

Engineering and Mining Journal

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Engineering and Mining Journal

May 25, 1918

Volume 105

Number 21

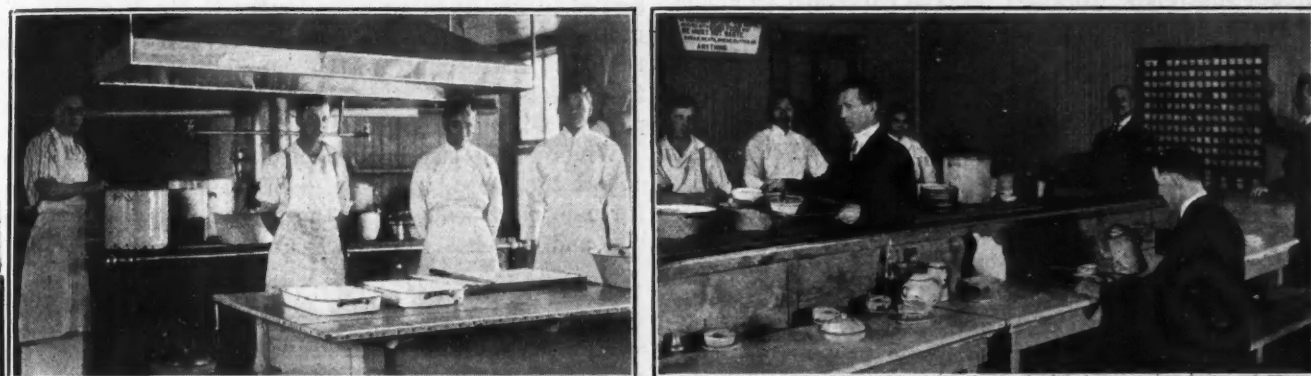


FIG. 1. THE KITCHEN RANGE AND SERVING COUNTER AT KERR LAKE CAFETERIA BOARDING HOUSE, WHERE THE MEN HELP THEMSELVES

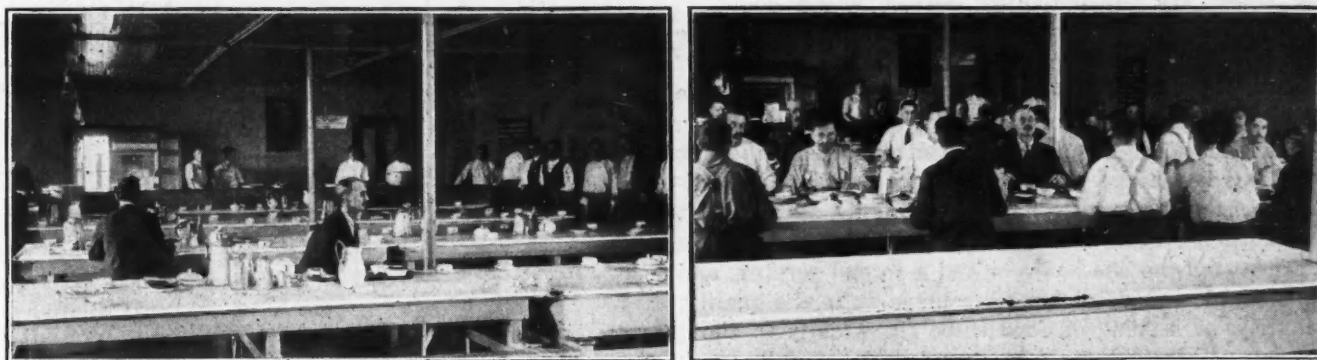


FIG. 2. THE MEN TAKE THEIR TRAYS TO INDIVIDUAL PLACES AT THE TABLES IN THE DINING HALL

The Cafeteria at the Kerr Lake Mine

By H. A. KEE*

The cafeteria system of serving meals at mine boarding houses has been successfully adopted at the Kerr Lake mine. Each man has his place at the table and receives a numbered meal ticket.

The men load their trays at the kitchen counter with whatever food they desire, and wastage and discontent have thus been reduced to a minimum. Change in method proves mutually satisfactory.

THE problem of feeding employees in mine boarding houses has been seriously considered by most mine managements, and one of the main difficulties has usually been to keep the debit balance of boarding house accounts as small as possible. Naturally, other things being equal, the more efficient and capable miners usually seek employment where they can procure the most satisfactory boarding and other accommodations. Most mining companies endeavor to feed their employees properly and to have them satisfied with the food served. Results meeting both conditions are often difficult to attain, due in part to wasteful cooking and serving, as well as to poor selection and buying of supplies;

and occasionally some of the employees are most unreasonable.

Doubtless all interested have studied this problem to some extent, and some remember early difficulties in obtaining a fair portion of food at mine boarding houses when untrained speed, light weight and short reach procured but meager results, as compared with the previously trained heavy-weight opposition.

The usual method of serving food in most camp boarding houses where there are a large number of men is to place on the table, in suitable dishes, one large portion of each sort of food to about every six or eight men, and often after the first three men have picked over and chosen their portions the remaining food in

*Manager, Kerr Lake Mining Co., Ltd., Cobalt, Ontario, Canada

that particular dish is not stimulative of a good appetite. Anything left in these dishes is seldom served again, and, as a result, this food is either dispatched to the garbage wagon or made into hash or stew, which is not always eaten. Often some one who has not struck his pace in the usual dash for food finds that the other fellow with previous experience had started his meal by eating all the pie he could reach, thus leaving nothing for his fellow workmen but the cherished privilege of using the same tactics the following day, if they so desire. It is generally conceded that the cash losses on boarding house accounts are not due to the amount of food actually eaten by the employees, but are invariably caused by the waste after the food has been cooked and served to disadvantage.

ADVANTAGE OF CAFETERIA SERVICE

A few years ago the Kerr Lake management casually looked into the matter of the cafeteria system of serving food as used in the larger cities, where excellent meals were obtained at much lower prices than was possible with the usual hotel service, and concluded that some modifications of this cafeteria system could be adopted to material advantage in mining camp boarding houses, as the individual service would doubtless prove more satisfactory to the employees, and at the same time eliminate considerable waste.

During the war everybody has been urged to conserve food, particularly by eliminating waste, and on Apr. 1, 1917, the Kerr Lake Company introduced in its mine boarding house the cafeteria serving system in modified form. The results have been highly satisfactory, inasmuch as there have been no changes made in the cookery staff, no one has required a second serving, and not a single complaint has been made as to the quality, quantity, or serving of food three times daily to about 70 men. This system of serving would naturally work out to much better advantage where it is necessary to serve a greater number, and it is interesting to note how well the men handle their individual trays.

A GOOD COOK THE FIRST ESSENTIAL

Naturally the first thing considered in securing best results in any boarding house is to procure a neat and efficient cook, who will continue to take an interest in his work. In this particular the company has been unusually fortunate. A daily report is made out, signed by the cook, and filed in the office, showing supplies used each meal, giving the number of men served each meal and weight of meats and number of eggs used, etc. It has been found much easier to control the amount and quality of supplies under this new system, and the ultimate waste is reduced to a minimum, as all food which is not eaten at any meal remains in perfect condition, and is served later.

The food is placed on the serving counter in large kettles and pans in full view of the men as they are being served. It is served by the chef and his two assistants at the rate of seven men per minute. Fig. 1 shows the kitchen range and the size of kettles and serving pans and the serving counter and serving operation, and Fig. 2 gives views of the dining room.

The men, on reaching the dining room, form in single file and, without hurrying, walk up on one side of the room, to the ticket board, where each man in his

turn procures his meal ticket, on which, as shown in Fig. 3, his name and payroll number are stamped. The man places his ticket in the counter receiving box, and then takes a 14 x 16 in. black japan tray, with knife, fork and spoons, and is served that portion of food which he desires. After being served, he proceeds with his tray of food to his numbered place at the table, and if he leaves sugar in his cup or otherwise wastes the food served to him it is an easy matter to check him up by getting his table number and referring to the office records. Each man eats the same clean and wholesome food after this individual service, and all are evidently pleased with the new system of serving.

When every one has finished eating, the assistants collect the trays, with the dishes, and clear the tables for another meal, while the chef unlocks the ticket box and punches the tickets for that particular meal.

FIG. 3. CAFETERIA MEAL TICKET

No. 100

Name <i>John Jones</i>					
Month of <i>April,</i>					1918
1	B	D	S	M	EXTRA
2	B	D	S	M	
3	B	D	S	M	
29	B	D	S	M	
30	B	D	S	M	
31	B	D	S	M	

Total Meals.....

Amount \$.....

Table No. 67

The tickets after being punched are replaced in the ticket board under their various payroll numbers. At the end of each period, these tickets are sent to the office and the various totals deducted from the payroll. If a man is discharged or calls for his time during the period, he procures his ticket from the chef before any settlement is made at the office. Extra charge is made for more than three meals per day, as the men can eat all they require in three meals, and enjoy the food served to them. Experience indicates that if men are allowed the privilege of eating four times a day, a considerable waste and ultimate dissatisfaction on their part usually result.

White enamel ware dishes are used for serving the food, thus eliminating waste and breakage, and it was found by experiments that less bread, butter, tea, coffee and milk were required when all of these necessities were placed on the table where men can help themselves. This system of serving or modifications of same should effect a material saving if installed in all mining and lumber camps where it is found possible to use it.

Necessary food will be conserved and the men will be pleased with the service if particular pains are taken in the first installation of the system. Such results as have been obtained by the Kerr Lake Mining Co.'s cookery staff under this new system would recommend it, more especially to companies feeding a larger number of employees.

War Savings Stamps at United Verde Mine

BY H. DEWITT SMITH*

The employecs of the United Verde Copper Co., of Jerome, Ariz., have responded 100 per cent. strong to the company's campaign for the purchase of war savings stamps, thrift stamps and the Third Liberty Loan. Special arrangements for payroll deductions have been made, and the records and clerical work necessary were simply and efficiently conducted by the company officials.

THE method of conducting the war savings stamps and Third Liberty Loan campaigns at the United Verde Copper Co., of Jerome, Ariz., is here presented in the hope that the same or similar methods may be adopted to advantage by other mining companies to interest their employees in actively supporting the United States Government by means of monthly payments toward the purchase of war savings stamps and Liberty bonds.

Up to the time that war savings stamps and thrift stamps were offered to the public, in January, 1918,

First, to educate and interest every patriotic employee to the need of financially supporting the U. S. Government during the period of the war as his government or as the government which he has adopted for protection and for a freeman's livelihood; second, to encourage thrift by cumulative savings on the part of

NATIONALITY CENSUS OF JEROME, ARIZ., APRIL, 1918

Nationality	Number	Per Cent. of Total
American	382	30.6
Mexican	391	31.3
Austro-Hungarian	152	12.2
British	96	7.7
Spanish	66	5.3
Italian	56	4.5
Miscellaneous	105	8.4
Total	1248	100.00

a class not naturally so inclined, and, third, to eliminate as far as possible all pro-German and anti-American elements, who naturally would not take kindly to the idea of lending their aid to this Government.

On pay day, Jan. 21, leaflets issued by the Government descriptive of war savings and thrift stamps were

CHECK NO. 1225 CERTIFICATE NO. 01935022

NAME Doe, John

Qns SEMI-MONTHLY MONTHLY CASH

Month	1918		1919		Month	1918		1919	
	1st Half	2nd Half	1st Half	2nd Half		1st Half	2nd Half	1st Half	2nd Half
Jan.		4 12			July				
Feb.	4 13	4 13			Aug.				
Mar.	4 14	4 14			Sept.				
Apr.	4 15				Oct.				
May					Nov.				
June					Dec.				
Total									

January 25, 1918

United Verde Copper Co:

I herby authorize the UNITED VERDE COPPER CO. to deduct from wages due me each SEMI-MONTHLY PERIOD (until notified to the contrary) the sum of \$ 4.12, toward the purchase of THRIFT and WAR SAVING STAMPS, which will be delivered as paid for.

Check No. 1225 (Signed) John Doe

SIGNED CARDS AUTHORIZING WAGE DEDUCTIONS FOR THRIFT AND WAR SAVING STAMPS ARE FILED IN MANILA COVERS UPON WHICH A VOUCHER RECORD IS KEPT FOR EACH EMPLOYEE

little active interest had been manifested in Jerome in the purchase of Liberty Loan bonds. True, the local quota was largely oversubscribed on both first and second issues, but this was due solely to the large amounts taken by the two large companies in the district. Jerome, with a population of 6000, was represented by only 350 subscribers to the Second Liberty Loan.

As in many mining towns, the population of Jerome is shifting and rapidly changing, with only a small percentage who own their homes and have settled permanently in the town. Not over 50% of the population are American citizens, a large proportion being either Mexican or subjects of Austria-Hungary. A fair idea of the nationalities represented in Jerome may be obtained from the table of employees at the United Verde mine on Apr. 1, 1918, which appears herewith.

Under the conditions noted, the objects of the war savings stamp campaign at the United Verde mine, and, in a larger way, in Jerome itself, were three-fold:

attached to each pay check. Posters bringing out the salient features of these issues and the Government's need of every man's support were posted in conspicuous places around the plant. After this preliminary educational work, which was ably seconded by articles and editorials in the local papers, a committee of five, selected for their representative character, intense patriotism, and ability to converse in several languages, carefully canvassed the mine, explaining to each employee individually the features, merits and objects of war savings stamps. The advantages of monthly savings were pointed out, and a card as shown in Fig. 1, authorizing a deduction from the payroll, monthly or semi-monthly, was presented to each man.

After the mine had been completely canvassed, a list was compiled of all employees who had not purchased war savings stamps. Each of these men was again interviewed, usually by a man of his own nationality. In a large majority of cases, this second interview resulted in a subscription, as each man had had opportunity to learn from his fellow workers the generally favorable

*Superintendent of Mines, United Verde Copper Co., Jerome, Arizona.

attitude in which the campaign was held. Wherever a man did not care to purchase stamps, either through the time office or through the local banks or post office, his reason for refusal was noted.

As 818 out of a total of 1248 employees had requested that deductions, ranging from \$1 in thrift stamps monthly up to 10 war savings stamps semi-monthly, be made through the mine time office, a considerable task devolved upon the time office force. Under the direction of C. S. P. Gardner, chief timekeeper, this work was quickly systematized and has since proceeded satisfactorily to all concerned.

The deduction card, as illustrated, is turned in at the mine office, and there kept on file as an authorization for deduction in a manilla envelope or case, shown on the same page, serving a double purpose. The amount deducted each pay day is entered on the payroll and on the case at the same time. Should there be any uncertainty or dispute regarding the amount or time of any deduction, a complete record of all war savings stamp deductions for each employee is thereby made quickly available for reference. After the deductions have been entered on the payroll and totaled, the war savings stamp account is credited with this total, and an equal amount in stamps obtained through the local post office. The number of stamps as stated on each case is then inserted in a small envelope, which is placed in the case until called for. By this method any error in distributing stamps becomes at once evident, and is readily checked up. Each man is presented with a war savings stamp certificate, properly filled out, when he receives his first stamp. It has been found by experience that the majority of the employees prefer to retain these certificates in their own keeping, although a safe in the time office is provided for those who wish to avail themselves of the privilege.

During the first two months of the campaign, numerous requests from employees that the payroll deductions be changed by an increase or decrease were checked and tabulated by means of deduction change cards, the same form as shown, but printed on pink cardboard.

RESULTS OF WAR SAVINGS STAMP CAMPAIGN

As a result of this war savings stamp campaign, 1205 out of a total of 1248 employees began the purchase of stamps, either through the company time office or at the local banks or post office. No record is available of the amounts purchased through the banks or post office. At the mine time office, from Jan. 21 to Apr. 15, 1918, a total of \$40,196.61 in war savings stamps and thrift stamps had been purchased by mine employees, an average of \$32.21 *per capita*. Authorized payroll deductions for the first half of the month of April amounted to \$5,391.39. Many employees, however, preferred to pay cash for the stamps rather than have the deduction made from their pay checks.

Where such a large proportion of mine employees purchased war savings stamps, those who declined to purchase without good reason were made conspicuous by their refusal, and soon dropped out and left for a more congenial working place. As the other mining companies in Jerome quickly followed the example of the United Verde, the town was soon rid of an anti-American and pro-German element which had been a source of danger to companies engaged in war industries.

On the other hand, many of the employees, particularly among the Mexicans, Spaniards and the subject races of Austria-Hungary, who had taken little interest in the progress and support of the war, began to take more interest as they took upon themselves a share of the war's burden. This change of feeling was clearly shown by the progress made by the Third Liberty Loan.

THIRD LIBERTY LOAN SUBSCRIPTIONS

As there had been only 60 subscribers to the Second Liberty Loan from among the employees of the United Verde Copper Co., it was thought advisable to have a complete organization to insure better success on the third loan. Consequently, each shift boss and shop foreman was requested to appoint a man from his shift to solicit subscriptions. In addition, a general committee was appointed, consisting of representative men of each prominent nationality. A meeting of these committees was called for Tuesday, Apr. 9, to consider the best methods of handling the Liberty Loan campaign at the United Verde mine. However, on the morning of Apr. 6, when the national drive opened, the time office found itself besieged by applicants for bonds, and before the committees held their first meeting more than 600 subscriptions had been received.

As a result of the educational work in connection with the war savings stamps campaign, over 85% of the United Verde employees had subscribed to Third Liberty Loan bonds before the first week of the drive was over, without the necessity of organization at all. The few cases where employees could not subscribe were considered by the general mine committee, and an explanation was furnished concerning them. At the close of the third week of the Liberty Loan drive, the United Verde mine was represented by 1221 subscribers from its 1247 employees, and the 26 non-subscribers were considered 100% American from the fact that they were taking war-saving stamps to their limit in preference to bonds.

The Third Liberty Loan subscriptions were handled by deduction cards in a manner similar to that already described with reference to stamps. The United Verde Copper Co., as is the case with many other large copper companies in the Southwest, offered to purchase bonds outright to the amount subscribed by any employee. Payments were made by the employee as desired, but preferably at a rate of 10% or more per month.

The showing made by the United Verde Co. in the first week of the Liberty Loan drive immediately put the other copper companies and the Jerome merchants on their mettle, so that the close of the third week of the campaign found Jerome with approximately 2500 subscribers among its 6000 inhabitants, and proud of being a 100% town.

Similar results can be accomplished in any mining community by organized effort. This effort is well worth while in its result of welding union and non-union employees, operators and tradesmen, native-born and aliens, into one comprehensive unit whose first and only thought is to win the war.

The *Iron and Coal Trades Review* (London) states that production in Germany of nitrate by fixation was 30,000 tons in 1913, 60,000 tons in 1914, 150,000 tons in 1915, and 300,000 tons in 1916. Production in 1917 is estimated to be at least 320,000 tons.

Road Builders Work Close to the Front In American Sector in France

BY ROBERT K. TOMLIN, JR.*

Progress has been made by the road division of the American Expeditionary Forces from a paper organization to actual construction and maintenance of military highways in the war zone. About 1500 men are engaged in road reconstruction, maintenance and quarry operations. The work proceeds in spite of German shelling and our men are materially relieving the difficulties arising from the worn-out conditions of important roads. American machinery replacing hand labor.

IN DEALING with the work of the road service of the American Expeditionary Forces here in France my first studies were necessarily confined to matters of organization, inspection and planning. These were the early days back in January, when the principal activities of the chief of the road service and his department heads took the form of investigation and report. The results of our efforts were then on paper, not on the ground, for the rank and file of our special road-building and quarry regiments were still at Camp Meade, in Maryland, and practically no construction plant or tools had been received. Since those days a big change has been wrought. The vanguard of our special road construction and quarry forces landed in France some time ago. Road service headquarters was immediately shifted from Paris to a point nearer the front. A limited amount of equipment was received, some of it from the States, some from local sources. Men who had been chafing at desk jobs were transferred to open country. District offices were established; construction gangs were detailed to selected areas; and the real work of road reconstruction and maintenance in the zone of American operations in France began.

The machinery of the organization up to this time had been in the assembly stage. Now, however, the throttle has been opened and the wheels are turning. We are not yet going at full speed, but we are moving along nicely, and each week sees the lever jacked forward a notch or two. American road builders are now at work on military highways and in quarries within the range of German artillery fire as well as in other areas between the front and our seaport bases.

I have just come back from the advance section of our road service, where work, subject to interruption at any time by high explosive shelling or drenching by mustard gas, is being carried on under the direction of a captain of engineers who was formerly a division engineer in the New York State Highway Department. Upon his shoulders has fallen the responsibility of getting the job in the forward area started. His status, like that of several other engineer officers assigned to different areas of France, is that of a division highway

engineer reporting directly to the chief of the road service, who is located at present at the general headquarters of the American Expeditionary Force.

Just a little more than a month ago—on Feb. 15, to be exact—road work up near the front was begun by American forces. Since then things have moved swiftly. About 1500 men are now engaged in road reconstruction, maintenance, and quarrying in this advance zone. They are operating in seven groups, each group being assigned to a territory with definite limits. Five quarries are being worked by our men. Mechanical equipment has begun to arrive. Several crusher installations have been set up, among them one with overhead bins and mechanical elevating equipment, said to be the first of its kind to be erected behind any front in France since the war started, almost four years ago. Four days after the machinery and wood for the bins arrived at the quarry site our men had this outfit



HAND QUARRYING PENDING ARRIVAL OF CRUSHER

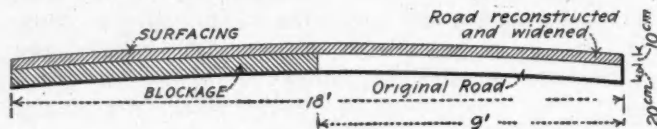
producing crushed rock. Nor have we stopped at the innovation of the portable crusher plant, with its elevating conveyors and storage bins. We are causing a good deal of comment among French engineers, I am told, by the use of bottom-dump wagons and elevating end-dump motor trucks. Such equipment as we are using for quarrying and transporting rock is a decided novelty over here, where the practice of depending on hand labor rather than mechanical plant is far more general than is the case in the United States.

As I stated in a former report, our road builders do not have to concern themselves to any great extent with the construction of new roads. There are already plenty of highways leading to the front, and our job now is maintenance, reconstruction and widening of existing waterbound macadam roads. Where our road

*War correspondent, McGraw-Hill Co.'s publications.

and quarry regiments are operating near the front the amount of work to attend to is about one mile of road per square mile of land. Certain "national" highways leading toward our battery positions and trenches are already of ample width and possess good foundations and drainage. Ordinary maintenance work is all they require. Some of the offshoot roads, however, are only from 9 to 12 ft. wide, and these must be increased to from 18 to 25 ft. in order to carry artillery and motor truck traffic. These offshoot roads are in most cases too thin to stand the heavy traffic of war, and our men are reconstructing them, as shown in the sketch.

The reconstruction work involves the preparation of



AMERICANS USE OLD ROAD AS HALF BASE FOR NEW

a subgrade, which is not rolled, and the laying of a foundation course of large stone or "blockage" to a thickness of 20 cm. This blockage is set by hand and chinked in with smaller stones. Then on top of it is spread a 10 cm. layer of crushed stone 1 to 4 in. in size, this layer being extended across the surface of the existing road, which serves as a base for about half of the widened route. When a roller is available the top course is rolled down; otherwise the compacting must be done by the traffic itself.

There is nothing very elaborate about the work. It is macadam road reconstruction reduced to its simplest form, for under the conditions that obtain in the advance section our engineers have found that this is the only type of road it is practicable to build and maintain. The captain of engineers in charge of our advance section work states the case thus: "The war-time type of road for France is the waterbound macadam road. It is the road for which local material is available and for which the methods of maintenance and reconstruction are simple. The fact that the local stone has a high cementing value is another argument in its favor." The stone referred to is a soft limestone, almost white.

Our policy in road building is to use local material as far as possible, thus cutting down on the length of haul for crushed stone. This is very important, for with quarries located far from the job the motor trucks hauling crushed rock for maintenance and reconstruction destroy the very roads for which they are bringing up repair materials. Then, too, it is now, in the early spring, that the roads are subjected to their severest test, for at this time military activity generally increases after the winter's lull and the roads must be cleared, so far as possible, of all traffic which does not carry ammunition, supplies and the other essentials of combat and sustenance. Giving weight to all of these factors, our road service is opening up, or taking over from the French, many quarries, on the theory that many quarries mean short hauls for crushed rock, and consequently fewer trucks operating on the highways.

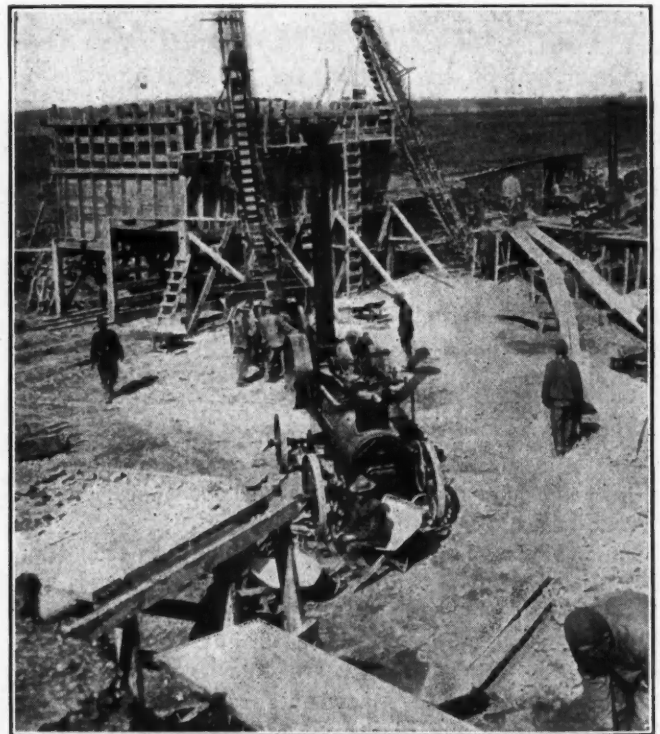
Up to within a short time ago most of our quarrying was a hand-labor job. Some of it still is, but our aim is to install mechanical equipment at all quarry sites just as soon as such equipment is to be had. *The accom-*

panying photograph shows the first mechanically equipped quarry which American engineers have installed near the front. It is of the semi-portable type, with jaw crusher, overhead bins and elevating conveyors. This is the plant which was set up in four days. As previously noted, this layout is a decided departure from previous practice of the allied armies behind the front. The rock here is the prevailing soft limestone, which, after being blasted—generally at night—is loaded into wheelbarrows and delivered by inclined runways to the jaw crushers.

The elevated bins, it will be noted, have two openings below. The larger of these is for motor trucks, while the other is for light railway (60 cm. gage) cars. American quarry practice over here is making a marked cut in the man-power required for operation by the provision of gravity loading of crushed rock into motor trucks, light railway cars and bottom-dump wagons.

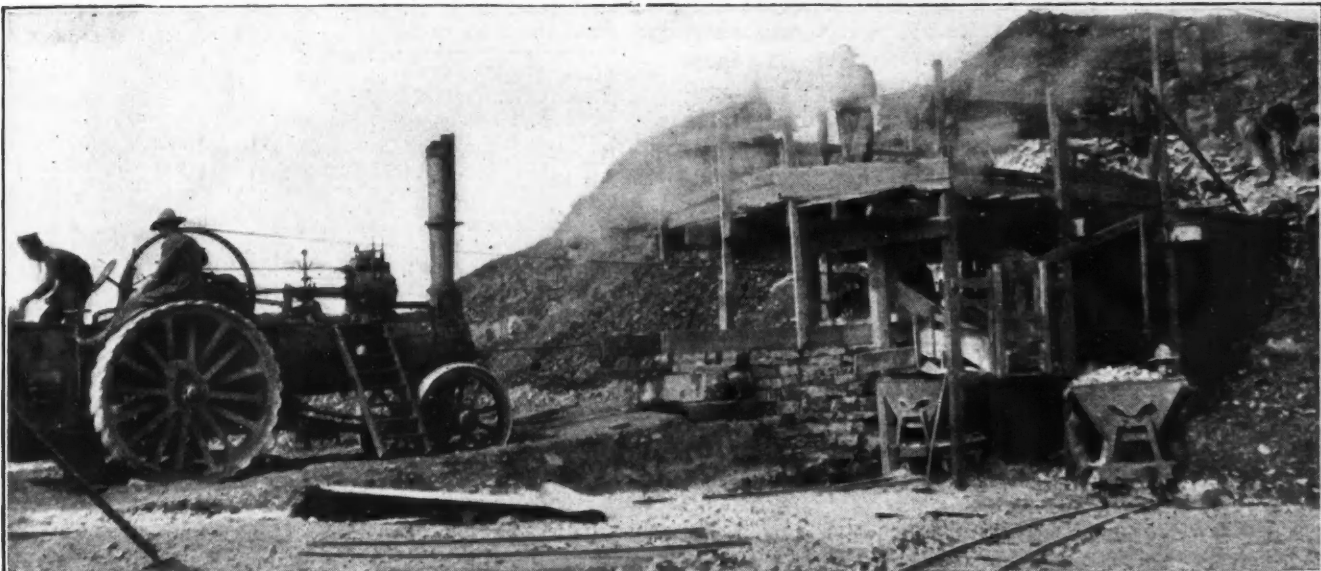
Another of the views shows a gyratory crusher which had been set up only a couple of days before I took this picture. At the time overhead storage bins had not been erected at this site, which had previously been worked by the French.

