

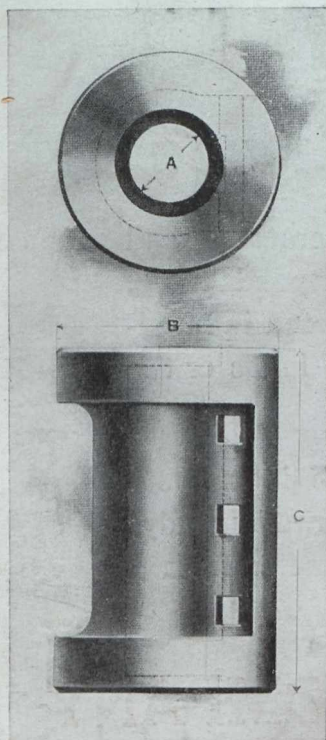
CANADIAN **MINING JOURNAL**

VOL. XXXVIII

TORONTO

No. 19

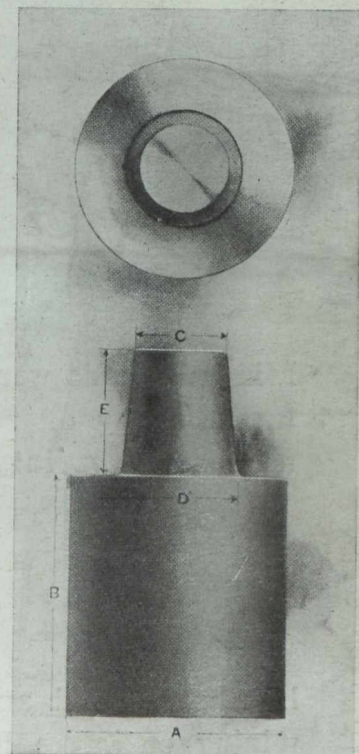
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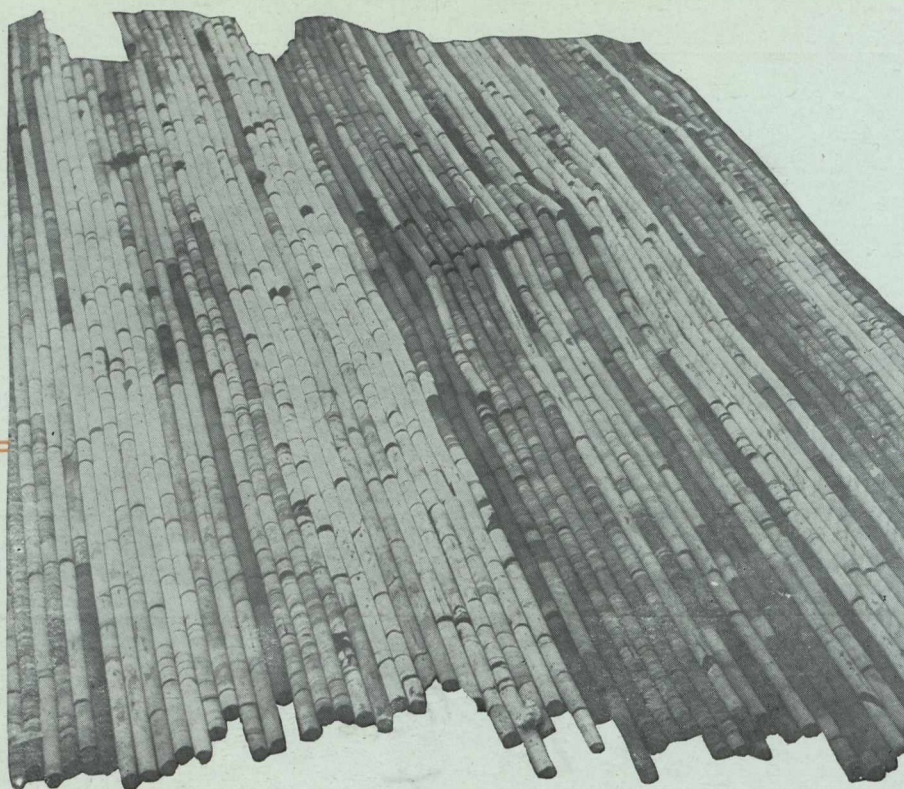
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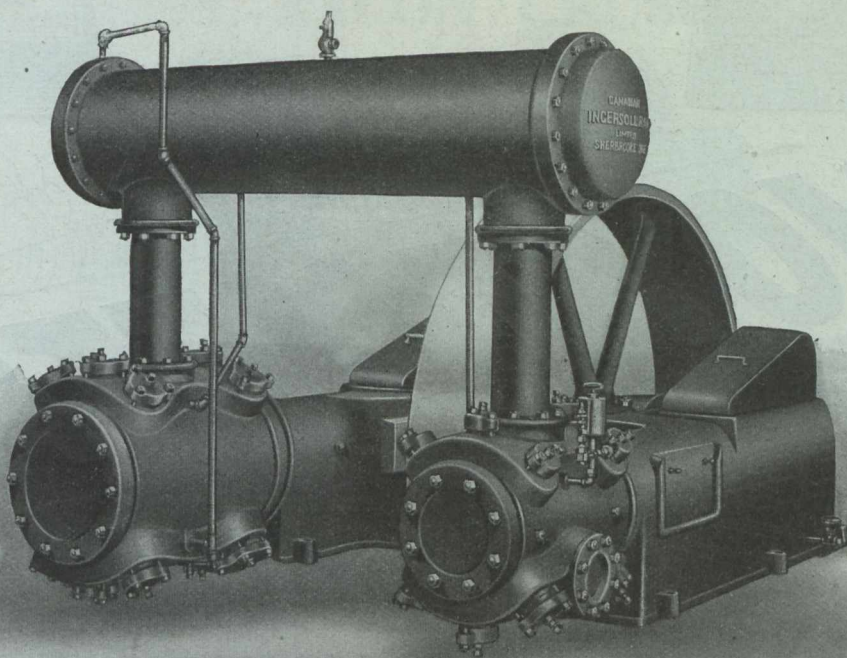
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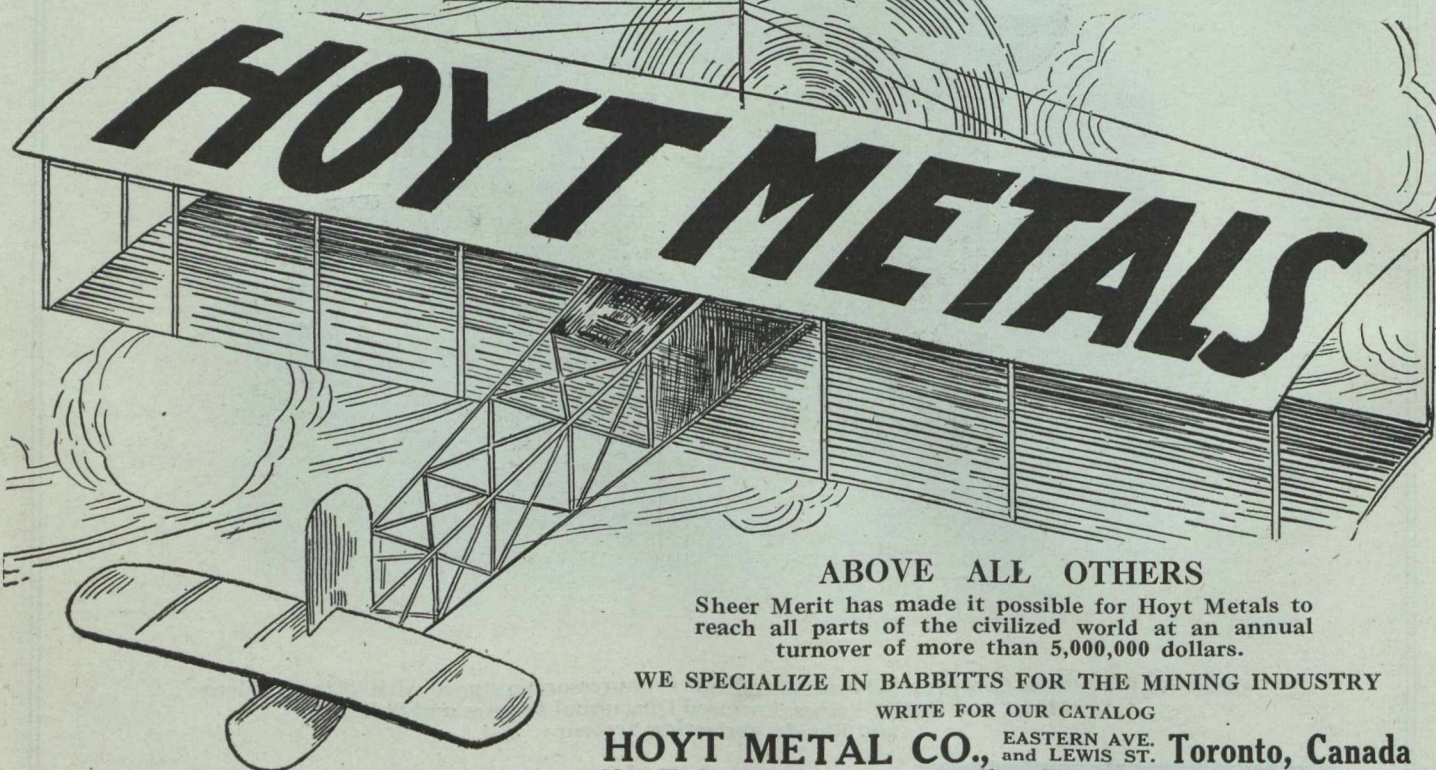
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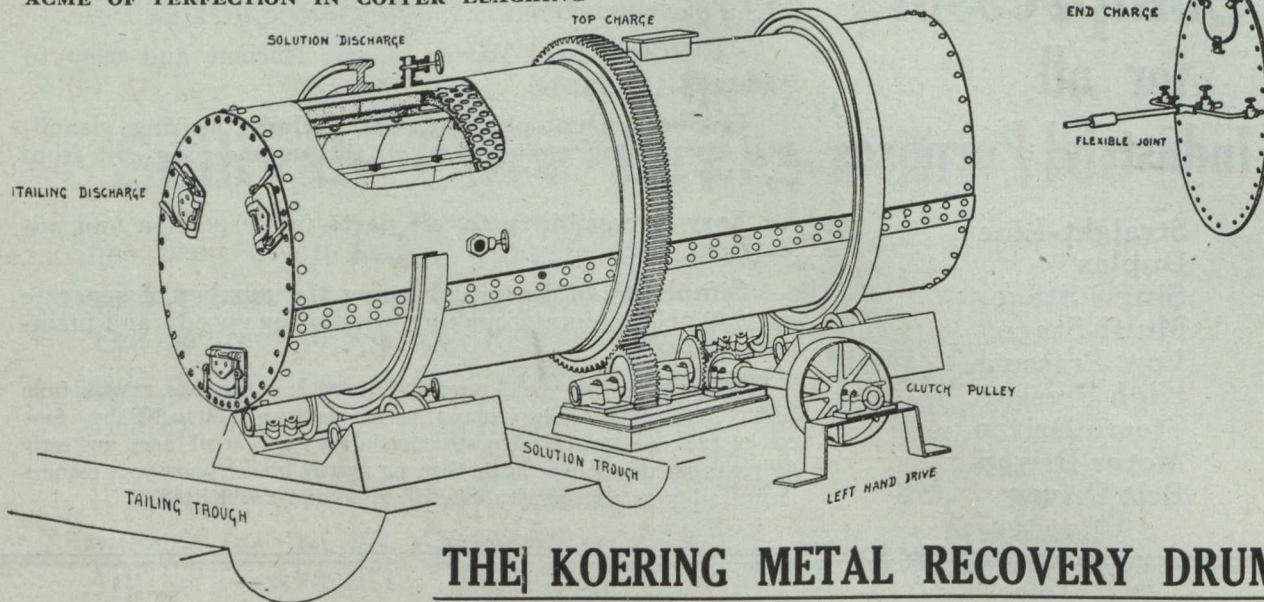
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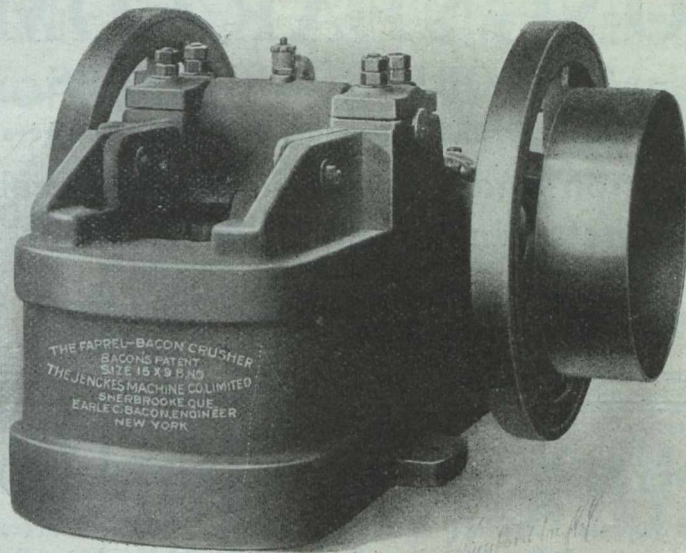
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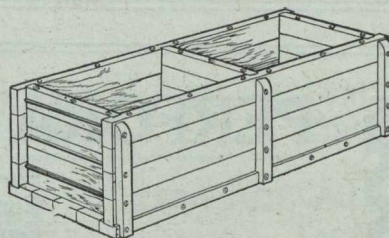
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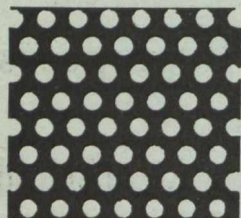
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The Minerals of Nova Scotia

