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CANADIAN

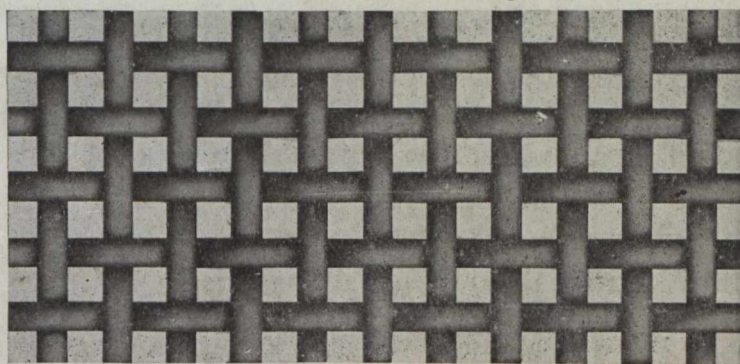


MINING JOURNAL

VOL. XL

MONTREAL

No. 3



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Another Shaft Record for Rotators

THE SENECA SHAFT, at Mohawk, Michigan, near Calumet, claims a new record for fast sinking. During May, June, July, August and September 994 feet of four-compartment shaft was sunk. The shaft is 11 ft. 4 in. x 21 ft. 4 in. in size, and will meet the Kearsarge amygdaloid when completed. On Sept. 30, it was 1312 ft. deep.

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FOR RAPID SINKING USE ROTATORS
Bulletin 670-F

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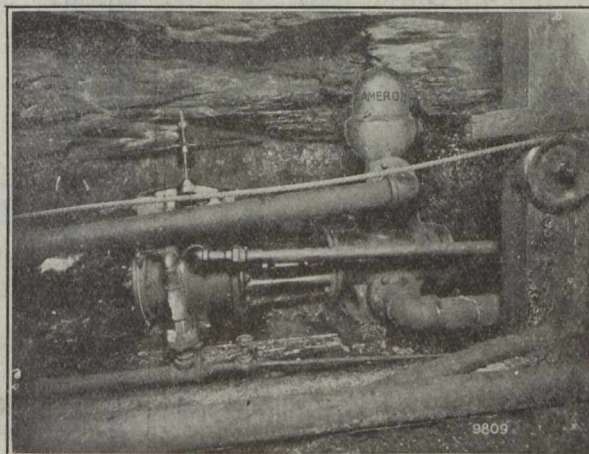
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p. 122 "Subways and Tunnels of New York."

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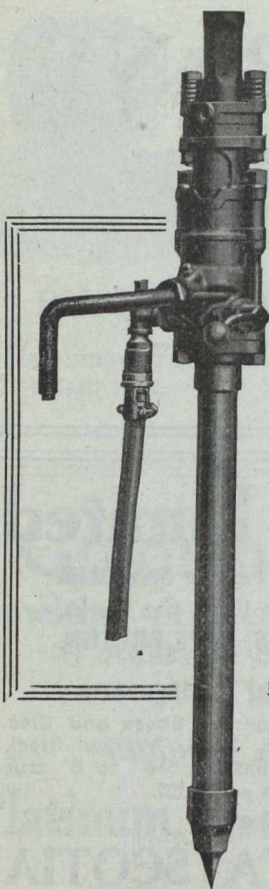
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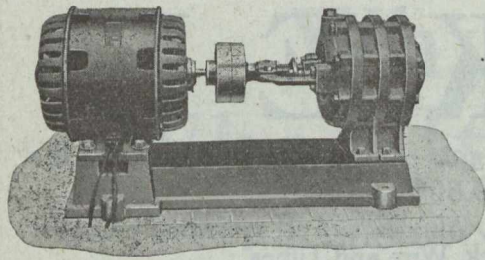


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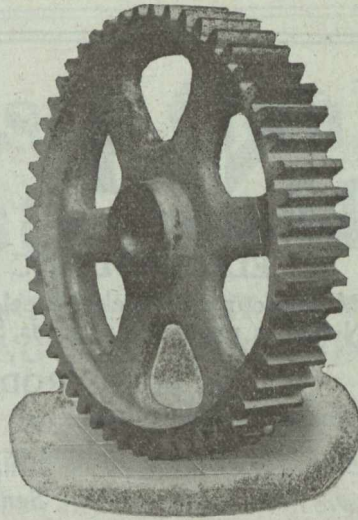
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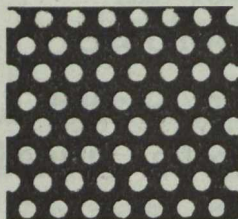
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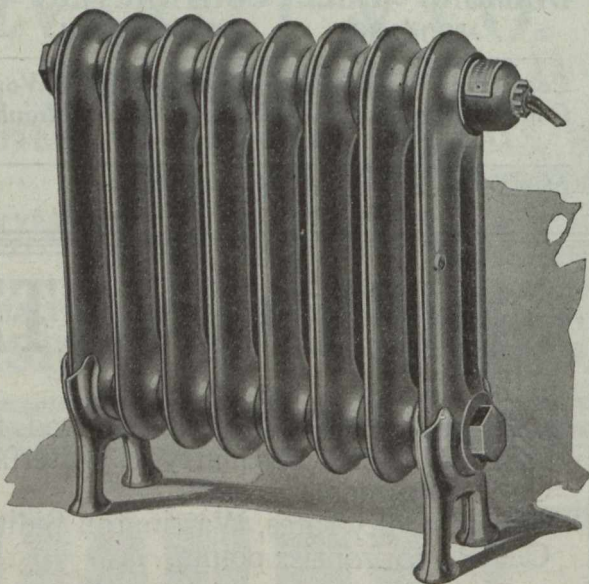
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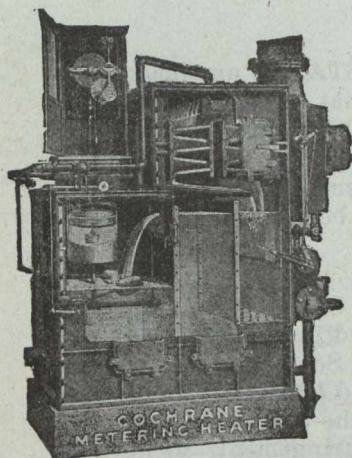
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Is the registered owner of the following Canadian patents: Nos. 76,621; 87,700; 94,332; 129,819; 94,516; 96,182; 96,183; 99,743; 127,397; 129,820; 134,271; 135,089; 137,404; 142,607; 147,431; 147,432; 148,275; 151,479; 151,480; 151,619; 151,810; 157,488; 157,603; 157,604; 160,692; 160,693; 160,694; 160,846; 160,847; 160,848; 160,849; 160,850; 160,937; 163,608; 163,707; 163,936; 164,587; 165,390; 166,415; 167,474; 167,475; 167,476; 167,603; 187,263.

On December 11, 1916, the SUPREME COURT OF THE UNITED STATES unanimously adjudged our basic patent for air-froth-flotation to be valid, holding that this patent covers any process of froth flotation wherein the results obtained are such results as are secured by the use of a fraction of one per cent., on the ore, of an oily frothing agent in an ore-pulp, with agitation. Three of the thirteen claims which specified the use of "a small quantity of oil" and which the Court held to be invalid have since, by proper disclaimer, been brought within the scope of the Supreme Court's decision.

On May 4, 1917, in the UNITED STATES DISTRICT COURT OF MONTANA, the opinion of Judge Bourquin was filed in the case of Minerals Separation Ltd., and others against Butte & Superior Mining Company, and was followed by a decree on September 17, 1917, wherein it was adjudicated that the three claims which had been limited by disclaimer were valid and infringed, and that the seven claims adjudged to be valid by the Supreme Court of the United States were infringed. The acts thereby adjudged to be infringement included the use of mixtures of petroleum oils and mineral-froth-forming oils in a total amount exceeding one per cent. on the ore, and also the use of Callow pneumatic cells.

On May 24, 1917, the UNITED STATES CIRCUIT COURT OF APPEALS at Philadelphia, in the case of Minerals Separation, Ltd., against Miami Copper Company, unanimously sustained the validity and broadly construed a second basic patent, owned by us, for the use of all "Soluble Frothing Agents." In the same opinion, the Court also validated a third patent for the use of cresols and phenols in the cold and without acid. The defendants, Miami Copper Company, endeavored to avoid infringement of these patents by using Callow pneumatic cells, but the Court held that the operations of the defendant company infringed all three patents.

On November 11, 1918, the SUPREME COURT OF THE UNITED STATES granted the petition of Minerals Separation, Ltd., and others for a Writ of Certiorari to review the decree of the United States Circuit Court of Appeals at San Francisco which had reversed so much of the decree of Judge Bourquin in the suit against Butte & Superior Mining Company as adjudged to be infringements those acts which employed oil of any kind or character used in excess of one-half of one per cent. on the ore.

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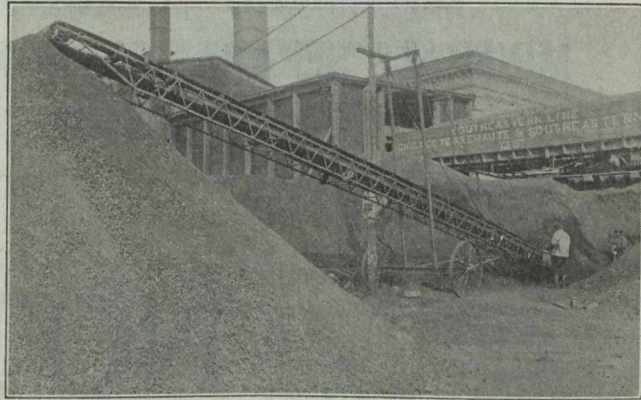
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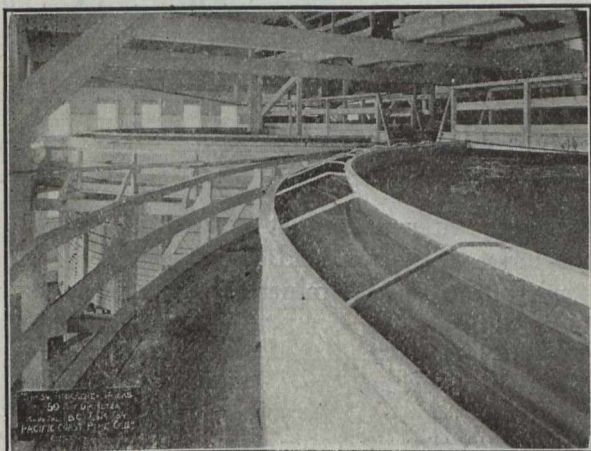
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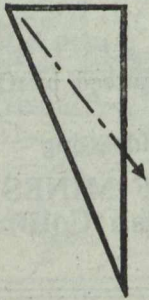
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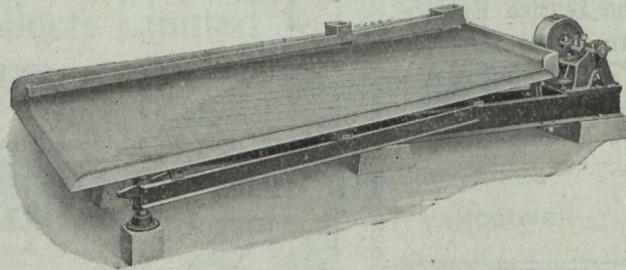
CONCENTRATING TABLES

Which has the greater area, one triangle or two?

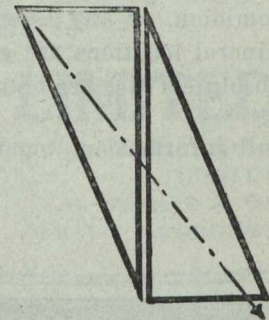
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VOL. XL.