In another photograph a detachment of our quarry regiment is shown breaking rock by hand, pending the



AMERICAN ENGINEERS HAD THIS QUARRY OPERATING FOUR DAYS AFTER EQUIPMENT ARRIVED

arrival of a crusher. The captain in charge of this work had established his camp only a few days before my visit to this quarry, and, eager to increase his output of crushed stone, he was preparing to build a crusher of his own from odds and ends of metal which he had ferreted out in a junk shop in a near-by town. "As soon as I can get the authorization to spend a few hundred dollars for this stuff," he said, "I will have a crusher set up and running in a few days." This spirit is typical. Our men have had to proceed with their work in the face of difficulties of all sorts, shortage of



THIS QUARRY, TAKEN OVER FROM THE FRENCH, IS SHOWN PARTLY EQUIPPED WITH GYRATORY CRUSHER, THE OVERHEAD STORAGE BINS NOT HAVING BEEN BEGUN

men, shortage of plant, delays in railroad shipments, etc. Yet they are not sitting down and waiting for something to turn up. When mechanical plant does arrive it is set up in a jiffy; if it is delayed, some sort of makeshift is resorted to, or else the rock is barred out and broken by hand. From four of our quarries where mechanical plant of some type is in service we are turning out about 500 cu.m. of rock daily, and the work is as yet hardly organized.

Most of the transportation of crushed rock from quarry to road is done, at this writing, by motor truck or horse-drawn dump wagon. A number of Mack motor trucks are in service for the longer hauls and Watson bottom-dump wagons for lesser distances. Both schemes of dumping—the automatic elevating body in the case of the motor truck, and the bottom opening leaves in the case of the wagon—are decided novelties among French road builders, and their first performances were in the nature of spectacles watched with the keenest interest. Much of the road stone is delivered by the French in small, two-wheel carts.

The men of our road-building and quarry regiments have been divided into gangs and are quartered close to the particular jobs to which they have been assigned. At some places camps have been established and the men live in wooden barracks. Others, newly arrived, are occupying canvas tents for the present. Still others are billeted in French towns. The road service is providing everything possible in the way of good food and clothing to make life comfortable for the men. Many of the rank and file are experienced construction men, road builders or engineers with degrees from our leading technical schools, who expected to be assigned, on their arrival in France, to jobs of a supervisory capacity; for example, as bosses of gangs on road reconstruction or maintenance. Up to the present time it has not been possible for all of these expectations to be realized and men with qualifications which would ordinarily place them in positions carrying varying degrees of authority are at present swinging pick and shovel or breaking rock. When we have at our disposal a larger supply of labor battalions and have cap-

tured more prisoners it is probable that there will be a change in the status of many of our road builders who are now doing ordinary day-labor jobs. Nevertheless, the men are showing an excellent spirit.

Judging by what I had to eat at one of the quarry camps there is nothing to complain of on the score of "grub." To some of us here in France who have either to pass up coffee or sweeten it with saccharine, eat brown war bread without butter and smoke French cigarettes, the lot of the military road builder, even if his job is for the time being of the routine, manual labor sort, seems to have its compensations, for he gets white bread to eat, real sugar in his coffee and American "smokes," which, in themselves, should discount many of the things which may be not quite to the liking of the man who is spreading crushed stone instead of supervising the work of German prisoners.

It is still a little early to attempt to tell the real story of our road-building work. That will come later, when all of our quarries are located, equipped and running full blast, and when our work of reconstruction and maintenance has been extended and put to the test of carrying the traffic of war for a longer time than it has done up to the present. Yet I am able to report real progress in the advance section of our road service, and I cannot do it better than by quoting from a note written to the commanding officer, lines of communication, advance section, by the general commanding the first division of the American Expeditionary Forces, behind which our road builders have been at work. Here is what the note says:

"I was very hard pressed in the sector on account of terrible roads, daily growing worse under hard usage. It was necessary to act quickly and directly with G.H.Q. Your men are doing good work. They are really saving the situation."

Australian Copper Production in 1917

Except for existing contracts with English consumers, the whole of the 1917 copper production of Australasia went to the Imperial Munitions Board at a fixed price of £116 13s. 4d. f.o.b. which was exceptionally advantageous in that it relieved the producers from the onus of finding freight accommodations, which, under existing conditions, were practically unobtainable, except for munitions supplies. It may have been only a coincidence that the purchase price fixed in June by United States Government was at about the same. The position in Australia was due largely to William M. Hughes' policy of all one price for the Australian output. The copper, as ore, matte or blister, had to pass through one of three refining works: Wallaroo and Eskbank for furnace refined and Port Kembla for electrolytic. No export of ore, matte or blister was allowed, except from West Australia, over 3000 miles from Port Kembla. The qualities accepted by the Munitions Board were copper, 99.85%; nickel, 0.02%; lead, 0.02%; and antimony, 0.008% for electrolytic brands, and 99.6% copper for furnace refined. Five Mines, Mount Lyell, Mount Morgan, Wallaroo, Hampden Cloncurry and Mount Elliott, produced seven-eighths of the output, the other one-eighth came from smaller producing mines such as Great Cobar, C. S. A. Mine, Mouramba, Abercrombie, Mount Royal, Mount Hope and Phillips River.

The average of the charges into the furnaces was about 3%, except Hampden and Elliott, which averaged 9%. The bulk of the ore was direct smelted in blast furnaces. Wallaroo has had a wet mill for several years, and was the first to use flotation for copper ores. Mills with flotation plants are now in operation at Mount Morgan and Mount Lyell to treat part of the siliceous ores. Production costs were high; and Lyell and Wallaroo worked at a small profit margin at £55, but operating costs have risen. Hampden and Elliott range from 10 to 15% higher in costs, as they send their blister a long distance by sea and land, to Port Kembla. Refining costs at Port Kembla were quoted at £12 per ton for outright purchase of blister and for 25% mattes; the toll charge averages about £18 per ton of copper content. The Port Kembla refineries also had high costs to contend with, and charged their customers accordingly. Being the only electrolytic and customs ore

PRICES OF AUSTRALIAN MINING SUPPLIES (F. O. B. SYDNEY)

Material	Price
Drill steel, solid, per ton.....	\$224.00
Steel sheets, per ton.....	168.00
Galvanized roofing, per ton.....	300.00
Steel rails, light, per ton.....	75.00
Steel plate, per ton.....	240.00
Wire rope, per ton.....	400.00
Carbide, per ton.....	260.00
Bar iron, per ton.....	100.00
Air hose, per foot.....	.50
Cast iron scrap, per ton.....	28.00
Coke, per ton.....	6.00
Packing, various, per lb.....	1.00
Grease, lubricating, per 100 lb.....	8.00
Cotton waste, white, per 100 lb.....	40.00
Linseed oil, per gal.....	1.50
Red and white lead in oil, per 100 lb.....	17.00
Explosives, 50% gelatin, per lb.....	.20
Cement, per bbl.....	3.00

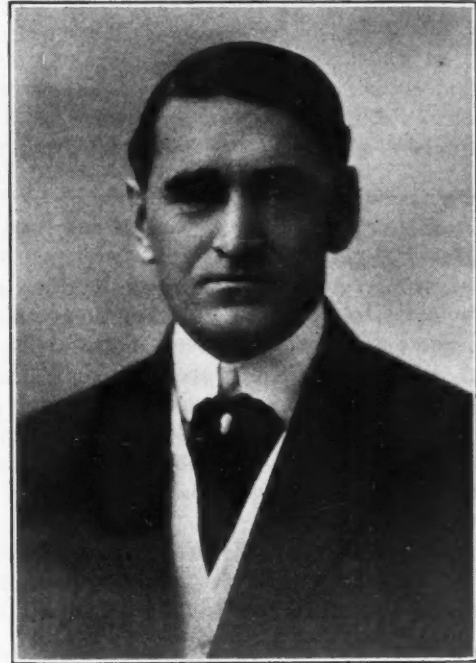
works in the commonwealth, they were forced to accept all material offered, suitable or not. Moreover, all producers had to transport their ore, matte or blister to Port Kembla works, and this added considerably to production costs, which resulted from small deposits and small reduction plants, as compared with American plants and deposits; high cost of materials and machinery and low labor efficiency, with high freights. Actual wages were no higher than American wages. Smeltery hands averaged \$2.50 and contract miners \$4 a day for eight hours and a 44-hour week. Materials cost from 50 to 100% above American mining materials, and nearly all machinery had to be imported at a marked increase in outlay for freight and duties. Labor troubles also were a factor.

The future of Australian copper mining depends upon the proper development of existing smaller mines, several of which present excellent prospects for profitable exploitation. The only other source of increase, or even maintenance of present small output, is the discovery of new copper fields. These no doubt exist in the vast unprospected interior of Australia. Copper mining, however, can usually be conducted successfully only when railways are available, and there seems little prospect of the interior of Australia being opened by new railways. The lines from Sydney to Broken Hill and from Adelaide to Perth, West Australia, are the only ones with possibilities. The closing of the smaller mines will be a great setback to Australian copper mining.

Mining Engineers in the Service



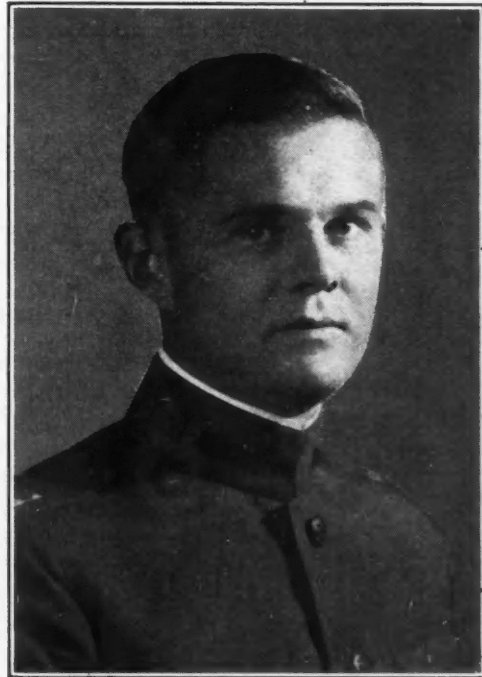
COL. AMBROSE MONELL



LIEUT.-COL. JOSEPH HYDE PRATT



CAPT. A. W. NEWBERRY



CAPT. JOHN L. CHURCH

Composition of Refractory Silica Brick

By J. S. McDOWELL*

The combination found in silica brick of several properties desirable in refractories has enabled it to play an important part in various industries. In burning, the quartz in the ganister used is inverted in varying degree to cristobalite and tridymite, resulting in permanent expansion of the brick. A 100% tridymite brick would be desirable, but could possibly be produced only at great expense. Further research into this phase of manufacture may make it commercially possible.

MANY pyrometallurgical operations and other processes employing high temperatures are largely dependent upon the availability of suitable refractories for the degree of their commercial perfection. Some of these processes, necessarily accompanied by difficult conditions, are limited by the properties of the commercial refractories. While no one refractory possesses all of the most desirable characteristics, the combination of a number of them in certain refractories renders them well adapted to particular conditions.

Silica brick, with its high softening point, good resistance to abrasion, ability to sustain loads at high temperatures, high thermal conductivity and definite

brick softens at a temperature not far from its fusion point. A high clay fire brick may soften to such an extent at 1300° to 1400° C. that it will begin to contract under a pressure of 50 lb. per sq.in., while its ultimate fusion point nearly approaches that of pure kaolin, that is, 1755° C. Silica brick, on the other hand, with its apparent fusion point placed at about 1725° to 1750° C. by a number of authorities, will sustain a load in excess of 50 lb. per sq.in. at 1500° C. Because of this, together with its close texture and hardness, silica brick is highly resistant to abrasion at working temperatures.

The thermal conductivity of silica brick as shown by the results of Dudley's investigations is approximately 25% greater than that of a good grade of fire brick. In the table, the coefficient of conductivity K as found by Dudley represents the flow of heat in calories per sec. per sq.cm. area, through 1 cm. thickness for a temperature difference of 1° C.

COEFFICIENTS OF CONDUCTIVITY FOR SILICA BRICK AND CLAY BRICK

	Conductivity	
	Temperature t and t ₂	Mean K Between t and t ₂
Silica brick.....	0-100	0.0021
	0-1,000	0.0031
Clay brick (first quality).....	0-100	0.0016
	0-1,000	0.0025

A brief outline of the process of manufacture of silica brick will have direct bearing on the consideration of

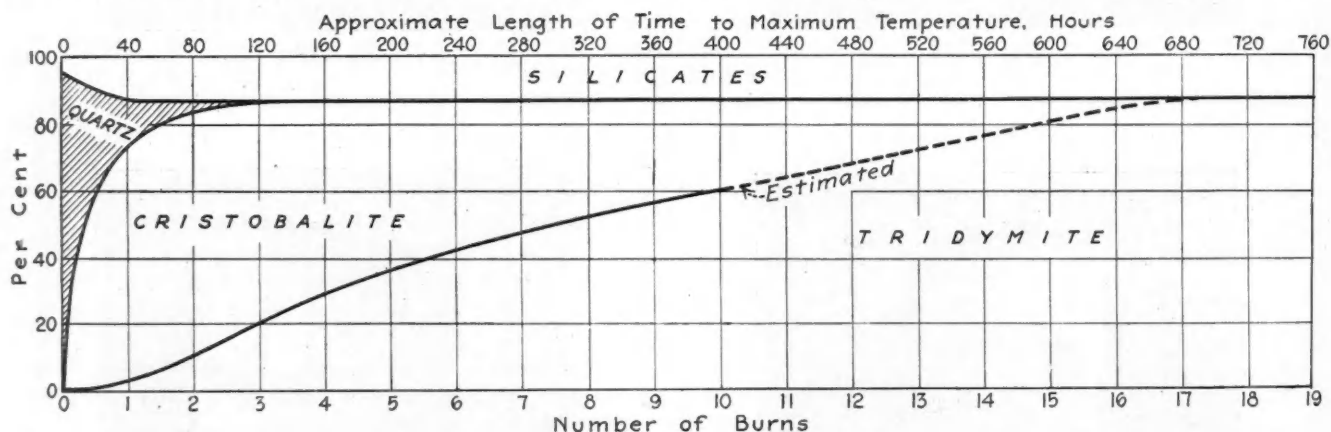


FIG. 1. DIAGRAM SHOWING CHANGE IN CONSTITUTION OF SILICA BRICK MADE FROM MEDINA QUARTZITE UPON CONTINUED OR REPEATED BURNING AT CONES 14 TO 15

thermal expansion, has played an extremely important rôle in the development of a number of industrial practices. With the advent of its use in byproduct coke ovens, the time required for coking has been reduced 25 to 40% and other improvements have been effected. For roofs of metallurgical reverberatory furnaces, glass tanks, etc., silica brick is now considered indispensable. Some other more or less important applications of silica brick are as linings and roofs for electric furnaces, limekiln linings and as muffles in various types of kilns and furnaces.

The high softening point of silica brick has an important bearing on its use in pyrometallurgical practice. Unlike some other refractories employed on a large scale, such as fire clay and magnesia brick, silica

some of its properties. Quartzite rock, commonly termed "ganister," is crushed to 2-in. size and smaller and ground in a wet pan to the degree of fineness suitable for the particular sizes and shapes to be made. As the grinding proceeds, 2% of hydrated lime with water is added. Molding follows, after which the brick is dried on rack cars in waste heat tunnels at a temperature of from 100° to 150° C. The thoroughly dried brick is then burned, usually in circular down-draft kilns.

PERMANENT EXPANSION OCCURS ON BURNING BRICK

In the process of burning, the brick undergoes an expansion from the "green" or unburned size. The major part of this expansion is permanent and is due to the inversion of the quartz to other silica minerals, which is accompanied by increase in volume. It is essential

*Harbison Walker Refractories Co., Pittsburgh, Penn.

that permanent expansion to the fullest extent be attained so that there will be no additional permanent expansion of the brick after being put into service. Aside from this permanent expansion, silica brick expands in accordance with the true thermal expansions of its constituent minerals. This temporary or true thermal expansion, although different for the minerals cristobalite, tridymite, quartz and the silicates, occurs largely over a narrow range of temperatures. To this expansion is attributed the spalling tendency of silica brick, the elimination of which property would improve the service and probably widen the scope of application.

Fenner in America and Le Chatelier in France first made exhaustive studies of the stability relations of the silica minerals. Seaver applied the knowledge secured from these investigations and made further studies as to their influence on the spalling tendency of commercial silica brick. This research was continued in the work "A Study of the Silica Refractories," in which an investigation was made of the mineral composition of

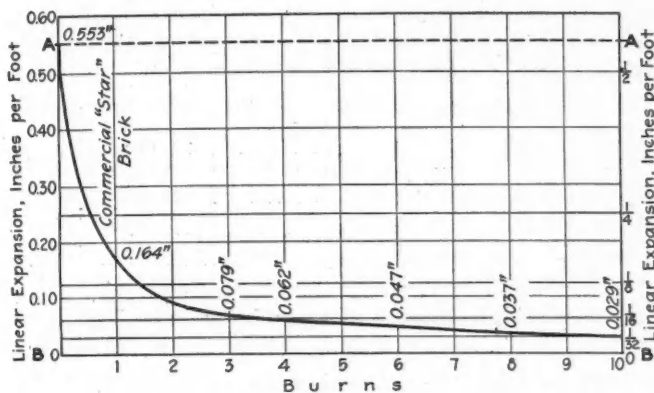


FIG. 2. RELATION BETWEEN LINEAR EXPANSION AND THE NUMBER OF FIRINGS

Distance from line B-B to curve represents expansion that has not been burned out of silica brick (made of Medina rock) after repeated firing. Distance from A-A to curve represents permanent expansion acquired.

Assumption is made that equilibrium is reached at a composition of 87% tridymite and 13% silicates, the latter having same specific volume as quartz.

silica brick burned successively one to six times in the regular commercial manner.

An additional microscopic study was made of the constitution of silica brick manufactured from Medina quartzite from Huntingdon County, Penn., one of which had been subjected to eight and the other to ten successive burnings in a silica brick-kiln. The results, expressed in volume per cent., are as follows: Eight burns: Silicates, 14%; cristobalite, 33%; tridymite, 53%. Ten burns: Silicates, 11%; cristobalite, 28%; tridymite, 61%. These figures, combined with those of a previous work¹ are shown graphically in Fig. 1.

The percentage of "quartz plus silicates" reaches an approximately constant value of about 13% upon the third burn. It therefore can be assumed that at this stage no residual quartz remains in the brick, and that the 13% of highly refractory material, not separated from the quartz in the microscopic analysis, represents various silicates formed by combination of quartz with lime and with the original impurities in the rock. Upon completion of the cristobalite-tridymite inversion, the ultimate composition of the brick should be about 87% tridymite, 13% silicate.

¹See p. 2039, "A Study of the Silica Refractories."

After the fourth burn, the inversion velocity decreases considerably, and brick burned 10 times still contain 28% cristobalite. The form of the curve indicates that 16 to 17 burns would be required to reach a condition of equilibrium with all the cristobalite transformed to tridymite. This is equivalent to a single long-continued burning in which the maximum temperature is maintained for a period of approximately four weeks. Advantageous as an all-tridymite brick probably would be, its production is not to be considered commercially, on account of the great expense.

FURTHER RESEARCH MAY PRODUCE COMMERCIALY THE ALL-TRIDYMITE BRICK

In the attempt to produce a tridymite brick, two other lines of endeavor are open: First, determination of the most advantageous temperature of burning, upon which subject there is not available any considerable data; and, second, a study of the effect of the micro-structure of the quartzite upon the velocity of the transformations.

It is not improbable that the brick of which the microscopic analyses are given here was burned at too low a temperature to secure the maximum inversion of cristobalite to tridymite, the burning having been at an average temperature of about 1400° C. as measured by Seger cones. Tridymite is not known to form above 1470° C., but doubtless it forms most rapidly at a temperature not much lower, say 1420° to 1440° C. A microscopic study of bricks subjected to long-continued or to repeated burning at this temperature would be of decided interest.

The theoretical value of the expansion remaining permanent in the brick after repeated firings, and which it would acquire upon long-continued burning at the proper temperature, is shown in Fig. 2. It is also made clear that, so far as the effect of repeated burning upon permanent expansion is concerned, there is really little advantage beyond the first burn, and for practical purposes none after the third burn. It has already been pointed out² that while reburning the brick diminishes the spalling tendency, the change is too slight to be of commercial importance.

It is to be emphasized that the figures of such theoretical curves as those given in Fig. 2 are not to be considered numerically accurate. They are presented merely to indicate the probable character of the curve, and to enable one readily to visualize the general trend of the various changes discussed.

BRICK MADE FROM DIFFERENT QUARTZITES VARIES IN COMPOSITION

The following is a microscopic analysis of the constitution of silica brick made from Baraboo quartzite: Quartz plus silicates, 67%; cristobalite, 27% tridymite, 6%. There is a noticeable difference between the mineral constitution of silica brick made from Baraboo rock and that of the brick from the Medina quartzite. The analysis of the latter is as follows: Quartz plus silicates, 25%; cristobalite, 71%; tridymite, 4 per cent.

On the basis of the above figures, 75% of the quartz of the Medina brick changes during the first burning to cristobalite and tridymite, while only 33% of that in the Baraboo brick undergoes this transformation.

²See p. 2051, "A Study of the Silica Refractories."

This difference is sufficient to warrant an inquiry into the underlying cause. Two hypotheses are tenable. The phenomenon might be explained by (1) differences in temperature and duration of burning, in grind, amount of lime added, etc., or (2) differences in the chemical composition and texture of the rock used.

The first hypothesis may be dismissed, as the conditions of manufacture of the two brick are essentially the same. Neither is there any material difference between the chemical compositions of the two rocks employed. It is probable that the explanation lies in the difference in texture of the Medina and Baraboo quartzites. A number of measurements of the sizes of quartz grains indicate that the Baraboo is of extremely coarse grain as compared with the Medina. This coarseness of texture of the Baraboo quartzite possibly prevents the inversions taking place as rapidly as in the finer-grained Medina rock.

TEXTURE OF QUARTZITES A FACTOR IN BRICK MAKING

In this connection it is of interest to recall the investigations of Wernicke and Wildschrey³ upon the texture of quartzites most suitable for silica brick making. They reached the conclusion, after extensive microscopic studies, that typical quartzites, consisting of intergrown quartz grains fairly uniform in size, are not suitable for brick making, because of the fact that brick made of them cracks (or spalls) too rapidly and attains its expansion too slowly. The good quartzites, according to these authorities, consist of quartz grains, mostly rounded, in a ground mass of cement of amorphous silica or cryptocrystalline quartz; they expand without cracking or spalling and acquire nearly their whole expansion on the first burn.

While the statement that the typical quartzites do not make good brick is too sweeping, it is probable that the finer grained the quartzite the more rapidly will the inversions take place on burning. It does not seem unreasonable to assume that the inversion to tridymite would be more nearly complete on the first burn in a quartzite such as that described, in which small quartz grains occur in a cement of amorphous silica; and that, therefore, silica brick made of such rock should acquire nearly its whole expansion on the first burn and present fewer difficulties on account of spalling.

All things considered, the selection of rock of the proper texture appears to offer greater possibilities for the production of a tridymite brick than any material alteration in the process of manufacture, such as time and temperature of burning. The spalling tendency is somewhat conditioned by the texture of the brick itself. Thus a brick of coarse grind spalls less than one of finer grind, as is shown by results of tests by Nesbitt and Bell, but too coarse a grind affects badly some of the more desirable properties. There are often wide variations in the textures of quartzites of the same geological location, so that only averages of a goodly number of grain size measurements should be considered.

Barium Sulphate may be precipitated in grains large enough to permit decantation with ease, according to the *Chemist Analyst*, by allowing barium-chloride solution to pass down a piece of capillary thermometer tubing into a boiling solution of sulphuric acid. The end of the tubing should be just below the surface of the acid.

³See p. 2013, "A Study of the Silica Refractories."

Tin Consumption in 1917

Consumption of pig tin for different purposes in the United States during the calendar year 1917, according to a statement issued by the War Industries Board, was as follows: Tin and terne plate, 27,600 long tons; solder, 17,000; babbitt and other bearing metals, 10,800; brass and bronze, 4800; foil, 4000; collapsible tubes, 2100; white metal, 1764; and miscellaneous, 8193; making a total of 76,257 long tons.

The above "miscellaneous" item has been subdivided as follows:

MISCELLANEOUS TIN CONSUMPTION IN UNITED STATES IN 1917		Long Tons
Galvanizing.....		105.40
Tinning and Retinning:		
Wire.....	363.48	
Partly for wire.....	84.00	
Utensils for food purposes.....	548.04	
Carriage and harness hardware.....	102.36	
Miscellaneous.....	818.28	
		1,916.16
Partly for tinning and retinning and partly for other uses.....		595.32
Bells (reports of 3 manufacturers making bells only).....		15.48
Pipes (tubes):		
Organ.....	24.00	
Soda, beer, etc., fountains.....	252.00	
		276.00
Partly for pipes and partly for other uses.....		620.40
Rubber.....		126.00
Type metal (reports of 2 manufacturers making type metal only).....		35.40
Bullets.....		64.68
Plated ware, britannia ware, etc.....		1,001.88
Chemicals:		
Oxide.....	1,110.00	
Bichloride.....	264.00	
Crystals.....	68.04	
Tetrachloride and crystals.....	276.00	
		1,718.04
Not specified.....		900.00
Total.....		*8,193.00

* Note—The actual total is 7,374.76.

As the United States is almost wholly dependent upon foreign sources for tin, it is of interest to note that importations of tin and tin ore during the first quarter of 1918, stated in terms of metallic content, have been at the rate of 5873 long tons per month, or 70,476 long tons per annum. To get an accurate estimate of total available supplies, however, the amount of tin recovered by detinning plants and in other ways should be added to these imports, as well as the almost negligible amount of tin produced in this country. U. S. exports of domestic and foreign tin, although small, should also be taken into consideration.

Recruiting the 27th Engineers

In a circular that we issued recently, with respect to recruiting the 27th Engineers, the special mining regiment, we said that, "Arrangements had been made so that drafted men can join, provided they are not needed to fill any deferred quota of their local boards." Soon after the issue of this circular, the measures that had previously been in effect for the induction of drafted men into special regiments were rescinded, and many applicants who responded to our circular were turned away for that reason.

However, arrangements are again in effect whereby men of special qualifications may be inducted into special branches of the service, or special regiments. We advise, therefore, that mining men who are desirous of enlisting in the 27th Engineers communicate with Lieutenant-Colonel Perry, Commanding Officer, 27th Engineers, Camp Meade, Maryland, filling out and sending to him the blank form that was issued with our original circular.

Air Blasts in the Kolar Gold Field, India*

BY E. S. MOORE†

Air blasts, quakes and explosive rock are terms used to indicate the phenomena that accompany failure of rocks under unusual strain in mining operations. Although usually associated with deep mining, there are examples that occur in comparatively shallow mines. The paper presents a description of the geological formations and the "air blasts" in the mines of the Kolar gold field. The causes of the blasts are discussed.

THE Kolar gold field has been for a long time the most important gold-producing area of India. It is in the State of Mysore, southern India, and not far from the City of Bangalore. The productive field is about three miles long, and in it a gold-bearing quartz vein varying in width from one inch to over 10 ft. is worked. The vein carries high assays to great depths, and many of the mines have paid large dividends.

The rocks of the Kolar region are pre-Cambrian in age and bear a close resemblance to some of the pre-Cambrian formations of America. The oldest rocks are basic lavas, now mostly altered to hornblende-schists, with which is associated some banded iron-formation. These rocks are similar to the Keewatin schists and iron-formation in the Lake Superior region. The schist is cut by the gold-bearing quartz vein.

FORMATION RESEMBLES BASAL HURONIAN

In parts of the area there is also a conglomerate containing pebbles of granite, jasper, and schist. The matrix resembles a hornblende-schist which is intruded by small granite dikes, which in some cases have been pinched off by the squeezing of the rock. This has led Dr. W. H. Smeeth, Chief Inspector of Mines of Mysore, to whom I am greatly indebted for information regarding this area, to regard this conglomerate as a breccia due to the crushing of granite dikes in the schist. Dr. J. W. Evans has regarded the conglomerate as probably a squeezed glacial boulder clay. From analogy with pre-Cambrian conglomerates in America, I regard it as a metamorphosed rock similar to the basal Huronian conglomerate. However, the main bearing which it has upon the problem under discussion is the apparent fact that it is younger than the schist and that it indicates the presence of a syncline in the rocks cut by the quartz vein.