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Iron The province contains numerous districts in which occur various varieties of iron ore, practically at tide water and in touch with vast bodies of fluxes. Deposits of particularly high grade manganese ore occur at a number of different locations.

Gold Marked development has taken place in this industry the past several years. The gold fields of the province cover an area approximately 3,500 square miles. The gold is free milling and is from 870 to 970 fine.

Gypsum Enormous beds of gypsum of a very pure quality and frequently 100 feet thickness, are situated at the water's edge.

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Department of Colonization, Mines and Fisheries

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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 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.

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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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The Flotation Process

All patent and other rights to this process
in North America are now controlled by

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who is the registered owner of the following Canadian patents: Nos. 76,621; 87,700; 94,332; 94,516; 94,718; 96,182; 96,183; 99,743; 127,397; 129,819; 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; 163,587; 163,608; 163,707; 163,936; 165,390; 166,415; 167,474; 167,475; 167,476; 167 603.

On December 11, 1916, the SUPREME COURT OF THE UNITED STATES 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 and, at a recent trial in the United States District Court at Butte, Montana, Judge Bourquin admitted these claims as amended.

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.

Prospective users of our flotation processes are earnestly requested not to be misled by the mistaken views disseminated by interested parties that any of these BASIC PROCESS PATENTS can be evaded by a mere variation of apparatus for agitating and aerating the pulp, or by the simple addition of oils or other materials in excess of a fraction of one per cent. on the weight of the ore treated.

NOTICE

Notice is hereby given that we will enforce our patents and stop all infringements, but are prepared to grant licenses for the right to use all or any of our processes to those who wish to use them. To those who infringe or have infringed our patents, notice is given that a settlement for such infringement must precede the granting of licenses for the future use of same.

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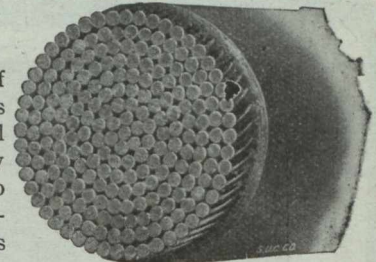
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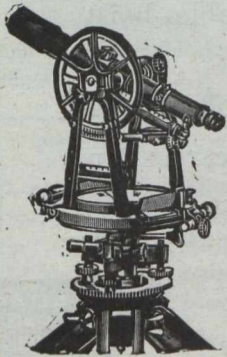
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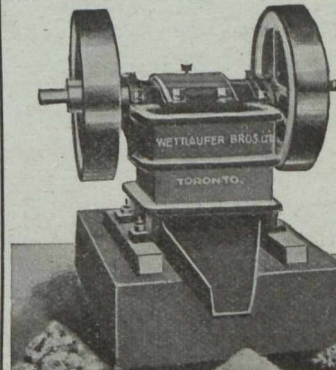


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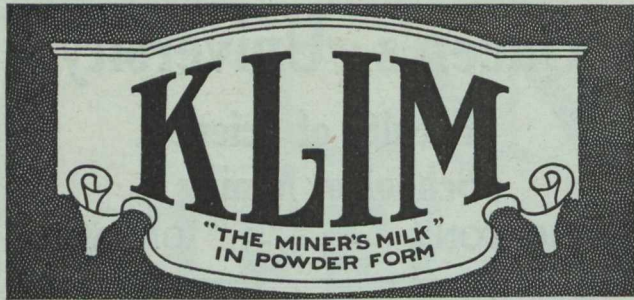
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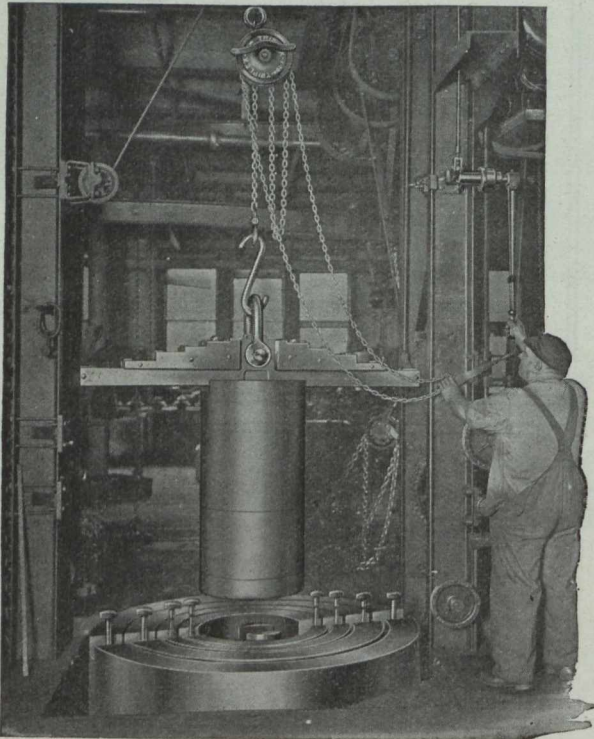
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THE CANADIAN MINING JOURNAL

VOL. XXXVIII.

TORONTO, October 1st, 1917.

No. 19

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ADVERTISING COPY.

Advertising copy should reach the Toronto Office by the 8th for issues of the 15th of each month, and by the 23rd for the issues of the first of the following month. If proof is required, the copy should be sent so that the accepted proof will reach the Toronto Office by the above dates.

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CIRCULATION.

"Entered as second-class matter April 23rd, 1908, at the post office at Buffalo N.Y., under the Act of Congress of March 3rd, 1879."

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COLORED REPRODUCTIONS OF ORE.

In answer to many enquiries concerning the colored reproductions of ore which have appeared in the Canadian Mining Journal, we beg to advise our readers that this work is being done on our own presses. Some excellent colored plates will appear in coming numbers of the Journal.

The "Toronto World" claims that the Minerals Separation Company is controlled by Germans and that the flotation process originated in Germany. The company's methods are such that they have aroused much opposition and criticism is to be expected; but the "World" is not well informed as to the facts.

THE MOLYBDENITE EMBARGO.

In this issue a correspondent who is developing a molybdenite property near Renfrew draws attention to the lack of uniformity in prices paid in the United States and in Canada for molybdenite, and to the result of this on development of low grade deposits.

The difference is very great. The Munitions Board is getting molybdenite at less than one-half the U. S. market price, and Canadian producers are not allowed to sell their product except to the Munitions Board.

Everyone is pleased to see the Imperial Government get its supplies at reasonable prices and \$1.00 per lb. is considered to be a high enough price to make the operation of a few Canadian molybdenite deposits profitable. It is unfortunate however that when United States buyers are asking for molybdenite and are offering big prices that we are not encouraged to develop some of the low grade and irregular deposits which might be operated profitably while the price is high. Development of such properties might result in the discovery of deposits which could be worked profitably when the price falls again.

Obviously the cost of producing molybdenite at most of the known properties will be high. Evidently however American users are experiencing difficulty in obtaining a sufficient quantity of molybdenite and they are willing to pay prices which would compensate for high cost of production. The Munitions Board price takes no account of the cost at individual properties; and though it is high enough to encourage producers who have good properties, there can be no doubt that the embargo is preventing development of the less promising deposits in Canada at a time when the higher price prevailing in the United States is encouraging the development of such deposits there.

If the munition makers are getting all the molybdenite they need it would be unwise to encourage the development of deposits less promising than those now being worked. On the other hand, if the supply in the United States is not sufficient and if the price ruling there can be taken as a fair indication of the demand, Canada is wasting an opportunity of marketing material that will be without value after the war.

A member of the British Columbia Legislative Assembly who, seemingly, thinks that ministers of the Provincial Government should wear top hats and Prince Albert coats on all occasions, informed a newspaper man that when the Minister of Mines for British Columbia visited a mine in his district he wore overalls. Since then Provincial newspapers have made frequent mention of the fact that such was the case, and numerous references have been made in print to the "overall" trip of the Minister of Mines.

THE INSTITUTE OF METALS.

The Annual Autumn Meeting of the Institute of Metals, London, was held on Wednesday, September 19th. At the opening session, between the hours of 4 p. m. and 6.30 p. m. the following communications were presented:

(1) "Experiments on the Fatigue of Brasses." By B. Parker Haigh, D.Sc. (London).

(2) "Hardness and Hardening." By Professor T. Turner, M.Sc. A.R.S.M. (Birmingham).

(3) "The Effects of Heat at Various Temperatures on the rate of softening of cold-rolled Aluminium Sheet." By Professor H. C. H. Carpenter, M.A., Ph.D., A.R.S.M. (London), and L. Taverner, A.R.S.M. (London).

(4) Note on "A Comparison Screen for Brass." By O. W. Ellis, M.Sc., (London).

At the evening session, from 8 p. m. to 10 p. m., the Programme will be as follows:

(5) "Further Notes on a High Temperature Thermostat." By J. L. Haughton, M.Sc. (Teddington), and D. Hanson, M.Sc. (Teddington).

(6) "Principles and Methods of a new System of Gas Firing." By A. C. Ionides (London).

(7) "Fuel Economy Possibilities in Brass Melting Furnaces." By L. C. Harvey (London).

(8) "The Effect of Great Hydrostatic Pressure on the Physical Properties of Metals." By Professor Zay Jeffries, B.Sc. (Cleveland, U. S. A.).

(9) Note on "The Use of Chromic Acid and Hydrogen Peroxide as an Etching Agent." By S. W. Miller (Rochester, N. Y., U. S. A.).

In connection with Mr. Ionides' Paper a demonstration of a new system of furnace heating was given.

OPHIR.

Toronto, Sept. 25.—The proposal to increase the capital of the Ophir Company to \$1,500,000 was unanimously ratified at the special meeting of shareholders yesterday afternoon. Application for the necessary supplementary letters patent will accordingly be immediately made.

The Granby Consolidated Company intends printing monthly the Granby News, a small publication chiefly for circulation among its numerous mine and smeltery employees, and which will contain information concerning the company's operations likely to be of interest to those for whom it will primarily be printed.