MONTREAL, JANUARY 22nd, 1919

No. 3

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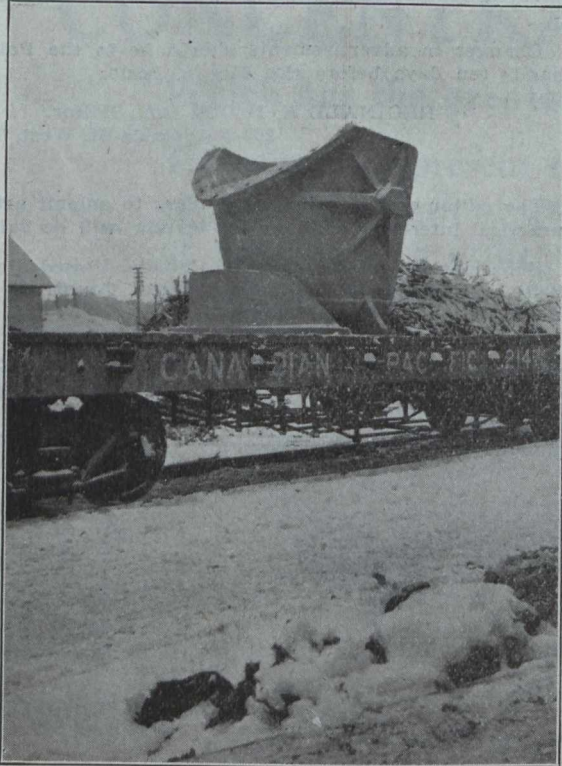
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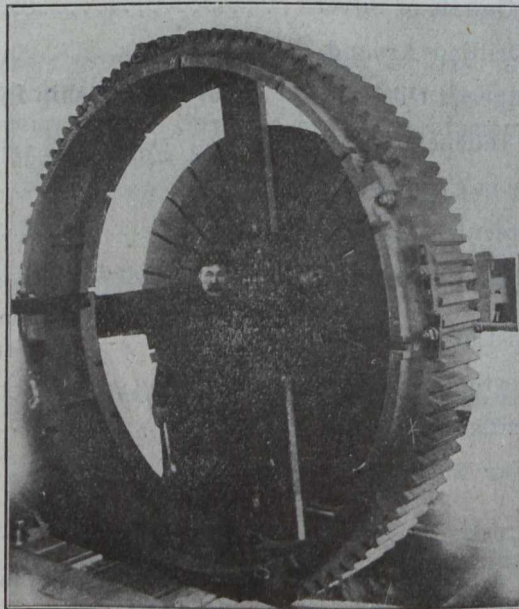
Largest Steel Castings Made In Canada



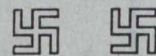
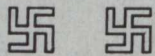
30,000 pound matte ladle cast in one piece with removable lip containing in all 840,000 cubic inches of solid steel



Four giant tread rings 14 feet in diameter moulded in on piece with gear moulding machine, combined weight 30 tons.



Machine moulded gear 12 feet in diameter weight 12,000 lbs.



Made by---

Hull Iron & Steel Foundries, HULL QUEBEC

EDITORIAL

GRANTING MONOPOLY BY ORDER-IN-COUNCIL.

According to a story emanating from Ottawa, and reaching Toronto by way of Winnipeg and the "Manitoba Free Press," the Dominion Cabinet has had under serious consideration a proposal to grant a monopoly to the Shell Transport and Trading Company, Ltd., to enter upon and develop all the oil-bearing lands in Canada lying in the Province of Alberta. It is announced that a decision by the Cabinet is expected to be reached shortly.

The granting of a monopoly of such a sort to any group of men is itself open to objection. But there is a more serious aspect of the matter. Is it in keeping with democratic ideals that matters of this sort should be dealt with in such a secretive way?

There has been no public discussion as to the merits of this proposal. The Canadian Mining Institute has not yet been asked for its opinion on it. Is it possible that our readers are satisfied to accept the statement of the irresponsible; but evidently inspired writer that "a decision one way or the other may be expected at an early date." Who is responsible for this statement? Where did the Ottawa correspondent of The Free Press get his information? Why do Canadians permit anyone at Ottawa to be in a position to give out such information? Who is attempting to use the Cabinet as an instrument for obtaining special privileges? Why does the Press accept the story as a reasonable one?

The way in which the obviously inspired story has been accepted is an acknowledgement that it is quite possible that such an important matter could be decided by a duly influenced Cabinet and that by an Order-in-Council the decision could be put into effect. This is no time for secrecy in Government actions affecting the development of our country. The Government, if it is seriously considering granting the proposed monopoly, will do well to avoid secrecy.

THE MINING INDUSTRY AND THE WAR.

As a first test as to the value of our mining industry, one may well ask: "Did it help us to win the war?" That it did so will be evident when we consider that we contributed coal, iron, steel, nickel, copper, lead, zinc, aluminum, molybdenite, arsenic, chromite, asbestos, graphite, magnesite, pyrites and many other minerals. Our coal helped to produce power for manufacture of munitions and to propel ships that carried men and munitions across the Atlantic. Our iron and steel was made into millions of shells as well

as into countless other forms of war articles. Our nickel was a very important factor during the war, for we produce four-fifths of the world's nickel, which is so greatly in demand for the manufacture of nickel-steel and nickel-chromium-steel. In a smaller way the other minerals and metals mentioned did their part.

It is well to enquire as to the source of these materials, and to consider whether we did as well as we should have done in the great emergency. The matter of coal supply is important to all our citizens. Why is there a shortage? Why has production in Nova Scotia fallen off. Why have the great coal deposits of western Alberta not been more generally utilized in the Prairie Provinces? The coal shortage affects almost everyone, and has helped to direct attention to the fact that we must have coal in war as in peace. When the calls for volunteers came in 1914 and 1915 the enlistment from our coal mining centres was exceptionally heavy. In Nova Scotia there was a rapid decline in number of miners available, and it has been and still is impossible to obtain men with the necessary experience to replace those who went to Belgium and France and fought so valiantly there. In Alberta the situation was quite different. There the mines were equipped and manned for a much larger output than the market demanded. The encouragement by the railways of the shipment of anthracite from the far eastern Pennsylvania fields, made it difficult for Western coal producers to compete in their natural market. When the anthracite supply was cut off there was soon an increase in output of Western coal. In Ontario there was more real danger of shortage, for here we are dependent almost entirely on imports from the United States. It is probable that we will continue to be so dependent. To balance such imports we should endeavor to export more coal from our Eastern and Western coal fields. The high cost of production may, however, make export trade practically impossible. In all parts of the country we should give more attention to the development of water powers for power purposes.

According to the Department of Mines, the total value of the mineral production in Canada during 1918 was probably not less than \$220,000,000. The total value of the production in 1917 was \$189,646,821. The Department of Mines estimates the production of coal during 1918 at about 15,180,000 short tons, as compared with a production of 14,046,759 short tons during 1917.

The production of the more important metals during

1918 is estimated as follows, viz.: Gold \$14,750,000 in value; silver 20,800,000 ounces; copper 117,000,000 pounds; nickel 91,500,000 pounds; Zinc 36,000,000 pounds; pig iron 1,182,000 short tons; steel ingots and castings 1,910,000 short tons. The production of these metals in 1917 was: Gold \$15,272,992 in value; silver 22,221,276 ounces; copper 109,227,332 pounds; nickel 82,330,280 pounds; Zinc 29,668,764 pounds; lead 32,576,281 pounds; pig iron 1,170,480 short tons; steel ingots and castings 1,745,734 short tons.

Our large output of iron and steel is not so satisfactory as the statistical tables indicate, for about 90 per cent of this iron was recovered from the treatment of foreign ore. The great iron and steel works of Nova Scotia draw their iron ore from Newfoundland. Most of the iron ore that goes into the furnaces in Central Canada comes from the Lake Superior States. We have deposits in Canada that will yield large quantities of iron ore; but it cannot be said that progress in iron ore mining is satisfactory. It seems probable that in the best interests of the country there will have to be more Government encouragement of the iron industry. The problem will be easily solved if rich large deposits are found, but to develop those that are known, in competition with the richer and more easily worked deposits of the Lake Superior States, is an enterprise that has not proven very alluring to capital.

In the case of nickel we are in a stronger position than any other country. The great mining industry of the Sudbury district are an asset that is hardly appreciated by Canadians. It is well known that the two producing companies are making a large profit on their operations; but there seems to be little recognition of the importance of the industry to the community. It is well to remember that the men employed in the mines and smelting works of the Sudbury district number about 5,000 men. The wages paid annually total over 5,000,000. Machinery and supplies purchased by the companies have cost many millions. In spite of the necessary heavy expenditures, however, the profits have in recent years been very large, and it was not surprising that the company has been called upon to set aside large sums for war taxes.

In Quebec the asbestos mining industry is flourishing, the demand in recent years being exceptionally good. Quebec is the world's chief source of asbestos, and consequently is benefitting by the numerous new uses which are being found for this heat resisting material. The backbone of Quebec mineral production during the war, as pointed out by Mr. Theo. C. Denis, is formed by non-metallic substances—*asbestos*, *mica*, *magnesite*, *pyrites* for sulphuric acid, and a very varied assortment of structural materials. The prominent part which the latter plays in the mineral production of the province is indicated by the fact that in pre-war times (in 1913) in a total value of a little over \$13,000,000 the building materials accounted for 62 per cent, the metallic substance for 3½ per cent, only, the balance

(34½ per cent) being made up of non-metallic minerals, such as *asbestos*, *mica*, *graphite*, *magnesite*. The effect of the war on our mining industry has been most marked, for in 1917 and 1918 the above proportions were greatly altered, and they now stand about as follows: Building materials, 33 per cent; metallic ores, 12 per cent; non-metallic minerals, 55 per cent; the total production of all of which amounted to \$16,266,000 in 1917. Figures for 1918 are not yet available, but it is likely that the total value will exceed 17 million dollars.

Great progress is expected to be made this year in the now well established gold mining industry of Northern Ontario. There has been a great demand for gold during the war; but the selling price did not rise with the cost of production, and conditions were becoming such that few gold mines could be profitably operated. In spite of the difficulties encountered, however, progress was made during the war, and a great expansion will soon be possible. There can be little doubt that, for many years gold mines of Northern Ontario will pour out millions of new wealth. Big gold mines employ many men and represent very large investments for plant and development work. The dividends paid do not tell the whole story. Millions are spent annually for labor, supplies, machinery, etc. Around the mines a new community grows and makes a new market for farmers and merchants. Eventually the development of the mines is followed by agricultural development of the surrounding country. Some of the mines will be doubtless worked profitably for many years, and when their end comes the country will have been well tested by settlers who have had unusual transportation facilities and a close market provided by the mining industry. Mines, like railroads, are responsible for much of the agricultural development of our country. It is fortunate for the country that our gold mines lived through the war. The life of the chief producers was not thought to be in danger; but there was every possibility of their being seriously crippled if conditions had become worse instead of better.

One of the most active companies operating in British Columbia is the Consolidated Mining & Smelting Company of Canada. This company is a big producer of gold, copper, lead and zinc. It operates the smelter at Trail. When war broke out the company was not refining its zinc. The company during the war established zinc refining on a large scale, and is also refining some copper. In the face of many difficulties a big plant was built and put into operation. The company thus assisted in overcoming the situation which had been brought about by German control of the zinc market.

Notable progress was made during the war in developing *molybdenite*, *magnesite* and *chromite* deposits in Quebec. As a result we have now the greatest *molybdenite* mine in America, where when the war started was only an undeveloped prospect. A *magnesite* industry has been established and a market found for a

considerable quantity of chromite. Great progress has been made in processes of treating these three minerals. We may properly attribute most of this progress to the demand created by the war.

Throughout Canada the war demands stimulated activity in the development of certain minerals. We have little doubt that this stimulation will have permanently good effects.

STATE ADMINISTRATION OF NATURAL RESOURCES.

The question of the rights of the State with reference to the resources within its boundaries has seldom been clearly defined; and in actual practice the legislative control exercised by the State varies widely in the civilized communities of the world. For the sake of simplicity, let us discuss an ideal case, where a state, hitherto unpopulated, but endowed with rich resources, is thrown open to immigrants sufficiently numerous to populate the country and develop its varied resources. Let us suppose also that the outside world clamoured for admission into this new land. It will be granted without much argument that the wise policy for the authorities of such a state to adopt, in order to promote the best interests of the state as a whole, and of the future generations in particular, would be to declare all resources to be the inalienable property of the state, to be leased, under certain restrictions, to individuals or corporations. Under such a system the authorities would always be in a position to exercise supervision over the corporate wealth of the community. They would conserve where necessary in order that the population yet to come would not suffer from the faults of their predecessors. They would prevent exploitation by the promoter with the resources as a pawn in the great game of chance. Such a community would be guided by the principle that the natural resources are, and must always remain, the property of the people as a whole, and not of any individual member of the community; that private initiative and private capital should be given free scope under a long-lease tenure, thereby eliminating the valid objections which may be urged to any system of government operation; that, in order to preserve the rights of the community at large, all such leases should be granted subject to certain conditions of operation, in order on the one hand to ensure satisfactory production, and on the other hand to prevent waste. Such would no doubt be the position taken by any government which had to deal with the situation that we have outlined. And even under present conditions, were enormous resources, such as, for instance, the copper deposits of the Coppermine and neighboring territory in the Arctic Zone, discovered within easy reach of transportation, it is more than probable that the force of public opinion would compel the government, rather than even lease to private corporations, to operate the bonanza directly for the benefit of all the people.