Surrounding the area of schist and conglomerate is a large mass of granite-gneiss resembling the Laurentian gneiss of the Lake Superior region. Still later than the rocks mentioned above are basic intrusions which cut the quartz and schists; in the mines these are known as trap. One dike of this type is 50 to 60 yd. wide. The quartz vein consists of a dark, translucent, rather opalescent to chalcedonic type of quartz, almost everywhere showing, by its refraction of light and by its fractures, that it has been subject to molecular strain.

Streaks of schist are common in the vein, and their arrangement suggests that the solutions depositing the quartz were thrust into the cleavage planes of the schists under great pressure, and probably during some shearing in the schists. In some places the vein is highly folded and the schist in the vicinity of the quartz is, as a rule, fine-grained. It likewise shows evidence of a strained condition.

DESCRIPTION OF THE AIR BLASTS

The term "air blasts" has been used not only in India but also in America and elsewhere to describe certain disturbances which occur in mines and are accompanied by strong rushes of air through the workings. Such occurrences have been described from the Lake Superior copper and iron districts. They are caused by the falling of large masses of roof in stopes or by the sudden crumbling of pillars under the superincumbent weight of the rock above the mine workings, thus producing a rapid movement of air in the party enclosed spaces. There is thus a reasonable justification for the use of the term to designate such phenomena. As the term is now used in India by some writers it must be regarded as a misnomer, since the "air blasts" are distinguished from the larger disturbances in the mine, which are called "quakes." The name was apparently applied to them originally by the miners, owing to the similarity between the explosions in the rock and those which might be caused by occluded gas. Air blasts and quakes are doubtless closely related, and similar to the phenomena described in Australia, Bohemia and England as "explosive rock" and "air blasts."

In the Kolar field the air blasts occur in the quartz vein, trap dikes or the hornblende-schist, being most frequent in the quartz. They bear a strong resemblance to the explosion of a small charge of powder placed in the wall of the workings, because in some cases the rock blows out from the solid face of the drift or stope as a puff of rock powder, while in others small fragments are shot out with sufficient force to scratch and severely cut the miners. Often a continuous crackling and snapping are kept up at the fresh working face, interspersed with explosions like those of small detonators. The explosions do not bear any definite relation to the depth of the mine, after a few hundred feet in depth has been reached, and they are therefore independent of the superincumbent weight of the rock in the mine workings. They have occurred during the sinking of the large circular shaft on the Mysore property, in very compact hornblende rock, and less than 700 ft. below the surface. In some of these explosions large masses of rock were blown out with loud reports, and one was mentioned in which it was estimated that 80 tons of rock were precipitated from the wall, making it necessary to employ a shield to protect the workmen while sinking the shaft.

AIR BLASTS RESEMBLE EARTHQUAKES IN KOLAR MINES

The term "quakes" has been employed by Dr. Smeeth in his excellent work on these phenomena to describe the heavier shocks which occur in the Kolar mines and

*Condensed from a paper to be presented at the Colorado Meeting of the American Institute of Mining Engineers.

†State College, Penn.

produce effects at the surface in all respects like those of local earthquakes. In some cases these shocks have been sufficiently severe to be felt at a distance of nearly four miles from their point of origin. They have been destructive to mine structures and in some cases to the lives and limbs of the miners. One case is described by Smeeth in which a block of rock, the weight of which was estimated at half a ton, was hurled with a low trajectory from end to end of a stope 30 ft. in length. In some cases the footwall of the vein, which usually lies on a slope of 50 to 60°, buckles up and large masses peel off with considerable violence.

As a rule, these larger shocks, or "quakes," occur in the deeper levels and in areas where considerable stoping has been done. They are particularly prevalent where quartz pillars have been left to support the roof of the workings, and they seem to owe their origin partly to the superincumbent load of rock in the workings, but their violence can only be ascribed, like that of the air blasts, to some latent energy or strain in the rocks of this area.

A marked similarity is seen between these air blasts in India and the explosive rocks of Australia and Bohemia. Jaquet describes explosions in a block of slate called the "kicking-ground" in the Hillgrove mines, New South Wales. This explosive rock is a more or less silicified and altered slate traversed by numerous joints, which are coated with thin films of calcite. The rock is liable to split off at any time, particularly just after blasting, and the more serious explosions occur when a chain pillar of rock is being removed between a stope and the level above. Jaquet quotes J. R. Godfrey (Inspector of Mines), who describes an explosion in which a fragment flew from the face of a stope where two men were drilling and blinded one of them; while in another explosion the whole floor over a section of a stope split up into thousands of fragments with the sound of breaking crockery. In still another case a fragment of rock flew from the face of a stope and cut a man in two. It is stated, further, that the explosions do not occur in the Hillgrove mines in shafts or crosscuts off the lines of the reef.

CAUSES OF THE BLASTS

Various explanations have been offered to account for these explosions. For the Hillgrove mines Jaquet has mentioned the following hypotheses: (1) molecular strain, (2) occluded gases, (3) compression due to intrusion of granite, or other causes. He concludes that the rocks must be under great strain, and, being unable to bend, they must break suddenly under certain conditions. He apparently does not favor the granite intrusion hypothesis and dismisses entirely the idea that occluded gases might cause the explosions. Regarding the air blasts in the Pribram mines, in Bohemia, Stefan states that "The conclusion seems justified that the cause of these explosions is not only the pressure of the superincumbent rock-mass, which is at right angles to the strata, but is due also to a stress parallel to the bedding planes and to the axis of the syncline."

For the Kolar field, Bosworth Smith considers that the air blasts are due to a molecular strain in all three of the rocks, trap, schist, and quartz, and he likens the explosion which occurs during mining operations to the breaking of a Prince Rupert's glass drop, which is

a mass of glass under severe strain caused by sudden cooling. As to the cause of the strain, he considers that the quartz is compressed by the walls of the vein through regional pressure, and not simply by the weight of the overlying rocks, while the trap is under strain because of sudden cooling and the hornblende-schist because of metamorphic changes which have given rise to the calcite, forming stringers through the rock.

Smeeth agrees with Smith regarding the origin of the strain in the trap dikes, because, as he states, there is no evidence that the dikes have suffered extensive compression since their solidification. As to the possibility that metamorphic changes in the schist produced the strain, Smeeth points out that the chief change has been the alteration of augite to hornblende, and since this change is facilitated by pressure, there is reason to suppose that the compressional strain would be relieved rather than increased. Further, the compressional strains in the schists produced by the intrusion of the surrounding granite and the injection of the dolerite dikes would be relieved by the later cooling and shrinkage of these rocks, and the strain in the schists would be tensional. Regarding the strain in the quartz, Smeeth is of the opinion that it is also tensional, partly because of the fact that there are secondary stringers of calcite, quartz, and metallic minerals in the reef, suggesting that the rocks have suffered sufficient tensional strain to open joints and permit the filling of these with mineral matter.

CONCLUSIONS REGARDING BLASTS IN THE KOLAR FIELD

After observing the rocks in the Kolar field and considering the descriptions of the air-blast phenomena in the other regions which have been mentioned. I have come to the following conclusions regarding their origin: They are due to a stress on the rocks, which has produced a strain, and under mining operations this strain results in a violent rupture. In the case of the larger shocks, which Smeeth calls "quakes," the violence with which pillars and other supporting masses give way in the workings under the superincumbent load is due to a large extent to this internal strain.

As to the cause of the stress, the only satisfactory explanation is the application of pressure resulting from crustal movements. At Pribram the blasts occur in the flat-lying strata of the syncline and not in the upturned beds in which the strain has been relieved by faulting and tilting. In the Hillgrove mines, although the geological description by Jaquet is not detailed, it is evident that the slates have been intruded by masses of granite. In the Kolar region, the older rocks, in which the quartz vein lies, are surrounded by granite and nipped in by it in a closely compressed syncline. There thus seem to be in all these fields certain similar conditions pointing to the fact that the rocks in which the blasts occur have been subject to great compressional forces. As to the ability of the cooling dolerite dikes to produce sufficient tensional strain to cause the explosions, this seems doubtful.

The spheroidal weathering and fracturing described by Smeeth as probably supporting this view is a characteristic feature of such basic rocks in many regions and does not warrant much consideration. The greater facility with which the fine-grained edges of the dikes will explode is what would be expected under normal

conditions, since the rock would be more brittle in those parts of the dikes, just as the silicified slates and schists in the other regions described would be more brittle and would crack up more readily than the other parts of the same rocks. Nor does the tensional hypothesis adequately explain how the heating of the schists and quartz by the intrusion of the later rocks could produce tension in these rocks unless it can be shown that a complete change in the molecular character of the rocks was produced by this heating, and such evidence appears to be lacking. If the heating converted augite into hornblende, the resultant increase in volume of over 4% would cause expansion rather than tension; whereas, if rocks simply expanded by heating they would contract again to their normal condition on cooling.

It also seems probable that the crystallizing of the quartz vein may have exerted some expansive pressure on its walls. As to the occurrence of the small secondary quartz and calcite veins, they may be accounted for by torsional movements in the rocks, which are still, on the whole, under great compressive stress. The rocks in the mines are not uniformly explosive, and such an explanation would account for this condition. In some places the rocks have opened through torsional movements and in others they have yielded to compressional forces, which have produced the movements indicated by the slickensides, while in still others they have not been compressed sufficiently to cause them either to shear or to rupture, and in these spots the potential energy gives rise to the blasts. Such a condition is particularly likely to arise in a region where heavy dikes intrude rocks of varying compressive strength and brittleness.

The force which compresses these rocks may be due to two or more causes: (1) Epirogenic movements in the earth's crust, due to adjustments of stresses over considerable areas of the earth's crust, with accompanying igneous activity; (2) general settling back of considerable areas of the crust during adjustment after the eruption of large amounts of igneous rock from certain portions of the crust. Such forces might easily obliterate the results of all contraction and relief of pressure in the rocks of the area by cooling, and to such forces as these the strain producing the air blasts is attributed.

In this field a well-equipped seismological laboratory has been established and complete records of all shocks are kept. The effects of the heavy shocks are similar to those of local earthquakes. Some of the officials at the mines have been anxious to have a number of tests made on the rocks of the region to determine their elasticity, crushing strength, and other properties, and I have endeavored to have such tests made, but so far, partly owing to war conditions, have been unable to accomplish this work.

Mexican Taxes on Oil Lands

According to a dispatch dated Feb. 25 from the American Ambassador in Mexico City, which is published in *Commerce Reports*, the Mexican government has issued a decree fixing taxes as follows on petroleum lands: First, on petroleum lands being developed by lessees under contracts made prior to May 1, 1917, 10% of the annual rental up to 5 pesos per hectare,

20% of the annual rental from 5 pesos to 10 pesos per hectare, 50% of the annual rentals above 10 pesos per hectare, and 5% of all royalties paid by the lessee to the lessor; second, on oil lands being developed by the owners of the land, 5 pesos per hectare annually, and 5% of the products annually; third, oil lands for which no rental is being paid are taxed 5 pesos per hectare annually, and oil land on which no royalties are being paid is taxed 5% of the products annually. [Peso normally=\$0.498; hectare=2.47 acres.]

Monthly Copper Production for 1918

This table is compiled from reports received from the respective companies (except in the cases noted as estimated), together with the reports of the United States Department of Commerce as to imported material, and in the main represents the crude-copper content of blister copper, in pounds.

The grand total includes, under "Imports in ore and blister copper," the production of such companies as Canada Copper, Granby, Cananea, Braden, Cerro de Pasco and Chile. As a matter of record, however, the individual figures are given after the total. We also report the production of the Boleo and Katanga companies, whose copper does not come to the United States.

MONTHLY CRUDE COPPER PRODUCTION, 1918

	January	February	March	April
Alaska shipments.....	6,131,821	6,249,456	8,014,059	3,579,920
Arizona:				
Arizona Copper.....	2,500,000	3,600,000	4,000,000	4,200,000
Cons. Ariz. Smelting...	1,820,000	1,780,000	2,270,000	2,000,000
Inspiration.....	5,000,000	6,200,000	8,750,000	9,250,000
Magma.....	560,000	800,000	900,000	1,050,000
Miami.....	4,709,483	4,502,905	5,174,365	4,913,590
New Cornelia (a).....	2,374,000	2,522,000	3,218,000	2,806,000
Old Dominion.....	3,400,000	2,841,000	2,872,000	.....
Ray.....	7,571,000	6,860,000	7,585,000	7,350,000
Shannon.....	972,000	788,000	962,000	.....
Shattuck Arizona.....	849,440	854,042	1,013,593	842,790
Other Arizona.....	31,232,643	28,587,020	29,575,371	25,007,820
California:				
Mammoth.....	1,620,000	1,370,000	1,620,000	1,530,000
Michigan:				
Calumet & Hecla.....	12,140,197	12,077,320	13,784,569	11,734,820
Other Lake Superior (b).....	7,000,000	7,000,000	7,000,000	7,000,000
Montana:				
Anaconda.....	24,900,000	24,100,000	28,000,000	26,500,000
East Butte.....	2,574,140	2,324,040	2,395,940	1,811,360
Nevada:				
Mason Valley.....	1,536,600	1,253,000	1,455,200	1,058,400
Nevada Cons.....	6,500,000	6,250,000	6,060,000	6,900,000
New Mexico:				
Chino.....	7,590,244	5,882,581	7,833,046	6,290,513
Utah:				
Utah Copper.....	13,500,000	11,900,000	16,380,000	16,690,883
Eastern smelters (b).....	1,750,000	1,750,000	1,750,000	1,750,000
Total reported.....	146,231,568	139,491,364	160,613,143	.....
Others, estimated.....	19,200,000	20,520,000	24,912,025	.....
Total United States..	165,431,568	160,011,364	185,525,168	.....
Imports, ore and concentrates, etc.....	9,288,153	14,996,443	18,392,301	.....
Imports in blister, etc..	34,513,165	41,016,225	36,514,548	.....
Grand total.....	209,232,886	216,024,032	240,432,017	.....
British Columbia:				
Canada Copper Corpn..	445,268	336,000	.....	.....
Granby Cons.....	4,209,393	3,843,686	3,807,600	3,689,982
Mexico:				
Boleo.....	1,576,400	1,576,400	1,631,500	.....
Cananea.....	3,130,000	3,960,000	4,480,000	4,100,000
Other Foreign:				
Braden.....	6,200,000	4,754,000	5,248,000	4,722,000
Cerro de Pasco.....	6,598,000	5,332,000	6,966,000	.....
Chile.....	8,358,274	6,326,000	10,192,000	7,770,000
Katanga.....	4,519,430	2,645,520	3,086,440	4,695,798

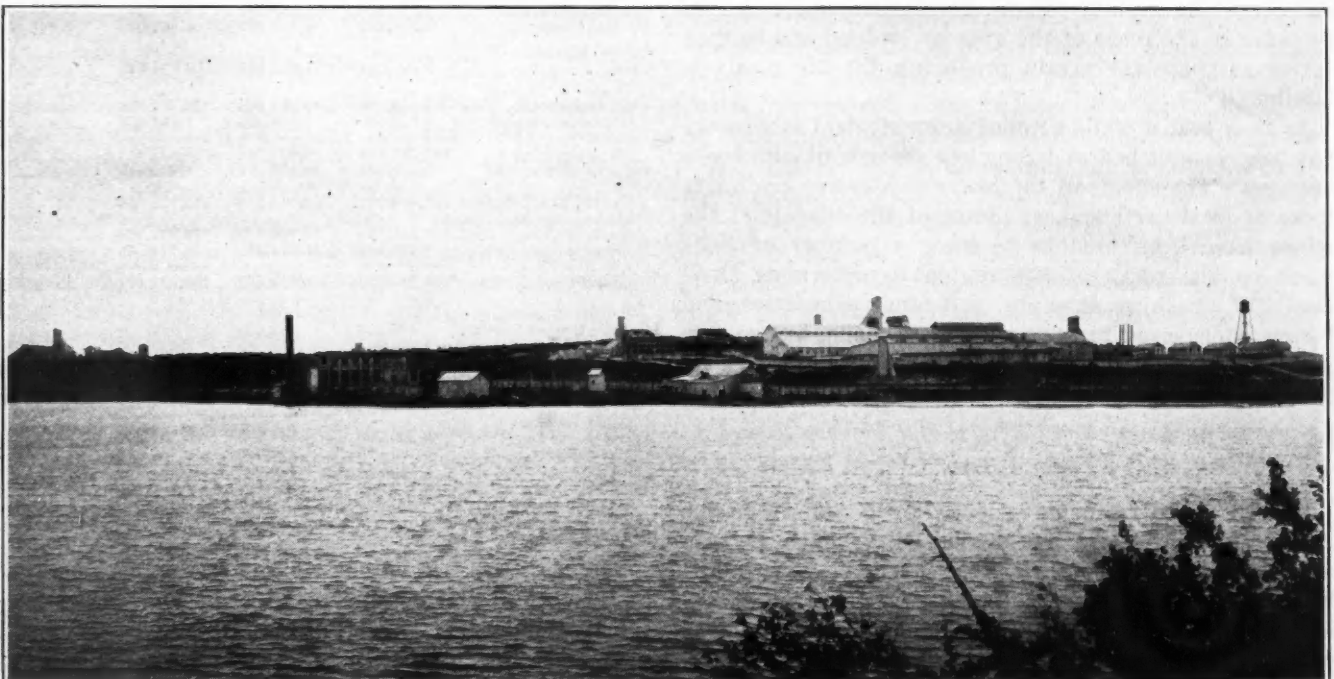
(a) Only electrolytic cathodes are entered. New Cornelia also produces some copper from ores sent to Calumet & Arizona smelter, which is included under "Other Arizona." (b) Estimated.

The item "Alaska shipments" gives the official figure of the United States Department of Commerce. Kennecott production for January, February, March and April was 5,970,000, 5,888,000, 5,772,000 and 4,794,000 lb., respectively.

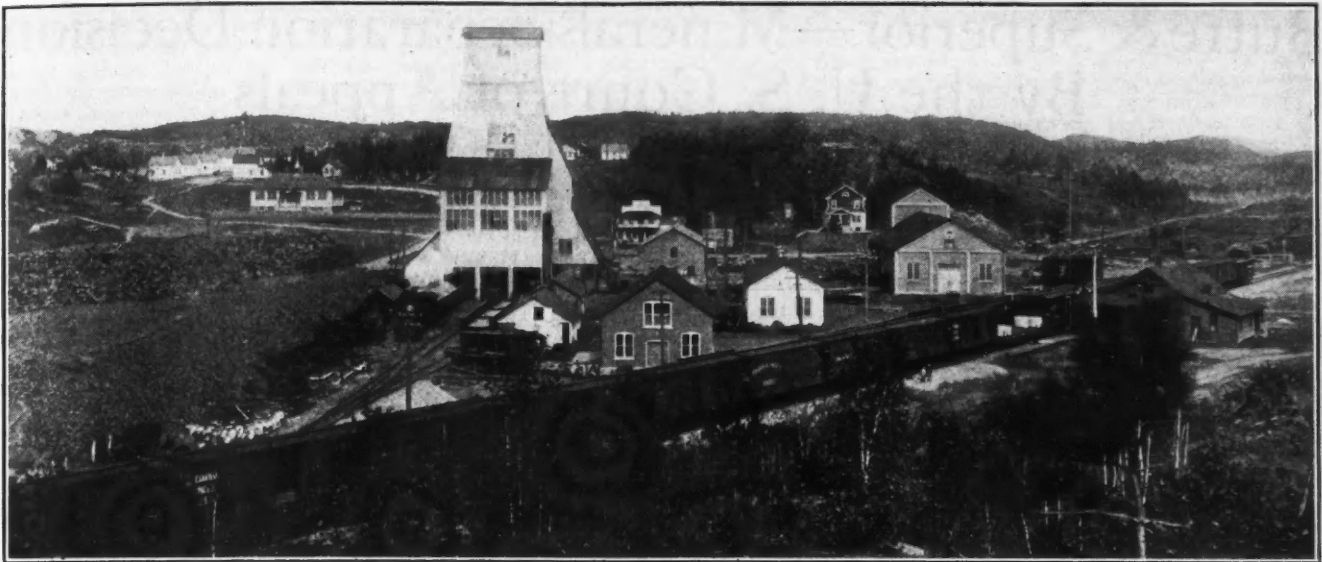
Ontario Nickel, Copper and Gold Mines



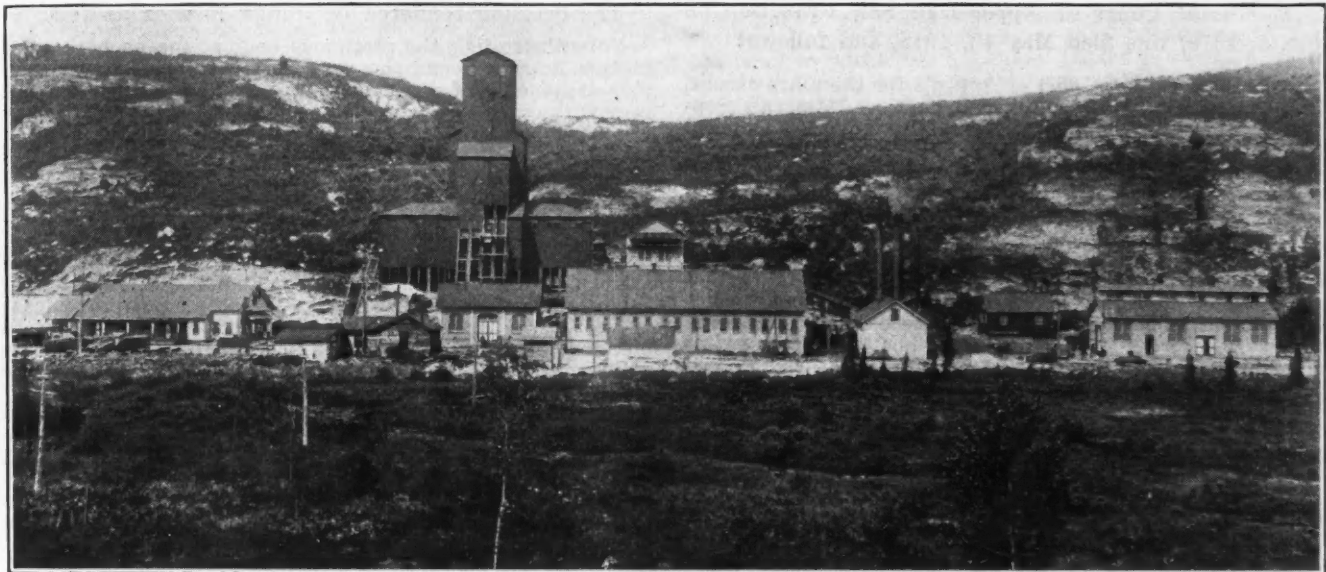
SHAFTS AT THE CREIGHTON MINE (NICKEL-COPPER) OF THE CANADIAN COPPER CO., AT CREIGHTON, ONTARIO



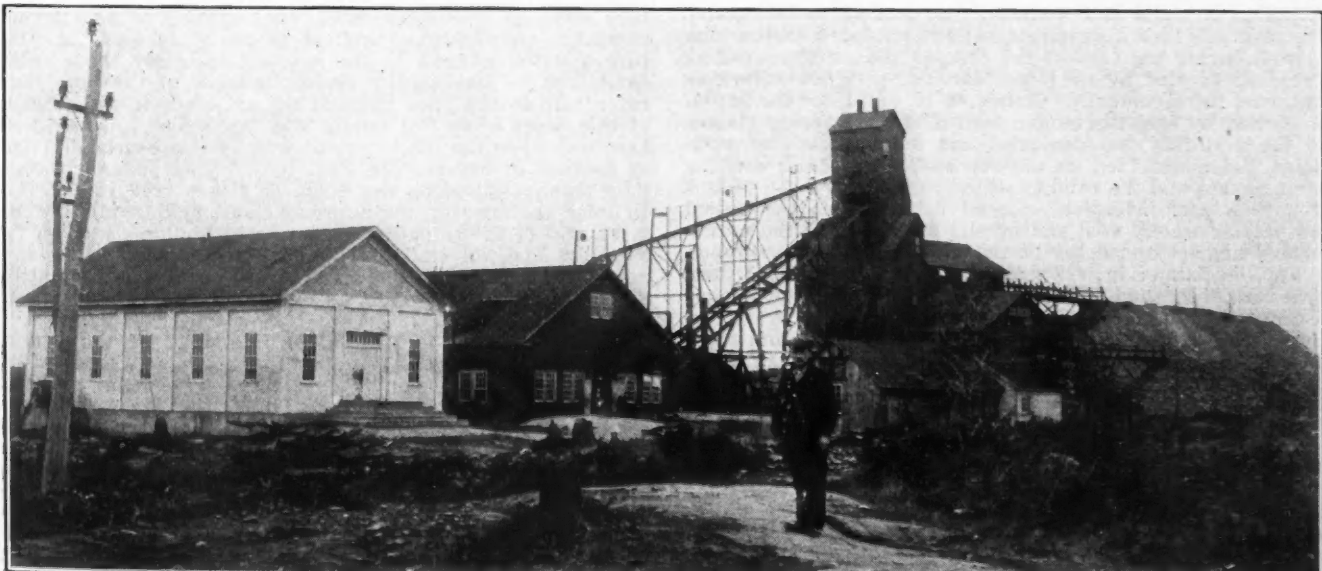
HOLLINGER MINE OF THE HOLLINGER CONSOLIDATED GOLD MINES, LTD., AT PORCUPINE, ONTARIO



WORTHINGTON NICKEL-COPPER MINE OF THE MOND NICKEL CO., ONTARIO



LEVACK MINE OF MOND NICKEL CO., WHICH PRODUCES NICKEL-COPPER ORES, IN SUDBURY DISTRICT, ONTARIO



VICTORIA NICKEL-COPPER MINE OF MOND NICKEL CO., NEAR CONISTON, ONTARIO

Butte & Superior—Minerals Separation Decision By the U. S. Court of Appeals

The decision rendered and order issued by Judge Ross is that the use of more than 0.5% oil by weight in the ore does not constitute an infringement of patent, as held by Minerals Separation, Ltd., and that the judgment rendered in the case of Butte & Superior Mining Co. must be reversed and the case remanded with directions to the court below to dismiss the bill at the complainants' cost.

THE deferred decision rendered by Circuit Judge Erskine M. Ross, presiding, and the opinion of Judges William W. Morrow, concurring, William W. Hunt, concurring in part and dissenting in part, in the hearing on appeal in the case of Minerals Separation, Ltd., vs. Butte & Superior Mining Co. before the U. S. Circuit Court of Appeals in San Francisco on Mar. 8, 1918, was filed May 13, 1918, and follows:

In the U. S. Circuit Court of Appeals for the ninth circuit, Butte & Superior Mining Co., appellant, vs. Minerals Separation, Ltd., et al., appellees, No. 3081. This is an appeal from the decree of the U. S. District Court for the district of Montana sustaining letters patent No. 835,120, issued to Sulman, Picard and Ballot on Nov. 6, 1906, for a process of ore concentration, and adjudging the appellant herein to have infringed the same.

The appellees, two British corporations and one domestic corporation, are the legal owners of the title to the patent in suit and of the rights to profits and damages for infringement thereof. The appellant is a domestic corporation doing business at Butte, Mont., where the acts of infringement complained of were committed. The suit was commenced on Oct. 10, 1913, and a preliminary injunction sought. At the hearing, on the motion for a preliminary injunction, the pleadings and proceedings in the suit of Minerals Separation, Ltd., et al., vs. James M. Hyde, in the U. S. District Court for the district of Montana, were offered and received in evidence and are a part of the record herein. That suit was upon the same patent, and the issues were substantially the same as in the present case.

The answer of the defendant set up the defense of anticipation and denied infringement. While the case was at issue, before trial on the merits, the Supreme Court of the United States rendered its decision in the Hyde case (242 U. S. 261), holding Claims 1, 2, 3, 5, 6, 7, and 12 of the patent to be valid and Claims 9, 10, and 11 to be invalid. The plaintiffs filed a supplemental and amended bill on May 1, 1917, during the trial of the case on the merits, pleading a disclaimer filed by them on Mar. 28, 1917, and charging continued infringement of Claims, 9, 10, and 11 of the patent as limited by said disclaimer and of the remaining claims. To the plaintiffs' supplemental and amended bill of complaint, defendant filed its answer on May 4, 1917, denying infringement and the validity of the patent by reason of lack of novelty and invention; alleged further that the patent had become wholly void and invalid by reason of the unreasonable neglect and delay of the plaintiffs to file a proper, or any, disclaimer in writing to Claims 9, 10, and 11, held to be invalid by the Supreme Court in the Hyde case; alleged also an estoppel against any claim of infringement by the use by the defendant of an amount of oil exceeding 0.5% on the weight of the ore, basing this defence upon a statement made by one of plaintiffs' counsel in the Supreme Court of the United States in the Hyde case that the invention described in the patent was not reached or practiced until the amount of oil fell to or below 0.5% on the weight of ore treated by the process.