The Greenwood Ledge states that copper matte is being sent from the Ladysmith smeltery to the Canada Copper Corporation's works at Greenwood in Boundary district of British Columbia, to be converted into blister copper.

According to the Vancouver World, the Geological Survey of Canada has decided to open an office in the city of Vancouver, British Columbia, "in view of the great importance to the Dominion at large of the mining industry" of that province.

Mr. Raleigh P. Trimble, for years considerably interested in the development of several new mining properties situated in the western part of Omineca division of British Columbia, has returned to that district from Portland, Oregon.

CORRESPONDENCE.

THE MOLYBDENITE EMBARGO.

To the Editor of the Canadian Mining Journal:

Sir,—I am very much interested in the production of molybdenum and at the present time am busily engaged in the development of a molybdenite property near Renfrew.

The difficulties of initial mining, as will be known to all interested, are both expensive and great, deserving all the encouragement possible. For this reason I have recently been in communication with the Imperial Munitions Board on the question of the price which they are permitted to pay for concentrates for the Imperial Government. This price is in the neighborhood of \$1.00 per lb.

In the most likely possibility of low grade ore being encountered, say under 1%, the cost of mining is so heavy that it does not leave much, if any, margin for the owner, and then only in the event of him being fortunate enough to strike a large body soon after beginning work.

In addition to the heavy cost of mining I have also pointed out to the Board the tremendous difference between their price, plus an embargo, and the prices which can be obtained in the United States, which, my latest report says, is \$2.40 per lb. Owing to the embargo, producers are not permitted to take advantage of outside opportunities.

Molybdenum is a most urgent necessity to the Imperial Government and our Allies at this critical time, and I do not take second place to anybody in my loyalty, but I do strongly believe that the Imperial Government, through the Imperial Munitions Board, should allow a fair price to encourage the production, more extensively of this metal, or at least allow us to take advantage, to some extent, of the higher values offered in the United States.

If there are other molybdenite producers interested in this question perhaps a little discussion might result in an improvement in conditions.

I wish to make my mine successful and in some small way do "My Bit" towards the ultimate result of the Allied Cause; but unfortunately I am not in a position to carry on business on philanthropic lines, much as I would wish.

Sept. 20, 1917., 123 Bay St., Toronto.

Yours, etc.

A. W. Taylor.

The Taylor Molybdenite Mines, Renfrew.

COPPER 23½ CENTS PER LB.

Washington, Sept. 20.—Copper prices were fixed today at 23½c a pound, about three cents below the prevailing market, by agreement between the Government and leading copper producers, effective for four months.

Sales to the Government, the public and the allies will be at this price, f. o. b. New York, and producers agreed not to reduce wages now paid in the industry. They also pledged themselves to maintain maximum production and to prevent copper from falling into the hands of speculators.

MAJOR NEIL MACDONALD HOME.

Among the soldiers who returned to Canada last week was Major Neil "Foghorn" MacDonald, of Winnipeg. "Foghorn" enlisted as a private.

Mineral Wealth Along the T. & N. O. Railway

By A. A. Cole.

In 1902 the Ontario Government decided to build a colonization railroad northward from the Canadian Pacific Railway at North Bay, for the purpose of opening up what is known as "The Clay Belt" of Northern Ontario. With the meagre information then available, it required considerable courage and optimism to foresee this colonization railroad as a paying investment, even in the distant future.

To reach the southern border of the Clay Belt required the construction of over a hundred miles of railway, through a country whose only apparent promise of future freight revenue was from the lumbering industry. Before the line was completed, however, a discovery was made which changed the whole aspect of the Government's investment. Almost within sight of the rich farm lands of Temiskaming, the first silver finds were made at Cobalt in the Autumn of 1903 by members of the railway construction parties. From this time forward the mining industry became the most important revenue producer for the Government Railway; and it is likely to hold this lead for many years to come.

The Cobalt silver deposits proved to be very rich, but most investors were skeptical. Several small shipments of silver ore were made in 1904, but it was not till the following year that real mining operations were commenced. Interest in the new camp rapidly increased, till in 1905 it reached the proportion of a boom. The District was easily accessible and it was a novelty for investors to be able to reach a thriving mining camp in a Pullman car in little more than twenty-four hours of leaving New York City. The stocks of the producing companies became inflated beyond their real value and carried with them the usual wild-cat schemes. The inevitable crash and slump followed, and for some years afterwards speculation in mining stocks in this district was practically dead.

In the meantime the legitimate industry was making steady and rapid progress, as may be seen from the accompanying table of production:

Table No. 1. Silver Production of the Cobalt Camp

Year	Ounces	Value
1904	206,875	111,887
1905	2,451,356	1,360,503
1906	5,401,766	3,667,551
1907	10,023,311	6,155,391
1908	19,437,875	9,133,378
1909	25,897,825	12,461,576
1910	30,645,181	15,478,047
1911	31,507,791	15,953,847
1912	30,243,859	17,408,935
1913	29,681,975	16,553,981
1914	25,162,841	12,765,461
1915	23,730,839	11,742,463
1916	20,000,000	13,000,000
	254,391,494	\$135,693,020

The above figures may be expressed in another form in the statement that the Cobalt District is now producing silver at the rate of $2\frac{1}{4}$ tons per working day, or going back fourteen years, it has produced over two tons of pure silver for every working day since the camp was discovered in 1903.

The silver ores of Cobalt are complex and there was no place in Eastern Canada to treat them, so that all the early shipments went to smelters in the Eastern United States, only the richer ores being shipped. The ores contained other valuable constituents besides silver, and soon a number of Canadian enterprises were started, of which the two largest are now operating on an extensive scale, producing not only refined silver, but refined arsenic, cobalt and nickel either as metals or in other saleable forms. The principal source of cobalt oxide used to be New Caledonia, but since these Canadian refineries have entered the market, they have driven out all competitors.

The silver bearing veins are narrow, but as they were taken out and mining developments became more extensive, it was found that there still remained a large tonnage of low grade silver-bearing material that could not pay the high freight and smelter charges without previous treatment. The first concentrating mill started operations in 1907 and others quickly followed, till at the present time there are fifteen operating mills. The tonnage of ore treated increased from 50,000 in 1907 to 635,000 tons in 1916. The average reduction in weight due to concentration is from 45 to 1, and as the percentage of values recovered is about 80, the increased value per ton of the concentrate is about 36 times that of the original ore. An important metallurgical advance has been made by the introduction of Oil-Flotation. It is not likely that this method of concentration will supersede the standard method already in use in the camp, but in many cases it can be made a valuable addition to the existing plants and the extraction bettered with only a small additional cost.

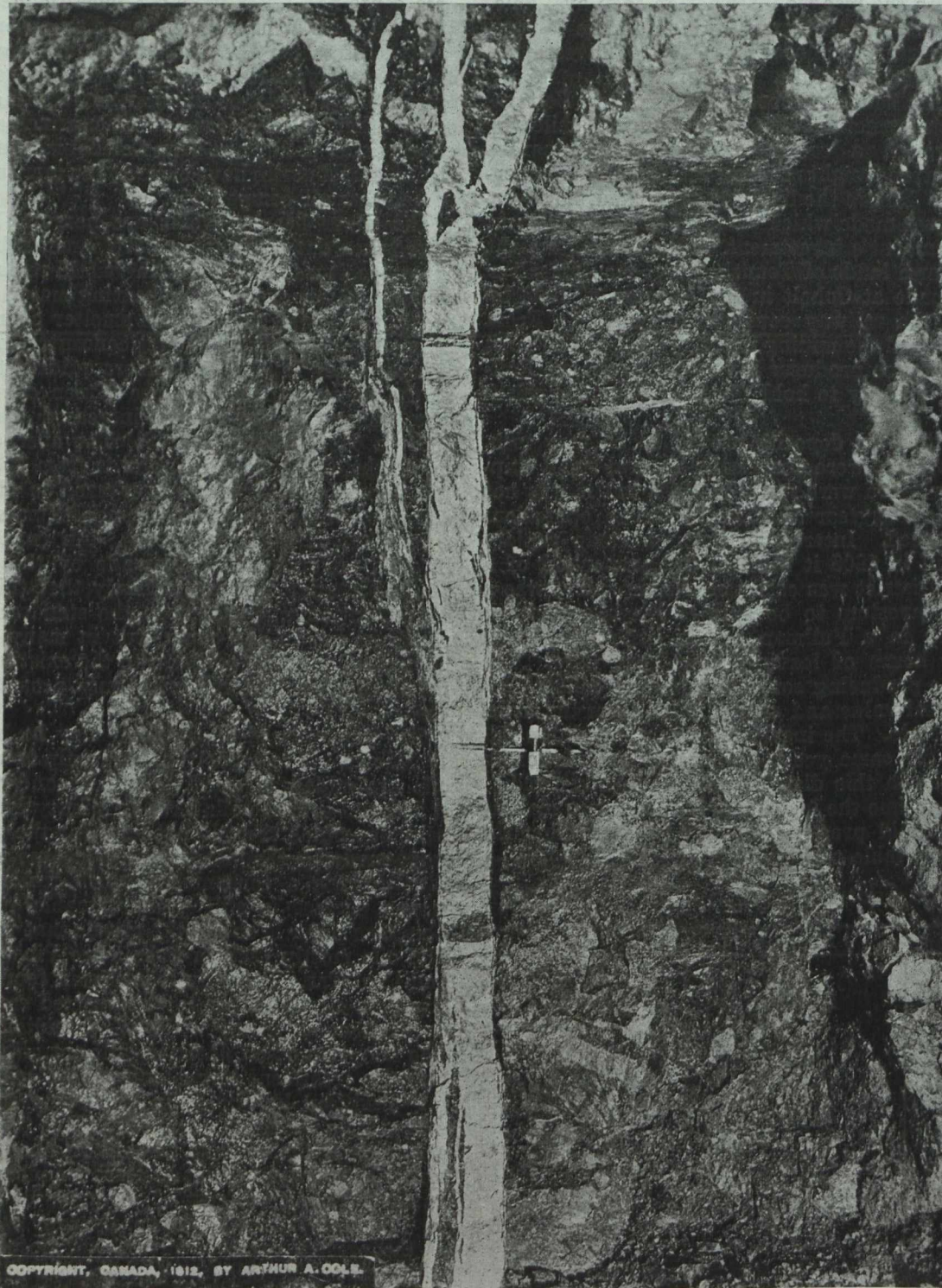
The principle of oil flotation may be briefly stated as follows. If to a finely ground pulp in water certain oils are added in small quantities and then aerated it is found that the oils have an affinity for the metallic particles which they do not have for the gangue. The foam made by the oil carries off the metallic particles thus making a concentrate which while not by any means perfect is still quite valuable to the Cobalt Camp, as silver is one of the metals that will thus float. The oils mostly used in Cobalt are Pine Oil, Creosote and Coal Tar. Recently it has been found the expensive pine oil which has to be imported can be replaced by hardwood creosote oil of Canadian production. The adoption of oil flotation will not only make available for treatment large tonnages of tailings now being produced by the mills, but many tailings-dumps will also be retreated at a profit. The tonnage of such old tailings dumps will amount to about $2\frac{1}{2}$ million tons. If we assume that at least 4 ounces per ton can be saved at a gross cost of 2 ounces we have a profit on this material alone of nearly four million dollars at the present price of silver. Oil flotation will also make lower grade material treatable at a profit, increasing the available tonnage and thus lengthening the life of the Camp.

Cyanidation has been introduced to a greater or less degree in several of the mills so that considerable bullion is now produced instead of a concentrate which had to be shipped out of the district for further refining.