The history of the growth of state communities has, however, been very different from the hypothetical case which we have outlined. Pioneer conditions are hard. Inducements must be offered in order to attract the best type of settler. At the early stage initiative and enterprise are essential, and these qualities are best displayed by the private individual and

corporation. In the normal case the agricultural settler is the most desirable immigrant, and there is a deep-rooted desire in the human heart to possess the land on which the seed is sown and the harvest is reaped. For this and other reasons, the door is thrown wide open. Land is sold, given away, or alienated after certain conditions have been fulfilled. Other resources, such as timber, minerals, and even water powers, are handed over in toto; and a state may find itself after a lapse of a few centuries in a position where its revenue depends entirely on the indirect wealth which accumulates through the growth of commerce, and on the taxes collected on the production from resources in the development of which it has lost all control. This is a position to which not a few countries have been reduced; and there is undoubtedly a strong movement to-day towards a return to a general leasing system of natural resources, including even the land itself. Just as in the case of the private industrial corporation, the final bridging of the ever-widening gap between capital and labor may be formed by a carefully administered profit-sharing system, so in the case of the greatest industrial corporation—the state—the people may demand that they shall be more directly than heretofore participants in the profits accruing from the development of the natural wealth of the country in which they live and labor.—R. C. W.

While we have good reason for stating that the mining industry is well established in Canada; that production is increasing steadily and capable men are in charge of most of the operations, we should not be satisfied with the progress we are making. Our mineral resources become valuable only when they are used. Undiscovered ore is of no value, and undeveloped deposits are of little value. We should endeavor to speed up the work of the prospector and assist those who undertake the developing of properties in new districts. Only by the expenditure of labor and capital do mineral deposits become of use. For one prospect that becomes a profitable mine there are many that prove worthless. Those who provide funds for development work recognize that they run a good chance of losing their money. The experienced operators do not expect that many of their ventures will be profitable. They have a right, however, to expect that their successful ventures should prove very profitable. It is the hope of winning one of the rich prizes that leads men to seek mineral wealth in the wilderness. The whole country benefits from their work. It is in the interests of Canadians that development of our mineral resources be speeded up, that prospectors should be encouraged, that the Mines Departments should be authorized to extend their work. More attention should be given by farmers and manufacturers to this matter, with the view to obtaining a larger market in Canada for their products.

Important producing mines of the Slocan District (B. C.), during the past year were the Queen Bess with 2,300 tons and the Galena Farm at Silverton with 1,079 tons.

Coniagas Mine Has Produced Over 26,000,000 oz. Silver

President R. W. Leonard, said in his address at the annual meeting of Coniagas Mines, Ltd.:

During the year ended October 31st, 1918, your mine at Cobalt and your Smelter and Refinery at Thorold (The Coniagas Reduction Co., Ltd.), have been operated continuously and satisfactorily, having in view the difficulties incident to the limited supply of labor and the high cost of materials, which have materially increased the unit costs of your Companies' products. The decreased output and the increase in cost of production have been only partially offset by the enhanced prices received for your products. The average price realized by The Coniagas Mines, Ltd., for Silver sold during the year, was 94.14 cents per ounce, as compared with 79.89 cents per ounce in 1917, and 63.11 cents in 1916.

The output of silver from the mine during the year was 974,264 ounces, as compared with 1,344,267 ounces during the preceding year; and the combined sales of ore from your Mine and the products of your Reduction Company aggregated \$4,099,490.

No new discoveries of ore of importance have been made at the Cobalt property, and the future output of the mine depends more than ever on the low-grade ore concentrated in the Mill than on the high-grade ore sacked in the mine. The extent of this low-grade ore is very difficult to determine, but the estimates of Mr. F. D. Reid, Mine Manager, would indicate that a further three years' supply is available, assuming a continuance of present market conditions.

The Coniagas Reduction Company shipped during the year 2,390,737 ounces of Silver, much of which had been taken in at the lower prices prevailing during preceding years, and there are at present over 1,000,000 ounces in process of reduction.

The total shipments of silver from the property to October 31st, 1918, aggregate over 26,000,000 ounces.

The ore has been mined and concentrated during the past year at a net cost of 33.87 cents per ounce, as compared with 21.36 cents per ounce during the previous year. This cost includes all overhead expenses, royalties and other general expenses, but excludes cost of smelting, refining, shipping and marketing, which amount to 7.98 cents per ounce, as compared with 4.31 cents per ounce for the preceding year; and includes a War Profits Tax estimated at \$25,332.54. The average cost per ounce of Silver produced during the past 12 years, including all charges above mentioned, has been 16.306 cents.

During the year the following Dividends, amounting to 7½%, were paid:

No. 39—Feb. 2nd, 1918, 2½% . . . \$100,000.00

No. 40—May 1st, 1918, 2½% . . . 100,000.00

No. 41—Aug. 1st, 1918, 2½% . . . 100,000.00

and a Dividend of 2½%, with a bonus of 2½%, was declared, payable on Nov. 1st, 1918. These disbursements make a total distribution to the Shareholders to date of \$9,240,000.00, of which \$7,200,000.00, or 180% of Capital, was paid as Dividends, and \$2,040,000.00, or 51%, as Bonuses.

Up to the present time no royalties have been paid to the Minerals Separation Corporation for flotation

concentration patents. This Corporation, which claims ownership of these patents, is under investigation by the United States Federal Trade Commission to determine whether they are conducting their operations in the United States on a fair basis.

After making a payment of \$30,000 in April last for extension of the option on the Ankerite gold property at South Porcupine, requiring a further very substantial payment, your directors decided to drop the option on this property, but your company still owns three adjoining claims, comprising in all about 120 acres, carrying the extension of the Ankerite ore body.

The consolidation of the Wabi Iron Works, Ltd. (of which your Company owned 6,055 shares at a par value of \$1.00), with the Electric Steel & Metals Co. of Welland, and the Boving Hydraulic & Engineering Co., Ltd., of Lindsay, has been effected under the Corporate name of Electric Steel & Engineering, Ltd., and in exchange for shares held in the Wabi Iron Works, Ltd., your company has received 137 shares of Preferred and 137 shares of common stock of a par value of \$100, in the new company. A dividend of 3½% was received on the preferred shares on July 1st last.

In view of the substantial cash balance shown in the Financial Statement, your Directors, at a meeting held on October 7th, decided to subscribe, on behalf of the company, for \$615,000 of Canadian Victory Loan Bonds, which were purchased in November, making your total holdings of that security \$700,000.

Superintendent Fraser D. Reid, in his report, says:

During the year an average of 108 men were employed. The mill ran 93.36 per cent. of possible time.

The tonnage of ore milled was 68,597.0 tons, or an average of 3.38 tons a stamp for 24 hours, as compared with 60,928.8, averaging 3.07 tons per stamp for the previous year. There were 529.51 tons, dry weight, of High Grade Concentrates shipped, and 866.77 tons, dry weight, of Low Grade Slime Concentrates, the former averaging 1164.10 ounces per ton and the latter 244.81 ounces per ton. Mill heads for the year averaged 15.94 ounces per ton as compared with 18.56 ounces per ton for the previous year.

The Cyanide Plant, which had been operating solely on canvas table concentrates and primary mine slime, was shut down on November 20th, 1917. Such action was necessitated by the fact that the canvas tables had been discarded and the Callow Flotation Process had been installed.

The Callow Flotation Plant, to which another unit was added during the year, treated all tailings from the concentrating mill, affecting a material recovery therefrom. The assay of final tailing, in ounces per ton, was 1.75, as compared with 2.98 ounces for the previous year.

Re-treatment of the sand tailings pile was begun in May, and continued satisfactorily until November, when further operations were curtailed by the non-delivery of machinery necessary to carry on operations during the winter. During this time 21,886.9 tons were treated.

There still remains, stacked on the property, 155,113

tons of sand, tailing of an average value of 3.5 ounces to the ton, and 40,000 tons of slime tailing of an average value of 6.0 ounces to the ton. The total value of sand and slime tailings, in ounces of silver, is 782,895.5.

Development work during the year has been confined to the following of small veins and stringers on all levels and driving numerous crosscuts through

unexplored areas.

This work has developed a large tonnage of low grade milling ore. The broken rock on stulls in the mine has been increased 13,825 tons.

A total of 63.22 tons, dry weight, of high grade mine ore, was shipped, which averaged 2,303.7 ounces per ton.

The Coniagas Mines, Limited, was incorporated November, 1906; concentration of ore began September 24th, 1907; mine ore and concentrates shipped and treated together during 1907 and 1908.

Work done to date and work done during the year ending October 31st, 1918:

| | Total to Octo. 31st, 1918. | Total to Oct. 31st, 1917. | Work done during 1917-1918 |
|-------------------------------|-------------------------------|------------------------------|----------------------------------|
| Shaft Sinking, Feet | 879 | 879 | |
| Drifting, Feet | 19,909 | 18,834 | 1,075 |
| Crosscutting, Feet | 10,678 | 10,295 | 383 |
| Winzing, Feet | 721 | 632 | 89 |
| Raising, Feet | 1,538 | 1,396 | 142 |
| | <hr/> | <hr/> | <hr/> |
| | 33,725 | 32,036 | 1,689 |

| | Tons removed since beginning of opera- tions to Oct. 31, 1918. | Tons removed to Oct. 31, 1917. | Tons removed during 1917-18. |
|-------------------------------|--|--------------------------------------|------------------------------------|
| Crosscutting | 52,124.1 | 51,624.0 | 500.1 Waste |
| Drifting | 64,357.5 | 61,670.0 | 2,687.5 Ore |
| Stoping | 470,556.5 | 404,655.0 | 65,901.5 Ore |
| Open Cutting | 4,880.0 | 4,880.0 | |
| Winzing and Raising | 7,209.9 | 6,916.0 | 293.9 Waste |
| Shaft Sinking | 2,955.0 | 2,955.0 | |
| | <hr/> | <hr/> | <hr/> |
| | 602,083.0 | 632,700.0 | 69,383.0 |

Ore Milled in Tons to October 31st, 1918.

| Total to Oct. 31st, 1918. | Total to Oct. 31st, 1917. | Milled during 1917-18. |
|------------------------------|------------------------------|---------------------------|
| 524,062 | 455,465 | 68,579 |

There is sufficient broken rock on the stulls in the mine to keep the mill in operation at present capacity for over a year without breaking any new ore.

Total Shipments from the Coniagas Mine.

| Year, Nov. 1 To Oct. 31. | Mine Ore | | Concentrates. | | Total | |
|-----------------------------|---------------------------|------------|---------------|------------|----------|------------|
| | Tons | Ounces | Tons. | Ounces. | Tons. | Ounces. |
| 1905-06 | 289.0 | 657,513 | | | 289.0 | 657,513 |
| 1906-07 | 2,655.0 | 1,341,372 | | | 2,655.0 | 1,341,372 |
| 1907-08 | Mine Ore and Concentrates | | | | 627.5 | 1,457,240 |
| 1908-09 | 350.0 | 807,313 | 426.0 | 599,975 | 776.0 | 1,407,288 |
| 1909-10 | 330.1 | 979,630 | 645.5 | 949,901 | 975.6 | 1,929,531 |
| 1910-11 | 619.1 | 2,142,961 | 1,418.4 | 1,646,312 | 2,037.5 | 3,789,273 |
| 1911-12 | 650.0 | 1,944,212 | 1,287.5 | 1,564,164 | 1,937.5 | 3,508,377 |
| 1912-13 | 735.8 | 2,249,394 | 1,034.3 | 1,323,004 | 1,770.1 | 3,572,398 |
| 1913-14 | 492.9 | 1,451,522 | 748.2 | 1,045,872 | 1,241.1 | 2,497,394 |
| 1914-15 | 274.0 | 940,432 | 629.7 | 1,061,620 | 903.7 | 2,002,053 |
| 1915-16 | 193.2 | 522,908 | 647.9 | 1,250,378 | 841.1 | 1,773,286 |
| 1916-17 | 124.3 | 391,964 | 742.4 | 952,303 | 866.7 | 1,344,267 |
| 1917-18 | 63.2 | 145,642 | 1,396.3 | 828,621 | 1,459.5 | 974,264 |
| | 6,776.6 | 13,574,866 | 8,976.2 | 11,222,153 | 16,380.3 | 26,254,260 |

Shot Drilling Around Thetford Mines

By J. W. DAVIS.*

Increased activity in mining around Thetford and Coleraine, Quebec, has resulted in considerable prospecting work in asbestos and chromite iron deposits in which Calyx Shot Drills are being used extensively with very satisfactory results.

The formation in this whole district is fractured serpentine and granite, some of the latter being so hard that it will cut glass. The slips run in all directions, and the majority may be described as high angle fractures.

Cut No. 1 illustrates an average core and shows the irregular nature of the seams. Cores taken at several points within a radius of fifteen miles of Thetford have all been drilled in the same broken formation so that it is possible to accurately predict the drilling speed and cost for holes of the same depth, although where granite is not encountered the drilling is faster and the cost lower. However, few holes have been drilled that have entirely missed the granite which is in seams from 1 to 15 feet thick.



it was found practically impossible to obtain a core in disseminated chrome ore which is so soft that the core almost invariably crumbled whereas the Calyx Drill takes out perfect cores with a percentage of recovery hitherto unknown. The results have caused a revival in this particular method of prospecting which had been practically abandoned in Thetford and adjacent camps.

Cut No. 3 illustrates a chrome core in which the chromite is plainly visible.