Upon the issues thus presented, voluminous testimony was taken upon all the questions involved, which, as stated, were substantially the issues in the Hyde case restated and reconsidered by the lower court in the present case. The court thereupon entered a decree in favor of the plaintiffs, in accordance with the conclusions of the opinion, holding

that the plaintiffs were the owners of the patent in suit, that the processes employed by the defendant both before and after the filing of the bill of complaint, to and including Jan. 7, 1917, embodied the invention of the patent and infringed Claims 1, 2, 3, 5, 6, 7, and 12 thereof and Claims 9, 10, and 11 as limited by said disclaimer, and that the process employed by the defendant from the 7th day of January, 1917, down to and through the time of the trial, embodied the invention of the patent and infringed Claims 1, 2, 3, and 12 thereof and Claims 9, 10, and 11 as limited by the said disclaimer. The decree granted a permanent injunction against the further use of such process by defendant and directed that an accounting be had for the assessment of damages accruing from such use. From that decree the defendant has appealed to this court.

Henry D. Williams, New York, N. Y.; Lindley M. Garrison, New York, N. Y.; William Houston Kenyon, New York, N. Y., and Odell W. McConnell, Helena, Mont., solicitors and of counsel for complainants and appellees. Thomas F. Sheridan, Chicago, Ill.; J. Edgar Bull, New York, N. Y.; J. Bruce Kremer, Butte, Mont.; L. P. Sanders, Butte, Mont., and Alf. C. Kremer, Butte, Mont., solicitors and of counsel for defendants and appellant.

The decision rendered by Judge Ross is as follows:

Notwithstanding the strenuous contentions on both sides of this litigation, and the very elaborate preparations and able arguments of many distinguished counsel, we can but regard the case as a very plain one. To start with, the law is too well established to require discussion or the citation of authorities that the patentees' rights under a patent are governed and limited by its valid claims, its specifications being referred to only as illustrative of the true meaning of the claims. It is equally well settled now that the mere result of an invention is not patentable nor is froth or scum or pine oil or any other kind of oil or oleic acid patentable as such. In their specifications the patentees of the patent in suit declare that their invention "relates to improvements in the concentration of ores, the object being to separate metalliferous matter, graphite and the like, from gangue by means of oils, fatty acids, or other substances which have a preferential affinity for metalliferous matter over gangue." But of the claims of their patent adjudged by the court below to have been infringed by the appellant not one specifies any particular kind of oil, although the fifth and sixth specify as one of their constituents "a small proportion of oleic acid (which is an acid existing in most fats in combination with glycerol) amounting to 0.02 to 0.05% on the ore," and we do not understand it to be contended that the appellant uses any oleic acid in its process.

It is not denied that at the time of the invention in question the affinity of oil for the metalliferous portion of powdered ore when mixed with water was well known, as well as the further fact that the agitation of such a mixture with, as well as without, the addition of acid would carry the metalliferous portions to the surface of the mixture and the gangue to the bottom; certainly those facts would not be successfully denied, in view of the numerous references to the prior state of the art made in the opinion of this court when this patent was last under consideration here and when the whole patent was by this court held void as lacking invention (214 Fed. 100). That judgment was, it is true, reversed by the Supreme Court (242 U. S. 261). In doing so, however, the Supreme Court held invalid Claims 9, 10, and 11 of the patent, each of which claims was for "a small quantity of oil," so that it is plain the appellees are not entitled to be protected in the use of "a small quantity of oil" of any kind, which, as is obvious, is a wholly indefinite quantity.

Holding Claims 1, 2, 3, 5, 6, 7, and 12 of the patent valid to the extent that it did, the Supreme Court, after pointing out in its opinion that there were many investigators at work in the field to which the process in suit related when the patentees came into it, and that it was while engaged in study of prior kindred processes that their discovery was made, said, "While the evidence in the case makes it clear that they discovered the final step which converted experiment into solution, turned failure into success—the former patents having used so much oil as to make its cost prohibitive (the Barbed Wire Patent, 143 U. S. 275)—yet the investigations proceeding were so informing that this final step was not a long one, and the

patent must be confined to the results obtained by the use of oil within the proportions often described in the testimony and in the claims of the patent as critical proportions, amounting to a fraction of 1% on the ore." Amounting to a fraction of 1% on the ore is very far from saying amounting to every fraction of 1% on the ore. A fraction is one thing; every fraction is a very different thing.

It is obvious, we think, that if the Supreme Court had meant to extend the scope of Claims 1, 2, 3, 5, 6, 7, and 12 of the patent to 1% of oil on the ore, as is here contended by the appellees, it would not have said anything about any fraction of 1%. Certainly there would have been no necessity for doing so, and certainly the use of such specific language as it employed without a purpose cannot be justly imputed to that great tribunal. That the "critical proportions," "amounting to a fraction of 1% on the ore," so protected by the Supreme Court in its decision does not include every fraction of 1% on the ore is, we think, very clearly shown by the same opinion where, after describing the prior state of the art, the court said:

"Into this field of investigation at this state of its development came the patentees of the patent in suit. They were experienced metallurgists of London, of inventive genius and with financial resources, and they entered upon an investigation of the processes of oil concentration of ores which was continued through several years, and consisted of a very extended series of experiments in which the quantities of oil, of water and acid used, and the extent and character of the agitation of the mass under treatment resorted to, were varied to an almost unparalleled extent as to each factor, and the results were carefully tabulated and interpreted. It was while pursuing a comprehensive investigation of this character, having, as the evidence shows, the special purpose in mind at the time to trace the effect on the results of the process of a reduction to the vanishing point of the quantity of oil used, that the discovery embodied in the patent in suit was made.

"The experimenters were working on the Cattermole metal-sinking process as a basis when it was discovered that the granulation on which the process depended practically ceased when the oleic acid oil was reduced to about 0.5% on the ore. It was observed, however, that, as the amount of oleic acid was further reduced and the granulation diminished, there was an increase in the amount of float froth which collected on the surface of the mass and that the production of this froth reached its maximum when about 0.1%, or slightly less, on the ore of oleic acid was used. This froth, on collection, was found to consist of air bubbles modified by the presence of the minute amount of oil used and holding in mechanical suspension between 70% and 80% of the total mineral content of the mass treated. It was promptly recognized by the patentees that this froth was not due to the liberation of gas in the mass treated by the action of the dilute acid used, and its formation was at once attributed in large part to the presence of the air introduced in the mixture by the agitation which had been resorted to to mix the oil with the particles of crushed ore, which air, in bubbles, attached itself to the mineral particles, slightly coated as they were with what was necessarily an infinitesimal amount of oil, and floated them to the surface. The extent of the agitation of the mass had been increased as the experiments proceeded until the series of Gabbett mixers, fitted with the usual baffles, were speeded at from 1000 to 1100 revolutions per minute.

"A careful consideration of the record in this case convinces us that the facts with respect to the process of the patent in suit are not overstated by the plaintiffs' witness, Adolf Liebman, an expert of learning and experience, when he says in substance: 'The present invention differs essentially from all previous results. It is true that oil is one of the substances used, but it is used in quantities much smaller than was ever heard of, and it produces a result never obtained before. The minerals are obtained in a froth of a peculiar character, consisting of air bubbles which in their covering film have the minerals embedded in such manner that they form a complete surface all over the bubbles. A remarkable fact with regard to this froth is that, although the very slight and easily destructible air bubbles are covered with a heavy mineral, yet the froth is stable and utterly different from any froth known before, being so permanent in character that I have personally seen it stand for 24 hours without any change having taken place. The simplicity of the operation, as compared with the prior attempts, is startling. All that has to be done is to add a minute quantity of oil to the pulp to which acid may or may not be added, agitate for from 2½ to 10 minutes and then, after a few seconds, collect from the surface

the froth, which will contain a large percentage of the minerals present in the ore.'

"It is not necessary for us to go into a detailed examination of the process in suit to distinguish it from the processes of the patents relied on as anticipations, convinced as we are that the small amount of oil used makes it clear that the lifting force which separates the metallic particles of the pulp from the other substances of it is not to be found principally in the buoyancy of the oil used, as was the case in prior processes, but that this force is to be found chiefly in the buoyancy of the air bubbles introduced into the mixture by an agitation greater than and different from that which had been resorted to before, and that this advance on the prior art and the resulting froth concentrate, so different from the product of other processes, make of it a patentable discovery as new and original as it has proved useful and economical."

Nothing, it seems to us, can be clearer, from the foregoing quotations from the opinion of the Supreme Court, than that it did not intend to extend the monopoly of the patent in suit to the use of 1% of oil on the ore; for it, in effect, thereby distinctly declares and adjudges that the discovery of the appellee's "experimenters" only rose to the dignity of invention when they ascertained that the desired results could be and were obtained by the use of 0.5% of oil on the ore, with still better results as the quantity was reduced to the vanishing point at less than 0.1%. The quantities of oil that gave —¹ to this invention—0.5% on the ore (at which point no more granulation exists), to the lesser and extreme limit of the minute quantity (less than 0.1%), at which the desired result ceases—are the "critical proportions," amounting to a "fraction of 1% on the ore," to which the appellees' patent is confined by the Supreme Court, as we understand its opinion. And that is just what appears from the present record was the contention of the present appellees before the Supreme Court on the argument of their appeal from the judgment of this court holding that there was no invention in what they did. For it is undisputed that on the argument of that appeal this colloquy occurred between two of the justices and two of the attorneys for the then appellants and the present appellees:

Justice McReynolds—I would like to ask you when, in this process of reducing oil, your invention came into existence.

Mr. Kenyon—At about 0.5% of oil.

Justice McReynolds—Before you got to the 0.5% did you have any invention?

Mr. Kenyon—We were passing from the region of Cattermole which was a distinct—

Justice McReynolds—I want to know when your invention came into existence.

Mr. Kenyon—This invention was not reached, I should say from these figures, until about 0.5% of oil was reached.

Justice McReynolds—At 1% you had no invention?

Mr. Kenyon—No.

Justice McReynolds—At 0.5% did you have invention?

Mr. Kenyon—It began to come, remote, but it began to come. At 0.3% the float vastly increased; at 0.1% the float again vastly increased.

Justice McReynolds—When this float is more than 0.5% of oil it does not infringe?

Mr. Kenyon—It does not infringe.

Justice Pitney—What have you to say in answer to what Mr. Scott said the other day to the effect that 1.8%, or perhaps more, of oil would give the same result, with increased agitation?

Mr. Williams—Absolutely no.

Mr. Kenyon—It would not.

Justice Pitney—I understood him to say so yesterday, and I supposed there was something in the record to justify it.

Mr. Kenyon—Nothing. That will be a part of my argument.

Inasmuch as it appears without dispute that the appellant company has never used in its process any oil in quantity as small as 0.5%, it results from the views above expressed that the judgment must be reversed and the case remanded with directions to the court below to dismiss the bill at the complainants' cost, without regard to the question raised respecting the sufficiency of the disclaimer filed by the appellee company or to its resultant effect.

The opinion rendered by Judge Hunt, concurring, is as follows:

I will briefly state the ground upon which my concurrence rests: The Supreme Court in sustaining the claims carefully noted those which were limited to a fraction of 1%,

¹The word omitted from the copy is evidently value.

and the decision explicitly confined the patent to the results obtained by the use of oil within the proportions often described in the testimony and in the claims. Claims 1, 2, and 3 use the language, "amounting to a fraction of 1% on the ore." Claims 5, 6, and 7 express amounts of percentages on the ore. Claim 12 uses the words of limitation, "amounting to a fraction of 1% of oil on the ore." Claims 9, 10, and 11 make no reference to a fraction of 1%, but do contain the words "a small quantity of oil." The essence of the invention was in the use of this extremely small fraction of 1%, and the Supreme Court, while sustaining the fraction-of-one-per cent. claims, held invalid the small-quantity Claims 9 to 11, because they were too broad. No monopoly could be given on the use of a small quantity of oil, for that was old. It was new, however, to avoid the use of larger quantities. The patent must be confined to the use of critical proportions. Now, keeping in mind that by the decision the court has limited the invention to the "critical proportions often described by the testimony and in the claims," we naturally ask what are the critical proportions described in the specifications. Page 1, Line 79, of the specification says: "To this is added a very small proportion of oleic acid, say from 0.22 to 0.5% on the weight of the ore"; and on Line 96 we have: "The minimum amount of oleic acid which can be used to effect the flotation of the mineral in the form of froth may be under 0.1% of the ore, but this proportion has been found suitable and economical." We thus have given to us 0.5%, or less, as the critical proportion described. Preferably 0.1% is to be used.

We also ask: What is the evidence wherein there is "after described" the critical proportion? A summary of it is that it is very nearly 0.1%, or 0.2%, as may be required for particular ore, all through the evidence. It appears that minute and critical amounts of oil are to be used as necessary to make the process successful. From one pound of oil to the ton of ore (0.05%) to four pounds per ton (0.2%) were the limits in practical work as stated by witnesses.

Again when counsel had the colloquy quoted in the opinion of Judge Ross with the Supreme Court the guiding thought evident in the mind of the inquiring justices was to stamp precision upon the point when "invention in the process" began to appear. With apparent definite purpose of meeting the interrogatories, plaintiff told the court that invention began to come when, in the descending uses of percentages of oil, as small a quantity as 0.5% was used, and was first present then and when 0.2% was used.

Of course a court should cautiously consider a response often quickly made by counsel in answer to questions put from the bench, lest an injustice may follow by attaching undue weight to an isolated argumentative answer, but in this matter we are earnestly trying to gather the scope and accurate meaning of the expressed thought of the court. We may, therefore, refer to the fact that the exact position of the plaintiff as to the invention was called for not once but twice; not generally nor indirectly, but positively, simply and unequivocally. Hence, in the controversy as to the true interpretation of the opinion, the question put and answers given may be fairly resorted to, not as conclusive at all but as aids toward a better understanding of the statement of the limitations of the claims of the patent and of the definition of the invention included in its language.

Nor do I think there is ground for saying that discrimination was had between known oils, whether vegetable, mineral or animal, and oily liquids which have a "preferential affinity to metalliferous matter" — must the plaintiffs be held; and in using kerosene or fuel oil defendants are but employing oils which the patents authorize the use of, and when defendants use proportions beyond the critical ones of oil (not oleic acid but other oils), they are not infringing. Oils doubtless vary in being adaptable for use. Some will probably secure more froth than others, and oil formulæ may in their ingredients depend upon the particular ore to be treated, and upon the economic relationship to the problem under solution; but the froth developed in using the minute quantities of oil is, I think, essentially of a character like the froth shown when different quantities of oil are used. The difference is largely by reason of a special quantity or kind of oil, or the special extent of the agitation applied. The experiments made before us prove this. In the Cattermole process the froth was held to be distinguishable from the froth produced in the patented process of the critical proportion of oil by the fact that certain remarkable and great results come from the use of the critical proportion which were not obtained when the quantity used in the Cattermole process was employed. By using the critical proportion of oil as defined, the patentees

get the maximum froth. They have discovered a process, not a froth, and the process is limited to the use of oil in the specified critical proportion. The sequel of these views is that, inasmuch as defendants keep out of the limits made for the plaintiff by the decision of the Supreme Court, by using more than the critical proportion, they do not use plaintiffs' process.

Judge Morrow, concurring in part and dissenting in part, rendered his opinion as follows:

I concur in the opinion of the majority of the court that the decree should be reversed, but I do not concur in the direction that the bill be dismissed. I am of opinion that the use of an oil or oily liquid in defendant's separation process in a quantity not "amounting to a fraction of 1% on the ore" is within the express terms of Claims 1, 2, 3, and 12 of plaintiffs' patent and is an infringement of such patent, but I am of opinion that the use of oil or oily liquid in a quantity amounting to over a fraction of 1% on the ore is not within the terms of Claims 1, 2, 3, and 12, and is, therefore, not an infringement upon plaintiffs' process, and that a decree should be entered accordingly.

The direction of the Supreme Court in *Minerals Separation, Ltd., vs. Hyde*, 242 U. S. 261, is that "The patent must be confined to the results obtained by the use of oil within the proportions often described in the testimony and in the claims of the patent as critical proportions amounting to a fraction of 1% on the ore." The term "critical proportions" is not used in the claims of the patent, but such proportions were described in the testimony in the Hyde case as the application of a small but exact quantity of oil to different ores, and always within the range of treatment of "a fraction of 1% on the ore," never to the treatment of different ores within the range of "0.5%," except in the use of oleic acid and that upon certain ores such as Broken Hill ores.

The application of the term "critical proportions" in the use of oil on ores generally within a range of 0.5% was discovered by counsel for appellant in this case, and so far as appears from the record was revealed to the public for the first time in this court. The colloquy between Justice McReynolds and Mr. Kenyon, counsel for appellant in the Supreme Court in the Hyde case, referred to by Judge Ross in his opinion, related to the use of oleic acid on Broken Hill ores, concerning which I do not understand that there is any controversy. I think the direction of the Supreme Court that "the patent must be confined to the results obtained by the use of oil within the proportions amounting to a fraction of 1% on the ores" means just what it says, and that within such proportions the process described in the patent is held by the Supreme Court to be a valid discovery protected by the specifications and Claims 1, 2, 3, and 12.

The Supreme Court does not say that the patent must be confined to the oleic acid (Claims 5, 6, and 7), nor does it say that the other claims of the patent must be confined to the use of oil in the fraction mentioned in those claims. Had the Supreme Court intended that the scope of the patent should be confined to the use of oil in the proportion not to exceed 0.5% on the ore, it would certainly have said so in so many words and would not have left it to be inferred that the patent must be confined to results obtained by the use of oil in such proportions as are limited in Claims 5, 6, and 7. For what purpose does the court hold Claims 1, 2, 3, and 12 valid? Manifestly because these claims provide for the use of oil in the proportions "amounting to a fraction of 1% on the ore"; that is to say, upon ores generally.

The specifications mention the fact that the ores were not all alike and that different ores may require the use of different proportions of oily material in order to secure the desired separation of metalliferous matter from the gangue by the production of a froth. The Supreme Court, commenting upon this variation in the requirements of the process, said: "Such variation of treatment must be within the scope of the claims, and the certainty which the law requires in patents is not greater than is reasonable, having regard to their subject matter. The composition of ores varies infinitely, each one presenting its special problem, and it is obviously impossible to specify in a patent the precise treatment which would be most successful and economical in each case. The process is one for dealing with a large class of substances, and the range of treatment within the terms of the claims, while leaving something to the skill of the persons applying the invention, is clearly sufficiently definite to guide those skilled in the art of its successful application, as the evidence abundantly shows."

The use of oleic acid on Broken Hill ore was the oil and the ore of the discovery, and the proportion of the oil used is described in Claims 5, 6, and 7. But how about the use of

²There is an omission in the copy that cannot be supplied.

other oils on other than Broken Hill ores? The proportions required for oleic acid on Broken Hill ores had been determined by actual tests, but other oils and other ores had not been fully tested, and the application of the process might require a different proportion of oily matter upon a different class of ores to meet such a contingency. Claims 1, 2, 3, and 12 call for the use of an oil or oily liquid "amounting to the fraction of 1% on the ore"; furthermore, in declaring Claims 9, 10, and 11 invalid the Supreme Court clearly did so because such claims were not confined to the use of oil "amounting to a fraction of 1% on the ore." The claim was for the use of "a small quantity of oil," which might be a quantity more than "a fraction of 1% on the ore."

The validity of the other claims in controversy having been sustained upon their limitation to the use of oil within the proportion "amounting to a fraction of 1% on the ore," it followed that Claims 9, 10, and 11 were held invalid because they were not so confined and were therefore too broad. The disclaimer accordingly disclaims from Claims 9, 10, and 11 of the patent "any process of concentrating powdered ores excepting where the results obtained are by the use of oil in a quantity amounting to a fraction of 1% on the ore." Such language was strictly in accordance with the decision of the Supreme Court, and I think a sufficient rejection of the excess from the invention claimed, leaving the patent in the form limited by the opinion of the Supreme Court with respect to the objection that the disclaimer was not filed in time.

The mandate of the Supreme Court became effective Jan. 13, 1917, decreeing the patent to be invalid as to Claims 9, 10, and 11, but valid as to the other claims in issue. On Mar. 28, 1917, the plaintiffs filed their disclaimer, some time before the right to petition for a rehearing in the Supreme Court had expired. Considering the importance of the procedure to be followed, the residence of the patentees in another country, and the consequent delay in communication, the date of filing was not unreasonably delayed.

[The omissions noted in the decision and opinions are due to errors in transmission. Corrections will be made when a printed copy reaches us.—Editor.]

Public Hearing on Proposed Mine Regulations for New York

A public hearing on the proposed rules of the New York State industrial code relating to mines and quarries was given on May 10 before the State Industrial Commission in New York. Comment from those present was directed chiefly at clauses governing the use of explosives. Rule 1007, relating to the marking of explosives, detonators and fuses, was criticized by representatives of various powder companies on several grounds. It reads as follows:

It shall be unlawful for the operator or superintendent of any mine to permit the use within such mine of any explosive, or any blasting caps or detonators, or fuse, unless there shall be plainly printed or marked, in the English language, on every original package containing explosives, the name and place of business of the manufacturer of such explosive, the date of its manufacture, and its character and grade; . . . It is recommended that employers provide common or safety fuse of uniform speed, preferably ninety (90) seconds per meter.

The contention had been made that powder companies now date their powder in code for their own benefit, code being used to avoid prejudice on the part of the consumer against the powder on the ground of date alone; otherwise many consumers, if able to read the date, might come to regard it as a gage of the quality of the powder, which was not the case. Dating the powder so that all might read, it was thought would inevitably lead employees using it to pick out the powder of most recent date and to reject the older material, though the latter were perfectly good.

The requirement that the name and place of business of the manufacturer be shown on every original package, as well as the date, brought out the statement from

one of the powder men that his company, in order to supply a customer per contract, sometimes caused powder made in a competitor's works to be shipped to the customer under its (the former company's) name and brand. This happened, it was stated, when the company was prevented from keeping its contract through accident, such as the destruction of the plant from which the customer's powder was ordinarily shipped. If it were not feasible to fill the customer's order from a more remote plant of the company, in such a contingency the company turned its formula over to its competitor, furnishing the latter with its own cases for shipment to the customer. This could not be done, the representative claimed, if the actual manufacturer's name were shown on the cases. The practice cited was objected to by a consumer present. It was suggested that the rule be changed to read "the manufacturer selling such explosive" instead of "the manufacturer of such explosive."

William W. Jones, the state mine inspector, said that the chief objection to the use of code in marking explosives was that there was generally no way of knowing the age of a stock of powder purchased by one company and later taken over by another company; also that in one instance, great difficulty had been experienced in tracing the manufacturer of defective powder, because his name did not appear on it.

It was recommended that the clause reading "90 seconds per meter" be changed to read "90 seconds per yard," as is customary. The requirement of rule No. 1006, that all magazines situated above ground shall be bullet-proof, was cited as an unnecessary hardship, except in cases where high explosives were stored.

In a discussion as to whether safety rules should be printed in other languages besides English, Mr. Jones said that there were 52 nationalities represented in the iron mines of Essex County, N. Y., and that statistics showed that only 40% of foreigners could read their native tongue.

Lake Superior Iron Ore Shipments

Figures secured from consumers and tabulated for the Pig Iron, Iron Ore and Lake Transportation Committee indicate that Lake Superior iron-ore requirements for the season of 1918 will be 61,813,000 tons. This tonnage is larger than some ore men expected, says *Iron Age*, but it is not thought that the Lake fleet will have any trouble in bringing down this quantity of ore provided the railroads are able to furnish a fair supply of cars at lower Lake ports so that the movement will not be restricted. Water shipments last year were 62,498,901 tons, and during the previous year 64,734,198 tons. The policy of the Government in urging steelmakers to use bessemer steel where possible, and especially for the manufacture of rails, has stimulated the demand for bessemer ore, and one sale of approximately 100,000 tons is reported. The ore movement down the Lakes, which has been rather slow since the opening of navigation, is improving materially. No change has been made in the prices of iron ores, which delivered at lower Lake ports, are: Old range bessemer, \$5.95; old range nonbessemer, \$5.20; Mesabi bessemer, \$5.70, and Mesabi nonbessemer, \$5.05 per ton.

Remember the Comfort Fund of the 27th Engineers.

Correspondence and Discussion

Molybdenum and the Mines Control Bill

Your firm stand and exceptionally keen analysis on the proposed Mines Control bill, as presented in your editorials, undoubtedly has the hearty support of nearly every one engaged in the production of ores and minerals, especially the thousands of smaller producers throughout the mining regions of the West. The loyalty, patriotism and self-sacrifice of the Western miners, by which is meant the real prospectors and smaller independent operators, cannot be excelled by any class of citizens in this whole country. Profiteering is not their specialty. The great majority of them are glad to make ends meet, as long as the opportunity to eventually "strike something better" is not legislated out of existence entirely.

When a maximum price was fixed for copper, only the larger producers were consulted. The result has been that all the smaller producers either have been or are now being crowded out of existence. This is explained because of the enormous increase in cost of supplies and general operating costs, higher smelting rates and other charges, which, instead of increasing production, have had the opposite effect. For several reasons, the large corporations producing copper are still making a decent profit.

The mining states have furnished, and are furnishing, their full quota of fighting men, which is as it should be; but that is another reason why the price-fixing should be done in a way that would stimulate the production of essential minerals by those who are left, if any "fixing" is needed at all. As generally understood, the bill now being molded is supposed to be for the fostering and stimulation of the production of the minerals of which there is a shortage, such as pyrites, manganese, chromite and sulphur, and undoubtedly Government aid along the right lines would mean a great increase in production of some of these, especially manganese and pyrites. This assistance from the Government should be in the way of metallurgical experiments, with the view of making available ore deposits throughout the Southwest which are now either too low grade to be of value or too far removed from rail transportation to be profitably exploited. If, for instance, a successful method was evolved from concentrating low-grade manganese ores containing 10 to 25% metal, of which there is a large amount in Arizona, the manganese shortage would be overcome.

Conditions here are difficult—which may be construed as an argument for and not against the Mines Control Bill—and need Government attention. The miners of molybdenum and tungsten minerals need help, especially the producers of molybdenum, but not in a metallurgical way. These minerals are produced principally in small lots by individual operators who dispose of their output to agents of the larger metal companies making a specialty of these minerals, and who incidentally seem to control and manipulate the market for this product at

will. Notwithstanding the fact that the need for molybdenum should be just as great at this moment as it has ever been, the producers here have suddenly bumped up against a closed market. Former buyers of molybdenite and wulfenite concentrates now refuse to take any more at any price. The miners do not know what it means and wonder what has happened. Because of this state of affairs, production has practically ceased. Whether this is caused by the expected Government price-fixing, or simply "juggling" by the interests which apparently control the market, is not apparent. If the latter is the case, then the Government has an excellent opportunity to do some real good by assuming control of this product immediately, and this step could undoubtedly be made without waiting for the Mineral bill. The problem would be simple. A minimum price should be fixed and the Government establish purchasing agencies at convenient points for the producers. A Government voucher or a warehouse receipt for each small lot could readily be cashed at local banks, and the miners thus kept going. The Government would then be in position to distribute the product where most urgently needed for the speeding up of war material, and the miners would be encouraged to go ahead and speed up production as never before, when the bugaboo of a bot-tomless market has thus been removed.

If the natural channels of trade for essential products during these serious days are tampered with, whether by enemy interests or profiteers, then the quicker the Government acts the better. In the case of molybdenum, it seems curious that the demand should have ceased so abruptly. If its use as an alloy has come to an end, then of course the present stagnant condition is a natural result. If not, then there is "something rotten in Denmark" which needs an immediate airing by the Government.

Give the miners a square deal—I mean the smaller individual operators who constitute the great numerical majority of producers—and they will do their part. The large corporations are not suffering much, as they are always in position to guard their interests at the proper time and place. The rank and file of the mining fraternity look to publications like the *Journal* to champion their just rights. The *Journal* is in close touch with affairs at Washington and in a good position to ward off unwise legislation and call attention to conditions that hamper instead of help to squelch the Huns.

Benson, Ariz., Apr. 26, 1918. MARTIN FISHBACK.

Safe and Unsafe Practices in Mines

In the *Journal* of May 4 there are two important illustrations showing the use of a steel loading board upon a car at a chute mouth ready for loading. The projecting chute is one of the oldest arrangements in mining, and is often installed without regard to the possibility of minor accidents resulting from its use. In designing

a chute the maximum side projection should fall within a vertical line established by the position of the near rail. Between the lower edge of the bottom boards of the chute and the top of the car there should be a clearance of not less than 4 nor more than 6 in. In the best practice, the arrangements for operating the chute gate should be so designed as to allow of the gate being operated from the side of the chute, instead of directly in front, as shown.

ENGINEER.

New York, May 6, 1918.

Chrome Production and Distribution

I wish to offer a criticism on the article contributed by Samuel H. Dolbear in the *Journal* of Apr. 6, entitled "Chrome Production and Distribution." I refer especially to the statements made that brokers in California perform no useful function. Though it is true that a great deal of harm has been caused by the irresponsible type of broker, it is equally true that the responsible broker has performed and is still performing valuable services in the distribution of chrome ore and other war minerals.