The mills mentioned were all for the treatment of low grade ores and in the meantime all the high-grade ores including concentrates were shipped to the smelters. Two companies, the Nipissing and the Buffalo Mining Companies, determined to treat their high-grade ore at the mines, in order that they might have only bullion to ship. With this end in view each erect-

Cobalt Mills, Amalgamation and Cyanide.....	39%
Southern Ontario Smelters.....	45%
United States Smelters.....	16%

	100%



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A Cobalt Silver Vein.

ed a high-grade mill. The method employed was a combination amalgamation and cyanide treatment, about 97% of the extraction being made by amalgamation. The tendency has thus been more and more towards the complete refining of the silver at the mine,

so that now four of the leading companies ship out their whole product in the form of refined silver bullion, while some of the remaining companies ship much of their product as bullion. With these two high-grade mills in Cobalt, and with the Coniagas and Deloro

smelters operating in Southern Ontario, most of the Cobalt ores are now treated in Canada as is shown by a statement covering the calendar year 1915.

With mining costs normal, but the grade of much of the ore unusually high, the profits were necessarily great. It has even paid some companies to pump out a whole lake, in order to recover the silver from the rich veins in the lake bottom. Twenty-four companies have paid dividends aggregating \$67,460,000 or 47% of the gross production.

As soon as the value of the Cobalt Camp began to be understood it was only natural that prospectors should spread out in all directions from it seeking similar deposits. Their work bore good results for other silver districts, Gowganda, Casey Township and South Lorrain were found, though none has yet been discovered comparable to Cobalt. As the prospectors pushed north towards the height-of-land, tales of gold discoveries began to come in. The early gold finds all proved disappointing and the old saying that "gold in paying quantities would never be found in Ontario" was often heard repeated. The history of early gold mining in Western Ontario, as in the Lake-of-the-Woods district, tended to strengthen the idea.

In the Autumn of 1909 promising gold claims were staked in the Porcupine Lake District, 100 miles north

development slow. With the large number of men in the bush, clearing and prospecting, forest fires became a constant menace in the dry summer months. The summer of 1911 was particularly noteworthy in this respect. The season was very dry and hot, and fire after fire, threatened the mines, burning over the Hollinger property in May and culminating in the disastrous conflagration of July 11th, in which more than seventy lives were lost and almost all the mining and milling plants completely destroyed. It was fortunate that a branch line of the Government Railway had been completed into the district and opened for traffic just a few days previously. Fresh supplies were rushed in and construction on a larger scale was commenced immediately. From that time forward progress has been steady. Production started in 1910 with \$35,000 and had increased by 1916 to \$9,398,000, which is 92% of Ontario's gold production. Ontario now occupies first place as a gold-producing province with a production of \$10,339,000, which is 57% of the total production of Canada.

This is only the beginning. Development has been most encouraging, and each year adds to the extent of the known ore reserves. There are now eight producing companies of which four are already paying dividends. The three largest mines, the Dome, the

Table No. 3. Total Production, Cobalt Mines, 1904-1916

Year	Nickel		Cobalt		Arsenic		Silver		Total
	Tons	Value	Tons	Value	Tons	Value	Ounces	Value	Value
		\$		\$		\$		\$	\$
1904	14	3,467	16	19,960	72	903	206,875	111,887	136,217
1905	75	10,000	118	100,000	549	2,693	2,451,356	1,360,503	1,473,196
1906	160	.....	321	80,704	1,440	15,858	5,401,766	3,667,551	3,764,113
1907	370	1,174	739	104,426	2,958	40,104	10,023,311	6,155,391	6,301,095
1908	612	.....	1,224	111,118	3,672	40,373	19,437,875	9,133,378	9,284,869
1909	766	.....	1,533	94,965	4,294	61,039	25,897,825	12,461,576	12,617,580
1910	504	.....	1,098	54,699	4,897	70,709	30,645,181	15,478,047	15,603,455
1911	392	.....	852	170,890	3,806	74,609	31,507,791	15,953,847	16,199,346
1912	429	14,220	934	314,381	3,166	80,546	30,243,859	17,408,935	17,818,082
1913	377	13,326	821	420,386	3,663	64,146	29,681,975	16,553,981	17,051,839
1914	90	28,978	351	590,406	2,030	116,624	25,162,841	12,765,461	13,501,469
1915	35	28,353	206	383,261	2,490	148,379	24,746,534	12,135,816	12,695,809
1916	91	30,684	510	413,760	2,164	100,052	23,849,964	12,622,849	13,167,345
	3,916	130,202	8,723	2,858,956	36,201	816,035	259,257,153	135,809,222	139,614,415

of Cobalt and 30 miles West of the Government Railway. In the early winter the trail was crowded with an eager throng with pack-sack and toboggan, an occasional dog team being seen, and a genuine gold rush was in progress. A sleigh road was soon cut through to the new camp and the trip from the railway, that had previously taken three or four days to walk, could be made in one day by driving. Before Spring practically every claim for miles around the early discoveries was staked. It was fortunate that the best discoveries soon passed into strong financial hands, so that in the troublous days that followed, before actual production could begin, sufficient capital was available to continue development, without interruption. For some time progress was slow. Supplies had to be put in during the winter to run for the rest of the year.

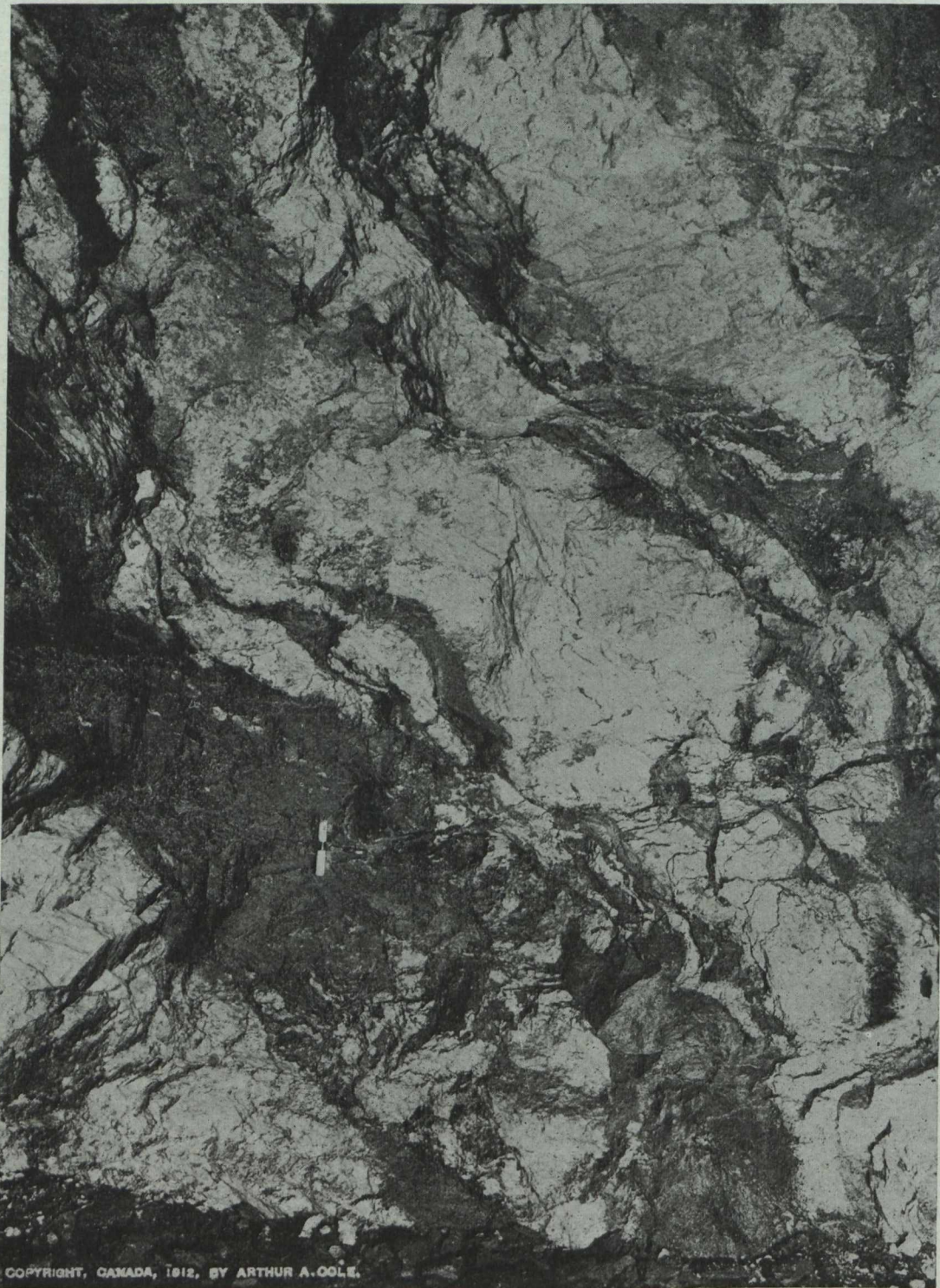
The country was heavily wooded and the overburden frequently deep, so that prospecting was difficult and

Hollinger and the McIntyre are making the Porcupine District famous. The Hollinger mine has paid \$7,456,000 in dividends to the end of 1916, and with the dividends of the Dome and Porcupine-Crown a total of \$9,162,000 has already been reached. The McIntyre joined the list of dividend payers early in 1917 and the ore shoot it has developed on the 1000 foot level is one of the best in the district.

Other discoveries have also been made and new districts are coming into prominence. In Munro township, 50 miles east of Porcupine and 10 miles east from the railway, the Croesus Gold Mine shipped two tons of ore that contained \$35,500 in gold, and this along with \$40,000 to be recovered by milling was produced by sinking a small shaft 110 feet deep. At a depth of 300 feet development continues to be satisfactory and a mill is now being erected. At Kirkland Lake, 35 miles further south east, and 7 miles from Swastika, on the railway, several mines are developing, of which

the Tough-Oakes with its narrow rich gold veins, is already a dividend payer. At Boston Creek, 10 miles further south, rich gold ore has also been found, and already there is one small producer.

Then the water routes radiating in all directions from the railway, make transportation comparatively easy to prospectors and they also supply power in abundance for the development of the mines.



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A Porcupine Gold Deposit.

Mining Opportunities in Northern Ontario.

The Temiskaming and Northern Ontario Railway forms a main artery from which prospecting activity takes its start. Thus along the Temiskaming and Northern Ontario Railway from Cobalt to Porquis Junction, a distance of 125 miles, it was noticeable this year that there was hardly a station from which some mining operations were not being carried on.

The Ontario Government Railway was originally projected as a colonization railway but the finding of rich mineral lands in the country traversed opened it up much more rapidly than would otherwise have been the case. The happy combination of mineral and agricultural land in the district is of the greatest benefit to both, furnishing a cash-market to the farmer at his very door. New districts are being reported from

time to time, and the older districts are looking better as work proceeds.

The established mining camps form nuclei from which prospecting parties are sent out. Thus the finding of Porcupine may be directly attributable to the Cobalt Camp, and it was due to the exertions of men from these camps that important discoveries have been made along the Transcontinental Railway and also in Northern Manitoba.

Anyone who looked over the unbroken forest of Northern Ontario a dozen years ago and predicted that this district would soon be producing over 20 millions in gold and silver annually would have been put down as a fantastic dreamer, but that figure is surpassed to-day by 3 million dollars and the output is continually increasing.

And yet, only a small portion of the country has been prospected. Running north-east and north-west from Cobalt and extending to the Arctic Ocean is the great Pre-Cambrian Shield, the basement formation of the Continent. It contains thousands of square miles and offers to prospectors **Better Chances of Locating Valuable Mineral Deposits Than Can be Found in Any Other Country in The World.**

MAKING ENTRANCE EASIER AT QUEEN'S

Kingston, Ont., Sept. 20.—It has been decided by the Faculty of Applied Science of Queen's University that it is advisable during the period of the war to admit students with lower requirements in mathematics, namely, pass matriculation. This decision was brought about because war conditions have caused a larger demand for men with education in engineering, and it is evident that after the war there will be a call for more such men. It is desirable, therefore under these circumstances, to take measures to hasten the preparation of men for engineering work and to encourage young men to enter upon engineering courses.