The Calyx Drill can use any size bit necessary and by taking out a large core is able to penetrate broken ground and to recover a very large percentage of the material drilled. At Coleraine a total of 209' of core was recovered from a hole 212' deep. The ability of the Calyx Drill to extract asbestos cores without losing the fibre is a very important consideration as it is only by visual examination that the extent of the deposit may be determined.

Cut No. 2 illustrates a core in which the vein of crude has not been disturbed. With the diamond drill

*District Sales Manager, Canadian Ingersoll Rand Co., Limited.

The first shot drilling in the district was done about three miles back of East Broughton with the object of testing out a deposit of Chalcoppyrite in a schist formation. 3" tools were used taking out a 2" core but these proved too small as the ground was very badly broken, the core largely consisting of a continuous series of thin discs about an inch thick, which however were recovered. At a depth of about 90 feet the ground be-

came so fractured that the hole finally caved in and the tools were extracted with considerable difficulty. A set of 4 1/2" tools was substituted, the core being 3 3/8" diameter and a new hole penetrated the same material making a full recovery without further trouble. In this way 4 1/2" tools were adopted as most suitable for the formation and have since been used on all shot drills in the district. It was demonstrated that in solid rock the large tools did not drill appreciably slower than smaller ones while in fractured material they were essential and satisfactory.

The present high prices and the demand for asbestos and chromite are mainly responsible for the increased activity in shot drilling but several other factors have contributed. Some of the present pits are very deep and hoisting is becoming increasingly difficult and dangerous. In consequence the neighboring ground is being prospected with a view to opening new surface workings. To do away with the present system of cableways and also to enable the miners to work in bad weather underground workings are being opened up on some of the properties and this ground is being thoroughly prospected to determine the location of the best ore and the proper position for main hoisting shafts.

Shot drilling is still being done on half a dozen properties and better records are being made as the operators become more familiar with the formation. However, the following tables and notes are representative of the work done during 1917 and it is our intention to collect further data which will be incorporated into a second article at a later date. All costs cover complete operating charges including moving of drill but do not include interest on investment or depreciation:—

Bennett-Martin Asbestos & Chrome Mines Ltd.,
Coleraine, Que.

BOREHOLE NO. 1.

| | |
|---|--------|
| Depth, feet | 212 |
| Diameter core | 3 3/8" |
| Diameter hole | 4 3/4" |
| Angle, from vertical | 15° |
| Working hours | 190 |
| Running hours | 185 |
| Greatest footage in one shift | 18' 3" |
| Average footage per shift | 11' 1" |

COST

| | |
|-----------------------------------|----------|
| Labor (including board) | \$149.15 |
| Gasoline | 30.00 |
| Oil | 3.75 |
| Shot | 11.10 |
| Bit wear | 6.50 |

| | |
|-------------------------|----------|
| Total cost | \$200.50 |
| Cost per foot | .94 |

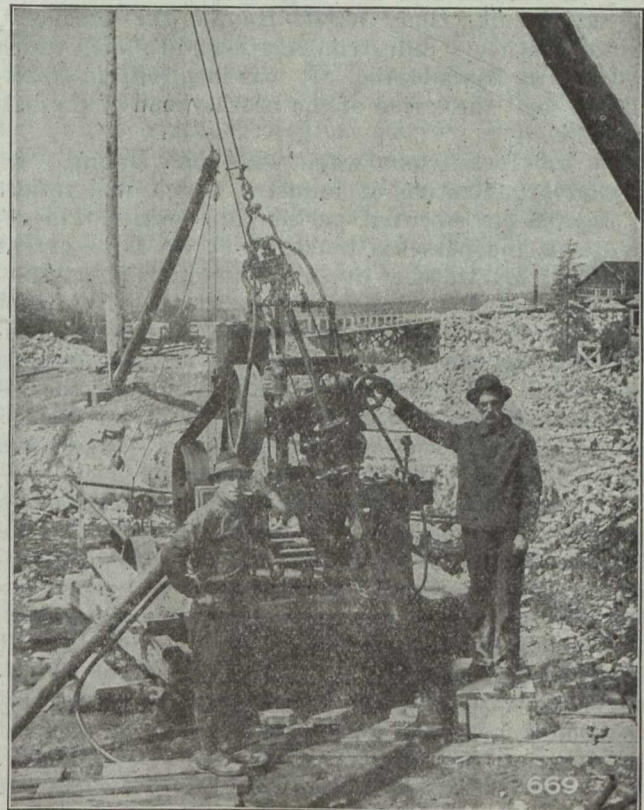
Jacobs Asbestos Mining Co.,
Thetford Mines, Que.
BOREHOLE NO. 1.

| | |
|--|--------|
| Depth, feet | 356 |
| Diameter core | 3 3/8" |
| Diameter hole | 4 3/4" |
| Vertical hole | |
| Working hours | 380 |
| Running hours | 339 |
| Greatest footage in one shift | 16' 0" |
| Average footage per shift | 9.66' |
| Average footage per running hour | 1 foot |

COST

| | |
|-----------------------------------|----------|
| Labor (including board) | \$434.90 |
| Gasoline | 41.50 |
| Oil | 5.90 |
| Supplies | 3.00 |
| Shot | 20.00 |
| Bit wear | 13.00 |

| | |
|--|----------|
| Total cost | \$518.30 |
| Cost per foot | 1.45 |
| During 21 shifts average drilling speed was 11 | |



Mutual Chemical Co., Black Lake, P. Q.

3 3/8" Core.
4 3/4" Hole.

All Angle Holes.

| Hole No. | Depth Feet | Working Hours | Drilling Hours | Greatest Footage Per Shift | Shot Pounds Used | Core Feet Recovered | Times Pulled Rods | Footage Per Hour Working | Footage Per Hour Drilling |
|----------|------------|---------------|----------------|----------------------------|------------------|---------------------|-------------------|--------------------------|---------------------------|
| 5 | 121 | 140 | 96 | 17' 4" | 126 | 80 | 72 | .858 | 1.26 |
| 6 | 151 | 180 | 126 | 14 | 173 | 118 | 62 | .824 | 1.20 |
| 7 | 146 | 152 | 109 | 16 | 135 | 102 | 46 | .85 | 1.33 |
| 8 | 144 | 174 | 103 | 16 | 125 | 119 | 48 | .93 | 1.38 |
| 9 | 128 | 147 | 99 | 16 | 125 | 100 | 47 | .85 | 1.33 |
| 10 | 128 | 120 | 98 | 16 | 110 | 103 | 47 | 1.08 | 1.34 |
| 11 | 92 | 97 | 71 | 14 | 98 | 70 | 28 | .95 | 1.30 |

Average cost, including moving of drill was \$1.28 per foot and excluding moving \$1.14, 12 shots bits were used in drilling a total of 1,426 feet at an average bit wear cost of .0791 per foot. It was found advisable to keep a number of bits on the job and to square off the ends daily.

At the present time shot drilling is being done by the following operators in the Thetford Camp:

Asbestos Corporation of Canada, Beaver Mine, Thetford Mines, P. Q., Federal Asbestos Company, Robertson, Que., Quebec Asbestos & Chrome Mines, St. Cyr, Quebec, Dominion Mines and Quarries, Black Lake, Que.

Carefully tabulated costs are being kept on all this work and will be published at a later date.

THE IMPERIAL OIL CO.'S INDUSTRIAL RELATIONSHIP PLAN.

Hon. W. J. Hanna Outlines the Scheme.

The spirit which found its noblest expression in the brotherhood of the battlefield has outlived the conflict. It is taking its dominant place in the endeavors of peace. Addressing the gathering of officers and employes of the Imperial Oil Company—the oldest refinery in Canada and the largest in the British Empire—at Sarnia, Hon. W. J. Hanna, the president, outlined the new “industrial relationship plan” which the company has adopted. It was inspired, he frankly stated, by “the lesson of the brotherhood of the battlefield.”

“We are feeling our way,” said Mr. Hanna, “toward an organization of industry which will reflect and express its essential partnership—which will restore to us the personal touch which, to some extent at least, we lost in what we call our industrial era.”

Fifty employes’ representatives, elected by ballot by the five thousand men at the works, met the officers of the company with a view to developing greater co-operation and camaraderie, and to discuss the industrial relationship plan, which provides for adjustment of all matters of wages, hours, etc. Mr. Hanna outlined it in his address as follows:

“The agreement governing this new relationship between the company and its employes which is submitted to you provides for conferences between employes’ regularly-elected representatives and representatives of the company on the subject of wage adjustments, hours and all matters of mutual interest. It gives to every employe who believes himself to be suffering from unjust treatment or unfair conditions, access through his elected representative to the general superintendent and higher officials of the company, and the right of a conference upon his grievance. It insures the continuance of the policy which has always protected the employe from discrimination on account of membership or non-membership in any church, society, fraternity or union, and it provides other conditions between the company and ourselves which will, we hope, continue and strengthen the harmonious relations which have always existed.

“Our motive in establishing the labor relationship plan with its benefits to employes is not based on philanthropy. We know you better than to suggest philanthropy to you. This plan is purely a policy of business administration to promote continuity of effect and permanence of employment, to the end that replacement changes, one of the most serious menaces to the prosperity of capital and labor alike, is reduced to a minimum.

“On the first day of January we propose that every one who has served the company for twelve months shall become insured for an amount, depending, of course, on his years of service and his earnings, the minimum being \$500 and the maximum \$2,000.

“On February 1 we propose to establish old age pensions, so that when a man has reached the age of 65 he can retire, and on his retirement be assured of a reasonable amount to care for himself and family during the rest of his years.

“On the first of March we propose to establish a sick benefit plan by which we can properly care for our men when sickness overtakes them.”

Mr. Hanna also announced that all employes who had served as soldiers would be reinstated in the service of the company at no reduction from their former wages or salaries, and adjustments made where necessary to meet the physical condition of any who had suffered disabilities.

Thirteen trades are represented upon the workingmen’s committee elected by the thousand employes of the Imperial Oil Company’s Sarnia refinery to inaugurate the industrial republic. The conference, at which an agreement was reached providing for the adjudication of matters of wages, hours, living conditions, and the rights of wage earners, marks the first practical application of an industrial relationship plan in any large industry in Canada, and by Jan. 1 it will be extended to cover five large refineries, many marketing stations throughout Canada, the company’s fleet, and more than six thousand employes.

Since 1897, when it was incorporated, the company has had no labor troubles, and the agreement reached to-night by the unanimous vote of directors and employes was not in the nature of a truce, but of a treaty based upon 21 years of peace. Henceforth any employe who believes himself to be suffering from unjust treatment or unfair conditions will have the right of appeal to his workingmen’s representative, and through him to the higher officials of the company.

The questions as to the remuneration and treatment of labor are to be determined by joint conferences of the company and employes’ representatives, and it is provided that at these conferences the number of company representatives voting shall not exceed the number of workingmen representatives having the same right, except for certain specified offences, most of which represent violations of law. No employe is to be dismissed without the right of appeal to a conference for a review of his case, and the agreement sets forth that there is to be no discrimination against any employe on account of membership in any union, fraternity or other organization.—Hamilton Spectator.

MILLER INDEPENDENCE.

Boston Creek, January 2.

The by-law authorizing the increase of the capital of the Miller Independence Mines from 500,000 to 700,000 shares has been passed unanimously. Upwards of 400,000 of the 500,000 shares of the issued capital was represented at the meeting. W. E. Simpson, who, together with Frank Groch of Cobalt, is consulting engineer for the company, arrived here early this week for the purpose of thoroughly sampling the mine. It is planned to survey and sample the entire surface and underground workings. This work is preliminary to the actual beginning of the big development programme now proposed and for which the increase in capital has been authorized.

MINING IN CARIBOO DISTRICT.

Discussing the season's mining operations in the Cariboo District, B.C., Henry Boursin, a well-known mining man, makes the following statements:

"The output from the hydraulic mines this year was less than that of last year, owing to a shorter water season and scarcity of labor, although the clean-up of the Stout's Gulch Mine was more than usual, due to the discovery of another channel of pay gravel. Stout's Gulch is a small stream just above Barkerville, B.C. The yield of gold from the Gulch, first by drifting and later by hydraulic, amounts to \$2,500,000. The width of hydraulic pay (more than 600 feet) is extraordinary for such a small stream.

"C. W. Moore, acting for American capitalists, has bought the locally owned Waverly Hydraulic Mine on Grouse Creek, four miles from Barkerville. Although the Waverly is one of the oldest hydraulic properties in the Province, it doubtless contains more gold than has been washed out of it, as the head of the sluice flume is 30 feet above the bottom of the pay gravel in the main channel, and the gravel below the flume is known to be rich.