In the first place, it must be conceded that there are many reputable persons and firms in the brokerage business in all lines, and their business is just as legitimate and useful as any other branch of merchandising, provided it is run on business principles. Trading in chrome and other minerals was thrust upon the brokers in California at the beginning of 1914, and it is an injustice to accuse brokers, as a class, of performing no useful function.

When the supply of foreign materials, including chrome, manganese, magnesite, tungsten and kindred ores, was first cut off in 1914, the manufacturers consuming these ores were forced to try to find a domestic supply. They naturally turned to the importers who had been supplying them with foreign ores. These importers are in many cases no more than brokers, and, as a result, brokerage firms on the Pacific Coast began to get inquiries first from Eastern brokers and later direct from the consumers. These inquiries caused the Pacific Coast brokers to look around for supplies, and directly resulted in the opening of most of the existing chrome properties, either by the brokers themselves, or by outside parties who received assurances from the brokers that they would buy their ore or sell it on a commission basis. If it had not been for the existence of reliable brokerage houses, it is doubtful whether half of the existing chrome mines would have even been discovered by this time.

If brokers are to be eliminated, where is the line to be drawn? Are the California brokers alone to be eliminated or are the large refractory companies and Eastern chemical houses which sell a certain large proportion of their ore direct to the consumers without any manufacturing process also to be eliminated, or are they to be restricted to buying only the ore which they manufacture into bricks, chemicals or otherwise prepare? Also, where is the justice to the small consumers of chrome ore who cannot afford to keep their representatives in the field to compete with the direct buying agents of the large concerns? The legitimate chrome ore broker acts as the buying agent for numerous small steel mills and chemical houses whose consumption is not large enough to justify the employment of a buying agent. Should there be a discrimination against these

concerns, many of which are manufacturing steel and other equipment for the Government? The legitimate chrome ore broker is also a collector of tonnage from small deposits. In many cases he is also either a partner in the mine or is in some way connected with the financing of the mine.

Now, as to Mr. Dolbear's suggestions as to the remedy. He first suggests placing all chrome operations under Government control through licenses and inspection. This would undoubtedly cause a delay in the production, owing to the fact that there are probably not sufficient inspectors available who are familiar with the mining of chrome ore. They would have to be trained in the field, and the necessity of obtaining licenses and going through other red tape would discourage the prospector and individual land owner who might surmise that he had chrome on his land, with the result that the chrome mining would soon be carried on entirely by the few large companies now operating in the field. These companies would naturally select the best and most available properties, and those properties which did not look so encouraging would be neglected. Second, he proposes to provide, without charge, engineering advice to chrome miners. Though in certain rare instances this might be of value, all that any engineer could advise would be that the miner dig and see if the chrome went to any depth, and in case he uncovered a large body of chrome, he could readily afford to hire his own engineer to give advice. The third suggestion is to provide financial assistance to chrome-concentrating enterprises and require that construction and operation be supervised by engineers approved by the War Industries Board. This proposition, in the writer's opinion, is entirely unnecessary and would not result in any advance in tonnage of chrome ore, for the following reasons: There is plenty of money available for legitimate enterprises such as concentrating plants, provided a continuous market for the product can be assured. No one who has a large tonnage of chrome ore in sight and who can obtain a contract for one or two years at a reasonable price will have any difficulty in securing financial assistance to build a suitable concentrating plant.

The fourth remedy is to prohibit brokerage and speculative transactions in chrome ore and license sale and purchase. I have shown above the usefulness of legitimate brokers, and, therefore, consider this suggestion unwise and unjust. Mr. Dolbear's fifth and last point, to furnish cars promptly, with preferential movement when loaded, is well taken; lack of cars has probably caused much inconvenience to the chrome miners. In my opinion the remedies which would immediately result in an increase of tonnage in chrome ore production in California and Oregon are as follows: That the Government fix a price which will show a profit on chrome-mining enterprises for a period of at least two years, and agree to take all chrome offered at that price; that there be established at convenient Western points—the closer to the mining operations the better—automatic samplers under Government supervision, and arrangements made for prompt settlement of ore as soon as it is sampled and weighed. If these two points were carried out, together with the fifth suggestion of Mr. Dolbear, namely, that cars be furnished promptly, there is no doubt that a larger tonnage of chrome ore would be immediately available.

WILLIAM A. STEWART.

San Francisco, Calif., May 8, 1918.

Events and Economics of the War

The Red Cross campaign to raise \$100,000,000 during the current week was officially opened at New York on May 18 by President Wilson, who in a speech pledged the man power of America without limit to winning the war. Regular airplane mail service, said to be the first in the world, was inaugurated on May 15 between Washington and New York. Wide inquiry into the conduct of the war was opposed by the President, on whose appointment Charles Evans Hughes has undertaken to investigate the Borglum aircraft charges. The Overman bill passed the House and has been signed by the President. By forbidding all shipments to this country, unless sanctioned by the War Trade Board, a new bar against imports was erected. Twenty-one persons were indicted by the Federal Government for connection, it is charged, with the deportation of workmen from Bisbee, Ariz., last July. Platinum stocks were commandeered by the Government, which also fixed the prices that it will pay for platinum, palladium and iridium.

Abroad, by the arrest of 500 Sinn Fein leaders on May 18 and 19, measures were taken by the British government to thwart an alleged German plot in Ireland. In a Commons speech, Foreign Secretary Balfour said that any serious peace offer from the Central Powers will be considered, but that no sincere proposal had as yet been made. Except for some action north of Kemmel and various raids, the week on the Western front was uneventful. At Paris, all accused in the *Bonnet Rouge* treason case were convicted. The Italians torpedoed a large Austrian dreadnought in a naval raid on Pola. China and Japan concluded a pact to combat German influence in the Far East.

New Restrictions on Exports

For the purpose of preventing the useless consumption of materials and labor in making articles for export which for the present may not be exported, and to save tonnage by prohibiting the exportation of articles which have not been recommended by the government of the country of destination as being necessary, the War Trade Board has arranged to have the missions, now in Washington, of Great Britain, France, Italy and Belgium pass upon the advisability of releasing all proposed exports before licenses are granted to shippers. The new rules became effective on May 15, and no applications for licenses will be considered in the future unless the official representatives of the nations named believe that the proposed shipments are essential to the war program.

To obtain this approval, applicants must forward to the proper mission their applications, duly executed in triplicate, in accordance with the rules and regulations of the War Trade Board. One copy of approved applications will be forwarded by the mission directly to the War Trade Board, Bureau of Exports, one copy retained,

and the other copy returned to the applicant for his convenience in keeping a record. Applicants will be required to agree with the War Trade Board not to purchase or acquire for export or take any steps in the process of producing, manufacturing or fitting for export the articles specified in the application until an export license has been duly granted.

If, prior to May 15, 1918, any of the articles specified on such applications were purchased or acquired for export, or if any steps were taken in the process of producing, manufacturing, or fitting for export such articles, applicants must agree that, after licenses have been issued, exportation thereunder will not be made until the written approval of the War Industries Board has been received with respect to articles specified on Schedule A. On July 1, 1918, all outstanding licenses granted on or before May 14, 1918, will be revoked. Any goods not then exported against such licenses may thereafter be shipped only if licenses are secured after being applied for as above set forth.

Schedule A, referred to, includes aluminum (metal), asbestos, carbon electrodes, arsenic compounds, chromium ore and compounds, cyanides, explosives, manganese ore and compounds, potassium salts, pyrites, copper (metal, wire and cable), ferroalloys, graphite (crucibles and electrodes), iron and steel products (billets, blooms, ingots, pig iron, plates, sheet bars, slabs, tin plate, wire rope), all lumber, mercury, mica, nickel (metal), optical instruments and glasses, metallic sodium and any metal or ferroalloy thereof, spiegeleisen, tin (pig or block), tungsten, tungsten steel and ore, and wolframite.

Engineers Wanted for Naval Service

The Bureau of Navigation, Navy Department, wishes to secure trained engineers for general service in the Navy in steam engineering, electrical engineering and radio duties, it is announced by the Engineering Council. Applicants will, if accepted, be enrolled as ensigns in the Naval Reserve and will be sent to the reserve officers' school at Annapolis for a special course of about four months, after which those who finish successfully will be given further training ashore or afloat, and will then become available for regular sea or shore duty, as the exigencies of the service may demand.

The following qualifications are necessary: (1) A degree in mechanical, electrical or mining engineering, conferred by a college of recognized standing; (2) at least two and one-half years' practical engineering experience subsequent to graduation (exclusive of time spent as sales agent); (3) not over 35 years of age; (4) physically strong and sound in health.

The American Institute of Electrical Engineers, American Institute of Mining Engineers, American Society of Mechanical Engineers, Naval Consulting Board and National Research Council have each been requested

to submit a list of 50 names, the personnel to be apportioned equally, of men trained in (1) steam engineering duties, (2) electrical engineering duties, and (3) radio duties. The exact engineering duties to be performed in general service by each applicant will be decided after completion of the training under naval supervision.

It is probable that from among the applicants selected a class will be formed at the Naval Academy about the middle of June, and each applicant should without delay forward to the Engineering Council, 901 Engineering Societies Bldg., 29 West 39th St., New York, which is acting for the five organizations named, a statement detailing his education and engineering experience, together with a small photograph, if practicable, and such letters of recommendation as he may wish to submit.

Will Survey War Industries

Charles A. Otis, president of the Cleveland Chamber of Commerce, has been appointed by the War Industries Board to make a survey of the industrial resources of the country. He will work out a zoning system for all war industries in cooperation with the War Department. The scheme contemplates organizing the industries in each zone so that, as nearly as possible, all products may be finished in the zone of origin. Each zone under the plan will have as its centre a large manufacturing city. Plans, specifications and other war information will be sent from the War Industries Board to the zone centres, where orders will be distributed to the proper factories. Officials of the board say the plan will speed up war work greatly. The survey will enable the Government to determine the facilities of individual plants. Long hauls and delay in assembling will be eliminated.

Some Coal-Price History

The severance of his connections with the Government as a war aid by Francis S. Peabody deprives the country of the services of a man who has done yeoman work, says the *Boston News Bureau*.

At the beginning of the war, Mr. Peabody came to Washington, and, as head of the coal production committee of the Council of National Defence, was conspicuous in the primary arrangements with the operators for an adequate output of coal to meet all requirements. Through his activities and personality to a very large extent, a price was reached which was pronounced by Secretary Lane as satisfactory to the Government. Unfortunately, the agreement was repudiated by both the Secretary of War and the Secretary of the Navy. The Fuel Administration, which came into being soon afterward, recommended a scale of prices based on certain data obtained by the Federal Trade Commission. These prices were approved by the President. What happened afterward in coal production is familiar but not pleasing history. The Fuel Administration has since adjusted prices repeatedly, many of the prices now ruling being higher than those agreed upon by Mr. Peabody and the operators in April of last year. Following the assumption of control by the Fuel Administration, Mr. Peabody served as assistant to the director of mines in the Interior Department, in charge of explosives regulations.

Platinum Stocks Commandeered

All platinum, iridium and palladium held by refiners, by specified importers, and by manufacturing jewellers and large dealers have been commandeered by the Government, it was announced by the War Industries Board on May 14. The price fixed for platinum is \$105 an oz.; for iridium, \$175 an oz., and for palladium, \$135 an oz. (troy weight). Manufacturing jewellers may use 25% of their present stocks for commercial purposes by signing a waiver of all claims for compensation from the Government by reason of the requisition. Delivery to the Government of manufactured platinum now held or controlled by jewellers will be waived, provided they sign a waiver of claims similar to the manufacturers' waiver.

All handlers of the metals were instructed to forward within five days a sworn inventory of their stocks. Jewellers were required to submit by June 30 an estimate of those metals included in the manufactured articles upon which the labor has exceeded 20% of the value of the metal. Failure to comply makes their stocks liable to seizure.

Ordnance Plant Site Selected

Neville Island, in the Ohio River, near Pittsburgh, has been selected by the War Department as the site for the great Government ordnance plant to be built and operated in the interior. The island is seven miles long and not more than a mile wide. At one end is the Neville furnace of the Carnegie Steel Co., a subsidiary of the United States Steel Corporation. Railroads occupy the river banks, paralleling the island, the New York Central on one side and the Pennsylvania on the other.

Negotiations for a second large ordnance plant for the Government are said to be nearing completion. The War Department and the Midvale Steel Co. are reported to be in substantial agreement on the expansion of the company's plant at Nicetown, near Philadelphia, for making heavy ordnance. The Midvale company has long been engaged on large war orders, but under the new arrangement, it is said, the capacity of the plant will be more than doubled.

Knight Shines as Champion Riveter

Charles Knight, colored, a riveter at the Sparrows Point plant of the Bethlehem Shipbuilding Corporation, established a new world's riveting record on May 16 by driving in nine hours 4875 $\frac{3}{4}$ -in. rivets, 2 $\frac{1}{2}$ in. long, beating by 453 rivets the record made a day or so before on the Clyde by a Scottish riveter named Thomas Devine. The latter drove 4422 rivets in nine hours in the side of a ship at Reardmore's Dalmuir yards. Knight's feat at Sparrows Point was witnessed by William Tinsley, chief inspector for the U. S. Shipping Board; Joseph O'Keefe, inspector for the Shipping Board; H. Mitchell, inspector for the American Bureau of Shipping, and John Sheriff, inspector for Lloyd's Bureau of Shipping. Knight was awarded the international prize of £25 offered by Lord Northcliffe for the best score above previous records.

Remember the Comfort Fund of the 27th Engineers.

Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

Senate Committee May Reshape Bill For Minerals Control

Legislative measures permitting serious interference with established industry will meet determined opposition in the Senate. This has been made clear by Senators who are on the Committee on Mines and Mining and by other members of the Upper House. The hearings held recently on the Minerals Control measure have attracted wide public attention. It is evident that the committee will present a very different bill from that passed by the House, but no member of it ventures to outline the probable scope of the measure as reported.

Walter R. Ingalls, editor of the *Engineering and Mining Journal*, who was on the stand for the greater part of two days, discussed, among other things, the advisability of having a minerals and metals advisory board. Such a board, he pointed out, should coordinate Government operation and, at the same time, it could be of great assistance to industries by advising with them. This arrangement, he further pointed out, would obviate undue interference with the work of an experienced and well-organized industry. He also suggested that all of the objects of the bill could be attained more effectively by the creation of a United States Mining Corporation, or a War Minerals Corporation, on lines similar to those of the War Finance Corporation.

Mr. Ingalls' suggestion of a minerals and metals advisory board brought up the question as to what action would be taken if an industry refused to cooperate with the Government's board and would not follow the suggestions or requests made. Attention was called to the fact that this difficulty is being experienced now by the War Industries Board in its relationship with the consumers of graphite and chrome. It is Mr. Ingalls' observation, however, that there is a uniform disposition on the part of industries to cooperate with the Government in every way. He pointed out, however, that in some cases an industry might not believe it practicable to carry out some of the suggestions made by the Government's specialists. In the case of graphite, he said that he is aware that officers of the Government had told certain manufacturers of crucibles they should use more Alabama graphite, and that the manufacturers of those crucibles had replied that they had tried to do so but had been unable to do it successfully. "If a board were created," Mr. Ingalls said, "with the authority to tell the manufacturer of graphite crucibles that he must revise his methods and henceforth make crucibles in a certain way, it probably would have the result that we would get fewer crucibles than we did before, and it may be that we would not get any." Another extract from Mr. Ingalls' testimony follows:

"As to letting the price in the outside market become extraordinarily high by the limitation of the free market, that is the surest and swiftest way and also the least harmful way of cutting out non-essential uses.

We had such an experience in the lead market last year. The lead market is always a limited market, for the reason that so large a part of the lead production goes to consumption on average-price contracts. In the early months of the war, the Government intimated that it was going to require a great deal more lead than in fact it really needed. Those intimations, coming into a restricted market, caused users of lead who had already entered into contracts for the delivery of the finished articles and were uncovered as to their supply of raw materials naturally to become frightened. They rushed into the market to get what they could. As a result, the price was bid up to nearly 12c. a pound.

"The Government was absolutely responsible for that. It was because of its erroneous estimate. The effect of this extravagantly high price, however, was immediately to curtail consumption. That was done in the most dramatic way—almost overnight. The lead market changed suddenly from a situation of stringency to a situation of superfluity, with a decline in prices that did not stop until the market got down to 5½ cents."

Antimony and mercury are the only two metals enumerated in the bill which come under the direction of Pope Yeatman, of the War Industries Board. For this reason, Mr. Yeatman confined his remarks before the committee largely to those metals. He said that no action had been taken by the War Industries Board with regard to antimony, because there are large stocks on hand—enough for six or nine months, even if no further supplies be received. Abnormally large importations had been made, he pointed out, in an effort to take advantage of the high price which had prevailed.

With regard to quicksilver, Mr. Yeatman said that prices higher than those now prevailing would not be likely to increase production greatly. He said it is the policy of the War Industries Board to interfere as little as possible with production, and then only when insufficient supplies are being produced, or to prevent a runaway market. He saw no danger in the quicksilver situation at present. Producers seem entirely satisfied as to price, he declared.

With regard to the need for the legislation, Mr. Yeatman said that he agrees with Mr. Baruch in the latter's statement that "We are exerting a large measure of control now, but I think it ought to be more definite and legally fixed than it is." Mr. Yeatman is strongly of the opinion that price-fixing is necessary to stabilize the market and to insure maximum production. He said that his experience with the maximum price was satisfactory. He cited the case of copper and of Grade A spelter. In the latter case, he asserted that the maximum price is having the effect of bringing out production from spelter manufacturers who did not make Grade A previously. As a result, he declared, there is a much larger production of Grade A, and the price has come down. One of the objections to a minimum price, Mr. Yeatman pointed out, is the probability of a

big accumulation which would hang over the market with a depressing effect.

Ravenel Macbeth took exception to the statement that the maximum price is operating successfully, declaring that the present price had driven the small producers of copper to the wall and that the industry in the West soon will be exclusively in the hands of two big concerns.

Charles H. MacDowell, chief of the chemical explosives section of the War Industries Board, showed how the Government is being hampered, from lack of such legislation as that under consideration, in attempting to deal with the platinum situation. Great difficulty, he said, is experienced in devising means to pay for the platinum which is offered. He admitted that the Government is worried about the shortage of platinum and declared that it was recently necessary to issue 1000 additional commandeering orders and that the Government is still bargaining in Russia in an effort to obtain the metal. The situation is somewhat ameliorated by the fact that there is a large potential reserve of platinum in the country in the form of jewelry. Difficulties, however, of reworking platinum in jewelry make it advisable to put forth every effort to secure the metal in its pure state.

With regard to the graphite situation, Mr. MacDowell declared that failure to make a uniform product was the chief objection to domestic graphite, but that those mines that are making a uniform product are having no difficulty in selling their output. Stocks of manganese in the United States, he asserted, are sufficient to meet requirements for at least three months.

Frank H. Burnett, the purchasing agent of the Lackawanna Steel Co., said he is "thoroughly discouraged" in his efforts to secure domestic manganese. He also had much criticism to offer regarding domestic chrome ore and the business policy of the brokers who handled it. He told from his own experience of an instance where a San Francisco concern boosted the price from 80c. to \$1.50. This would not be so bad, Mr. Burnett claimed, if the producer got the money. He believes an unfair percentage of the profits in handling these domestic ores under present conditions is going to the middleman. Mr. Burnett said he would be willing to pay \$1 a unit for domestic manganese at a Western mine. He believes it essential to the best interests of the steel makers and to the producers that manganese and chrome and other minerals named in the bill should be regulated. He favors a maximum price and a licensing system.

A hardship would be forced upon those manufacturers of steel whose outputs are small if regulations were adopted forcing the use of an increased amount of spiegeleisen, in the opinion of G. B. Waterhouse, the metallurgist of the Lackawanna Steel Co., who also appeared before the committee. A large production of steel helps greatly, he said, in making possible the use of an increased amount of spiegeleisen.

Powell Memorial Monument Dedicated

The memorial monument to Maj. John Wesley Powell was dedicated May 20 by the Secretary of the Interior. This memorial, which is a stone altar supporting a bronze tablet, on the very rim of the Grand Canyon of

Arizona, celebrates one of the most daring exploits of the pioneering of American science. Major Powell's first passage of the Grand Canyon in the fall of 1869 with a party of nine men in four boats was a plunge into the unknown. Indian reports, the only ones obtainable, stated that the canyon concealed lofty cataracts and that the river passed in places under ground. The passage, which had begun in early spring many miles up the confluent Green River, was one of extreme hardship and danger. One of the boats, most of their provisions and their scientific instruments were lost, and four men who deserted in the canyon and succeeded in climbing the cliffs were killed by Indians. For many days the party lived in wet clothes on short rations of wet flour. Powell's second passage in 1871 was a remarkable scientific achievement. In 1881, Powell became the second director of the U. S. Geological Survey. He died in 1891.

Gold and Silver Reserve Drops

The precious-metals reserve of the United States has decreased \$116,000,000 in the first nine months of the fiscal year, as shown in a report issued on May 8 by the Bureau of Foreign and Domestic Commerce. Exports of gold totalled \$180,989,092, of which Japan took \$70,000,000, Spain \$48,000,000, and Mexico \$15,000,000, the remainder going chiefly to South America. Gold imports were \$83,150,219. Purchases of silver have increased more than 100%, but still are \$19,000,000 less than the exports.

Trade Agreement Made with Norway

In the commercial agreement recently concluded with Norway by the War Trade Board, the following articles, among others, may be exported to that country: tin, raw, 80 metric tons; lead, 1000 metric tons; iron and steel (pig iron, ingots, bars, hoops, angles, plates, pipes, fittings, wire, etc.), 250,000 metric tons; copper (plates, bars, pipes, wire, cable), 7000 metric tons; asbestos, 350 metric tons; rock phosphate, 40,000 metric tons; antimony, 12 metric tons; electrode carbon, 5000 metric tons, and borax and boric acid, 80 metric tons.

May Raise Transportation Rates

Railroad Administration officials have estimated that an increase of at least 25% in freight and passenger rates will be necessary this year to meet the higher cost of fuel, wages, equipment and other operating expenses, now set at between \$600,000,000 and \$750,000,000 more than last year. Recommendation that rates be raised by approximately this percentage has been made to Director General McAdoo by his advisers. A decision on the matter is expected within six weeks.

Steel Survey Planned

A survey of the world's steel needs is to result as an outcome of a conference last week between steel makers and the War Industries Board. Before intelligent steps can be taken in apportioning steel, it was pointed out at the meeting, a more definite idea of the needs of all consumers must be had. On this survey will depend how much steel can be allotted to other than war uses.

Some of the Finest

A new view of some of the men in the 27th Engineers, the mining regiment, is shown in the adjoining column. It was taken on the Naval Academy athletic field at Annapolis, Md., just after the detachment shown had returned from the rifle range. Two hundred men of "B" and "C" companies appear in the photograph, which was obtained through the courtesy of Capt. F. S. Norcross, Jr., commanding "C" Company. Incidentally, Captain Norcross was superintendent of mines for the Canada Copper Corporation, at Copper Mountain, B. C., prior to being commissioned.

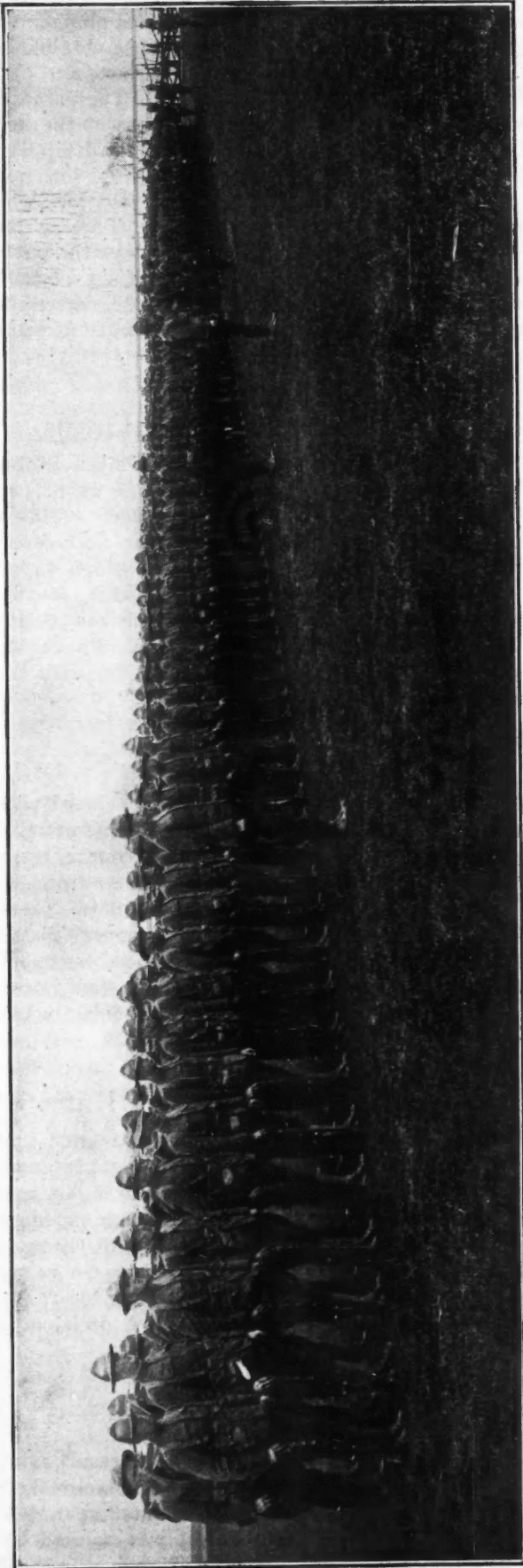
Few, if any, organizations can be more interesting to mining men than the mining regiment. While the men are being trained as infantry, the chief purpose which they will serve will be to engage in mining operations at the front. Some of the most modern mining machinery has already been furnished them. Every man is also given a thorough course in First-Aid and safety work. Much of the interest, however lies in the fact that the regiment in its personnel is representative of almost every camp in the country. Do you want a line on the mining practice in any particular section? You can get the information in the mining regiment, just as you get a book in the library. Such association must be valuable as well as interesting to the men themselves. For us on the outside, as a contributor recently said, the regiment is the mining world. It is an animated service flag for the industry.

Indicative of the warm-heartedness of many for the regiment is the total contributed thus far to the Comfort Fund. In itself it is a generous sum, but when the size of the regiment is considered it appears to shrink. It will not go far, as one can readily figure, in providing comforts for 1500 men. In fact, over \$2000 has already been spent on three companies, though the regiment is not yet in France. It should be easy to raise many times this amount from the hundreds of companies and thousands of technical men engaged in the various phases of mining.

The proceeds of a war carnival given under the auspices of the Wisconsin Mining School at Platteville, Wis., on Apr. 19 and 20, were divided between the Red Cross, a local company of volunteers now at the front, and the 27th Engineers. Similar methods of raising money for the mining regiment could well be adopted in almost all mining communities. All are urged to contribute to the Comfort Fund. The subscriptions are:

Previously acknowledged.....	\$13,664.00
Students of Wisconsin Mining School.....	50.00
A. M. Plumb.....	5.00
C. W. Snow.....	2.50
Charles A. Mitke.....	5.00
A. A. Hassan.....	10.00
A. A. Hassan, Jr.....	5.00
Emin A. Hassan.....	5.00
Bernard MacDonald.....	5.00
C. F. Rand.....	50.00
Calumet & Arizona Mining Co. and New Cornelia Copper Co.....	400.00
Oscar Lachmund (fourth contribution).....	10.00
C. N. Bell.....	10.00
C. S. Witherell.....	25.00
Total.....	\$14,246.50

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*.



DETACHMENT OF THE 27TH ENGINEERS, INCLUDING PART OF B AND C COMPANIES, AT ANNAPOLIS, MD. PHOTO BY J. L. McABOY, ANNAPOLIS.

The President and the War*

The President is, in some respects, on trial today as never before. We do not mean, of course, as the leader of democracy and of liberal opinion. Here he stands by himself, far beyond all others in high office. It is as the executive officer of the nation that he is being put to the test. He is now called upon to demonstrate that he is equal to administrative problems of a magnitude never before paralleled; that as manager of the country's affairs he is capable of administering them in a national crisis which far transcends in its difficulties and ramifications anything dreamed of heretofore. Is he a sufficiently capable business head? Can he, being but a single finite individual, accepting the enormous responsibilities placed upon him by Congress at his request, conduct the business of the hour with success and dispatch, compelling honesty and efficiency in every department?

It is this question, we are sure, which is worrying thoughtful men and women the country over. As a spiritual leader, the bulk of the people trust him and rank him high. But can he guide the nation's destinies through the maze of business complications which constitutes the greatest of wars? Today he is possessed of every conceivable power short of absolute dictatorship. Congress has divested itself of all its powers save one large one—the control of the pursestrings. It has even bestowed upon his Postmaster General the ability to crush any newspaper critic of the President whose opinion he interprets to be a stumbling block in the prosecution of the war. How will the President make use of this vast authority, greater, we believe, than that possessed by any king or kaiser? Will he build up a national war machine controlled by the ablest possible machinists and operated with the maximum of efficiency; will he take Congress and the public into his confidence; will he let duly authorized committees know what is going on, as is in some degree the case in England, and in far greater degree in France? Or is it to be a government within four walls, self-satisfied, self-content, impatient of critics and of inquiry, and convinced that public criticism of any subordinate is merely another reason for continuing him in office?