The deficiency will be made up the first year by devoting a larger amount of time to mathematics, so that the total requirements for a degree will remain exactly the same.

DOMINION MOLYBDENITE CO.

The Dominion Molybdenite Co., operating the mine at Quyon, Quebec, has now in successful operation its own concentrating plant. The Callow cell is being used and the results obtained by the oil flotation process are said to be excellent.

Recent shipments of ore from the Iron Mask mine, near Kamloops, have been 105 tons for the week ended September 7 and 111 tons for ten days to the end of August.

In the lower Coast district, production at the Britannia Co.'s mines is being continued on a large scale. The chief evidence of progress on Vancouver island is the recent re-opening of the smelting works at Ladysmith.

The Northport Power and Light Company has been organized to supply electric power and light to the Northport Smelting and Refining Company, operating the smelting works, now modernized, formerly owned by the Le Roi Mining Company, of Rossland, B. C. Current will be taken from the West Kootenay Company's main transmission line from its hydro-electric stations at Bonnington Falls, Kootenay river, B. C.

Investigation of Explosion at New Waterford

Following is the report of the commission which investigated the explosion which occurred in No. 12 colliery, New Waterford, on July 25th last:

Sydney, N. S., August 14, 1917.

To Hon. E. H. Armstrong, Commissioner of Public Works and Mines, Halifax.

Sir,—In accordance with the provisions of Section 44 of the Coal Mines Regulation Act, I beg to submit the following report with regard to the accident which occurred at No. 12 colliery of the Dominion Coal Co., Ltd., at New Waterford, N. S., on the morning of the 25th July, 1917.

You associated with me in this investigation the following gentlemen: Silby Barrett, miner, of New Aberdeen; Robert Baxter, miner, of Donkin; Thos. J. Brown, General Superintendent of the Nova Scotia Steel & Coal Co., Ltd., Sydney Mines; George B. Burchell, General Manager of the Bras d'Or Coal Co., North Sydney; Alexander Campbell, miner, New Waterford; Alexander McDonald, District Supt. of the Dominion Coal Co. Ltd., Caledonia; Wm. J. McKay, mining checkweighman, New Waterford; Norman McKenzie, mining engineer, Glace Bay; Neil A. Nicholson, Deputy Inspector of Mines for the Sydney Mines inspection district and Alfred J. Tonge, M. E., General Supt. of Mines, Dominion Coal Co. Ltd., Glace Bay, who acted with me in taking the statements of the witnesses heard, made lengthened examinations of the No. 12 mine on the 31st July and 1st. August, 1917, and concur with me in the report which follows:

We held our first meeting on the morning of the 31st July, in the Dominion Coal Company's office, No. 12 colliery, New Waterford, and decided to enter the mine for the purpose of examination, which we did, and spent the remainder of the day in examining parts of the mine affected by the explosion. On the following days, August 2nd, 3rd, and 4th, we examined witnesses at New Waterford, and adjourned until Thursday, the 9th of August. On August 9th and 10th, examination of further witnesses was resumed at Waterford. On August 11th, we met in Sydney to consider the evidence taken. We found it necessary to obtain further information relative to the direction and effect of the forces of the explosion at a particular point in the mine, and for this purpose, and in order to facilitate the work in hand, a number of the assessors were selected to make a further examination and report; work on the preparation of our report being resumed on the 13th, in Sydney. On Tuesday, August 14th, we all met in Sydney to receive report of special committee that were visiting the underground workings in No. 12 colliery, and to prepare and complete our report.

The explosion which caused the death of sixty-five men and boys occurred in the west side of the Dominion Coal Company's No. 12 colliery, on the Victoria Seam, at New Waterford, about 7.30 on the morning of Wednesday, July the 21st, 1917.

Our duty appeared to us to be: to determine in what part of the mine the explosion originated; what was the cause of the explosion, and to suggest such recommendations as would make for greater safety in the future.

Origin of the Explosion.

To reach a conclusion as to where the explosion originated presented many difficulties, and it was necessary that a most careful examination should be made,

and that this examination should be completed before the evidences and traces of the effects of the explosion in the mine were obliterated.

A careful and searching examination by all of the assessors was therefore undertaken during the days of July 31st, and August 1st. Plans were prepared upon which were marked the direction of forces, which indicated the path of the explosion as observed by us, and later confirmed at important points by a number of the witnesses.

In a cross-cut in No. 3 room east of No. 2 long balance, No. 6 west level, a shot had been fired on the morning of the 25th of July, 1917. This place was found to be 7 ft. 4 inches wide, measured across the face midway between the roof and pavement. The place was undercut all across to a depth of 6 ft. 10 inches, slightly "gripping" in each rib. Two wall holes were found bored, one near each rib; the holes were well placed with sufficient clearance from wall and roof and of a depth corresponding with the depth of the mining.

The shot on the east rib had been loaded and fired, but had not brought down the coal as expected. To ascertain the condition of the coal and the effect of the shot, it was decided to have the shot opened up. A shearing was put in about one foot from the hole toward the center of the place, and the shot was opened out and it was found that the back part of the coal was affected by the explosive. The back was found well cut and the east rib was cut to a point 35 inches from the face of the coal, leaving the whole face of the coal, a thickness of about 35 inches, entirely undisturbed.

A marked cleavage was noticeable parallel with the face cleat directly inside of the 35 inches of the undisturbed face coal. Some of the tamping was found intact in the hole in the undisturbed portion of the face coal showing conclusively that no part of the force of the explosive had escaped by way of the shot hole.

From all the information gained by shearing out the shot hole in which the shot was fired we came to the conclusion,

FIRST—No second shot had been fired in the hole.

SECONDLY—That the hole was well placed.

THIRDLY—That from measurements taken there was no indication of the hole having been too heavily charged.

From the foregoing we come to the conclusion that a part of the force of the explosive escaped as flame down the cleavage already noted, and out through the mine, carrying with it matter in a state of ignition promoting a gas, or gas and dust explosion.

A part of the force of the explosion passing up No. 2 long balance died out quickly on reaching No. 4 level; the probable cause of this was having only one opening on the long balance between rooms Nos. 8 and 13, and finding no material in that direction to accelerate its force. The part of the force which went down the long balance and in and out of No. 6 level and down through the balance on to and out of No. 7 level covered a much larger area, and was propagated by dust or gas or both.

After giving this matter the most careful and serious consideration, and hearing all whose evidence we felt would be helpful in the enquiry, discussing and studying every phase of the matter and every suggestion as to other possible originating points we have arrived at the conclusion that all the indications of the forces point to the initial explosion occurring on the west

side of the mine in cross-cut number one, partly driven between rooms Nos. 3 and 4 on the east side of what is known as the long balance number two on number six level.

Recommendations of Investigators.

In view of the evidence touching this lamentable accident, we beg to submit the following recommendations, and trust that your honorable government will, in the interests of the safety of life, approve of the issuing of instructions or the enactments of legislation that will give these recommendations effect:

Where balances, cross-cuts or other single places are driven, we recommend that to prevent accumulations of gas a more effective means of directing the air to the faces should be adopted than the practice we found in some cases obtaining in No. 12 colliery.

The deputy inspectors should be instructed to accompany as often as necessary mine examiners on their regular examination rounds, to satisfy themselves that such examinations are made within the time required by the Coal Mines Regulation Act, and that the reports of such examinations are in strict accordance with the facts as found.

The Coal Mines Regulation Act should be so amended that the examiners shall be required to state the approximate quantity of gas when found in any of the places they have examined.

Heroic Rescue Work.

In concluding our report, we desire to place on record that acts of the greatest bravery and endurance were performed by all those who volunteered for the work of rescue. The dangers to be encountered were known to be great, but as long as there was life to be saved, there was no lack of volunteers, who, unfalteringly faced the dangers to the limit of their endurance or succumbed in the attempt to save the lives of their fellow men.

It is with extreme regret that we mention that three young men, impelled by the highest conception of their duty to save the lives of others, lost their own in the attempt. In this connection we especially mention the names of John McKenzie, Philip Nicholson and Karl Pietchiek.

We extend our deepest sympathy to all those who have been bereaved by this most regrettable calamity.

Submitted herewith are the following documents and plans: Exhibit A.—A plan showing in red the route travelled in the mine by the assessors. Exhibit B.—A plan of the whole mine, showing where the bodies were found. Exhibit C.—An enlarged plan of the long balance, where accident occurred, showing in detail the cross-cut in No. 3 room. Exhibit D.—Names, numbers and occupation of the victims of the explosion. Exhibit E.—Document giving particulars of shotfirers' and overmen's meeting. Exhibit F.—Copy of examiner's report book July 1st to 25, 1917. Exhibit G.—Copy of overman's report, July 3, to 24, 1917. Exhibit H.—Copy of shotfirer's report book, July 3, to 24, 1917. Exhibit I.—Barometer chart. Monday, the 23rd of July to Sunday the 29th. Exhibit J.—Memo of examination of lamps. Exhibit K.—Dominion Coal Company's special rules. Exhibit L.—A plan showing points where samples of dust were taken for analysis; attached are the analyses. Exhibit M.—Plan showing direction of forces at the time of the explosion. Exhibit N.—Copy of evidence taken at coroner's inquest. Exhibit O.—Evidence taken under section 44, Coal Mines Regulation Act. Exhibit P.—Copy of special report of assessors who again visited the mine on August 13th.

Gas Explosions in Crowsnest Coalfield

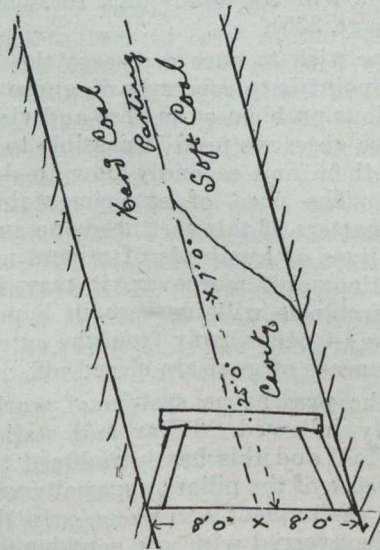
By James Ashworth.

In 1904 the writer contributed a paper to the Manchester Geological and Mining Society on Outbursts of Gas at the Morrissey Collieries owned by the Crows Nest Pass Coal Co. Ltd. In continuation he may say that after closure of No. 1 mine work in this part of the coalfield was not resumed until 1907, when a new mine known as No. 7 was opened up. This mine was lower down in the coalfield section than No. 1 mine, and had an overhead cover of about 800 feet. It had a steep angle of dip (65 to 75 degrees) and a total thickness of 32 ft. Only about 16 ft. of the footwall portion was worked, and in the middle of it there was a natural parting, separating the two 8 feet portions, the bottom half being of harder nature than the top part. The mine was ventilated by a forcing fan, and therefore the main haulage road became the return airway.

The first serious outburst of gas in No. 7 mine occurred at the face of the main level on the 27th of January 1909, filling the level with small coal for a distance of 15 feet from the face. The large volume of gas given off was sufficient to extinguish a safety lamp 30 feet outside the main entry, and yet a horse which was left inside by its driver was afterwards found alive.

The second outburst occurred in the upper counter level, about 1550 feet from the outside, on the 19th of April, displacing 15 tons of dust coal and accompanied by a considerable volume of gas.

The third outburst took place on the 5th of May, in a raise in the soft coal between the main entry and the upper counter level. This raise was up about 25 ft. and 14 ft. back from the face. Two men were at work in the raise and had evidently attempted to escape,



as one was found on the timber at the bottom of the raise and the other in the level below; both having been smothered by gas and dust. Only about six tons of coal dust was displaced. It may be noted that both the level and upper counter were open for several yards past the place where the raise was being driven up.

The fourth outburst occurred on the 19th of May, at the face of the main entry, soon after the miners had completed a setting of timber. A cracking sound warned them and they escaped to the outside without injury.