"F. J. Tregillus, T. A. Blair and Pat Carey are sinking a shaft on the nine-foot gold-bearing vein on their Warspite Claim four miles from Barkerville. At the present depth, 14 feet, the shaft discloses an excellent showing of visible gold, while the rock in which no gold can be seen shows a nice string of flour-gold when mortared and panned. The vein on which this work is being done has been exposed at intervals by trenching, and open cuts a length of more than 8,000 feet, and is believed to be the motherlode from which the \$20,000,000 placer of Williams Creek and the \$2,500,000 placer of Grouse Creek have their origin.

"The creeks mentioned drain the western and eastern slopes respectively of the Proserpine Mountain, and the strike of the vein closely approximates the up-stream limit of rich placer on each creek.

"The Lightning Creek Gold Gravels company is drilling with a Keystone on Lightning at Wingdam. This company was promoted by C. H. Unverzagt, of New York, and last summer an agent of the United States Government was sent to the property to see how conditions tallied with advertisements.

THE GREENWOOD SMELTER PROBLEM.

The closing down of the Greenwood, B. C., Smelter by the Canada Copper Corporation has stirred the residents of that district to action. They do not propose allowing the plant to remain idle if anything they can do can prevent it. Hon. J. D. MacLean, Minister of Education in the Provincial Government and the member for the section particularly affected, visited his constituency recently and interviewed the management of the company to ascertain whether some arrangement could not be made for the re-opening of the smelter. His efforts, however, were without avail, although he is understood to have volunteered to use his influence with the Government to endeavor to obtain financial assistance. The citizens will not accept a negative, following up Dr. MacLean's unsuccessful intervention with a mass meeting in order to obtain the united financial and moral backing of residents. They appointed Mr. Oscar Lachmund, former manager of the Canada Copper Corporation, to take charge of negotiations with the company officials and advanced three alternative propositions. One is that a sufficient ore supply be sought to keep the plant in operation and the Canada Copper Corporation again

be asked to continue. Another is for an independent company to lease the plant and pay royalty to the company for ore from their mines. The third is that the Town of Greenwood buy the smelter, build a lead stack, and operate with copper, lead and silver ores from both sides of the international boundary.

U. S. Mineral Output in 1918 Valued at \$5,160,000,000

Preliminary estimates of the U. S. Geological Survey show that the output of metallic products, chief of which are pig iron, copper, ferro-alloys, lead, zinc, gold, silver, and aluminum, was valued at over \$1,895,000,000 in 1918, against \$2,091,825,000 in 1917, and that the non-metallic products, principal of which are coal, petroleum, clay products, cement, and natural gas, were valued at over \$3,265,000,000 in 1918, against about \$2,889,000,000 in 1917. The total for 1918, including unspecified products, is roughly estimated by the Survey at \$5,160,000,000, a good increase over the total of nearly \$5,011,000,000 for 1917, and a vast increase over \$3,513,972,000 for 1916.

Copper.

The production of copper in the U. S. in 1918 was slightly larger than in 1917, according to preliminary figures and estimates collected by B. S. Butler, of the United States Geological Survey, Department of the Interior, from all plants that make blister copper from domestic ores or that produce refined copper. At an average price of about 24.75 cents a pound, the output for 1918 has a value of \$473,000,000, as against values of \$510,000,000 for 1917, and \$190,000,000 for 1913.

Lead and Zinc.

The domestic mine output of lead and zinc decreased in 1918, according to C. E. Siebenthal, in a statement just issued by the U. S. Geological Survey, Department of the Interior. The lead and the recoverable zinc of ores mined was approximately 563,000 tons and 627,000 tons, as compared with 651,156 tons and 711,192 tons in 1917. The refined lead output of smelters and refineries was 645,000 tons, against 612,214 tons in 1917, and the antimonial lead output was 22,000 tons, as against 18,647 tons. The lead available in the United States is 540,000 tons, against 515,258 tons in 1917. The output of spelter from domestic and foreign ore was 525,600 tons, compared with 669,573 tons in 1917. Spelter from foreign ore decreased to 23,300 tons from 84,976 tons in 1917. The apparent domestic consumption of spelter was 440,000 tons, compared with 413,984 tons in 1917. The consumption figures of both lead and zinc include the metal shipped abroad for use of the American Expeditionary Forces. The average price of lead at New York was 7.6 cents a pound, and of spelter at St. Louis, 8 cents a pound.

Oil.

The quantity of petroleum marketed from oil wells and field storage tanks in the United States in 1918 amounted to 345,500,000 barrels, an apparent gain of 3 per cent. over the former record output of 335,315,601 barrels, established in 1917. The output in 1918 includes no less than 6,500,000 barrels of crude oil removed from field storage during the year. The surface reserve of crude oil held by oil producers and pipe-line companies in the United States at the end of 1918 is estimated at 123,000,000 barrels, compared with 150,000,000 barrels at the end of 1917.

Special Correspondence

NORTHERN ONTARIO.

More Miners Now at Cobalt.

"Oceans of labor," such was the unhesitating reply of a leading mine manager in Cobalt recently when interviewed as to the labor situation in the Cobalt camp. In the Cobalt mines a shortage of ten per cent in the working forces of the various properties existed about two months ago, while to-day the supply of labor is satisfactory. With the price of silver high, the mines of the Cobalt district are producing silver at a good margin of profit from ore that recently as two years ago was unprofitable to handle. Thus the ore reserves of the producing mines have been added to a large extent and the life of the camp lengthened thereby. The present year promises to be one of exceptional prosperity for the silver mining industry, and Cobalt, which has occupied such an important place in the world's output of the white metal for a number of years, will retain a very high place in the list of districts producing silver. With the slackening of production in a number of the world's largest copper mines from which a good deal of silver has been produced, the demand for Cobalt's silver should increase. Thus, the outlook for the white metal during the current year is very bright and the Cobalt district will benefit greatly thereby.

Pittsburg-Lorrain Mine Closed Down.

The Pittsburg-Lorrain mine in the South Lorrain section of the Cobalt camp has closed down. The work at this property had been carried on consistently and aggressively by private interests of Pittsburg for the past two years with varying results; the operation representing a most earnest endeavor at mine making. The syndicate, in addition to owning and operating the old Currie property, also operated the mine and mill of the Wettlaufer Silver Mines under lease. All work was recently discontinued, after the shipment of two carloads of ore, from the property.

The Flotation Prices.

The Federal Trade Commission of the United States recently commenced proceedings against the Minerals Separation North American Corporation, which concern claims the patent rights to the oil flotation process for the treatment of ore. The charge is under the terms of its organic act, with the administration of a simple, just and inclusive pronouncement of laws—"Unfair methods of competition in commerce are hereby declared unlawful."

The action of the American Federal Trade Commission will give general satisfaction to mining companies using the oil flotation process in the Cobalt camp. The Minerals Separation Corporation has so framed its agreement or contract that mining companies would always have to pay a toll to it if the Federal Commission had not come to their rescue. It is hoped that the Commission will come to a just and conclusive decision, and that this process, by which 30,000,000 tons of ore annually are treated in Canada and the United States, will be properly governed.

Paragon-Hitchcock.

A narrow vein, carrying high silver values is reported to have been discovered on the Paragon-Hitchcock property at Elk Lake. The vein is about one inch in width and was encountered at the 100-foot level.

Device to Hold and Turn Steel.

Mr. Duncan McKinley, a miner of Elk Lake has secured a machine which is said to do work of one man in working with hand steel. The little machine, which is very compact, holds and turns the drill after each stroke, so that the hammerman is all that is required to drill with hand steel. A number of practical miners have tried the invention here and give it great praise.

Increasing Working Force at Adanac.

Owing to favorable developments at the Adanac mine it has been decided to add to the working forces at the property and also to increase the number of machines employed. This announcement was officially given out recently. During the past year the Adanac has been operated aggressively, something like 1,000 ft. of underground work being done. It was not until recent months that the work reached the point recommended by Alfred R. Whitman for extensive development. A crosscut has been run to the west of the long drift at the 310-ft. level of the property, during the course of which work a number of important developments took place a series of veins containing silver values being encountered. The main vein of this series has been drifted on for a considerable distance and a considerable amount of good grade ore has been developed. The decision of the company to increase the working forces at the mine, and the recent announcement that shipments would be made regularly to one of the customs mills of the camp, indicate that the operation of the property is meeting with a good deal of success.

McKinley Cuts New High Grade Silver Vein.

A new high grade vein was cut this week at the 300 ft. level of the McKinley-Darragh-Savage mines at Cobalt. The find was made in the western half of the property where a considerable area of virgin ground remains to be explored. So far several rounds of shots have been taken off the vein, which has been found to maintain a width of from one to two inches, some of the ore running as high as four thousand ounces to the ton, while the average grade is high. Besides the rich high grade streak the wall rock on either side is well shot through with leaf silver, and a considerable tonnage of low grade ore is being opened up. The finding of low grade ore in the wall rock at the McKinley is quite the usual occurrence. The low grade ore sometimes proves ultimately of more value and a more lasting source of revenue than the limited shoots of high grade.

A recent financial statement of the company showed its financial position to be fairly strong, aggregating \$350,169, made up as follows: Cash on hand, \$196,034; ore in transit and in smelter, \$105,500; ore at the mine ready for shipment, \$48,535. The McKinley-Darragh's new oil flotation mill has been working on sands and slimes from the bed of Cobalt lake for the past summer and has added to the revenue of the company about \$8,000 per month from this source. This oil flotation mill has closed down for the winter, but operations will be resumed in the spring on an enlarged scale a new large pump being installed for the quicker handling of the material to the mill. While it is early yet to pass an opinion on the new vein cut in the western section of the property this week, the indications are that an orebody of considerable importance might be developed.

Crown Reserve's New Vein Shows Up Well.

The new rich vein recently discovered at the 200 ft. level of the Crown Reserve Mine continues to show up well under development. For a distance of one hundred feet the vein has shown a width of from about three inches on an average, and contains average silver values of about three thousand ounces to the ton. The vein occurs in conglomerate formation and the geological conditions are such as to point to the likelihood of the deposit being of extreme importance. A considerable amount of ore has already been opened up and will add considerably to the revenue of the company. One of the most important features in connection with the development on the eastern section of the property where the vein was encountered, is that the eastern section of the property is practically virgin territory, with favorable geological conditions existing. This fact presents big possibilities. The exact depth of the conglomerate formation has not yet been ascertained, but it has been proven to continue to at least a depth of 35 ft. below the 200 ft. level. The discovery of this vein, coupled with the further development of the ore shoot, marks the discovery as one of the most important recorded in the Cobalt camp in several months.

The annual meeting of the Crown Reserve Mining Company will be held in Montreal on the 22nd of the current month. The company owns a large amount of the stock of the Porcupine Crown Mines and no doubt some definite announcement of the further operation of this mine will be forthcoming at the meeting, and the recent developments at the company's Cobalt property should prove a source of much satisfaction to the shareholders.

Cobalt's Big Silver Producers.

The Nipissing Mining Corporation of Canada and the Kerr Lake Mines were the leading producers of silver in the Cobalt camp during the past year. The year was not marked by any sensational developments, but rather a very high, consistent rate of production was maintained. The Nipissing and Mining Corporation of Canada produced somewhere around four million ounces each during the year, while the Kerr Lake produced around two and a half million ounces. The O'Brien Mining Company is the only other Cobalt producer which exceeded the million ounce production. The Coniagas mine, which has maintained a production of upwards of a million ounces for the past eleven years, this year fell below the million ounce mark by about twenty-four thousand ounces. The Nipissing with its large acreage of virgin ground has added a number of high grade silver veins to the large number previously known. A more or less comprehensive plan of development is now being carried out at this leading Cobalt property, in addition to which normal production is being maintained. This extension of development plans may reasonably be expected to result in the discovery of other important ore bodies. During the past year the Nipissing mine has taken the position formerly occupied by the Mining Corporation of Canada as the largest silver producer in the British Empire, and there is every reason to look forward to this enviable position being maintained by the company for many years to come.

Bailey-Cobalt.

The shareholders of the Bailey-Cobalt Mines are being asked to sanction the sale of the property to a new company known as the Bailey-Northern Customs, Limited, with a capitalization of one and a quarter million dollars. The proposed plan is that the liquidators

sell to the new company the Bailey mine with all its assets for 425,000 shares of the stock in the new company, which will enable the liquidators to distribute one share of new stock for every ten shares of Bailey stock now held by the shareholders. The new company would then purchase the assets of the Northern Customs Concentrator Company which owns a large mill located in the Cobalt camp, which is understood to have cost upwards of \$300,000 to erect. This mill at the present time is said to have contracts for treating ores from the LaRose Mines, Foster Mine, Right of Way and Green Meehan mine, and has other contracts under negotiation. The recent circular sent to the shareholders states that the mill is capable of earning \$91,250 yearly from its custom mill operation alone. The new company, besides owning the Bailey mine and this large customs mill has made provision to have \$50,000 in the treasury for working capital. The proposed plan also provides for the payment of all claims of the liquidators shall be settled and the new venture started out free of debt and with \$50,000 in the treasury. As soon as the new proposal is ratified by the shareholders the new company propose to start work and commence mining operations.