Yesterday's happenings lend sharper point to these queries than they have borne heretofore. The President indignantly refused, as he has refused before, to permit Congress to appoint a committee which might conceive its functions to be to inquire into and supervise the conduct of the war. In consequence, the Senate has modified its pending proposal to an inquiry into the progress of aircraft and ordnance production and into the Quartermaster Corps. With his feeling that there should be no committee to supervise the conduct of the war everybody can sympathize; if he is to exercise executive control he must exercise it undividedly. Yet there is a growing belief that there must be some means provided for sifting popular complaints on their merits in an authoritative way. It cannot be left to executive officers to investigate themselves or their fellows. That is not the way it is done abroad; it is not the way it should be done here, for it is not the democratic way.

When anything goes wrong with the conduct of a

campaign in Great Britain there is appointed a parliamentary committee to investigate; for instance, when the Maurice scandal broke out it seemed natural to Mr. Asquith to move for a special committee of inquiry. Even the Kaiser had to yield to the entirely novel demand for a parliamentary committee to watch the progress of the war and keep in touch with executives when the Reichstag was not in session; hence we have the Reichstag Main Committee sitting all the time as a committee on the state of the nation. There *must be a check* upon officials, and not even President Wilson should be free from the necessity of having such a committee to prevent Mr. Wilson's subordinates from going to excesses or becoming so independent as to forget efficiency and coöperation and to be negligent in preventing the appearance of graft or of waste.

Sulphur, Pyrite and Sulphuric Acid in 1917

Sulphur was produced in the United States in 1917 by eight mines, one in Louisiana, two each in Texas, Nevada, and Wyoming, and one in Colorado. Precise statistics are unavailable, but according to the U. S. Geological Survey the production in 1917 was roughly 50% greater than in 1916, and the indications point to a still further increase in 1918.

Statistics received from the Bureau of Foreign and Domestic Commerce show that 973 long tons of sulphur were imported into the United States in 1917 and that 152,831 long tons were exported. The imports of sulphur in 1917 were less than 5% of those in 1916, but the exports were more than 18% greater than in 1916 and were the largest ever made from this country in a single year. The total value of the sulphur exported in 1917 was \$3,504,661, which would indicate an average value for the sulphur of \$22.93 a ton.

INCREASE IN OUTPUT OF PYRITES

The pyrites industry showed an unsettled condition in 1917, due largely to uncertainty as to whether importation of foreign pyrites would be continued. In spite of this uncertainty, however, the domestic production was about 10% greater than in 1916. Statistics collected by the Geological Survey show a total production of 462,662 long tons, valued at \$2,485,435. The two states making the largest output were Virginia and California, which together produced nearly 300,000 long tons. The increase in the production in 1917 is due to an increase in the output of established mines rather than to contributions from many new mines. Though the war stimulated production somewhat less than had been expected, work was in progress on many new properties, which will doubtless still further increase the output.

IMPORTATIONS OF PYRITES

The quantity of pyritic ore imported in 1917 was notably less than that imported in 1916 and was practically the same as that imported during the years preceding the war. The total imports of pyrites in 1917 were 967,340 long tons, valued at \$5,980,457. Of this quantity 214,115 long tons came from deposits in Canada and Newfoundland and 753,225 long tons from deposits in Spain and Portugal. The principal cause of the de-

* From the New York Evening Post, May 16, 1918.

cline in the imports was the difficulty of obtaining ships to bring ore from Spain. An increase in the imports of pyrites from Canada is expected in 1918, but, on the other hand, a still greater decrease in the imports of ore from Spain is probable.

SULPHURIC ACID

The quantity of sulphuric acid produced in 1917 was nearly twice as great as that produced in 1913, which may be taken as a normal before-the-war year. The production of sulphuric acid in 1917, expressed in terms of acid of 50° B., was 5,967,551 short tons, valued at \$71,505,536, to which must be added 759,039 short tons of acids of strengths higher than 66° B. (which cannot be calculated for comparison with acid of 50° B.), valued at \$16,034,545. The increase over 1916 in the production of acid expressed as 50° B. was therefore more than 325,000 short tons in quantity and \$8,800,000 in value, and the increase in the production of stronger acids was more than 315,000 short tons in quantity and \$5,225,000 in value. The value of the total production of sulphuric acid in 1917 was over \$14,000,000 more than in 1916.

The foregoing totals include byproduct acid—that is acid produced at copper and zinc smelteries. The production of acid from this source in 1917, expressed as acid of 60° B., was 1,336,209 short tons, valued at \$14,516,104, to which must be added 119,048 short tons of acids of strengths higher than 66° B., (which cannot be calculated as acid of 60° B.), valued at \$2,374,341.

ACID PRODUCTION FROM 221 PLANTS

Statistics collected by the Geological Survey show that 221 plants in 33 states produced sulphuric acid in 1917. Of these, 139 produced acid of 50° B., 66 produced acid of 60° B., 60 produced acid of 66° B., and 38 produced acid of higher strengths. Pennsylvania and New Jersey produced sulphuric acid valued at more than \$10,000,000 each, and Virginia, Maryland, Illinois, and Georgia each produced sulphuric acid valued at more than \$5,000,000. The value of the total production of these six states amounted to over \$50,000,000 or considerably more than half of the entire value of the acid produced in the country.

The following quantities and kinds of sulphur ore were used in making sulphuric acid in 1917:

	Sulphur	Pyrites	Gold and Silver Bearing Pyrite and Galena	Copper-Bearing Sulphides	Zinc-Bearing Sulphides
Domestic.....	463,364	376,955	17,380	708,502	584,100
Foreign.....	20,463	880,183	.....	147,531	152,811
Total.....	483,827	1,257,138	17,380	856,033	736,911

In the column headed "Pyrites" are tabulated all the sulphide ores used that are not treated further for their content of copper, lead, zinc, gold or silver.

Statistics received from the Bureau of Foreign and Domestic Commerce show that 4287 short tons of sulphuric acid, valued at \$98,232, was imported to the United States in 1917; and that 31,771 short tons, valued at \$1,600,125, was exported.

New Caledonian Exports of nickel ores and matte amounted to 32,017 metric tons in 1917, according to "Echo des Mines et de la Metallurgie." Exports of chrome ore amounted to 41,892 metric tons in the same year.

Butte & Superior—Minerals Separation Decision Is Modified

The decision of the U. S. Circuit Court of Appeals in the case of the Butte & Superior Mining Co. vs. the Minerals Separation, Ltd., appearing on p. 962 of this issue, was modified by an order of the court on May 20. The modifying order of the court follows:

Before Ross, Morrow and Hunt, Circuit Judges.

Ross, Circuit Judge, Hunt, Circuit Judge, concurring; Morrow, Circuit Judge, concurring in the reversal but dissenting from the modification of the decree herein directed and as to costs.

Understanding from the presentation of this case that the real and pivotal question for the decision of this court was whether or not under the decision of the Supreme Court in the case of Minerals Separation, Ltd., vs. Hyde, 242 U. S. 261, the use of any oil by the appellant in quantity of 1% or less on the ore constituted an infringement of the appellee's patent, and that the fact was undisputed that the appellant had not used as little as 0.5% of oil in its process, in reversing the judgment of the court below we directed that court to dismiss the bill at the complainants' cost. Inasmuch, however, as it appears and is admitted that prior to and including Jan. 7, 1917, the appellant did use in its process oil in quantities of 0.5% and less, thereby in those instances infringing the patent of the appellees,

IT IS HEREBY ORDERED that the judgment of this court herein rendered and entered May 13, 1918, be and hereby is corrected so as to read as follows:

The decree appealed from must be and is reversed and the case remanded with directions to the court below to so modify its decree as to accord with the opinions of the majority of this court; the appellant to recover its costs on this appeal.

Endorsed order modifying decree filed May 20, 1918.

F. D. Monckton, Clerk,
by Paul P. O'Brien,
Deputy Clerk.

The Bureau of Mines and the Third Liberty Loan

The results of the Third Liberty Loan drive among the staff and employees of the U. S. Bureau of Mines show that 1059 persons subscribed a total of \$590,100. This included 628 persons in the Washington offices of the Bureau, who subscribed \$189,450. The men regularly employed in the field, the consulting engineers and chemists of the Bureau, and the state explosives inspectors who are charged with the enforcement of the Explosive Regulation Act under the Bureau, with 431 persons subscribing, gave a total of \$400,650. In the Washington offices proper, 595 men subscribed \$177,900. In these same offices 133 women subscribed \$11,550. There were 628 persons in the Washington office out of a total personnel of 750 who subscribed. Director Manning was gratified at the outcome, which indicated a high degree of patriotism and a whole-hearted response.

Bauxite Production in 1917

The total production of bauxite in the United States in 1917, according to the U. S. Geological Survey, was 568,690 long tons, of which the Arkansas field produced 506,556 tons and the Georgia-Alabama-Tennessee field 62,134 tons. Imports in 1917 amounted to 7760 tons, as compared with 30 tons in 1916. The price of bauxite in 1917 ranged from \$4.75 to \$10 a ton, and the average price was \$5.48 a ton at the shipping point.

Editorials

The Overman Act

THE Overman bill, having been passed by Congress and signed this week by the President, is now an act. Under its terms Congress has conferred upon the President complete power for coördination of the executive work of the Government. He can rearrange departments and bureaus of the Government, correlate them as he sees fit, and cause them to do what he wants them to. He can abolish red tape by one stroke of his pen. His power is supreme. It has been said that Congress has abdicated all rights except that of making appropriations. That is too sweeping a statement. Congress has not abdicated its rights of investigation, of levying taxes, and doing many other things. Nevertheless, it is clear that Congress has given to the President control of a great many things that it used to keep to itself.

We favored the Overman bill. It was needful that the President should be unhampered in his authority. But, now, having acquired everything that he wants and everything that he ought to have, the responsibility resting upon his shoulders is greater than ever. No longer may it be urged that there could be no war cabinet for the reason that Congress had not authorized it. No longer may there be the excuse that there could not be real coördination, owing to Congress having instructed one department to do certain things, and another department to do certain things of overlapping or conflicting nature. No longer may the Interstate Commerce Commission, and the Federal Trade Commission stand in the way of progress and efficiency while they adhere to their fantastic, impracticable ideas. The President may abolish them summarily, or at least render them innocuous (and it is a pity that this was not done years ago, before they had any opportunity to play their mischievous parts). We hope now that the President will conduct the affairs of the country like those of a great business institution, which he has the right and power to do, and we pray that he will have the wisdom to select good men to aid him.

The Excess Profits of Mines

THE reports of the principal mining companies for 1917 now having been issued, we are able to get a broad view of how they have treated the requirements of the Excess Profits Law in their accounting. But the view, if broad, is nevertheless unsatisfactory. The mining companies are not to blame for this; rather it is the obscurity of the law. Some companies have charged off an estimated sum into a reserve for taxes, out of which the levy is to be paid. Other companies, and Anaconda is one of these, have taken their computation right into their general expense, although the tax has not yet been paid. Still other companies do not show this item at all in their accounts for 1917, apparently leaving it to ap-

pear first in the accounts for 1918, in which year the tax for 1917 will be paid.

The fact is that no company knows today just what taxes it is liable to for last year, owing to the uncertainty which exists regarding the amounts deductible from income for depletion under the Income Tax Law and the amounts to be used for invested capital under the Excess Profits Tax Law.

The Treasury regulations regarding depletion furnish only the roughest indication of what they intended to allow or not to allow for value or cost of the property, and the resulting depletion deductions, and in many cases the mining companies have felt that the regulations did not allow to them the deductions to which under the law they were entitled. In most cases the mining engineers, to arrive at the fair value of the property at Mar. 1, 1913, have naturally followed the standard formula based on the present value of the amount which it could fairly be considered would be realizable over the life of the mine from the mineral content of the property. The department has, however, intimated that such a basis would not accord with its ideas as to the way in which the value should be figured, but has not yet definitely disallowed depletion deductions made by mining companies on that basis. Many companies paid their 1916 income tax on the basis of net income after making depletion deductions ascertained in such manner, and have not yet had additional assessments made against them for the 1916 taxes, although the department may have expressed its opinion that the deductions made would not be allowed. Such companies naturally could do nothing but return the 1917 income on the same basis as that used for 1916.

Accordingly, we have the first factor of uncertainty existing as to what is the proper depletion deduction to be made before determining the net income on which the income tax and also the excess profits tax would be payable.

This uncertainty exists not merely for properties which were owned prior to Mar. 1, 1913, for which depletion was to be based on their value as of that date, but it also exists for properties purchased subsequent to that date, because the cost of the properties is not always readily determined, particularly where stock, either with or without par value, has been issued for the property.

The question of invested capital under the Excess Profits Tax is a matter of absolute uncertainty. Invested capital is on an entirely different basis from that to be used for depletion, and, in spite of the endeavor of the Treasury Department to make its regulations as fair and comprehensive as possible, we do not believe there is a company that has any assurance that the figures which it has returned will represent its invested capital as finally determined by the department.

The companies cannot, of course, do anything but claim what they feel that they are entitled to. We think

that in most cases the companies have endeavored to present their returns fairly and honestly, but it must be recognized that there were many factors which were not in any way covered by the law and regulations, and the companies naturally have presented to the department their claims, even though there might be some uncertainty as to whether the department or, in the last analysis, the courts, would allow all that the company felt it was entitled to.

We thus have a situation where the tax returns submitted by the companies will be only what the officials of the company have considered they should be required to pay, and even though they may have taken the best legal and accounting advice that they could obtain, there is no assurance that the amount of the taxes ultimately assessed will accord with the returns now submitted.

Since it was not until some time after the end of 1917 that the final tax forms and regulations were issued, many companies were unable to complete their returns of taxes and determine what these would amount to before the figures were prepared for the annual reports. Naturally, for such companies the exact figures could not be used, and in their annual reports they either had to put in an estimated amount (which might be more or less than their tax return would show) or else they had to omit any item for such Federal taxes and make the comment that it had not been included. The opinion in various companies differs as to whether it were better to put in an estimated figure which might or might not prove correct, or to leave the item out entirely and tell the stockholders that nothing had been included for such taxes.

Other companies that had their tax returns prepared and filed before the figures for the annual report were completed could include an adjustment at the end of the year to show just the amount of taxes which they had included.

The fact would stand, however, that even though the figures included in the annual report were those which had appeared on the tax return submitted by the company, they are not, however, final and conclusive, since no mining company knows today just what taxes it will be called upon to pay for last year, and, as far as we can learn, the Treasury Department itself and the Board of Review have not yet been able to get any clear situation in their own minds as to just what is the basis on which invested capital and depletion should be figured for mining companies.

The Last Decision in the Flotation Case

THE full text of the decision rendered on May 13, 1918, by the Court of Appeals in San Francisco, in the case of Minerals Separation vs. Butte & Superior, shows that this was one of the most interesting and one of the most important contributions to the judicial literature of this celebrated case. It is clear, moreover, that consideration of the case will have to be entertained again by the Supreme Court.

Judge Ross and Judge Morrow, of the court sitting in San Francisco, concur in the opinion that the Supreme Court did not intend to extend the monopoly of the Minerals Separation patent in suit to the use of 1% of oil on the ore, but intended to limit it to that per-

centage within which there happened a different result, and there were different phenomena, from what anybody had ever experienced previously. By using the critical proportion of oil, the inventors discovered a process, not a froth, says Judge Hunt, and the process is limited to the use of oil in the specified critical proportion. That proportion, as brought out in testimony before the Supreme Court, was 0.5% or less.

The Supreme Court in sustaining certain claims for the patent carefully noted those which were limited to "amounting to a fraction of 1% on the ore." Judge Ross holds that "amounting to a fraction of 1% on the ore" is very far from saying amounting to every fraction of 1% on the ore. A fraction is one thing; every fraction is a very different thing. These judges, therefore, interpret the decision of the Supreme Court as really limiting the patents to the critical point, which they decide as being 0.5% oil. Judge Hunt dissents respecting this construction of the language of the Supreme Court, holding that when they said not more than 1%, they meant just that. Otherwise, Judge Hunt concurs with Judge Ross and Judge Morrow.

This decision completely upsets the contention of Minerals Separation that was upheld by Judge Bourquin. The allegation that the use of more than 1% of oil is simply a diluent that does not evade the patents did not carry any weight with the San Francisco judges. That opinion of Judge Bourquin was preposterous, we thought at the time it was rendered. It would have made poor old Carrie Everson an infringer, and also all of the other pioneers whose investigations were so informing that in the mind of the Supreme Court the last step of the Minerals Separation metallurgists was but a small one.

That fantastic idea having been brushed away, the case now resolves itself into the difference between 0.5% of oil and 1% of oil. It is clear that the Supreme Court must interpret its own language, but in taking the case to the Supreme Court again there will be opportunity for the introduction of new evidence, which may open the way to a complete reversal of opinion.

Besides the points involved in this case, there are two other main things in connection with the flotation process that remain open. These pertain to the nature of the agitation and to the nature of the oiling or frothing agent. There are said to be in use today frothing agents that are outside of any Minerals Separation patents; and it is considered to be not outside of the bounds of probability that some day flotation may be practised without the use of any frothing agent. It is clear that the flotation process is not so closely fenced in as has sometimes been claimed.

Fixing the Price for Platinum

THE Government has fixed the prices for numerous minor commodities that do not attract any great attention, not being of so much general interest as coal, copper and such things; and officials exhibit great glee in doing this. It affords them an opportunity to display their authority and brandish the big stick. It does not matter with them whether they are wise or not. There is no legal price-fixing authority, but there are many ways of effecting what comes to the same

thing, such as threats of railway and fuel discriminations, arrangements of "licenses," commandeering, etc. "Agreements" with producers are a polite fiction. The producer usually "agrees" under duress.

It is quite in order for the domestic producer to be bully-ragged and dragged in chains after the official chariot. He may not be strangled immediately. Under the guise of "reasonable profit," probably he will not be. However, his production is not apt to be increased unless he was committed to capital expenditures previous to his seizure. In that event the "wisdom" of Washington will be paraded, and the victim will be left to query how he is going to get his money out of useless bricks and mortar later on.

But when we consider the fixing of a price for commodities like tin and platinum, that we can obtain only from abroad, we wonder whether madness is culminating. It may be a proper deduction to say that \$105 is a "fair" price for platinum, considering the cost of production. The U. S. Government may say it will pay that for any brought into this country, and that nobody but the Government may be the buyer. The Russian and the Colombian may say, "Very well; I will send you my platinum if I feel like it, but if the Germans, or somebody else, offer me more, what can you expect?"

The Government could have obtained large supplies of platinum from Russia if it had not been for official stupidity in Washington. Probably we can still obtain some if we are willing to play the game. But will it not be easier to tell the patriotic women of the country to destroy their jewelry so that the settings may be melted? If the time for such a sacrifice ever comes, let the women remember that it was needless and that they were the victims of price-fixing and the buncombe of "reasonable profit."

BY THE WAY

Col. W. B. Thompson, head of the Red Cross committee to secure contributions from corporations, says, according to *Boston News Bureau*, that if any director fears suit on personal liability for voting contributions to the Red Cross he should read the remark of Judge Morgan J. O'Brien, who said: "There would be just as much chance of a stockholder of a corporation getting a judgment against a director for voting a Red Cross contribution as there would be of convicting an American soldier of murder because he had shot a German spy."

A Cornishman fresh from the "ol' country" came to Ishpeming, Mich., and secured work under ground. It so happened that his working place was decidedly wet, and, in spite of the fact that Dicky was well equipped with boots, slicker and other necessary paraphernalia, he was soaked to the skin before the end of each shift. After a few days, he decided that he must interview the captain and get a job on the surface if possible.

The following day, Capt'n Jan, making his customary rounds, came across Dicky, and in reply to his usual, "Moornin' m' son; 'ow's gettin on?" received the following reply: "Naow that thee's made mention of the bloody subjeck, why, dam-me, Capt'n Jan, she's goin'

poorly. When I wuz young shaver in ol' country, used to fish naow an' then for bloater an' 'errin', but, dam-me, never figgered as 'ow I'd be one, and this 'ere bizness I do dislike tremendous. I wonner, naow, Capt'n, if thee'd min' givin' a chap a bloody job on shoor."

Arthur Train, the novelist, put down a German newspaper at the Century Club, in New York, with an impatient grunt, writes the *Washington Star*. "It says here," he explained, "that it is Germany who will speak the last word in this war." Then the novelist laughed angrily and added: "Yes, Germany will speak the last word in the war, and that last word will be 'Kamerad!'"

A Government official declares Germans are spending hundreds of millions of dollars to spread discontent, particularly among the uneducated people in all the countries of the Allies. "In the first two years of the war the German propoganda machine was a very amateurish organization, but the propogandists kept at it, and finally they began to get the machine into working order until it became a very wonderful organization. Its tentacles reach into every country in the world, and it costs the German government probably \$500,000,000 a year to maintain it." In Germany, said the official, they called into the service of the state the great psychologists of the country, the big newspaper men, and university professors, trade experts, and even novelists and dramatists. Agents were sent into every country in the world to study the people, until the government files in Berlin contained complete data regarding the peculiarities and susceptibilities of all people with whom Germany had reason to anticipate a clash.—*Boston News Bureau*.

Advertisements

(Beatrice Barry, in the *New York Times*)

"Wanted—a sturdy, steady man
Of any age at all—
One who can handle heavy weights,
And help to lift and haul.
Color or creed will matter not;
He need not read or write;
We work the union eight-hour day
With double pay at night.
Experience we'd like, of course,
But any man who's strong
(A laborer is what we want)
Could qualify ere long.
To put this man to work at once
Our foreman we empower,
So please report, prepared to start
At sixty cents an hour."

And lo! A little farther down
The advertising page:
"Wanted—an office man with brains,
Past thirty years of age.
A clever correspondent—one
Who is not prone to shirk,
And will not feel himself aggrieved
When asked to do night work;
A man of some experience,
A college man preferred,
With quick intelligence endowed,
And by ambition spurred.
The highest references we
Require—the man we seek
We'll gladly pay a salary,
To start, of twelve a week."

Personals

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

C. M. Weld, of New York, is in Canada.

Lieut. H. Smeddle, 15th Battalion, Tank Corps, British Army, has been promoted to captain.

Wilbur A. Nelson has been appointed state geologist of Tennessee, succeeding the late Dr. Purdue.

R. T. Beggell has resigned as manager of the Dome Lake Mining and Milling Co., Ltd., at Porcupine.

Hills & Willis, mining engineers of Denver and Cripple Creek, Colo., have dissolved partnership.

J. C. Shepherd is opening up manganese deposits at Batesville, Ark., where he has made his headquarters.

Walter Dennison, of Cushman, Ark., has been elected president of the Eureka Manganese and Mining Co., of Arkansas.

Pierre Rossiter Hines, lieutenant in the 318th Engineers, married Charlotte Brady Eichbaum on Apr. 19, at Portland, Oregon.

Leighton Stewart, mining engineer of New York, was commissioned a lieutenant in the Canadian Engineers on Mar. 15 and is now in training at St. Johns, Quebec.

C. T. Ulrich, secretary of the Kennecott Copper Corporation, was recently elected a director in the place of Thomas Cochran. Other retiring directors were re-elected.

Herman Garlichs has been appointed a member of the advisory committee in non-ferrous metals to the U. S. Tariff Commission.

H. W. Forster has resigned as assistant manager of the Tigre Mining Co., Esqueda, Sonora, Mex., to enter the fourth officers' training camp.

G. A. Williams, of Joplin, Mo., with the Connecticut Zinc Corporation, looked over properties in the Batesville, Ark., manganese field recently.

Edmond A. Guggenheim, director of the Braden Copper Mines Co., has returned from an inspection trip to the company's property at Rancagua, Chile, as well as to the mines of the Chile Copper Company.

Walter J. Nicholls, of Spokane, Wash., has been in Del Norte, Calif., inspecting chrome properties purchased by a syndicate headed by himself and A. L. White, of Spokane.

Dr. Willet G. Miller, provincial geologist of Ontario, has sailed for London, England, to attend the first meeting of the Imperial Mineral Resources Bureau, as representative of the Canadian Government.

H. Vincent Wallace, consulting mining engineer of Los Angeles, Calif., has opened an office at 329 Central Bldg., for examination, management and consulting work as applied to mining.

A. A. Hassan, Jr., first lieutenant since December, 1917, in the U. S. Aviation Corps, is now an instructor in advanced flying and aerial gunnery at Lake Charles, La. Emin A. Hassan has volunteered in the U. S. Naval Aviation Corps and is at present stationed at Cambridge, Massachusetts.

Evelyn Ashley Wallers, president of the Transvaal Chamber of Mines; Ernest Chappell and Douglas Christopherson, of Johannesburg, have been created Commanders of the Order of the British Empire for services in connection with the war. E. G. Izod and F. Rowland have been made officers of the order.

Irwin H. Cornell, of the St. Joseph Lead Co., was entertained at luncheon, May 20, by the producers and sellers of lead, who met in order to say farewell to him upon his leaving for Washington to go into the Government service. A handsome gold watch was presented to Mr. Cornell in appreciation of his services to the industry in the past and as an earnest of good wishes in the future.

L. E. Salsich, formerly general superintendent of the Coleraine district of the Oliver Iron Mining Co., has been transferred to Hibbing, Minn., as assistant district manager of the Western Mesabi district. A. Y. Peterson, formerly assistant general superintendent of the Chisholm district, has been transferred to Coleraine as general superintendent. H. S. Sherman, formerly superintendent of the Genoa Mine at Eveleth, Minn., has been made superintendent of the Hull Rust mine, at Hibbing, with Bert St. Vincent as assistant superintendent. Fred E. Mott, formerly superintendent of the Hull Rust mine, has

been made general superintendent in the Virginia district. George Dormer, formerly assistant general superintendent in the Eveleth district, has been made assistant general superintendent in the Virginia district, succeeding Charles Grabowsky, who has been transferred to Eveleth as assistant general superintendent to E. J. Mitchell.

William Pellens, Jr., formerly superintendent of the Carson Lake district of the Oliver Iron Mining Co., at Hibbing, Minn., has been given charge of the Fayal district at Eveleth.

M. A. Baker, of Virginia, Minn., has been appointed superintendent of the Pearson mine, at Nashwauk, Minn., for the Shada Mining Co., of Duluth, succeeding Hale H. Hunner.

L. Salazar S. has been appointed head of the department of explorations and geological studies of the Mexican government, with headquarters in the building of the Instituto Geologico de Mexico, Mexico, D. F.

D. W. Brunton, chairman of the War Committee of Technical Societies, has been appointed head of the advisory board of the newly created war inventions section of the general staff corps of the War Department.

A. K. Knickerbocker, formerly chief engineer for the Great Northern Iron Ore Properties, has accepted a place as superintendent of the Northern Minnesota Iron Ore Co. at Cuyuna, Minn. Alex Ekstrom, of the Meriden Iron Co., succeeds Mr. Knickerbocker.

J. H. Mackenzie, recently manager of the Atolia Mining Co. at Atolia, Calif., has joined the staff of the U. S. Bureau of Mines. Mr. Mackenzie, who is contributing his services gratis, will have charge of the Bureau's tungsten problems. He was formerly general manager of Stratton's Independence, Ltd., at Cripple Creek, and later manager of the Goldfield Consolidated Mines Co., at Goldfield, Nevada.

Obituary

Charles Sickal, a California pioneer of '49, died at Martinez, Calif., on April 24.

First Lieut. Guy Raymond Forbes, formerly chief engineer for the M. A. Hanna Co. at Virginia, Minn., died in France recently of disease. He was born in Virginia, Minn., 39 years ago and was a graduate of the mining school of the Michigan Agricultural College. He attended the first officers' training camp at Fort Snelling, Minn., last year, and was in France with the 508th Engineers.

Societies

American Institute of Metals. The letter ballot taken on the proposed merger with the American Institute of Mining Engineers resulted in 168 votes cast in favor of and 5 against the proposal.

American Institute of Mining Engineers, New York section, will meet jointly on May 28 with the other engineering societies represented by Engineering Foundation in the Engineering Societies Bldg., 29 West 39th St., New York, to hear an address by Dr. George E. Hale on "Work of the National Research Council."

Columbia Alumni Club of Utah held a meeting and dinner at Salt Lake City in connection with the monthly dinner of the University Club, on April 27. J. Parke Channing, a guest of the club, gave an interesting talk on conditions in Russia and on general war preparations in this country. W. G. Riter acted as toastmaster. About ninety members and guests were present.

