.44½	2.45
St. Louis	.20	.27½	.34½	.44½	
Denver	.18½	.26	.33	.43	2.55
Dallas	.26	.33½	.40½	.50½	
Los Angeles	.22	.29	.37		3.05

CHEMICALS

SODIUM CYANIDE—New York price is 30c. per lb.; Denver, 44c.; Chicago, 31½c.; St. Louis, 35c.

SODIUM SULPHIDE—In New York the price per pound is 8½c. for concentrated, 4½c. for crystals. The St. Louis price is 9½c. for concentrated, 20c. for fused; the Chicago price is 7½c. for concentrated, 3½c. for crystals. Concentrated comes in 500-lb. drums, the crystals in 440-lb. bbl.

ZINC DUST—For 350 mesh the New York price is 16c. per lb.; Chicago, 16c.; Denver, 14c. f.o.b. Pueblo; St. Louis, 16c.

ALUMINUM DUST—Chicago price is \$1.65 per lb.

MINERS' LAMP CARBIDE—Prices net f.o.b. cars at warehouse points.

	Union 100-Lb. Drums Per Ton	Cameo 100-Lb. Drums Per Ton	Union 25-Lb. Drums Per Drum
East of the Mississippi, North of Chattanooga	\$106.00	\$101.00	\$1.52
Southeastern portion U. S. A.	115.50	110.50	1.63
Texas (except El Paso)	124.00	119.00	1.74
El Paso, Texas	126.00	121.00	1.77
Denver, Colo.	124.00	119.00	1.74
West Coast	129.00	124.00	1.81