Any solution of the troubles of the Bailey-Cobalt Mining Company will no doubt prove a source of gratification to the many shareholders who have long since ceased to think of the concern as a live issue owing to the long-drawn out litigation proceedings.

Want Government to Open Remainder of Gillies Limits.

The Ontario Government is to be asked in the near future to throw open the remainder of Gillies' Limits for mining purposes. The Boards of Trade of the North Country will perhaps be asked to co-operate with this end in view. A few years ago the section of the limits immediately adjoining the Cobalt camp were thrown open, but nothing of much importance has so far been discovered in this territory as the section thrown open did not include any of the area in which the conditions were favorable to the finding of silver deposits. If the restriction on Gillies' Limits could be removed, a large field would be open to prospectors, and the probability is that discoveries of much importance would be made. In the meantime those prospecting in the Limits would naturally make Cobalt or Haileybury their headquarters, and in various ways the increased activities would be beneficial to many towns in the North. It is anticipated that there will be a surplus of labor during the coming summer and early fall of 1919, and a large number of men would find profitable employment in the opening up and prospecting of this promising area which at the present time is being reserved for timbering purposes.

The Plenaurum.

Various opinions are expressed throughout the North country by mining men regarding the extension granted the McIntyre mining company of Porcupine on the Plenaurum property. It is stated that the reason for requesting an extension of time on this property, is the fact that it was physically impossible for the company to secure adequate working forces with which to carry out the proposed exploration program during the past year. While this is true, the extension of one year appears to have left the impression that nothing of big importance has so far been encountered on the property. The opinion in the camp appears to be that had the McIntyre opened up ore-

bodies of importance it would scarcely have been possible to secure an extension in view of the exceedingly reasonable terms governing the former option on which the present year's extension is based.

On the McIntyre mine itself, development work continues to be exceedingly favorable and the mine holders, unchallenged for the present, the enviable position of the second largest gold producing mine in the Dominion.

Porcupine Crown.

It is highly probable that the Porcupine Crown Mines will resume operations in the near future. The mine has been kept pumped out and the milling plant is in an excellent state of repair. Enough high grade ore for six months' operations is broken on the stulls in the mine ready for hoisting to the mill. The treasury of the company contains something like a quarter of a million dollars and, with scores of men coming to the Porcupine camp every week looking for employment, the time is considered opportune for the Porcupine Crown to soon commence operations at full blast. The ore reserves already blocked out at the property are sufficient to keep the mill operating at capacity for a period of two years. Previous to closing down, the company was on a dividend paying basis of 12 per cent annually, and it is anticipated these disbursements could soon be resumed after operations are again commenced at the mine.

BRITISH COLUMBIA.

100 Ton Mill for Bowena Copper.

The Bowena Copper company, whose property is situated on Howe Sound, British Columbia, is constructing a concentrating mill, with a daily capacity of 100 tons. The plant is being installed by Messrs. T. A. Walsh & Co., Ltd., of Vancouver, B.C.

Developing Galena at Lanark Mine.

Another strike is reported on the mine of the Lanark property, Illecillewaet, B.C., two to three feet of solid galena being reported to have been developed in No. 2 tunnel. This mine looks more promising as development continues, several first class bodies of ore having been blocked out in the course of the last few months. A meeting of the stockholders will be held on the 5th of January at Yakima, Wn., for which point Mr. W. B. Dornberg, the manager, left some days ago.

Rambler-Cariboo.

The Rambler-Cariboo Mines Company, according to estimates of its president, Mr. A. F. McClaine, has made a profit of \$20,000 during the current year. Gross returns were \$80,000. No dividends will be declared this year, but the profits have increased the company's surplus to approximately \$50,000. This property is situated in the Sloean District, British Columbia.

Duncan River District.

The British Columbia Government proposes opening up the Duncan River District, which is highly mineralized, by the granting of financial assistance for the construction of a wagon road. The minerals of the section, which has been handicapped in its development because of lack of transportation facilities, include gold, silver, copper, lead and zinc which occur under promising conditions.

WAR WORK OF THE U. S. BUREAU OF MINES.

Washington, December 18.

How a great governmental agency engaged in saving the lives of miners and promoting the welfare of the industry, at the call to arms was instantly turned into

an engine of death and destruction to enemies, is detailed in the annual report of the U. S. Bureau of Mines, Department of the Interior, by Van H. Manning, the Director.

The report, which closes with the fiscal year June 30, while the United States was still at war, tells of the strenuous part played by the Bureau of Mines in assisting to build up the terrifying machine of death that would not have been felt with its fullest force by the Hun until the following spring.

At the same time great good for the future peaceful pursuit of industry in this country and for the saving instead of killing of men has come out of this welter of death-dealing experiments, is the claim of the Bureau of Mines. Certain experiments with delicate instruments known as microphones and geophones, in order to detect the direction and the distance of enemy mining work in tunnelling and the location of enemy artillery no matter where placed, has disclosed that these same instruments can be of use in determining the location of men entombed in mines following disaster. It is expected that, if the men have the presence of mind to make even a slight noise, the rescuers listening with these devices will be able at once to locate the men and begin the rescue work. Men thus entombed have been known to live for a week or longer under such circumstances, the rescuers being unable to find them. Other men have died before they could be located. The bureau will equip its rescue cars as soon as possible with these devices.

The war experience of the bureau is going to help peace industries in still another direction. The coal experts, eager to do their share in winning the war, were assigned to the testing of boilers to be used in the ships of the Emergency Fleet Corporation. Speed, and the saving of coal were demanded. The result was that the experts so changed the design of the boilers that the coal heretofore necessary to send the ships along for six miles was sufficient to carry them seven miles. This great saving will be available in peace times.

Early in the war every experiment station of the bureau in the mining districts of the country at once closed its peace activities and marshalled for war. The entire bureau and its men and equipment were offered to the two war services. Especially pressing scientific problems were allotted to the different stations, and where the bureau did not have all the men necessary, it turned over its laboratories and equipment to the men assigned by the War and Navy Departments. In this way a central-control laboratory for the testing of materials of war was established at the Pittsburgh station of the bureau by the Ordnance Department. Steel for cannon, material for cartridges and other materials used by the Ordnance were here tested for flaws and weaknesses. The War Department was determined that no soldier, in the emergency of battle, would be able to say that his gun failed him because of faulty material.

The War Department next seized upon the opportunity of using the bureau's explosives station and bomb-proof a few miles from Pittsburgh, and there many important, yet secret tests into the action of new and deadly explosives, were made under the supervision of the bureau's and armies' experts. Information of the greatest importance to the war-making powers was obtained.

Early in February, 1917, when war between the United States and the Central Powers seemed inevitable, the bureau offered its services in the study of poisonous gases and gas-masks to the War Department, which was

accepted. This was the beginning of the great organization of 1,700 chemists who constituted the Chemical Warfare Service at the American University at Washington and whose jurisdiction was afterwards turned over to the War Department. The bureau claims that as a result of its work, the United States was months ahead of where it otherwise would have been, and the soldiers

all had gas-masks of such quality that the War Department some time ago issued a statement to the effect that the gassing of a soldier was to be considered in the future as a matter of ignorance. Still further it is claimed by the bureau that through the energy of its research organization, the large-scale production of toxic gases was far ahead of the supply of shells.

The Ore Dressing Laboratory of the Haileybury School of Mines

By J. A. McRAE.

The ore dressing laboratory of the Haileybury School of mines is completed, and last week the plant was subjected to a trial run. The services of Douglas A. Mutch, formerly manager of the Temiskaming & Hudson Bay Mines, and now connected with the Coniagas mines, have been engaged, and the next few weeks will be spent in tuning up the plant preparatory to regular utilization as a demonstration plant for the benefit of pupils, as well as for affording to the mine operator of the whole of this part of Northern Ontario facilities for developing a process for treating ore peculiar to their mine and under their own supervision. The formal opening will probably not take place until some time in February.

The members of the school board include some of the leading mining men and metallurgists in the Dominion. In this respect the school has been exceptionally fortunate. These men have given freely of their services, believing that in doing so they have performed a patriotic duty to the country, and have religiously adhered to the principle of doing their best for the mining industry. This is the chief aim of all able mining men who follow the great and fascinating business of mining to a point where achievement gives greater satisfaction than does salary or position.

Mr. F. D. Reid, manager of the Coniagas Mines, Cobalt, is chairman of the school board, the other members being J. J. Denny, manager of the Research Department at the Nipissing Mine, M. F. Fairlie, manager of the Mining Corporation of Canada, and E. A. Collins, formerly mining inspector for this district.

Equipment

The mill with which the Haileybury Mining School is equipped marks the highest point towards which the world's metallurgists have attained. The plant and machinery designed and installed by men who have attained to the height of the profession of mining and metallurgy, is among the most modern and flexible ever constructed. The plant was designed with the object in view of providing a plant suitable for treating ore by amalgamation, gravity concentration, flotation, using a single process, or using the various processes in any desired combination. The flexibility of the plant, therefore, makes it possible to duplicate the work of the various mills in operation throughout the district, or offers wide scope in conducting original tests. The following is a brief summary of a part of the tests and combination of tests possible to carry out in the plant:—

1st. Straight gravity concentration test, by crushing to the desired size in stamp battery and tube mill and concentrating the crushed product on jigs and concentrating tables.

2nd. Concentration followed by cyanidation.

3rd. Straight cyanidation, in which provision is made for all sliming and agitating process, or leaching the sand and agitating the slime. Provision is made to precipitate values from the pregnant solution by sodium sulphide, zinc-dust, or aluminum dust.

5th. Amalgamation followed by concentration.

6th. Amalgamation followed by cyanidation.

7th. Amalgamation followed by a combination of concentration, cyanidation or flotation.

The equipment consists of a small jaw-crusher, a battery of three light stamps, amalgamation plate, classifiers, tube mill, concentrating tables, agitators, thickeners, and flotation machine. The building of which the plant takes up the first story is 65 ft. by 35 ft. and is of brick.

The upper floor of the same building contains a carpenter shop, analytical laboratory, machine shop and blacksmith shop. The assay office is on the first floor.

From the interest being manifested on every hand it appears to be quite evident the entire North Country will take advantage of the opportunity the institution offers the boys of High School standing, as well as the course for mill-men, miners, prospectors and others engaged in mining work. That in various ways the cost and the effort expended will be returned in multiplied form is not doubted in view of the fact that the school is situated in such close proximity to the silver mines of Cobalt and the gold mines of Porcupine, Kirkland and Boston Creek, as well as the silver mining camp of Gowganda and other outlying mining districts.

It is considered fitted that leading mining men of Cobalt (the first real precious mining camp to be developed in the province of Ontario) should have placed such an important part in establishing such a school in its sister town. Also, the town of Haileybury is considered fortunate for having been chosen as the most suitable location for such an institution. A number of Haileybury's oldest residents, outstanding among which is License Commissioner George T. Smith, together with W. A. Wilson, principal of the school, first voiced the idea of establishing a mining school in Haileybury. The suggestion found early support from all parts of the district, and particularly from the Cobalt district.

How To Begin.

In establishing a mining school, many factors must be taken into account. First is the demand for such an institution. Second is the expense. Third is the choosing of a suitable location; and, fourth, is being able to enlist the services of competent mining men and metallurgists for its designing and construction.

In this district the demand was great. The favorable effect it should have in the matter of increasing the standard of skilled labor at the mine should be almost immediately felt. Already the services of boys with course as yet not completed are being sought for by the mines of the district. As for the location, it is within five miles of the heart of the great Cobalt silver camp, and almost on the southern fringe of the great gold zone which includes the already proven camps of Porcupine, Kirkland Lake and Boston Creek, as well as the great sweep of country in which rock formations are such as to point toward the likelihood of the discovery of other large precious metal camps. As for being able to enlist the services of efficient mining men and metallurgists, the Haileybury School of Mines has been exceedingly fortunate, as already stated. Also, concerning the matter of financing, the way has been made easier than that which might fall to the lot of another such project were an attempt to be made at its duplication in other districts. Of course, provided the demand is sufficiently great for such an institution, and provided it can be shown that the enterprise will undoubtedly be carried through successfully it is quite reasonable that limited financial assistance from the government should be forthcoming, for a time at least. However, more than this is necessary. For instance, the Haileybury School and equipment cost upwards of \$30,000. The great majority of the machinery was donated by mines, manufacturing concerns and private individuals. Had it been necessary to purchase this equipment, pay for the services of leading mining men and metallurgists in order to attain the present high degree of perfection, the cost might reasonably prove too heavy for the average community to undertake, and might, therefore, result in the finished plant falling far below the desired standard. It can therefore be seen that the first consideration before undertaking such a task is to have the unremitting support of the leading mining men of the district for which the school is being planned to serve, as well as the entire community. Unless the successful completion of the plan outlined can be clearly seen it would be dangerous to make a beginning. After following the trend of progress made since the commencement of the Haileybury School of Mines the foregoing deductions come to mind. Should they prove to be of value to any other community in which such an institution desires the advantages offered by a modern flexible milling plant, they will have served their purpose.