The writer visited this mine about a month after the outburst, and found that the displacement of coal had been almost entirely from the upper or softer part of the seam, and that the cavity extended upwards about 25 ft. above the top of the timber, and also into the solid coal at the face and tapered off into a triangular form in the last six feet. Below that the cavity would be about 8 feet square. The amount of coal displaced was 75 tons and the volume of gas given off during six hours was estimated to have been 750,000 cubic feet. After this outburst an enquiry took place. The management and three Government officials decided not to advance the levels any further as there seemed to be no certain means of anticipating these outbursts. The mine was not however closed down immediately, and some of the upper pillars were worked until the railway company which was using the coal for its locomotives found it was too small sized to suit their requirements. Moreover, the other collieries at Coal Creek and Michel were able to supply all the coal which the market needed. The coal seams of this part of the coalfield having been much altered by crushing and heat, would not make a good metallurgical coke and this formed a further reason why operations were suspended.

Up to the date of writing outbursts of gas of such great intensity have not occurred at any of the other collieries in this coalfield, and therefore it would seem that at Morrissey the special conditions of heat and pressure to which this end of the coalfield has been subjected have not yet been found in other parts of the field. The nearest approach to these disturbed conditions has been met with in the workings on the south side of Michel creek, where the strata is much disturbed by a severe twist in the dip of the strata. In this portion of the coalfield very large volumes of gas are driven off, practically continuously, as set out in some detail in a paper read by the British Columbia Chief Inspector of Mines before the U. S. A. Mine Inspectors' Institute, at Joplin, in June 1916. He then stated that in Old No. 3 mine, on the east side of the slope as much as 15,695 cubic feet of methane had been given off, per ton of coal mined, resulting in the whole of the return air current being charged with methane to the extent of 2.66 per cent. as ascertained by actual analysis at Ottawa by Dr. E. Haanel. In the same part of the mine, when it was not at work, the percentage of methane in the air was 2.18. In the whole of the return air current of 60,000 cu. ft. per minute the methane content was 1.83 per cent. when the mine was not at work.

In No. 3 East mine it is noticeable that the greatest yield of methane was from the west side, and it would therefore appear that the special conditions which caused these abnormal emissions of methane must be situated somewhere between the Old No. 3 and No. 3 East. On the 3rd of August 1915, whilst the mine was at work, the west side split contained 3.33 per

cent. of methane or as calculated gave off 7,392 cubic feet per ton mined.

The highest reported percentage of methane per cubic foot of air, found whilst the mine was at work, was 3.83 in Old No. 3 mine.

These mines were worked by two shifts of eight hours each, and the average volume of methane per ton of coal mined, calculated from mine samples of the main returns, was 4,326 cubic feet.

These figures are certainly extraordinary, and it is not surprising to find that when an explosion occurred on the 8th of August 1916 in No. 3 East mine, that so very serious was the damage to the mine that the body of one of the men killed has not yet been recovered.

The average thickness of No. 3 mine is given as five feet, and of No. 3 East as eleven feet. Both seams are bituminous and of excellent coking quality without washing.

The analysis of the coal from No. 3 mine is stated to be: moisture 1.01; volatile combustible matter 20.95; fixed carbon 71.00 and ash 7.04. Both of the coals named are very friable, and the use of explosives in getting them is limited. The overhead cover is about 1200 feet, in which thickness there are several other workable seams. It would appear however from the data thus far collected that the main volume of the methane emitted is principally built up in the whole or some part of the coal seam itself.

Whilst making analysis of the gases occluded in the coals from this coalfield it has been discovered that they consist in part of gases of the higher hydro-carbon series and that the gas usually described as fire damp is not necessarily methane only. This is a very important point to take into account, and in 1904, the writer came to the conclusion, that some part at least of the gas given off in the large outbursts, is "wet" gas, and similar in every way to the wet gas given off, say at the Dingman oil well in Alberta, and from which some percentage of gasolene is or was collected. The writer believes, as he did in 1904, that some of the gases in the coals are in liquid form, and thus when the restraining pressure is reduced as the covering coal is removed, they volatilise and force away the coal in the finest of dust, and in this manner file out the long cavities of irregular form, which remain after an outburst has been dissipated. It is very noticeable that the dust found in these mines under ordinary circumstances is of a very greasy nature, and that the higher hydro-carbon gases are found occluded in it.

Sudden outbursts of gas have received comparatively little notice either in British Columbia or elsewhere, but in May, 1909, a bulletin of the Canadian Mining Institute contained an interesting paper by Mr. D. B. Dowling of the Dominion Geological Survey staff, on "Some Possible Chemical Changes in the Formation of Coal" he says: "Experiments with pressure alone do not give results, since great periods of time are required; but when implemented by heat, there is evidence that there is a chemical change made by which the increased percentage of carbon is attained with very little actual loss of carbon. . . . That there is an increased tendency to throw off gas with the rise in carbon percentage is acknowledged; and when it has reached its maximum the coal might in some instances be classed almost with such unstable compounds as explosives. There are accounts of slight shocks producing "blow outs" of large dimensions in mines of

the higher bituminous coals. This liberation of gas need not be considered as coming from pockets of compressed gas; but as following much the same course as an explosion of dynamite, which is simply the rapid rearrangement of atoms. It would seem probable that the formation of gas was accompanied by a concurrent formation of a more stable coal compound and when the alteration was violent the stable coal was brought along with the gas as dust. Dust not formed in this way but from the operations of mining and handling the coal should be considered more as a series of minute particles of unstable compound borne along by a small gas atmosphere of its own making, and therefore not easily laid by sprinkling, and only to be got rid of by ventilation."

Unfortunately this paper of Mr. Dowling's, as far as regards the above quotation, did not elicit the least comment, and has remained as a dead letter.

In the annual report of the British Columbian Minister of Mines for 1909, the Chief Inspector of Mines, Mr. Frank H. Sheppherd, remarked that: "the question of dealing with these outbursts is the most important and difficult problem to cope with in this field. If this portion of the field is to be worked at all, it must be under conditions which will give the miner some chance for his life. Most of the outbursts in this field have been attended with loss of life. The whole question devolves upon the possibility of relieving the pressure ahead of the working face. If this cannot be done, it would be inhuman to ask or allow a miner to take chances such as are not experienced in any other industry. If the field is valuable and this may be readily conceded, it would appear that the operator could go to considerable expense in experimental work, having for its object the safe winning of the field and the protection of the lives of those who may engage in its development, and it would be a reproach to modern engineering skill to admit that the problem will not admit of a reasonably safe solution." (page 225).

When we wish to cure a disease the first and most important point is to correctly diagnose it, and so it is in this serious problem of sudden and violent outbursts of explosive gases we need if possible to find out when to expect them and secondly how to deal with them in safety. The need of experimental research into practical matters of this sort needs no emphasizing, because the lives of hundreds of miners may depend on their solution, and moreover, it may be anticipated that the problems will increase in importance as the mines extend further away from the entries, and where very large areas of goaf are closed off.

Up to the present no system of working has been consistently followed. Pillar and stall has been the usual method, and this has introduced the question of the proper size of the pillars, especially where "bumps" have been of frequent occurrence. In the latter cases it cannot be averred with any confidence that the very large pillars have given any better results than the medium or small pillars; but there is no doubt in the writer's mind that no system has given such good results as long wall. There are many instances where pillar and stall has been the system adopted, then changed to long wall, and again changed back to pillar and stall. In some cases the reasons given for the adoption of pillar and stall have been that this system gave the minimum of expense in moving dirt, in another case that there was not sufficient material to form substantial packs, and where there was material

with which to build packs, that the cost of making them was entirely prohibitive, due to the insistence of the miners' union officials that the miners should receive a fixed price per inch thick, per square yard, for "clod." It is of course possible to have a special gang of men to build the packs; but where it is possible it is better for the miners to build their own packs. In long wall working it is of the greatest importance to control the settling down and breakage of the roof, so as to maintain as regular a pressure as possible on the coal face.

In long wall working where gas in the floor gives trouble, it naturally escapes over a large area, and does not break out in sudden and dangerous volumes, as it frequently does in pillar and stall working.

Dangerous "bumps" seldom occur in long wall working after the first roof break has occurred, and therefore it is fair to conclude that bumps are mainly due to a combination of roof settling, and the effect of gas in the floor. As there are several modes of working a mine on the long wall principle it is necessary that the management should choose the one which best accords with the cost of extraction, and not to be in a hurry to change the mode of working because a few heavy settlings of the roof may occur. The success of long wall working depends on the regularity of the breaking down or bending of the roof, or as it is often described "roof control."

The long wall method of mining coal has another most important feature to recommend it, viz., that the mine is much easier to ventilate and therefore much safer, and requires less brattice cloth.

In long wall working the greatest trouble is experienced when the roof and floor are "very good," but they must be made to either bend or break.

In mines such as those in the Crows Nest Pass coalfield it is advisable in many cases to drill holes in the floor, particularly where rolls or faults are met with, and thus relieve the tension of the floor gas.

From the soft nature of most of the coal seams in the Crows Nest Pass and the absence of "backs," "slides" and natural partings, which are common in many coalfields, these coals drain very slowly and this fact is a principal cause of the abnormal outbursts of explosive gases.

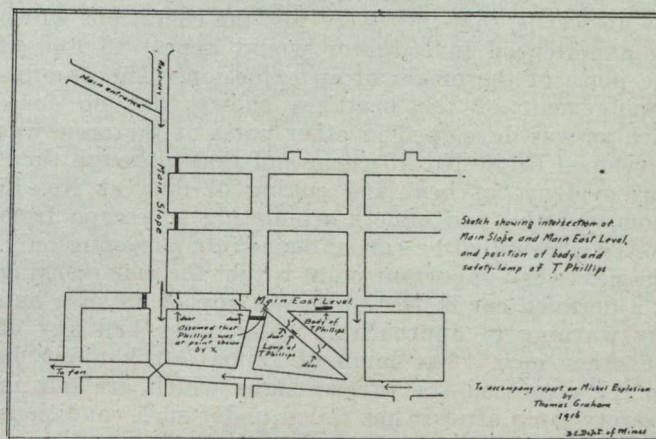
Since writing the foregoing notes the official report on the explosion in No. 3 East mine at Michel, on the 8th of August 1916, has been published in the Minister of Mines Report for 1916. This describes that the explosion occurred during a heavy thunderstorm, and shortly after the night or repair shift had gone in to work at 11 o'clock, and from the self recording card of the fan water gauge it is calculated that the explosion occurred about 11:20. No one outside the mine actually heard the explosion, or if they did, the noise was assumed to be caused by thunder. A miner who had just come out of the mine, and was on his way home, did not realize that an explosion had occurred.

The discovery was not made until the fan engineer who had two fans under his care, visited No. 3 East fan and found wreckage in the engine room, and other evidence of an explosion. The main entry to the mine was completely closed, and the explosion party had to go in through an old prospect opening. A fire in the main return airway from the east side was fortunately discovered and extinguished without further disaster. The body of the fireboss was found some distance away from the remains of his safety lamp. It

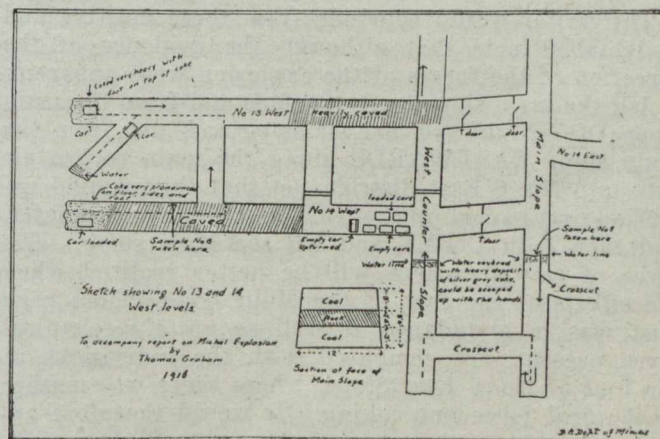
was assumed from this and other indications that the force had come from the main slope and not along the return airway. "The gauzes of the fireboss' lamp were badly crushed and showed evidences of alkali stain, as of the lamp having been heated." This would suggest that he had met with gas in the return air as soon as he passed through the main separation doors; but his death was due to violence and not to burning, as his hair was only slightly singed.