American Iron and Steel Institute will hold its 14th annual meeting at the Waldorf-Astoria, New York, on May 31. There will be forenoon, afternoon and evening sessions. The papers to be presented at the meeting will be as follows: Address of the president, Elbert H. Gary, of New York; "The Electric Steel Plant at South Chicago," T. W. Robinson, vice president of Illinois Steel Co., Chicago; "The Design of the Modern Blast-Furnace Stack," J. G. West, Jr., general superintendent of blast furnaces, Jones & Laughlin Steel Co., Pittsburgh; "The Modern Byproduct Coke Oven and Its Byproducts," W. H. Blauvelt, consulting engineer, Semet-Solvay Co., Syracuse, N. Y.; "Effect of Phosphorus in Soft Acid and Basic Open-Hearth Steels," J. S. Unger, manager central research bureau, Carnegie Steel Co., Pittsburgh; "Conservation of Ferromanganese," papers to be arranged for by C. A. Buck, vice president Bethlehem Steel Co.; "Relation of the Trade

Papers to the Iron and Steel Industry," Bertram S. Stevenson, M. A. Hanna Co., Pittsburgh.

American Society for Testing Materials will hold its twenty-first annual meeting at the Hotel Traymore, Atlantic City, N. J., on June 25-28. Besides committee reports, the provisional program includes various papers, among which are the following: "A Simple Type of Brinell Testing Machine," by A. V. de Forest, Stamford, Conn.; "A New Type of Brinell Machine," by J. G. Ayers, Jr., metallurgist, Hyatt Roller Bearing Co., Newark, N. J.; "Transverse Testing Under Non-Uniformly Distributed Load as Applied to Airplane Wing Ribs," by I. H. Cowdrew, Massachusetts Institute of Technology; "Sumner Elastic-Limit Recorder," by J. L. Jones, Westinghouse Electric and Manufacturing Co., Pittsburgh, and C. H. Marshall; "Cast Steel Anchor-Chain," by James French, chief surveyor, Lloyds' Register of Shipping; "Grain Growth of Cold Wrought Metals," by D. J. McAdam, Jr., and "Changes Within the Critical Range of a Given Steel," by J. G. Ayers, Jr. The topical discussion on June 26 on "Coöperation in Industrial Research" will be formally introduced by the following program: "General Introductory Remarks," by Dr. Henry M. Howe, chairman, engineering division, National Research Council; "Recent Development in Great Britain," by Dr. John Johnston, secretary, National Research Council; "Organization of Industrial Research," by Dr. A. D. Little, president, Arthur D. Little, Inc., Boston, Mass.; "Developments in Industrial Research," by Dr. Charles L. Reese, chemical director, E. I. du Pont de Nemours & Co., Wilmington, Del.; and "Some Benefits of Industrial Research to the American Canning Industry," by Frank E. Gorrell, secretary National Canners' Association, Washington, D. C. A discussion on "Season and Corrosion Cracking of Brass" will be held on June 27. The session on the evening of June 27 will be held jointly with the American Concrete Institute. The following have been nominated for officers: President, G. H. Clamer; vice president, George S. Webster; members of the executive committee, G. Aertsen, G. K. Burgess, G. B. Heckel and K. W. Zimmerscheid. The total membership on Apr. 20, 1918, was 2203, representing a net increase of 37 over the preceding year.

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.

Aluminum—Method of Utilizing Skimmings and Analogous Material. James Wright Lawrie, Milwaukee, Wis., assignor, by mesne assignments, to William F. Jobbins, Inc., Aurora, Ill. (U. S. Nos. 1,262,062; 1,262,063; Apr. 9, 1918.)

Cement—Composed of Iron Oxide and Phosphorus. William H. Allen, Detroit, Mich. (U. S. No. 1,261,750; Apr. 9, 1918.)

Crusher—Combined Ore and Rock Crusher and Pulverizer. Elmer C. Pratt, Mount Dome, Calif., assignor of one-third to Corlena M. Pratt, Mount Dome, Calif., and one-third to Andrew B. Jensen, Barstow, Calif. (U. S. No. 1,262,091; Apr. 9, 1918.)

Furnace for Calcining Copper and Like Ores. John G. Squire, Newcastle-upon-Tyne, England (U. S. No. 1,262,126; Apr. 9, 1918.)

Spiegel, Manufacture of. Albert Leighton Cromlish, Sharon, Penn. (U. S. No. 1,261,907; Apr. 9, 1918.)

Metallurgy—Process of Volatilizing Ores Involving Treatment with Chlorine Gas. Selden Irwin Clawson, Salt Lake City, Utah. (U. S. No. 1,262,453; Apr. 9, 1918.)

Mine Explosions—Apparatus for Localizing by Rock-Dust Barriers. John Marshall Grasty and Walter Sheldon Rodman, University, Va. (U. S. Nos. 1,261,922; 1,261,923; 1,261,924; Apr. 9, 1918.)

Smelting—Method of Preparing Finely Divided Metal-Bearing Material for Sintering. Frederick W. Yost, New York, N. Y., assignor to American Ore Reclamation Co., New York, N. Y. (U. S. No. 1,263,832; Apr. 23, 1918.)

Smelting—Mechanically Operated Scotch Hearth. Asheleigh S. Moses, New York, N. Y., assignor to St. Louis Smelting and Refining Co., St. Louis, Mo. (U. S. No. 1,263,695; Apr. 23, 1918.)

Tungsten—Reducing Furnace. Carl A. Pfanstiel, Waukegan, Ill., assignor to Pfanstiel Company, Inc., North Chicago, Ill. (U. S. No. 1,263,598; Apr. 23, 1918.)

Editorial Correspondence

SAN FRANCISCO—May 16

Producers of Manganese in California are relieved by the ruling made in Washington at the request of the ferroalloys committee of the Iron and Steel Institute on the embargo placed on imported manganese ores. California being a large producer of these ores, the ruling will prove a great stimulus. Manganese deposits occur in and are being worked in most of the following counties: Alameda, Butte, Calaveras, Colusa, Contra Costa, Del Norte, Humboldt, Lake, Marin, Mendocino, Merced, Napa, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Shasta, Sonoma, Tehama, Tulare and Tuolumne. The Noble Electric Steel smeltery, in Shasta County, is producing a large amount of ferromanganese, and the miners of manganese and chrome ores have an excellent market within easy shipping distance in the state as well as the Eastern market. Freed from the competition of imports, except from Canada and Mexico, the prospects of the manganese and chrome industry in California are encouraging.

Oil-Well Drilling Material and equipment equal to the requirements of normal production will be available, according to a statement made at the annual meeting of the Independent Oil Producers' Association by Thomas A. O'Donnell, member of the executive committee and an assistant to Mark L. Requa, of the U. S. Fuel Administration. Mr. O'Donnell stated also that though drilling materials will be more abundant and available, no hoarding of materials will be tolerated. Regarding probable price-fixing by Mr. Requa, which may be necessary before the war is ended, Mr. O'Donnell said the operators need not fear that the price would be below a point necessary to keep the industry in a healthy condition, and they could also feel assured that it would not be high enough to permit of profiteering. Mr. O'Donnell has resigned from the executive board of the association, as Mr. Requa did, in order more effectually to carry out the work they are doing for the Government. When the war is over they will both reënter the oil industry. Another point which Mr. O'Donnell impressed upon the association is that if the determination to win the war does not result in the requisite production of oil, the Government authorities would take the necessary steps to assure an ample supply for this country and for its Allies. In other words, so long as the United States has the oil the Government will see that the oil producers are supplied with drilling materials, and the Government expects them to produce the oil.

DENVER—May 17

Moffat Railroad Tunnel completion is now being planned by the Denver Civic and Commercial Association. The Government is to be urged to aid in this work. Arguments advanced for the tunnel completion are that it will afford an outlet for the immense coal reserves, both hard and soft, of northwest Colorado; that it will aid in developing the oil-shale industry, and that it will greatly assist in the settlement and use of the 4,000,000 acres of agricultural and grazing land now open to entry in the northwest part of the state. This tunnel will also make the "Moffat" road the shortest between Denver and Salt Lake City. Finlay MacFarland, president of the Denver Civic and Commercial Association, has appointed a committee of prominent Denver men to advise in this work. The Colorado State Grange, with membership of 15,000, and the Denver Trades and Labor Assembly will also assist.

SALT LAKE CITY—May 16

The Tintic Milling Co.'s report for 1917 is interesting as showing the outcome of an enterprise of worth to the district, and offering a solution of the problem of the treatment and disposal of local low-grade ores hitherto unmarketable. The net profit for 1917 from mill operations is not large, amounting to only \$12,281, but considering the difficulties of treatment of the ores, the high price of ores bought at current metal prices in the market, the cost of labor, interest paid on current bills and original in-

debtedness—the latter assumed on taking over the Knight-Christensen interests, the present company being practically a consolidation of the Knight-Christensen Metallurgical Co. and Mines Operating companies—the result is encouraging. The total revenue was \$542,265, and the operating expense \$491,444. The annual report by the company presages larger profits for the coming year, and it is stated that though the extraction has not been up to expectations, it has been sufficient to yield a fair profit. The mill was built at a total cost, with improvements, of \$207,442. The company was organized in 1915.

Little Cottonwood Transportation Company, a narrow-gauge line between Wasatch and Alta, has signified its readiness to start operations soon, by the publication of haulage charges for different classes of ore. These are made tentatively, it is said, with a view to covering costs and leaving a fair margin of profit. The rates are as follows: Ore valued at \$15 per ton or less, from Tanner's Flat to Wasatch, \$1.10 per ton; Sells mine and Wasatch Drain Tunnel to Wasatch, \$1.40; Alta to Wasatch, \$1.70 per ton. Ore valued at \$15 to \$35, Tanner's Flat to Wasatch, \$1.20 per ton; Sells and Wasatch Drain Tunnel to Wasatch, \$1.50; Alta to Wasatch, \$1.80 per ton. Ore between \$35 and \$50 per ton, Tanner's to Wasatch, \$1.30; Sells and Wasatch Mines to Wasatch, \$1.60; Alta to Wasatch, \$1.90 per ton. On ore valued above \$50, the above scales are \$1.40; \$1.70; and Alta to Wasatch, \$2 per ton. The average price for wagon haul on ore is \$3.50 per ton from Alta to Wasatch, and at times up to \$3.75 per ton, according to the condition of the roads. Up-freight from Wasatch to Tanner's, the proposed railroad freight rate is 12c. per cwt.; to Sells and Wasatch, 15c.; and to Alta, 20c. As outlined at present the railroad will operate only about seven months of the year, owing to heavy snows.

BUTTE, MONT.—May 16

Grading for the Southern Montana Ry. has been resumed. This road is being built by the Boston & Montana Development Co. from its mines to a point about 35 miles distant, connecting with the Oregon Short Line Ry. Efforts are being made to have this road completed and ready for operation about the last of August. In the course of a few weeks work is to begin on the erection of the concentrator to be built close to the mining property with the object of having it finished about the time the railway is ready for operation.

The Anaconda Company has nearly completed some improvements in the casting department of the converter building at the Washoe reduction works, in Anaconda, for the purpose of further economizing and to further aid in the Safety-First work. The casting machines will have direct drive from individual motors, instead of from the old shafting system, which has been discarded. Previously the heavy work was done by hydraulic power; now it is all electric. As the anodes come from the tank they are picked up by means of compressed-air lift and are lowered to the truck waiting in position to carry them to the car that is being loaded. Under the old system, the anodes were dropped on an inclined steel table and were lifted by two men as the truck was run underneath the edge. Many accidents happened because of this method of operation. Now occasions of accident are eliminated by the hoists, which lift the anodes by the "ears" and lower them from a swinging crane upon the truck, with the workmen standing well protected and out of range. Another improvement is the use of coal dust in firing the casting furnaces. The pulverized coal is brought by conveyors from the plant at the reverberatory building and is stored in bins, from which it is fed by gravity into a pipe, a fan run by motor drawing it through the pipe and feeding it into the furnace in a steady cloud. The new system entirely eliminates the grate firing, just as it has in the reverberatory furnaces. The capacity of the furnaces has been practically doubled, each one taking care of 200 tons of copper. The bins are of solid steel walls to guard against the possibility of a spark reaching the coal dust stored in them.

SPOKANE, WASH.—May 16

Henderson Bill Concerning Apex Law is made special order for further discussion May 16 by Northwest Mining Association. This association sent northwestern Congressmen tentative endorsement at former meeting, as follows: "We are advised Senator Henderson has introduced bill designed to remove necessity of litigation affecting extra-lateral rights of mineral claims by adoption of location laws similar to those prevailing in British Columbia and elsewhere which limit mining rights to ground lying between vertical planes passing through the boundary lines of claims that are 1500 ft. square. If we understand purport of this bill we strongly endorse the measure and request your hearty support thereof."

WALLACE, IDAHO—May 17

Research Fellowships in Metallurgy are offered at the School of Mines, University of Idaho, at Moscow, Idaho, in cooperation with the United States Bureau of Mines, through the generosity of the mine owners of the state. These fellowships are open to college graduates who have had good training in chemistry and metallurgy and who are qualified to undertake research work. The income of each fellowship is \$720 a year of 12 months, beginning July 1, 1918. For 1918-19 the following subjects are to be investigated: (1) Differential flotation—with especial reference to the zinc-lead ores of the Coeur d'Alene; (2) availability of western wood-oils for flotation concentration; (3) treatment of the complex gold-silver ores of southern Idaho.

Bureau of Mines Experimental Station maintained in connection with the Idaho School of Mines at Moscow has been successful in solving the problem of differential flotation as applied to the lead-zinc ores of the Coeur d'Alene district, according to a statement made this week by C. A. Wright, metallurgist in charge of the station. The work of the station has been largely devoted during the last few months to experiments with Coeur d'Alene ore, and so satisfactory have been the results that Mr. Wright announces that the processes evolved will soon be put into practical application in local mills. Another interesting announcement by Mr. Wright is that arrangements are being made for thorough tests of western pine, tamarack and other woods indigenous to the Rocky Mountain states with the view to obtaining flotation oil, and from the limited investigations already made he was hopeful that these tests would prove successful.

HIBBING, MINN.—May 15

Oliver Iron Mining Co. Shipped 12,141,386 tons of ore from the Hibbing district in 1917. The grand total for all the mines was 17,981,602 tons. The total shipped from the Lake Superior district, 64,437,003 tons. Of the 1917 shipment, 1,938,102 tons was shipped by rail. Shipments to the steel plant at Duluth consist of a large part of this tonnage. The Mesabi range, which is part of the Lake Superior district, shipped 64 per cent of its entire tonnage. Eleven mines of the Lake Superior district shipped over 1,000,000 tons, of which five were from the Hibbing district. They were: The Adams, Canisteo, Fayal, Hull-Rust, Kerr, Mahoning, Sellers, and Morris mines, from the Mesabi range, and the Newport, Norrie group, and Wakefield, from the Gogebic range. The 1917 shipments of the Oliver mines in the Hibbing district were: Burt, 692,017 tons; Hull-Rust, 6,461,443; Kerr, 1,586,409; Morris, 1,605,701; Philbin, 204,510; Sellers, 1,575,057; Winifred, 16,249; total, 12,141,386 tons. Independent shipments from the Hibbing district were: Agnew, 110,001 tons; Albany, 455,182; Cyprus, 29,024; Dale, 10,423; Grace, 81,815; Harold, 145,966; Laura, 105,515; Leetonia, 402,853; Madeira, 7125; Mahoning, 2,524,110; Midget, 113,003; Morton, 1832; North Star, 163,974; Smith, 253,223; Susquehanna, 609,198; North Uno, 177,028; South Uno, 99,992; Utica, 245,314; Warren, 94,030; Webb, 210,593; total, 5,840,216 tons. The total shipments from the Hibbing district amounted to 17,981,602 tons. These figures show the importance of the Hibbing district to the iron industry;

43.5% of the output of the range comes from Hibbing; 28% of the output of the entire Lake Superior region comes from this district. The Hull-Rust mine leads by shipping one third of the ore from this district. This one mine ships more ore than the total from any range except the Mesabi and Gogebic.

JOPLIN, Mo.—May 16

Shallow Lead Ore Near Racine, Mo., recently found, has encouraged operators to scramble for leases in that direction. The find was made when contractors started to excavate for a cellar on the Morrison land. It is believed by many mining men that the mineralized area extends from Lincolnville, Okla., east to Diamond, Mo., which would take in Racine.

A National Zinc Producers' Organization to be formed and a committee to leave for Washington this week to be present when the sheet-zinc makers are given new contracts for Government supplies is backed by over forty mining companies in this district who have agreed to pay \$20 per operating mill to make up a fund to be used by the committee. At meetings held at Picher, Okla., and Webb City, Mo., the last week, it was agreed a movement of this kind should be pushed as much as possible. A committee of four will go from the Tri-State Association at Picher and at least that many from the Webb City Association.

PHOENIX, ARIZ.—May 17

The World's Fair Mine, consisting of eight claims, is reported sold to an Eastern company, which already has taken charge. It is now being sampled by A. A. Holland for the purchaser. The mine was sold by Frank Powers, who in 1884 bought it from William Moran for \$100. Powers soon developed a silver bonanza, which he worked mainly for his own needs. The mine has produced lead-copper-gold-silver complex ores, common in this district. Development aggregates about 15,000 ft. of workings. The property is in Harshaw district, south of this point. It had its first location in 1879 and was abandoned before relocated by Moran.

The Ray Hercules Mill at Belgravia is expected to start up before the end of this month. It has been about complete for over a month, lacking only some electrical equipment and a few small but material odds and ends. There also has been delay in securing the essential railroad connection at Ray, where even now operation of the spur track to the filled ore bins is held up by an injunction. Handling of ore will be nearly automatic, from the skip hoist in the business section of Ray to the tailings dump at Belgravia, six miles distant. The mill capacity of 1500 tons per day is to be handled mainly by gravity, even on the railroad. The bins are already filled with ore that has come from extensions of haulage drifts. Drilling from the surface was stopped without fully defining the extent of the ore lenses, which are to be explored hereafter by lateral drifting. The upper part of the orebody is to be stoped down to the first level.

The Calumet & Arizona mines at Bisbee are affected, to a degree, as well as the later acquired property of the Lake Superior and Pittsburgh Company, by a decision of the Supreme Court of Arizona in the case of Cunningham vs. Costello. This concerns a claim of the heirs of Patrick Cunningham to at least one-half of the sums received by Martin Costello, of Tombstone, who sold about 20 mining claims in Bisbee in 1899 and 1904 to the C. & A. and the Lake Superior companies. Particularly affected is the famous Irish Mag mine, which for years was the principal producer of the C. & A. group. The main group originally was owned by James Daley, who fled from Bisbee after murdering deputy sheriff W. W. Lowther in 1890. Daley sent back a deed selling to Andy Mehan, a saloonkeeper, whose rights later were attacked by the Cohn Brothers, of Tombstone. Daley's wife claimed possession, however, and sold her interests for \$1800 to Martin Costello, a Tombstone saloonkeeper, who finally won from Cohn Brothers, after the case had gone to the United States Supreme Court. After securing title, Costello sold to the Calumet & Arizona for \$500,000, and later secured nearly as much for other mines from the Lake Superior company. Thereafter came new litigation, based upon a claim that Patrick Cunningham had supplied much of the money expended by Costello, and, in fact, was a full partner. This contention was sustained in the Superior Court of Coconino County, and now, after an additional eight years of litigation, has been approved, to a degree, in the Supreme Court, which finds that Cunningham undoubtedly was an equal partner in the claims at first sold and that he may have had equal rights in three or more of the

other claims. The case is remanded for trial with respect to the claims outside of the six especially referred to, which include the Irish Mag. There is another complication in a release that was secured from Cunningham's widow. The court specifically finds that this release will not affect the rights of the two Cunningham daughters.

TUCSON, ARIZ.—May 15

Twenty Prominent Citizens of Bisbee, Ariz., are at liberty under \$5000 bond following their arrest at Bisbee on indictments returned by the United States Grand Jury. Twenty-one men were indicted, the charge being "conspiracy to deprive a citizen of the United States of his legal rights in violation of Section 19 of the Penal Code." The men arrested today appeared before an acting United States commissioner at Bisbee and gave bond for their appearance at Tucson on May 28 for a preliminary hearing. All the men indicted are widely known in Arizona, and some of them have national reputations in mining and financial circles. The deportation which led to the indictments took place July 12, 1917, when armed citizens led by Sheriff Harry Wheeler rounded up 1186 men and loaded them on a special train of 24 cattle and box cars. The train, guarded by armed members of the citizen posse, was started for the state line. The Government came to the aid of the expelled crowd and provided a camp for them near Columbus, N. M. The deportation followed a strike which had been called at the mines about Bisbee and other parts of Arizona by I. W. W. officials in May, 1917. Two men were killed during the deportations. Prominent citizens among the indicted men declared today they believed the deportations were made for the good of the community and for the Government, in that the I. W. W. strike which prevailed in the district at the time was hampering production of copper badly needed in war time. When the strike was called, members of the I. W. W. began picketing the mines and agitators were sent into the district. After the deportations the strike was settled and work was resumed. A commission appointed by President Wilson to investigate the deportations reported that many of those deported had no connection with the I. W. W., but were business men, clerks and others not directly connected with the mines.

TORONTO—May 15

The Discovery of Nicolite and Smaltite near Doherty Station about 12 miles south of Timagami last fall has led to upward of 250 claims being staked in the district, which has attracted the attention of many Cobalt mining men. Several of the Cobalt companies have become interested in the field, and large numbers are engaged in prospecting and exploration work.

A New Gold District is reported in Quebec just over the Ontario line and a short distance east of the recent discoveries at Lightning River. So far little is known about it, but many are interested and the original discovery is considered promising. The section is easy of access, as it is only 20 miles from the railway and the trip can be made in a gasoline launch.

The Plate Mine at Sydney, N. S., of which further details of the arrangement made between the Canadian government and the Dominion Steel Corporation were given by Hon. C. C. Ballantyne, Canadian Minister of Marine, to the House of Commons on April 4, has accepted a contract from the government to take a minimum tonnage of 50,000 steel ship plates per year for five years. At the outset the price will be \$4.15 per 100 lb., but it will be readjusted every six months on the basis of the cost of steel ingots, with a maximum fixed at \$4.25. Should the price of ingots decline, that of steel plates will be lowered proportionately. Mr. Ballantyne said that the mill would probably be in operation in 12 or 15 months.

The Rising Prices for War Metals have resulted in greatly increased activity in Ontario, and leasing, which outside of Cobalt was formerly practically unknown, is now fairly common. This applies to mica, pyrite and more particularly fluorspar. In the section around Madoc a number of veins have been found and the shipments are becoming heavy. The veins are strong and well defined and occasionally swell out into pockets as much as 8 to 10 ft. in width. One or two of the larger companies are interested, but a considerable portion of the shipments is being made from small leases. In Quebec the mining of chrome ores is becoming of great importance and more and more attention is being paid to the deposits by both the mining companies and leasers. The ore usually occurs in serpentine and the distribution is erratic.

VICTORIA, B. C.—May 15

Exploration of Iron Ores in British Columbia has been facilitated by an amendment, at the last session of the Legislature, to that section of the Mineral Survey and Development Act of 1917 dealing with the drilling of mining properties. This act gives the Minister of Mines power, in diamond drilling a claim or prospect, to place a charge against such property of the cost of the work, together with a bonus equal to the total amount of the cost and interest at 6% per annum, computed annually. The amendment states that "in the case of iron mines, that is to say mines in which the iron recoverable from the ore is such that they are classed as iron mines by a resident engineer, no bonus shall be charged, and the amount payable to the Minister of Mines shall be the cost of the drilling or boring, with interest as aforesaid."

The Metalliferous Mines Inspection Act of British Columbia has received several changes from the British Columbia Legislature. One provides that all drills used must be provided with a water spray. This is aimed particularly at the stoper drill, which was used, at one time, to a large extent in the province and, in the majority of instances, without such an attachment. Another makes provision for substantial platforms at intervals of not more than 20 ft. in all shafts, whether vertical or steeply inclined. Formerly this rule applied only to vertical shafts. A third makes it obligatory for the inspector to post outside each mine a notice describing the condition in which he found the workings. This has been the rule in connection with coal mines, but has not been applied to metal mines until now.

The Esquimalt & Nanaimo Railway Belt is an area on Vancouver Island, estimated approximately 3296 sq. mi. The whole of the island comprises only about 17,000 sq. mi. and with respect of the minerals, there is applied both company and provincial regulations. This dual control has so complicated titles to claims within the section that the mining development within its limits has been seriously hindered. With a view to correcting this undesirable situation the Minister of Mines at the last session of the British Columbia Legislature asked for and obtained authority to enter into negotiations with the company looking to the establishment of a single authority in regard to the minerals of the E. & N. Belt, and that authority to lie in the hands of the province. It may be said, by way of explanation, that these lands were given the original builders of the railroad as a bonus for their enterprise.

A Bounty on Pig Iron manufactured in British Columbia is to be paid by the Provincial Government, according to a recent announcement by Hon. Wm. Sloan, minister of mines. A bill introduced in the Legislative Assembly provides that on pig-iron manufactured from ore mined in the province a bounty shall be granted not to exceed \$3 per ton and that a similar grant, not to exceed \$1.50 per ton, shall be allowed on pig iron manufactured in the province from ore mined outside its boundaries. This is considered in western Canada as the most important step taken in years to promote the iron industry in the Northwest. It is established that the province has immense bodies of unexploited magnetite deposits high in quality. All available reports of an authoritative character regarding the extent of these deposits have been assembled, and the result has been to satisfy the administration that the iron-ore resources are sufficiently important to warrant some progressive measure to induce development. The government has the power to diamond drill and to make entries on iron lands held for speculative purposes. This is to be done, and the expense charged to the property holders. If the owners then take no action, the law will be applied to force their action. At least this is the present prospect. A specialist on electric smelting is to investigate and submit a report on the best method of treating British Columbia iron ores. With information at hand as to the tonnage of the iron ore, the best method of treatment and the encouragement offered for local production of pig iron by the government, it is confidently believed that the basis of an important industry will be established in northwest Canada.

JOHANNESBURG—May 1

Tin Smelting in Johannesburg is a new industry and has been taken up by a well-known company, which has decided to carry on tin smelting on a commercial scale. A smelting plant has been erected, and contracts have been arranged for the entire output. The company, it is stated, is supplying the railways with all requirements.

The Mining News

ARIZONA

Cochise County

CALUMET AND ARIZONA (Douglas)—Smeltery production for April was 7,096,000 lb. copper, of which 4,374,000 lb. was available for the company.

Gila County

MOLINE-ARIZONA (Globe)—B. D. Baker, representing Walker & Sons, of Moline, Ill., reopening group of 21 claims about a mile from the Old Dominion smeltery. Shaft, down 400 ft., to be sunk to 1000 ft. and lateral development started.

MAZATZAL (Payson)—No. 1 adit passed 1000-ft. mark. Plan to sink a shaft 500 ft. from this adit and \$75,000 appropriated for new mining equipment. Property in charge of R. J. H. Bradley and situated 16 miles west of Payson.

Pima County

NEW CORNELIA COPPER CO (Ajo)—Copper production in April: Electrolytic cathodes, 2,806,000 lb.; from cement copper, 500,000 lb.; from smelting ores, 422,000 lb.; total, 3,728,000 pounds.

EL TIRO COPPER CO. (Tucson)—Silver-bell district property has been sued by the American Finance and Securities Co. for \$191,029.51. The company has been bankrupt and in litigation for several years.

MAGNATE COPPER CO. (Tucson)—Drift from shaft showing silver.

OLD HAT (Tucson)—At recent meeting the following officers were elected: President, S. H. Keeney; secretary-treasurer, F. O. Wiley; directors, C. N. Wilson, H. A. Walker, E. E. Heller, and T. J. Gore.

Pinal County

ELDER (Kelvin)—A. L. Kelly has taken over the Nieman-Elder group, north of town. Molybdenum ore was developed in the upper workings, but lead-silver-copper ore is mostly in evidence.

RAY-KELVIN MNG. CO. (Kelvin)—Organized by W. E. Cogdell, A. L. Kelly and J. E. Pascale to develop the Branch group of 24 claims north of Kelvin and adjoining the Ray Lead Development ground. In addition to the lead-silver ores, there is a vein in serpentine containing asbestos.

U. S. VANADIUM (Kelvin)—Work resumed in mine with three shifts. Milling ore previously broken. Large storage tanks for fuel oil recently installed at Erman siding.

GALIURO MOLYBDENUM CO. (Mammoth)—Plan to build molybdenite mill on Child's property 10 miles distant. W. R. Ramsdell, of Tucson, in charge.

RAY SILVER-LEAD (Ray)—To provide additional mining equipment.

MAGMA CHIEF COPPER CO. (Superior)—Watson tunnel approximately 1900 ft. Tunnel recently passed through heavy deposit of manganese carrying some silver, but no trace of copper yet.

Santa Cruz County

HARDSHELL (Harshaw)—Preparations to churn drill property. Old shaft being retimbered and some development to be done through the old workings. H. K. Welsh is in charge.