MAY ENLARGE TRAIL COPPER REFINERY.

The management of the Consolidated Mining & Smelting Co. of Canada has made a reassuring statement with respect to the future demand for metals and the general effect of the termination of the war on the mining and smelting industry, which is the backbone of the Eastern section of British Columbia. At present the Trail Reduction Works are working on an order for spelter; but the outlook for orders for copper and lead are not, as yet, bright. Silver and gold, of course, take care of themselves. It is stated to be the intention of the Consolidated Company to

continue operations on the present basis as long as possible, and more or less extensive plans have been made for keeping practically the normal force of men at work on construction or development. The Consolidated Company, now that the Canada Copper Corporation is stopping work definitely at its smelter at Greenwood, B. C., will handle the concentrates produced by its mill at Princeton, B. C., which is expected to be running next year. Should the situation develop as indicated, the enlargement of the Trail copper refinery to practically three times its present capacity—it being now 20-tons daily—will become necessary. This would mean considerable construction work and probably some changes to the copper furnaces and converters. Then, with the greater demand for gold and a less cost for supplies probably at no distant date, the tonnage to be taken from the Rossland gold-copper mines of the company should be materially increased. Gold mining, it is thought, with more staple conditions prevailing, will become more popular.

THE GIBBS BREATHING APPARATUS.

Self-contained breathing or rescue apparatus is a device by which man is enabled to do work in places where he is, by nature unfitted to go or live. Breathing apparatus of the self-contained type was first introduced into this country in 1907, following which various types of apparatus manufactured in England and in Germany were installed at the mines and industrial plants of Canada and the United States.

Until 1912 no effort was made to develop an American made apparatus. Investigations conducted by the United States Bureau of Mines demonstrated very forcibly that there was much room for improvement in the various types of European made apparatus, and work was commenced by the various engineers, physiologists and chemists of the Bureau of Mines for the development of an improved type of oxygen breathing apparatus.

The **Gibbs Oxygen Breathing Apparatus** developed by W. E. Gibbs of the U. S. Bureau of Mines, Department of the Interior, is the result of six years study, research and experimental work by these experts. Early in the year 1918 the manufacture of the Gibbs Apparatus was begun at the plant of the Edison Phonograph Works, Orange, N.J.

General Requirements of Breathing Apparatus.

In order to be safe and efficient, self contained breathing apparatus, whatever its type or the details of its construction, must comply with certain basic requirements. These requirements have been outlined by experts as follows:

(1) An oxygen supply adequate alike to conditions of rest and violent exertion, and capable of being adjusted to last as long as possible, in case the wearer should happen to be imprisoned in bad air by a fall of rock or other cause.

(2) Such efficient absorption of the carbon dioxide exhaled that the wearer, even during vigorous exertion and hard breathing is not compelled to re-inhale enough carbon dioxide to appreciably interfere with his capacity for exertion. One per cent should be the maximum, and less than half of one per cent the aim. The absorber should be able to take up an amount of carbon dioxide corresponding approximately to the total oxygen supply carried.

(3) Freedom from mechanical obstruction in the apparatus, so that the wearer may inspire and expire even during the most violent breathing without noticeable impediment; no negative pressure at any time,

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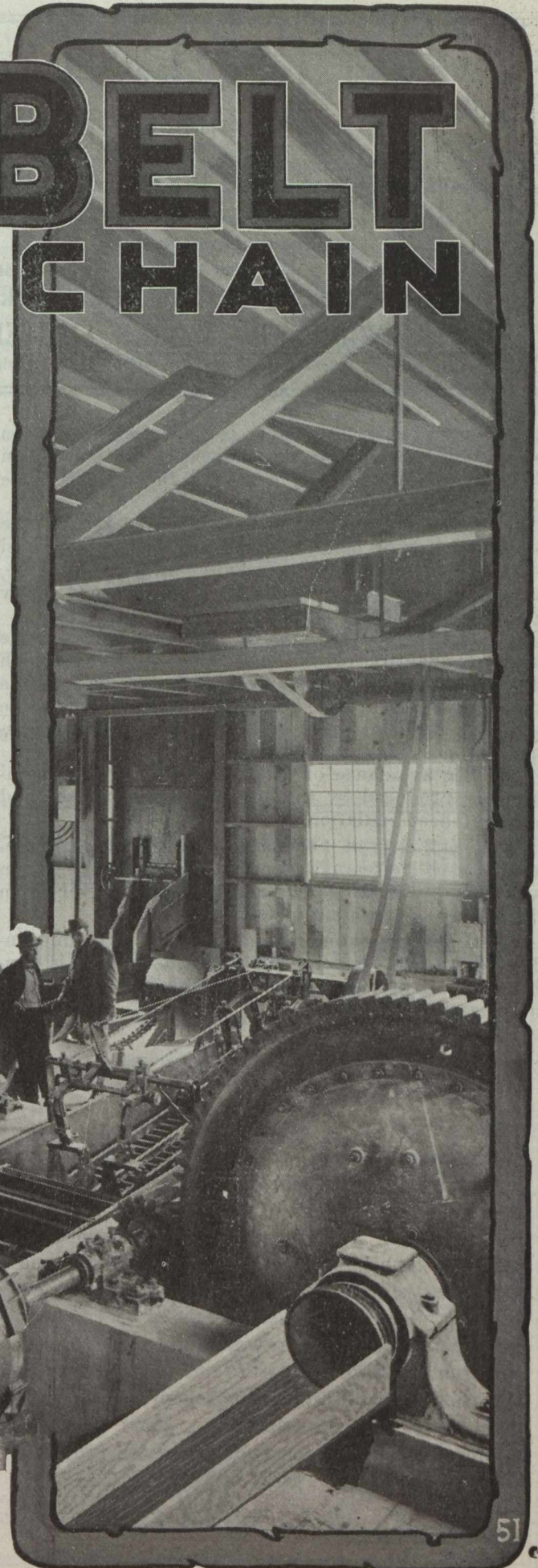
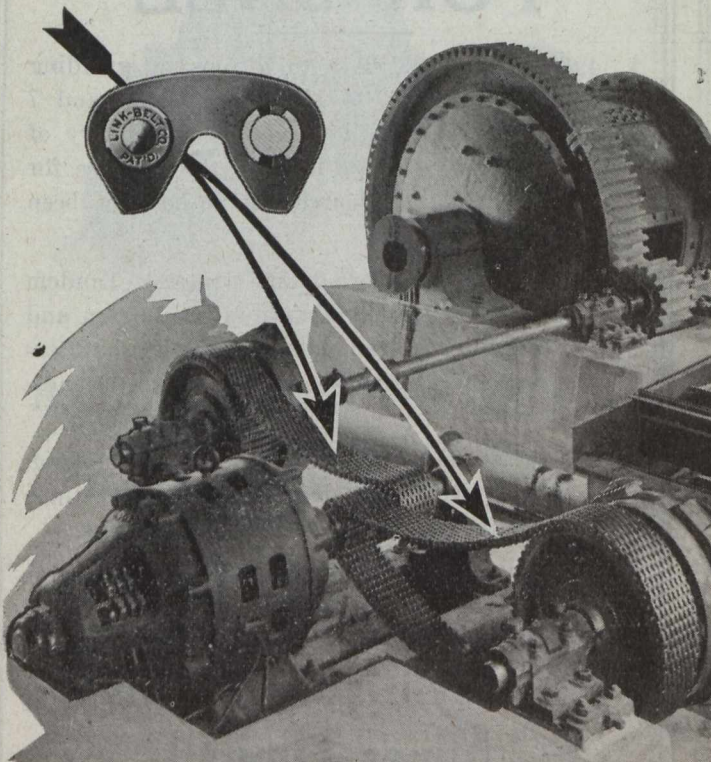
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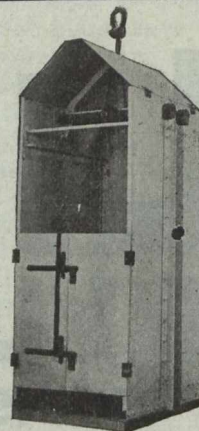
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as poisonous gases are liable to be drawn in; and a positive pressure at the mouthpiece of not more than 2 inches water gauge even during the most forcible expiration.

(4) Arrangements to obviate the danger of the breathing bag or bellows being breathed or squeezed empty when the wearer is crawling in a low passage, as he is then unable to inflate his lungs and may throw off the apparatus.

(6) Tightness of the apparatus so that not even the smallest quantity of the poisonous gases by which the wearer may be surrounded can be drawn into the apparatus and so reach his lungs, the apparatus to be as nearly accident proof and "fool proof" in this respect as possible.

(6) The avoidance of an excessively high temperature—as produced by the absorbers now in use—and efficient heat radiation.

(7) Simplicity of construction and such arrangements as will effectually protect the vital parts from breakage by striking against walls or roof or from the wearer's happening to fall.

The Gibbs apparatus was designed along the lines indicated in these general requirements and it is conceded by experts as having successfully filled the specifications.

CANADIAN MINING JOURNAL IS NOW A WEEKLY.

Beginning with the Jan. 8th number the Canadian Mining Journal is to be published weekly. With an enlarged staff and more frequent publication we will be able to give the mining industry better service. There have been some unavoidable delays in publishing the first two numbers, and some unsatisfactory productions owing to our new printing plant at Ste. Annes having to turn out work before the builders were quite through with construction. We can assure our readers that we will soon be publishing a much improved journal, with many more contributors. News from the mining districts will be published more promptly and there will also be more technical articles of interest to those who are operating mines and metallurgical works.

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Department of Colonization, Mines and Fisheries

The chief minerals of the Province of Quebec are Asbestos, Chromite, Copper, Iron, Gold, Molybdenite, Phosphate, Mica, Graphite, Ornamental and Building Stone, Clays, etc.

The Mining Law gives absolute security of Title and is very favourable to the Prospector.

MINERS' CERTIFICATES. First of all, obtain a miner's certificate, from the Department in Quebec or from the nearest agent. The price of this certificate is \$10.00, and it is valid until the first of January following. This certificate gives the right to prospect on public lands and on private lands, on which the mineral rights belong to the Crown.

The holder of the certificate may stake mining claims to the extent of 200 acres.

WORKING CONDITIONS. During the first six months following the staking of the claim, work on it must be performed to the extent of at least twenty-five days of eight hours.

SIX MONTHS AFTER STAKING. At the expiration of six months from the date of the staking, the prospector, to retain his rights, must take out a mining license.

MINING LICENSE. The mining license may cover 40 to 200 acres in unsurveyed territory. The price of this license is Fifty Cents an acre per year, and a fee of \$10.00 on issue. It is valid for one year and is renewable on the same terms, on producing an affidavit that during the year work has been performed to the extent of at least twenty-five days labour on each forty acres.

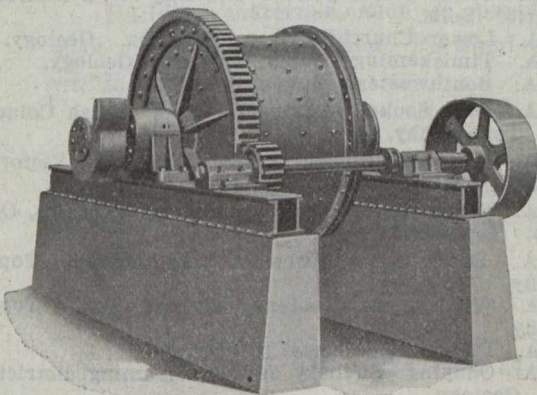
MINING CONCESSION. Notwithstanding the above, a mining concession may be acquired at any time at the rate of \$5 an acre for SUPERIOR METALS, and \$3 an acre for INFERIOR MINERALS

The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec, north of the height of land, where important mineralized belts are known to exist.

PROVINCIAL LABORATORY. Special arrangements have been made with POLYTECHNIC SCHOOL of LAVAL UNIVERSITY, 228 ST. DENIS STREET, MONTREAL, for the determination, assays and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. The well equipped laboratories of this institution and its trained chemists ensure results of undoubted integrity and reliability.

The Bureau of Mines at Quebec will give all the information desired in connection with the mines and mineral resources of the Province, on application addressed to

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Recent Publications

Iron Ore Occurrences in Canada, Vol. II. Compiled by E. Lindeman, M.E., and L. L. Bolton, M.A., B.Sc. Introductory by A. H. A. Robinson, B.A.Sc.

The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.

Building and Ornamental Stones of Canada (British Columbia). Vol. V., by W. A. Parks, Ph.D.

Peat, Lignite and Coal; their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.

Annual Mineral Production Reports, by J. McLeish, B.A.

The Coal-fields and Coal Industry of Eastern Canada, by F. W. Gray.

Occurrences and Testing of Foundry Moulding Sands. Bulletin No. 21, by L. H. Cole, B.Sc.