The evidence showed that the miners had only just reached their working places, when the explosion originated. Thus the miners working in No. 6 slope face, had undressed and put down their dinner pails and then returned to No. 13 parting to assist in re-railing a car left by the previous shift. It is in this part of the mine that there appears to be the best evidence of the point of origin of an explosion,—thus the brattice at the face of the slope was only slightly disturbed, and in the raise of the counter slope off No. 17 room was standing intact.

As to the cause of this explosion and its point of origin, the published report of the British Columbian Minister of Mines (1916), affords the following leading facts: (1), that the weather conditions were those of a violent thunderstorm, and it was at one time assumed that lightning was the cause of the explosion yet the report of the Chief Inspector of Mines does not take this view, and leaves the cause and point of origin an open question. (2) The first body found inside the mine was that of the fireboss which was inside the separation doors. The gauzes of his lamp showed evidences of having been heated and from this fact the natural inference would be that the return air was highly charged with firedamp, he having only just



Intersection at Main Slope and Main East Level.



No. 13 and 14 West Levels, Michel Mine.

entered the mine. The lamp was smashed by mechanical force and apparently his body had been thrown some distance inbye on the return air road by a force from the main slope which was the intake airway. (3) the evidence of force in this slope showed that practically all the strong air stoppings had been blown inwards, that is towards the return airways. Referring to the plan it would appear that the main force was developed in the west side workings below No. 8 west level and found vent for its expansion up the Main Slope. Only one man's body was expected to be found in this part of the mine; but it has not yet been discovered. No. 6 East Slope which branches out of the Main Slope about half way down, showed evidences of a downward force, but all upwards in the counter slope. In the main return from this district the indications of force were all inbye from the fire-boss' body, and the plan shows the meeting of these forces at No. 14 room. It is particularly noticeable that not a single one of the bodies of the men found, had been badly burned, and that the evidences of heat found on the four men in the main slope were only slight singeing and blisters as if caused by steam. Those men not killed by direct violence appear to have all died from carbon monoxide poisoning. (4) There were however several noticeable features near the foot of the No. 6 east slope, viz., (a), that at the face and also in No. 17 room the brattices were not blown down; (b), that the lamp of a miner named Davis one of the miners who worked in No. 17 room, was found hanging on a prop near the face, and "was found as clear from dust and smoke, as when issued from the lamp room"; (c) that this miner and his mate were the only men who had moved any distance from their working place. The question now arises as to what may be inferred from these conditions, and the answer is, that they were just the conditions which an experienced investigator would expect to find at the place of the origin of an explosion. The non-disarrangement of the brattices shows that no force such as was developed in other parts of the mine was developed below No. 15 room and that although there was evidence of heat and coking of dust at No. 15 room, yet the two miners attempting to escape from No. 17 were killed by carbon monoxide poisoning only. The next very important point is that the men working at a derailed car in No. 13 do not appear to have had any warning of approaching danger nor had any of the other men. The lamp of Davis left hanging in No. 17 possessed the precise signs which are left in a safety lamp after it has failed under such conditions to be a safety lamp, and has passed the flame of burning gas to the outside, viz., clean gauzes and the coloration which indicates that gas had been burning inside.

The writer would conclude from these positive and undeniable facts that although the evidence of the direction of the forces of the explosion were apparently UP the main slope to the surface and from the main slope DOWN the No. 6 East slope and also from the Main slope EASTWARDS along the main return air way into No. 6 East district, yet that the original explosion first passed up the No. 6 east slope and counter, and then both DOWN and UP the Main slope. The force of this argument will be better realized when the effects at the foot of the Main slope, where coke dust was in abundance as well as great mechanical force present, are compared with the indications at the foot of No. 6 East Slope, where there was neither mechanical force nor coking. It would therefore ap-

pear that the great force developed in the top half of the Main Slope was the joint result of an original ignition and explosion of gas at the foot of No. 6 East slope, which in its turn, ignited coal dust and carried the flame into the western district which below the fault was more gaseous than the No. 6 east district. Careful measurements of the main return air current from this mine showed that the air was saturated with moisture; that its volume was 120,000 cubic feet with a velocity of 1,500 cubic feet per minute; that 2,194,560 cubic feet of methane was given off during a working day, when 550 tons of coal were gotten, or at the rate of 3,990 cubic feet per ton of coal mined. The volume of methane produced was calculated from the analysis of samples of air taken in the main return.

Whilst testing samples of air from the Michel colliery, the Dominion Government analyst Dr. Haanel has proved the presence of hydrogen, and found indications which have shown "that hydrogen is not an uncommon constituent of mine airs." The presence of ethane has also been estimated as being one tenth of the methane present.

To those who have seen safety lamps tested in mixtures of hydrogen and air, and also in mixtures of methane and air, it is not difficult to realize what dangerous conditions may arise when a miner entering his working place immediately hangs up his lamp on a prop without first making a test for gas. Miners as a rule do not appear to appreciate the importance of observing the law in this respect, as was shown during an enquiry into a more recent explosion in the same district.

Assuming that the writer's deductions as above are correct it is more than probable that when the Coal Creek No. 3 mine is cleaned up to the face of the main and counter levels that the origin of the explosion which occurred on the 5th of April 1917, will be found to have been a bonneted Marsaut safety lamp.

The safety lamps in general use in British Columbia are of the bonneted Wolf Marsaut type, burning gasoline of benzene. With regard to their safety it is to be noted that M. Marsaut, whilst making his long series of tests by raising his double gauze bonneted safety lamps into a quiescent explosive mixture of gas and air, did not consider such lamps as absolutely safe, and hence he added a third superimposed gauze which is the true construction of the Marsaut safety lamp.

It must be obvious to every reader of these notes that the necessity for devising some means to ensure the better protection of miners' lives has now been amply demonstrated and the writer therefore submits in conclusion that the time has arrived when these dangers ought to be carefully looked into by a Special Research Commission or Committee and at as early a date as possible. And finally that the system of developing and extracting such seams of coal as those referred to should be defined by such Commission and strictly enforced by Act of Parliament.

There is much activity at the Canada Copper Corporation's property on Copper Mountain, in Similkameen district. Considerable quantities of material are being hauled by wagon from the railway at Princeton, and preparations for putting in a 3000-ton-a-day concentrating plant are stated to be in progress. A recent report is to the effect that work is to be resumed at the Coalmont coal mine.

Mr. Geo. H. Rice Recommends Permanent Commission For Crowsnest Coal Mines

Victoria, B. C.—In a short time announcement will be made by the minister of mines, Hon. William Sloan, as to what steps will be taken to meet as far as possible at present the recommendations contained in the report which George H. Rice, chief engineer of the United States bureau of mines, has made after full investigation of conditions in the coal area of the Crow's Nest pass section.

Following the "bumps" which occurred in 1916 in No. 1 mine of the Crow's Nest Coal company at Fernie, when miners were killed, the then government decided to engage Mr. Rice to make a complete survey of the field where, on a former occasion, in 1907, in No. 2 mine, the phenomena of "bumps" had occurred claiming the lives of a number of men, and necessitating government action to the extent of prohibiting operation of a portion of the mine field then being worked. In company with the then chief inspector of mines, Thomas Graham, now superintendent of the Canadian Collieries, Dunsmuir, Limited, and provincial mineralogist, W. Fleet Robertson, Mr. Rice visited the Fernie field in October last, and the result of his investigations has been in the hands of the present minister of mines, honorable William Sloan, for some months, but pending a decision as to what action should be taken upon the expert's recommendations, the findings have not been given out.

Coal Mines Are Gaseous.

Mr. Rice reports upon the phenomena of "bumps," and states that the Crowsnest pass fields as shown by the tests, are among the most gaseous in the world, and he recommends among other steps to be taken to overcome the adverse conditions, methods of mining to relieve the pressure, to which, he states, the "bumps" are due, the appointment of a permanent commission to be on the spot and conduct extensive tests continually, and advise the operators in their work of mining.

It is on this point of a permanent commission that the minister of mines has hesitated, as the expense connected therewith would be heavy. It is probable that, for the time being at least, a permanent chemist, competent to make tests of gas, etc., will be employed, and the larger question of a commission will be allowed to stand over. But many of Mr. Rice's recommendations along other lines will be approved. In fact, some of them are already being adopted by the mine owners. A summary of Mr. Rice's findings sets forth:

An Important Field.

The Crowsnest field is regarded by Canadian geologists as the most important field in British Columbia. It presents unusual natural difficulties, because the coal beds are at the base of elevated plateaus, and it is impossible to reach coal except through outcrop; also, the coal is under heavy load, requiring great care in mining to prevent "squeezes" and "bumps." The coal beds are very gaseous; that is, have large methane (fire-damp) flows at Coal creek and Michel, and at Morrissey the outbursts are unequalled except in certain mines in Belgium.

"Bumps."

"Bumps" are not related to gas outbursts, but they may occur, as in the state of Washington and Great Britain, where overlying rocks are rigid and where there is a great weight of cover, and when mining has either extracted too much coal in advance mining or it has not been taken out completely starting from the

outcrop, which would break the overlying rock in successive slices and thus prevent "bumps." "Bumps" are believed to be caused by subsidence of roof in certain areas under rigid rocks, leaving a great unsupported span of rock stratum. When one of these has given way, it means the hammerlike blow of thousands of tons striking on the immense roof or flexible stratum overlying the mine, which imparts the blow downward, breaking timber, causing extensive falls in the mine, and sending rock tremors through the strata.

Improper mining in No. 2 mine was the cause of "bumps" in that mine in 1907-8, and, in turn, the subsidence over this area affecting the strata higher up caused the recent "bumps" in No. 1 mine. "Bumps" may occur in the future over the same area but it is probable with decreasing force, as the rock stratum broken down in each case has less distance to fall, has less load and is more distant in heights above the mine.

If the measures adopted are carried out, viz., of taking out less than 15 per cent of coal on the advance and taking down the rash and roof coal in the working places in No. 1 mine, there is comparatively small danger to life for the men employed underground.

To give warning of impending outbursts of gas in certain dangerous zones with the advance of the working places long drill holes should be kept drilled in advance. To provide for the regular flow of methane, well kept-up airway of large area and powerful fans should be employed with ample margin or capacity. A permanent commission should be formed to further investigate and review the evidence collected by members of the commission, the inspectors of mines and others, having among its membership a geologist, a mining engineer, a chemist and an experienced mine operator.

The problem of equal importance, Mr. Rice reports, in working the Crowsnest field coals and especially in future developments under deeper cover and greater distance from the outcrop, is to adequately take care of the large quantity of gas. Very wisely the mines are not allowed to equip with electricity for haulage or lighting as the danger is too great. The following are the chief facts developed:

1. That the flow of gas as measured by the analysis of the returns and the outbursts of gas which occurred at the Morrissey collieries show that the Crowsnest Pass coal field mines are among the most gaseous in the world.

2. That gas is derived from two sources: (a) Stores in the crevices and point planes of rocks and coal; (b) Occluded, or that held in the pores or cells of the coal by surface tension.

3. That an unusual condition has been found in testing the amount and kind of gas given off by the broken coal, which, on the basis of one sample shows (a) that an unusual quantity of hydrocarbon gas is given off by the coal on grinding fine by vacuo; (b) that three times as much ethane and other hydrocarbons are given off as methane under these conditions.

4. That the gas pressures within a short distance of the face of the workings are low, which, however, is not proof that high gas pressure may not exist at a considerable distance in the solid away from the face.