PRUDENTIAL M. & M. CO. (Nogales)—At annual meeting, I. G. King was elected president, Louis Hudgin, treasurer and secretary, and I. Burgoon vice president.

Yavapai County

HUMBOLT CON. MINES CO. (Humbolt)—To begin work on No. 2 shaft, now down 230 ft. J. U. Jagers has arranged for financing all necessary development.

CALUMET & JEROME (Jerome)—Main crosscut penetrated 1530 feet.

MAYER ORE PURCHASING CO. (Mayer)—Has leased old Grey Eagle mill and ready to buy custom ore. Capacity 100 tons for oil-flotation process, and 60 tons coarse concentration. Company will act as purchasing agent for ores sampled and shipped to outside smelteries.

ARKANSAS

Independence County

ARKANSAS-OKLAHOMA (Batesville)—Company recently acquired from Nathan Adler lease on manganese property on Cave Creek, and to install a washer. Luther Evans will superintend installation.

ARK. PHOSPHATE (Cushman)—Hanford and Shepherd have lease and are experimenting preparatory to installing washer for treating manganese ore.

GEORGE LAND (Cushman)—Purchased by C. M. Fenton, of Joplin, Mo., and North Arkansas; comprises 40 acres land on Laferty Creek. To install washer.

PAGE (Cushman)—Stanley Hanford has 30-acre lease two miles north. Started work on first shaft. High-grade manganese.

Marion County

MONKEY HILL (Flippin)—Crude oil engines purchased for mill to be installed at once; other mill improvements being made.

HAWKEYE (Rush)—Arkansas Zinc company erecting new concentrating plant.

SURE POP (Rush)—Moving equipment to Allen land in manganese field near Batesville, where J. C. Shepherd and associates are installing new washer.

CALIFORNIA

Calaveras County

PENN COPPER (Campo Seco)—High-grade orebody recently developed. Wages of miners to be increased 50c. and smeltermen 25c. per day.

CHROME DEPOSITS situated near Copperopolis and extending northwest from Stanislaus River to Calaveras River being prospected and developed by several lessees. J. A. Vorhees and J. H. Borie contemplate transporting ore across the Stanislaus by wire cable tram and hauling with motor trucks from the river to Keystone, a station on the Sierra railway. Charles Stone and L. L. Coffey are operating the Longton property under lease.

Inyo County

WILSHIRE BISHOP CREEK (Bishop)—To be unwatered and development resumed. Jess Riley is superintendent.

Marin County

BOLINAS COPPER MIN. CO. (Bolinas)—Ore mined on 300-ft. level. Crusher installed and crushed and sorted ore sent to Selby. Company is generating light and power with gasoline engine.

Placer County

PARKER CHROME (Auburn)—New mill for crushing ore for shipment about completed. Orebody disclosed by tunnel.

CHROME DEPOSITS near Forest Hill reported to be attracting a number of prospectors. Irving Hewes said to have about 40 tons in sight at the old Finning sawmill. State Mining Bureau reports record two small deposits on Forest Hill divide.

San Bernardino County

POTASH BRINE ZONE, of Searles Lake region, extending north into Inyo County, opened to leasing by Department of the Interior. Embraces eight square miles of saline deposit 40 miles northeast of Randsburg. Connected by Trona railway from Searles station, on Southern Pacific, to Trona, on the Lake, and by automobile and motor truck road from Johannesburg.

MINNIETTA (Johannesburg)—New lead plant about completed. Expected to increase production about 40% above the former silver-lead recovery.

UNITED TUNGSTEN-COPPER (Randsburg)—To install 50-ton mill. Situated in the pine belt of the San Bernardino range. Copper holdings are in Arizona.

GOLD-BEARING DIKE discovery in Death Valley reported at Randsburg.

Ventura County

FELDSPAR on Entriken property, near Porterville, worked by Riverside Portland Cement Co. Extraction suspended on account of shortage of cars for shipping to Riverside works.

COLORADO

Gilpin County

PERIGO (Central City)—Old gold mine in northeast part of county to be reopened.

Gunnison County

AKRON (White Pine)—Air compressor to be installed. Mill to be entirely remodeled to handle low-grade mixed sulphide ores. Auto trucks haul to Sargents, on Denver & Rio Grande Railroad.

San Juan County

ARIADNE (Gladstone)—Arrangements being made to reopen this property. A. B. Iles is manager.

YELLOW ASTER (Eureka)—Reopened and active development work under way. Owned by J. W. Easley.

ST. LAWRENCE (Silverton)—To be reopened by St. Lawrence Leasing Co., and development continued.

SUNSET (Silverton)—To be reopened.

San Miguel County

TOMBOY (Telluride)—On April 29, new change house under construction at mine, and almost completed, caught fire in some unknown manner, and was completely destroyed. Loss \$6000. New building to be equipped with steel lockers to be started at once.

Summit County

PARK CITY DISTRICT shipments in final form for April were 8864 tons.

PARK-UTAH (Park City)—North and south drifts advancing rapidly, latter expected soon to cut McHenry fissure.

Teller County

W. P. H. MINE (Cripple Creek)—Second shipment from new 900-ft. level discovery returned \$50 per ton. Mine owned by United Gold Mines Co.

IDAHO

Shoshone County

HECLA (Wallace)—Company has lease on Green Hill-Cleveland mill, owned by Federal company, and to relinquish lease of Marsh mill, on Nine Mile. Leased mill is used exclusively to handle lead-zinc ore from Ore-or-No-Go vein, original Hecla vein being clean lead and company's mill not equipped to recover zinc. Green Hill mill much nearer mine and will save transferring ore in transit, both from mine to mill and from mill to smeltery.

KANSAS

Joplin District

LAWYERS (Trecee)—A 36-acre tract taken over short distance west of Trecee for reported consideration \$100,000. Had been developed by Boston investors represented by W. H. Tylee.

MICHIGAN

Copper District

FEDERAL SYNDICATE (Calumet)—Has taken over Bear Lake Pool property; began to enlarge pit 40 ft. deep May 6.

SENECA (Calumet)—Sunk vertical shaft 47 ft. in first six days of May.

FRANKLIN (Demmon)—New drift started on Pewabic amygdaloid lode south on bottom level, 37th, in good ground.

QUINCY (Hancock)—April output about 100,000 tons. Giving trammers double pay for working Sundays.

NORTH LAKE (Lake Mine)—New lode southeast drift 8th level, indicated by No. 10 diamond drill hole.

MASS (Mass City)—Force of only about 325 men underground; should be 500.

MICHIGAN (Rockland)—April output 2787 tons. After shipping 51,000 lb. of mass in April, over 30,000 lb. more has accumulated. Rich showing on Ogimah lode at 8th level.

VICTORIA (Victoria Mine)—April output 101 tons, as against 110 for March and 135 for February; yield over 14 lb. refined copper per ton; has averaged 15 lb. per ton since October, running up to 17 in February; never before over twelve.

MISSOURI

Joplin District

MARY L. (Joplin)—Small mill on Missouri Z. & L. Co.'s, tract used for custom work destroyed by fire; loss about \$8000. Had been recently erected.

OKLAHOMA MINING CO. (Seneca)—Mill estimated at \$75,000 cost to be erected. Sludge tables, crushers, engines and boilers to be purchased. C. T. Jobs in charge. C. B. Bettis, of Joplin, is president.

MONTANA

Blaine County

UNITED MINES (Wood River)—To go on producing basis in 30 days with remodeled 100-ton mill. Thomas S. Griffith is president.

Granite County

PHILIPSBURG DISTRICT—Twenty mines producing manganese ore at rate of 15 to 20 carloads per day.

PHILIPSBURG MINING CO. (Phillipsburg)—Concentration in operation and treating 300 tons crude manganese ore per day of three shifts.

NEVADA

Esmeralda County

CUPRITE DISTRICT—Sulphur deposits 15 miles from Goldfield have recently shipped three carloads to Los Angeles.

GOLDFIELD DISTRICT—Development continues throughout wide area and results during week satisfactory. Deep work at several points believed to be nearing ore-bearing zones.

ATLANTA MINES CO. (Goldfield)—Opening up ground on 1900 level at point where main vein comes in contact with shale.

BLUE BULL (Goldfield)—Manager D'Arcy now extending main drift on 250 level to cut rich oreshoot on which winze was sunk 70 ft. from 100 level. Deeper drift found in bad condition at some places, but has been repaired and now being advanced to reach oreshoot, probably 100 ft. from face.

GOLDFIELD CONSOLIDATED (Goldfield)—Mill treating large tonnage of tailing, from pond below plant, in addition to ore of medium and low grade from various parts of the Mohawk, Combination, Laguna, Jumbo, Clermont and Grizzly Bear mines. Lessees also extracting considerable ore from old workings and in following up narrow seams exposed in the old stopes. At Aurora better grade of ore being extracted than for several years and the mill treating 500 tons daily.

GRANDMA CON. (Goldfield)—Conditions in main shaft at a depth of 750 becoming increasingly interesting with appearance of quartz containing metallic elements and of a darker color than that which has been found mixed with the latite. J. K. Turner is engineer.

GREAT BEND (Goldfield)—Work progressing in Lockhart lease shaft, near eastern extremity of property.

SANDSTORM KENDALL (Goldfield)—Some exceedingly high-grade ore extracted lately by lessees.

SILVER PICK CON. (Goldfield)—Development continued on 250 level, where good assays secured in exploring large zone of quartz. Will proceed to sink main shaft, now 1100 ft. deep, to 1500 ft.

Lynn County

COMO CONSOLIDATED MINES CO. (Dayton)—Taken over by Truett, Taylor & Bonneau, Inc., of 8 W. 40 St., New York, N. Y., on Nov. 1, 1917. Have been opening up ore reserves and reconstructing 80-ton mill and also erecting employees' buildings, administration buildings, and a 10-mile private telephone line to Dayton. Also purchased two 3½-ton four-wheel drive motor trucks and one 1½-ton truck to increase mill capacity to 300 tons per day. R. K. Humphrey is in charge.

Nye County

CON. SPANISH BELT M. CO. (Manhattan)—Tunnel driven 1052 ft. in the old Barcelona mine in the Toquima range toward Ernst vein. Expert vein in 50 ft. Property is between Manhattan and Belmont.

MANHATTAN CONSOLIDATED (Manhattan)—A north crosscut from the fifth level station started to prospect block of Morning Glory limestone crossed in shaft sinking just below the fifth level.

WHITE CAPS (Manhattan)—West drift 307 extended now 131 ft. The 21-ft. advance all in ore; drift discontinued, as western limit of shaft orebody has been reached.

Raise 504 now up from level 128 ft. with excellent grade ore showing. Mill for week averaged 143 tons per day.

WHITE CAPS EXTENSION (Manhattan)—Since striking the block of limestone 130 ft. has been made.

UNION AMALGAMATED (Manhattan)—Ore milled extracted from raise from bottom level on Swanson orebody. Grade disappointing, although some bunches high grade served to sweeten average.

TONOPAH DISTRICT ore production for the week ended May 4 totaled 10,324 tons, of an estimated gross milling value of \$175,508. Producers were: Tonopah Belmont, 2094 tons; Tonopah Mining, 3300; Tonopah Extension, 2360; Jim Butler, 642; West End, 1013; MacNamara, 687; Montana, 180; and miscellaneous, 48 tons.

JIM BUTLER (Tonopah)—Raise 415 in Desert Queen part of mine opened vein 5 ft. wide in good ore, but cut off by fault.

LOUISIANA CON. MINING CO. (Tonopah)—Recently started operations treating by wet concentration heavy-sulphide ore in 75-ton mill at Tybo, 70 miles northeast. H. A. Morrison is superintendent.

TONOPAH-BELMONT (Tonopah)—March cleanup evaluated at \$280,000. First cleanup in April under average, but total for month expected to equal that of March.

TONOPAH EXTENSION (Tonopah)—New sinking pump ordered with view to deepening Victor shaft, first to 1750 level and later to 1850 level.

WEST END CONSOLIDATED (Tonopah)—Putting shaft in Ohio ground in condition.

OKLAHOMA

Joplin District

CHOCTAW CHIEF (Hockerville)—Construction begun on new mill.

SANTA FE (Hockerville)—Has completed shaft sinking to lower level and begins operation of new 400-ton mill this week.

TEXAS (Hockerville)—Started operation of new 150-ton mill a short distance southwest of town. Has good tonnage on dump.

BIG EIGHT (Miami)—Won suit as defendant in case filed to invalidate lease and once more pushing development. Two shafts being sunk to ore at 145 feet.

PORTLAND LEAD AND ZINC CO. (Miami)—Property purchased by new interests which will incorporate, develop and erect a mill.

YELLOW JACK (Miami)—Making good drill strikes on its lease and to develop fully. J. A. Carr, of Frederick, is president.

WAXAHACHIE (Oklahoma City)—Building 200-ton mill in Leadville, Okla. Expect to operate by July 1. Harry McIntosh, of Waxahachie, Tex., is president; Alford Hare is manager.

MINERAL BELT INVESTMENT (Picher)—Preparing to operate manganese mine in Polk County, Arkansas.

BLACK EAGLE (St. Louis)—Construction begun on new mill to be completed in 60 days. Two shafts in ore. Bothered somewhat by heavy water.

SOUTH DAKOTA

Lawrence County

HOMESTAKE (Lead)—The wages of employees have been increased and took effect on May 1. The percentage bonus which has been added to the regular wages will be discontinued and a new scale adopted. Under the new schedule a miner will receive \$4.25 per day for the duration of the war and a shoveler will receive \$3.85. After the war comes to an end, the same class of labor will receive under the new permanent scale \$4 and \$3.60 per day, respectively.

MOGUL MINING CO. (Terry)—Main tunnel advanced 850 ft. and to be continued 600 ft. further.

JUNO (Trojan)—Oberto and Arpino have leased mine and are making regular shipments to Mogul plants for treatment.

UTAH

Salt Lake County

ALTA TUNNEL & TRANSPORTATION (Alta)—Tunnel 325 ft. from point under outcrop of Prince of Wales fissure. Length now 3228 feet.

SOUTH HECLA (Alta)—Ore accumulated and awaiting shipment. Ore carbonate stope in western end producing well, and opening up sulphide stope in eastern end 3000 ft. distant.

MONTANA-BINGHAM (Bingham)—Two cars weekly shipped from Fortuna ground. Mill not operating at present.

WASHINGTON

Ferry County

FLUORSPAR (Keller)—Cons. Mining and Smelting Co., of Canada reported to have taken an option on three claims five miles north of Keller owned by H. C. Mitchem, of Spokane. Ore said to be high in fluor-spar.

CANADA

British Columbia

LANARK MIN. CO. (Hillcillewaet)—Installing 250-hp. hydroelectric plant. Property equipped with 100-ton concentrator treating lead-silver ore. W. B. Doenberg is president and manager.

SILVERSMITH MINES, LTD. (Slocan)—Organized to take over Slocan Star. Equipped with 100-ton concentrator for flotation. R. R. Stewart to take charge.

STANDARD SILVER-LEAD (Slocan)—New strike followed 350 ft., with ore still in the face. Width five to 12 ft. and of milling grade. W. J. C. Wakefield is president.

Nova Scotia

DOMINION STEEL CORPORATION (Sydney)—New coke-oven plant being installed, comprising 120 byproduct ovens of the Koppers type of 11.3 tons each, with guaranteed output of 1320 tons daily on 16-hour coking time. The first unit of the plant, consisting of 60 ovens, to be in operation before June and the second unit about a month later.

Manitoba

GOLD PAN (Rice Lake)—Shaft down 176 ft., and vein widened considerably.

MANDY (Schist Lake)—Mine has accumulations of copper ore ready for shipment to Trail.

Ontario

CORDOVA MINES, LTD. (Toronto)—Have 1200 electric hp. available for making ferrochrome, which expect to produce at rate of 100 tons per month. P. Kirkegaard is managing director at 33 Sun Life Bldg.

ASSOCIATED GOLDFIELD LTD. (Larder Lake)—Shaft on Haris-Maxwell claims down 500 ft. Sinking continued. Shaft on Doctor Reddick claim being unwatered preparatory to sinking. 2000 cu ft. compressor installed. Hydroelectric plant increased to 1500 kw. capacity.

JONES CLAIMS (Porcupine)—Camp buildings being erected and a road built preparatory to development.

WEST DOME (Porcupine)—Contract given for 1000 tons of ore to be treated at Dome Lake mill.

BRITISH AMERICAN NICKEL CORP. (Nickelton)—Negotiating for property in which to erect a refining plant, and decided on site on the Hull side of the Ottawa River.

WASAPIKA (West Shining Tree)—Sale of stock for installation of a 60-ton mill.

MINING CORP. OF CANADA (Cobalt)—Work on the Alexandra discontinued and exploration transferred to Waldman.

PENN CANADIAN (Cobalt)—Considerable damage done by a fire, which broke out in the power house on May 10.

TEMISKAMING (Cobalt)—Mill closed down for lack of ore. Underground work to be speeded up.

CANADIAN KIRKLAND (Kirkland Lake)—Surface work has resulted in the discovery of several veins.

ELLIOTT-KIRKLAND (Kirkland Lake)—Main shaft now down 515 ft. At 400 level vein crosscut 35 ft. from shaft. A level to be established at 525 ft. and downward continuation should be crosscut in 40 feet.

MINAKER (Kirkland Lake)—Foundations being laid for machinery.

MONTREAL KIRKLAND (Kirkland Lake)—Trenching, stripping and sinking test pits.

KEELEY (South Lorrain)—High-grade silver ore being shipped, a part being on hand from former operations.

SOUTH AMERICA

Peru

CERRO DE PASCO (Cerro De Pasco)—Production of blister copper in April was 5,952,000 pounds.

AFRICA

Belgian Congo

UNION MINIERE DU HAUT KATANGA (Elizabethville)—Produced in April 4,695,798 lb. copper.

The Market Report

SILVER AND STERLING EXCHANGE

May	Sterling Exchange	Silver		May	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
16	4.7550	99½	48½	20	4.7550	99½	48½
17	4.7550	99½	48½	21	4.7550	99½	48½
18	4.7550	99½	48½	22	4.7550	99½	48½

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

May	Copper		Tin		Lead		Zinc
	Electrolytic	Spot	N. Y.	St. L.	N. Y.	St. L.	St. L.
16	*23½	↑	6.85	6.70	6.85	6.70	7.30
17	*23½	↑	@6.95	@6.75	6.85	6.70	@7.35
18	*23½	↑	@7.00	@6.75	6.85	6.70	7.30
20	*23½	↑	@7.00	@6.75	6.85	6.70	7.25
21	*23½	↑	6½	6.70	@7.00	@6.75	@7.20
22	*23½	↑	@7.00	@6.75	6.90	6.70	7.17½

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

† 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 cakes 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 20c. per 100 lb. above St. Louis.

LONDON

May	Copper		Tin		Lead		Zinc
	Standard	Electrolytic	Spot	3 Mos.	Spot	3 Mos.	Spot
16	110	110	125	364	364	29½	54
17	110	110	125	363	363	29½	54
18	110	110	125	363	363	29½	54
20	110	110	125	360	360	29½	54
21	110	110	125	360	360	29½	54
22	110	110	125	360	360	29½	54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb. For convenience in comparison of London prices, in pounds sterling per 2,240 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—May 22, 1918

The most interesting feature of the market this week was copper, in which there were all kinds of surmises respecting an advance in price at the conference on May 22. Lead was distinctly stronger. On the other hand, zinc was easier. Also, in tin the situation seemed to be easier.

Copper—The situation in general remained the same as in previous weeks. The American and foreign governments placed

some very large orders. Domestic brass makers and other manufacturers are going to make larger use of cathodes, their disposition being to use all the copper in that form that they can, so as to cooperate with the producers.

The meeting between the copper producers and the War Industries Board on May 22 was largely attended. Up to the time of closing this report we had not received news of the action with respect to the price for copper.

Copper Sheets are quoted at 31½c. per lb. for hot rolled, and 1c. higher for cold rolled. It is said that some manufacturers have increased their prices. Copper wire is quoted at 27c. f.o.b. mill, carload lots.

Tin—The market was easier this week, owing to the desire of some importers to sell, their movements being apparently in anticipation that Banka shipments would be resumed. Their selling brought Banka down to 95c. c.i.f. American ports, while Chinese for May-June shipment was offered at 94@95c., but the Chinese and Japanese houses were averse to selling. A lot of Chinese No. 1 tin, 99%, sold in this market yesterday at \$1.03½. The London quotation came down to £360, but, at the same time, Singapore quoted £381, c.i.f. London. The London quotation is only nominal. In fact, there is no free market in Straits tin anywhere. Only two American concerns and six or seven British are allowed to buy in Singapore.

Lead—There was an increased volume of inquiries, and an increased transaction of business, our reports for the week footing up to more than 2000 tons. The price of 7c., New York, which has been maintained right along by the A. S. and R. Co., was realized early in the week. The St. Louis market rather lagged behind. It looks now as if the small producers have disposed of all the lead they want to, or have got to sell, and the market must rise to the price asked by the big producers, who are themselves more or less behind in their deliveries.

Zinc—The advance in this market culminated on Thursday, after which it became very dull, and eased off on offerings by brokers and speculators who had purchased at lower levels for a turn. Only a part of the Government's order for 2000 tons was placed last Friday, the officials being apparently dissatisfied with the prices tendered. It is understood that the order that was placed was booked at 7½c., New York. This was for Grade C spelter, which is worth a little more than common.

Zinc Sheets—Unchanged at \$15 per 100 lb., less usual trade discounts.

Aluminum—The price quoted is the Government price of 32c. per lb.

Antimony—This metal was in better demand, and business of considerable magnitude was done. We quote spot at 12½@12¾c. for the week, with 12¾c. at the close. We quote futures at 11¼@11½c., c.i.f., in bond.

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

Cadmium—This metal is quoted at \$1.40 per pound, unchanged.

Nickel—Market quotation is 40@45c. per pound.

Quicksilver—We quote California virgin at \$118@120. San Francisco reports by telegraph \$112.50, quiet.

Gold, Silver and Platinum

Silver—Market remains stationary, in London at 48½d. per oz. and in New York at 99½c. per oz. Exports from New York for the week ending May 18 are reported at 1,833,950 oz. and for the month of April from San Francisco 7,749,600 ounces.

The general stock of money in the U. S. on May 1 totaled \$6,540,954,630; of this \$3,042,711,222 was in gold coin and bullion, \$538,532,139 in standard silver dollars and \$228,034,831 in subsidiary silver. Money in circulation on May 1 was \$5,318,546,717.

Mexican Dollars at New York: May 16, 77; May 17, 77; May 18, 77; May 20, 77; May 21, 77; May 22, 77.

Platinum—Price fixed at \$105.

Palladium—Price fixed at \$135.

Iridium—Price fixed at \$175.

Ore Markets

Joplin, Mo., May 18—Blende, per ton, high, \$77.30; basis 60% Zn, premium, \$75; Class B, \$55; prime western, \$43.50@40; calamine per ton, basis 40% Zn, \$35@25; Average selling prices: Blende, \$45.20; calamine, \$33.42; all zinc ores, \$44.63.

Lead, high, \$87.20; basis 80% Pb, \$84@80; average selling price, all grades of lead ore, \$82.09 per ton.

Shipments the week: Blende, 8358; calamine, 421; lead, 1737 tons. Value, all ores the week, \$534,440.

The allocating of high-grade ore is being erroneously based upon the production of all grades of ore, and is creating a discouraging situation. The first week, each producer enumerated among those producing rolling mill special was allocated a selling portion of 73%. The second week this dropped to 51% and this week to 45%, and the saving of this special ore is daily receiving more and more attention. One producer is quoted as saying he believed it would soon drop to 30% allotment, and a buyer is credited with a remark that it would probably drop to 20%, unless the Government came to the rescue.

Platteville, Wis., May 18—Blende under new basis of \$75 base for premium grade. The highest price paid for the week's best product was \$70.75 per ton, ranging down to \$45 base for second grade high lead blende. Lead ore, basis 80% Pb, \$80 per ton. Shipments reported for the week are 2895 tons blende, 69 tons galena, and 993 tons sulphur ore. For the year to date the totals are 50,189 tons blende, 2705 tons galena, and 21,030 tons sulphur ore. During the week 3114 tons of blende was shipped to separating plants.

Antimony Ore—No business reported.

Chrome Ore—Unchanged at \$1.50@1.55 per unit, f.o.b. shipping points, for 45% grade. The situation seems to be a little easier.

Manganese Ore—Unchanged at \$1.20@1.30 per unit for metallurgical ore, 48% grade.

Molybdenum Ore—Unchanged at \$1.25 per lb. for 90% grade.

Pyrites—Spanish lump is quotable to those who possess a license from the Government at 17c. per unit on the basis of 9s. ocean freight, buyer to pay war risk, less 2% and excess freight. No change is predicted before Oct. 1 unless the War Board makes some modification. The prices for domestic pyrites depend on the location of the mine, freight rate, etc.

Tungsten Ore—Unchanged at \$24 for scheelite and \$19@24 for wolframite.

Iron Trade Review

PITTSBURGH—May 21

Operating conditions in the iron and steel industry have continued to improve, and the position is now such that the trade considers it much more important to strive to maintain the rate of output than to increase it. Means are being sought to forestall the decrease of 10 to 20% in output that has always occurred in July and August, and thought is also being given to next winter. The Carnegie Steel Co. is now operating 54 of its 59 blast furnaces, or two more than a fortnight ago, and its output, proportionate to rate capacity, is now running at 94% in pig iron and 93% in ingots, this comparing with 85% to 90% in pig iron and 85% in ingots in April and about 60% in both in January and February. The present rate, indeed, is better than was expected, as with everything under such strain full operation can hardly be counted upon. The fact that steel production bears substantially the same ratio to capacity as does pig-iron production is especially gratifying, indicating that there is no great shortage of scrap. It is probable, however, that much shell-discard steel is being remelted, when if the Government were not so anxious for a full diversion of

the steel output to war purposes, the discard steel would be sold for commercial purposes.

The Steel Corporation has bought a considerable tonnage of ingots in the last 10 days, which will be distributed among the subsidiaries that can roll the steel to best advantage into forms useful in connection with the war.

Little information of interest to the trade has been given out regarding the arsenal to be built on Neville Island, five miles down the Ohio River from Pittsburgh. The Steel Corporation will own and operate the steel plant, and will also build and operate the gun and projectile plant, the Government furnishing all the money for the latter, the corporation supplying gratis all the engineering and other technical services required.

Practically no business in commercial steel is being done, and deliveries on old commercial orders are greatly restricted, except that certain industries, recognized as most useful in helping indirectly to win the war, are being fairly well supplied.

Pig Iron—The census to determine what customers intend doing with the pig iron they have on order is well under way, and when completed will furnish the basis for distributing all the merchant pig-iron output, to place it where it will do the most good. Current transactions are light and are confined almost exclusively to the filling of war requirements.

Steel—As noted, the Steel Corporation has purchased a considerable tonnage of ingots. No soft steel billets are available for the general trade, and shell-discard steel is scarcer, although the manufacture of shell steel is steadily increasing.

Ferroalloys

Ferromanganese—The ferroalloys subcommittee urges all consumers of ferromanganese to use 70% instead of 80% and has ruled that contracts for 80% should be converted into contracts for 70%, tonnage to be modified so as to involve the same total manganese content.

Coke

Coke—Shipments of Connellsville coke have increased only slightly, but there has been a considerable increase in shipments of coal for byproduct coking. The blast furnaces that are in operation are now almost fully supplied with coke, but there are a few out of blast that cannot get in until more coke is available.

STOCK QUOTATIONS

Table with columns for N. Y. EXCH.† May 21 and BOSTON EXCH.* May 21. Lists various stocks like Alaska Gold M., Alaska Juneau, Am. Sm. & Ref., etc.

Table with columns for N. Y. CURB† May 21. Lists various commodities like Big Ledge, Butte & N. Y., Butte Detroit, etc.

Table with columns for BOSTON CURB* May 21. Lists various stocks like Alaska Mines Corp., Bingham Mines, Boston Ely, etc.

Table with columns for SAN FRAN.* May 21. Lists various stocks like Alta, Andes, Best & Belcher, Caledonia, etc.

Table with columns for TORONTO* May 21. Lists various stocks like Adanac, Bailey, Beaver Con., Chambers Ferland, etc.

STOCK QUOTATIONS—Continued

Table with columns for COLO. SPRINGS May 21 and LONDON Apr. 15. Lists various stocks like Cresson Con., Doctor Jack Pot., Elkton Con., etc.

MONTHLY AVERAGE PRICES OF METALS

Table showing monthly average prices for Silver in New York and London from 1916 to 1918.

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

Table showing monthly average prices for Copper in New York and London from 1917 to 1918, categorized by Electrolytic, Standard, and Ele rolytic.

Table showing monthly average prices for Tin in New York and London from 1917 to 1918.

Table showing monthly average prices for Lead in New York and London from 1917 to 1918.

Table showing monthly average prices for Spelter in New York and London from 1917 to 1918.

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

Table showing monthly average prices for Pig Iron, Bessemer, Basic, and No. 2 Foundry from 1917 to 1918.