Analyses of Canadian Fuels. Parts I to V, by E. Stansfield, M.Sc., and J. H. H. Nicolls, M.Sc.

Clay Resources of Southern Saskatchewan, by N. B. Davis, M.A., B.Sc.

Summary Report of the Mines Branch, 1916.

The Mineral Springs of Canada. Part II., by R. T. Elworthy, B.Sc.

The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—

Fuel Testing Laboratory.—Testing value of Canadian fuels for steam raising and production of power gas; analyses, and other chemical and physical examinations of solid, liquid and gaseous fuels are also made.

Ore-Dressing Laboratory.—Testing of Canadian ores and minerals, to ascertain most economical methods of treatment.

Chemical Laboratory.—Analysing and assaying of all mineral substances and their manufactured products. Copies of schedules of fees, which are slightly in excess of those charged by private practitioners, may be had on application.

Ceramic Laboratory.—Equipment is such that complete physical tests on clays and shale of the Dominion can be made, to determine their value from an economic standpoint.

Structural Materials Laboratory.—Experimental work on sands, cements and limes is also undertaken.

Applications for reports and particulars relative to having investigations made in the several laboratories should be addressed to The Director, Mines Branch, Department of Mines, Ottawa.

GEOLOGICAL SURVEY

Recent Publications

Summary Report, 1917, Part D. Reports on field work in Manitoba.

Memoir 95. Onaping Map-Area, by W. H. Collins.

Memoir 96. Sooke and Duncan Map-areas, Vancouver Island, by C. H. Clapp.

Memoir 98. Magnesite Deposits of Grenville District, Argen-teuil County, Quebec, by M. E. Wilson.

Memoir 99. Road material surveys in 1915, by L. Reinecke

Memoir 101. Pleistocene and recent deposits in the vicinity of Ottawa, with a description of the soils, by W. A. Johnston.

Memoir 103. Timiskaming County, Quebec, by M. E. Wilson.

Memoir 105. Amisk-Athapapuskow Lake district, by E. L. Bruce.

Map 63A. Moncton Sheet, Westmoreland and Albert Counties, New Brunswick. Topography.

Map 132A. Southwestern portion of Rainy River district, Ontario. Soils.

Map 135A. Lower Churchill river, Manitoba. Geology.

Map 145A. Timiskaming county, Quebec. Geology.

Map 154A. Southwestern Yukon.

Map 157A. East Sooke, Vancouver Island, British Columbia. Topography.

Map 161A. Beaverton Sheet, Ontario, York and Victoria Counties, Ontario. Topography.

Map 162A. Sutton Sheet, York and Simcoe Counties, Ontario. Topography.

Map 163A. Barrie sheet, Simcoe County, Ontario. Topography.

Map 165A. Windermere, Kooteney district, B.C. Topography.

Map 174A. Blairmore, Alberta. Topography.

Map 179A. Onaping; Sudbury and Timiskaming districts, Ont. Geology.

Map 183A. Harricanaw-Turgeon basin; Abitibi, Timiskaming and Pontiac, Que. Geology.

Maps 1697 and 1698. Explored routes in a belt traversed by the Canadian Northern Ontario railway,—in two sheets: Sheet 1 Gogama to Missonga, Sudbury district; Sheet 2 Oatland to Penhurst, Algoma district, Ontario.

Map 1690. Whiteburn Gold District, N.S. Geology.

Map 1702. Klotassin, Yukon Territory. Geology.

Applicants for publications not listed above should mention the precise area concerning which information is desired.

Maps published within recent years may be had, printed on linen, at the nominal cost of ten cents each.

The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon.

Communications should be addressed to The Director, Geological Survey, Ottawa.



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Many other useful minerals, both metallic and non-metallic, are found in Ontario:—actinolite, apatite, arsenic, asbestos, cobalt, corundum, feldspar, fluorspar, graphite, gypsum, iron pyrites, mica, molybdenite, natural gas, palladium, petroleum, platinum, quartz, salt and talc.

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Ontario in 1917 produced 46 per cent. of the total mineral output of Canada. Returns made to the Ontario Bureau of Mines show the output of the mines and metallurgical works of the Province for the year 1917 to be worth \$72,093,832, of which the metallic production was \$56,831,857.

Dividends and bonuses paid to the end of 1917 amounted to \$11,486,167.45 for gold mining companies, and \$70,821,829.34 for silver mining companies, or a total of \$82,307,996.79.

The prospector can go almost anywhere in the mineral regions in his canoe; the climate is invigorating and healthy, and there is plenty of wood and good water. A miner's license costs \$5.00 per annum, and entitles the holder to stake out in any or every mining division three claims of 40 acres each. After performing 240 days' assessment work on a claim, patent may be obtained from the Crown on payment of \$2.50 or \$3.00 per acre, depending on location in surveyed or unsurveyed territory.

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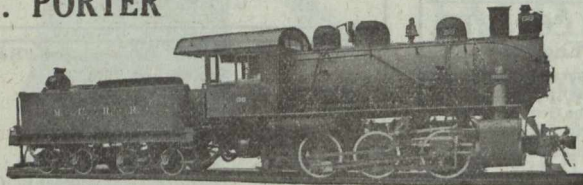
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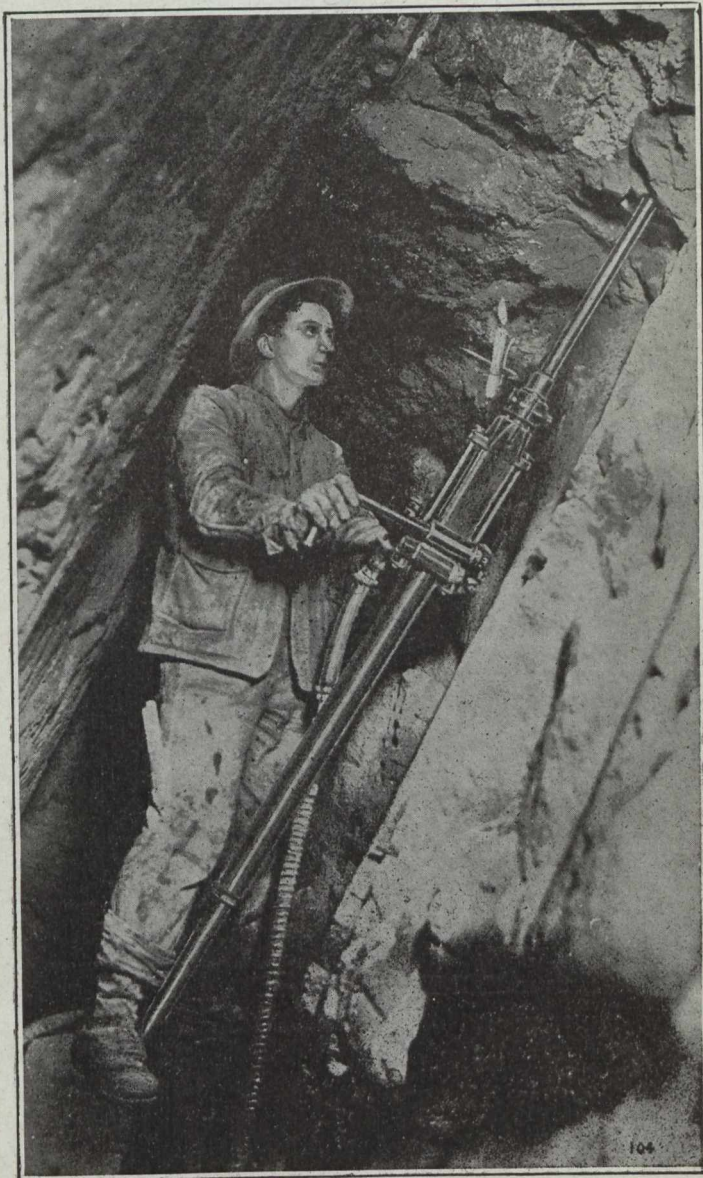
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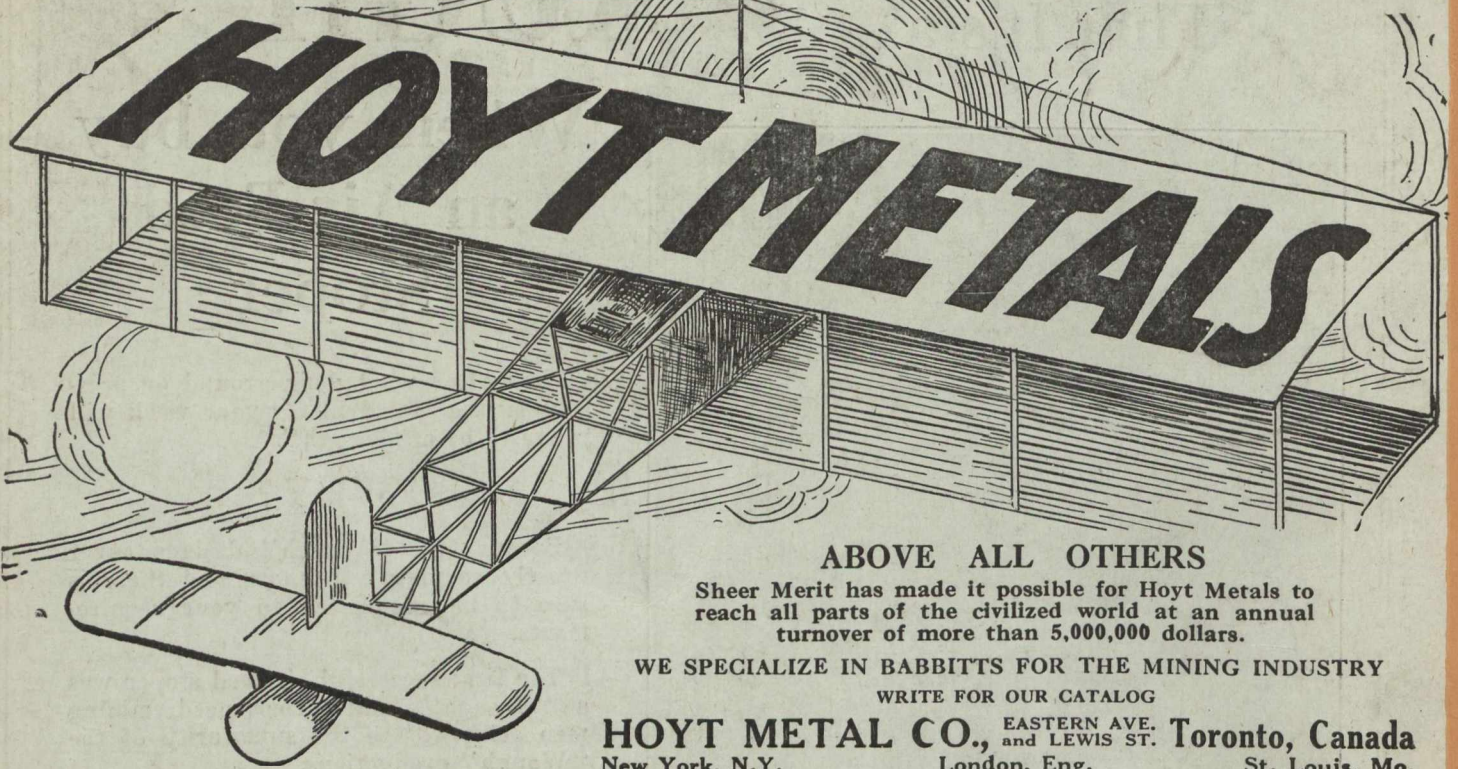
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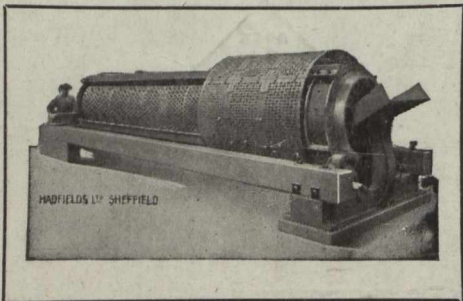
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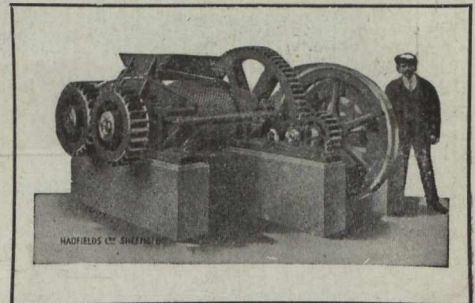
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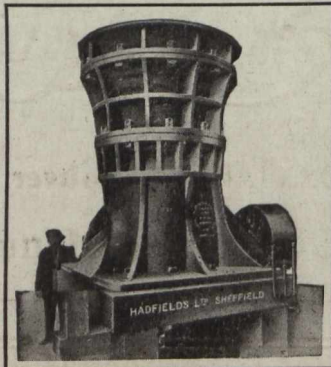
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