Mr. Rice has submitted recommendations as to the best method of draining the coal measures of gas and, in connection with his recommendation of the appointment of a permanent commission, state that there are obscure matters which can only be cleared up by further and continued investigation such as research work on gases, the recording of phenomena such as rock tremors, "bumps" and outbursts and the trial of methods of

mining. Such a commission would make a careful topographical survey in the vicinity of the operating mines and the establishment of monuments in advance of mine workings by precise methods of surveying so that all the changes may be observed; the establishment of seismographs registering vertical waves at two or three points on the face of the mountain above No. 1 south mine; the carrying on of experimental methods of mining of coal at the face in a practical manner, especially No. 1 bed so as to lessen the danger in case of "bumps" and to look into the best methods of timbering for protection; to determine the amount of occluded gas in different coal beds, to continue the excellent investigations initiated by the provincial inspection department into the question of fire damp by the gathering of samples of mine air; to record gas pressures, etc.

Mr. Rice points out in his report the greatest function of such a commission would be to determine how the collieries may be so laid under the difficult conditions, which confront mining operations in the Crowsnest field, that all the coal that is now considered as "reserve" may be ultimately obtained. When it is considered, he states, that it is practically impossible to sink shafts into the large part of the field and that, if the coal has to be attacked from the outcrop, to mine in the interior of the field will require entries or tunnels six, eight or ten miles in length, the magnitude of the problem is apparent.

PERSONAL AND GENERAL

Dr. W. F. Ferrier was in British Columbia about the middle of August.

Mr. Oscar Laehmund, of Greenwood, Boundary district of British Columbia, general manager of the Canada Copper Corporation, was in Seattle, Washington, early last month.

Mr. Wm. Lancaster has been appointed a district inspector of mines for the Province of British Columbia, with headquarters at Fernie, in the Crowsnest district, Southeast Kootenay.

Mr. Charles Camsell, of the Geological Survey of Canada, was at Copper Mountain, Similkameen district of British Columbia, last month, bringing his knowledge of that locality up to date, many important developments having taken place during the last year or two chiefly as a result of the exploratory and mining operations there of the Canada Copper Corporation.

Mr. J. T. Shaw, manager of the Hargraves mine, Cobalt, was in Toronto last week.

Mr. J. A. Reed, of the O'Brien mine, has sampled the Preston claims in Deloro township.

Mr. A. J. McNab, formerly superintendent of the Consolidated Mining and Smelting Co.'s smeltery, but now of Nevada, has been visiting old friends at Trail, B. C.

Mr. D. B. Morkill, of Hazelton, B. C., has been appointed superintendent of the Hazelton View mine, in Omineca mining division of British Columbia, in place of Mr. Duke Harris, who will investigate ore occurrences of Sibola region, also in that part of Central British Columbia.

Mr. Ernest Levy, for a number of years manager of the Josie group of mines in Rossland camp, British Columbia, owned by the Le Roi No. 2, Ltd., of London, England, has taken over the mining engineering practice of Mr. J. V. Richards, of Spokane, Washington, who has volunteered for service in the United States army.

SPECIAL CORRESPONDENCE

NORTHERN ONTARIO. Mining Corporation.

Mining Corporation of Canada is producing bullion at the rate of nearly five million ounces annually. Close to 410,000 ounces of silver is being produced every thirty days. Mining costs will show a little increase over the 1916 period owing to the extra cost of supplies and the added bonuses to the men's salaries. However, taking everything into consideration, it would appear that the current twelve months will be the most profitable period yet experienced by the Mining Corporation.

Nipissing.

Production from Nipissing for the month of August exceeded all previous records for the present year. The company mined ore of an estimated net value of \$293,116 and shipped products from Nipissing and customs ore of an estimated value of \$588,254. No new veins were encountered during the month; but all old sources of supply continued to prove satisfactory, several of the stopes proving to contain more ore than was originally anticipated. A number of new working places were started, some on exploration and others developing promising veins encountered during previous months. The high grade mill treated 32 tons and shipped 640,092 ounces of fine silver. The low grade mill treated 6,395 tons.

Pittsburg-Lorrain Operating Wettlaufer Mill.

The mill at the Wettlaufer mine has been leased by the Pittsburg-Lorrain mining company and is now in full operation. The capacity of the mill is around thirty tons per day. For the present the mill will be treating low grade ore which will run about twenty ounces to the ton. This should give a recovery of approximately \$18,000 per month. Besides this low grade ore the company has a quantity of high grade and a car is being made ready for shipment at the present time. Ore at the Pittsburg-Lorrain as so far determined has been in pockets. From one pocket between the first and second level approximately \$30,000 worth of silver was mined. This pocket was about twelve feet long, fifteen feet deep and about three inches in width and of a very high grade of ore. Some of the ore recovered at this pocket contained fifty per cent. of silver. About six hundred pounds of this ore has been found.

Genesee.

The main shaft of the Genesee mine, adjoining the Chambers-Ferland property of the Cobalt Alladin mining company, has reached a depth of 572 feet where the contact of the conglomerate formation with that of the lamprophyre was encountered. It was along this contact that the Chambers-Ferland encountered such excellent results, and with the expectation of cutting the vein system of the Chambers-Ferland a station has been cut at the 550-foot level of the Genesee and lateral work commenced. It is thought the chances of the latter property having the extension of the Chambers-Ferland veins are very good.

Kerr Lake.

Kerr Lake production for the month of August amounted to 200,855 ounces. The increase in the rate of production for the present year has been approximately 59,837 ounces. When the increased value due to the high price of silver is taken into consideration it will be readily seen that Kerr Lake is having one of the most prosperous years in its history, and some pleasing surprises are likely to be in store for shareholders in this wonderful mine.

National's Oil Flotation Plant.

At the National Mines the oil flotation plant is now treating approximately seventy tons per day. Due to defects in equipment more or less difficulty was encountered in getting this plant in operation. However, at the present time everything is running smoothly and a high recovery is being made from the old tailings. Underground mining operations have been suspended for the past month or six weeks, but arrangements are being made for a resumption of this work early in October. Exploration work will be pushed forward vigorously in the main working at the 1000-foot level which has already reached a point well over the line of the Silver Cliff property which is under lease to the National Mines. Nothing in the nature of substantial deposits of commercial ore have been encountered so far; but geological conditions are considered very favorable. A large amount of tailings are being taken from the lake and placed near the mill for treatment during the winter months. Some of these tailings accumulated from ore treated in the National mill by the old City of Cobalt mining company.

Record Shipments.

Ore shipments from the Cobalt camp for the week ending Aug. 14th, proved a record for recent years, and is concrete evidence of the speeding up of mining operations owing to the increased price being paid for silver. When it is considered that milling facilities are such that greater tonnages are being treated in almost every mill in the camp the significance of the shipping of 21 cars containing 1,504,513 pounds of ore becomes at once apparent.

Murray-Mogridge.

The shaft at the Murray-Mogridge mine at Wolfe Lake has reached a depth of 200-feet and a working station is being cut at this point, with the completion of which lateral work will be commenced. Conditions in general at this property are considered to be very satisfactory and have led to considerable activity in the immediate district on a number of other more or less promising prospects.

Kirkland Lake.

Where the downward continuation of the main vein of the Kirkland Lake Gold Mine was encountered at the 700-ft. level, the ore is said to compare very favorably with that found on the other levels of the property. Official advice regarding the width and value of the ore body at this depth has not been given out; but, due to the fact that gold is plainly visible in the ore, it is considered that all is quite satisfactory at this the deepest working in the Kirkland Lake camp.

Plant for Buff-Munro.

Arrangements for the installation of a small mining plant are being made at the Buff-Munro property in Munro Township. The shaft at this property has reached a depth of forty feet and the results so far obtained are understood to be very encouraging.

New Gold Discoveries Northeast of Matheson.

A new gold find has recently been made in the township of Coulson which adjoins the township of Rickard on the southeast corner and the township of Munro on the north-west corner. About twenty-five claims have been recorded. The mineralized zone is said to be fifty feet or more in width and is cut by small quartz stringers in which free gold and tellurides occur. A number of these claims are now under option to Mr. Edward A. Clark, of Boston, Mass., whose engineer, Mr. L. Stewart of New York, spent several days on the claims recently. Arrangements are being made to erect camp buildings

and proceed with development work as soon as possible. The scene of the new find is about ten miles northeast of Matheson and is easily accessible from the latter place.

Coniagas.

The Coniagas mining company of Cobalt has exercised the option on the Maidens-McDonald claims adjoining the Ankerite, which they had also recently acquired in the Porcupine district. It is said the full purchase price has been paid. This gives the Coniagas a large acreage in what will probably prove productive territory. The installation of a powerful mining plant on the Ankerite is nearing completion and it is understood the initial plan of operations will include the sinking of a shaft to a depth of five hundred feet from which point it is altogether probable that both properties will be worked. The Maidens-Macdonald was under option to the LaRose mining company of Cobalt for some time; but the option was allowed to expire early this summer.

Boston Creek.

Operations at the Boston Creek mine and the R. A. P. Syndicate property at Boston Creek have been suspended pending the results of litigation over the use of the shaft of the R. A. P. by the Boston Creek mine to develop their property at depth. These two properties are the most extensively developed in the Boston Creek area at the present time and both are understood to have considerable merit, and with the present difficulties out of the way there will probably be a renewal of activity in this section. A number of other properties are receiving attention in this district and results reported to date are highly satisfactory.

Will Work Orr Mine.

The Orr gold mine at Kirkland Lake which has been lying idle for over two years, was recently taken over by a new holding company known as the Kirkland Porphyry, and active operations are under way to develop same. In the early days of the Kirkland Lake camp this property was considered one of the most promising in the district, and quite a number of tons of high grade ore was bagged. On the west side of the Orr, 100-ft. from the boundary, the Kirkland Lake shaft is down 700-ft. This same vein is on the Orr property. On the north the Teck-Hughes is developing to the 600-ft. and meeting with excellent results, and the main vein of this mine crossed the north west corner of the Orr for a distance of about 300-ft. on the surface. In addition to this it is thought likely the Kirkland Porphyry will pick up the continuation of the Lake Shore No. 1 or main vein. Thus it would appear that the Kirkland Porphyry is beginning operations with more than ordinary reasons to anticipate success.

May Enlarge McIntyre Mill.

Ore reserves at the McIntyre mine at Porcupine are gradually increasing in spite of the fact that the mill has been working to capacity for the past ten months and many adverse conditions have been contended with. It is generally considered likely that the McIntyre management will soon ask the directors for the addition of another four hundred tons to the capacity of the mill, which will bring the capacity up to approximately 1,000 tons per day. The average grade of ore throughout the mine is \$12.50 per ton; but owing to the fact that all ore over \$2 per ton, which comes from development work is being treated, the mill heads for the next few months are expected to run around \$10 per month as no effort is being made to regulate the mill heads. A decision to increase the milling capacity to 1,000 tons per day should increase the net earnings corresponding-

ly. At the present rate the profits at this mine are estimated to be over \$1,000,000 or about thirty per cent. on the issued capital of 3,600,000 shares.

Gowganda.

A more or less extensive movement towards operating properties in the Gowganda mining camp seems to be in evidence this past few days and a considerable awakening of interest seems highly probable. In this camp silver deposits have proven more or less pockety but there are a number of properties on which veins carrying native silver on the surface are to be found. With the success attending the working of the Miller Lake-O'Brien, which is the premier mine of the Gowganda section and which is producing silver ore in sufficient quantity to class it among the best silver producers even in Cobalt, it is more than likely that capital will be forthcoming for the opening up of a number of the more likely prospects in this district.

Ontario Kirkland to Operate Hurd Property.

A deal for the purchase of the Hurd property at Kirkland Lake was consummated on the 18th of the present month, and the formation of a new company to be known as the Ontario Kirkland Gold Mines with a capitalization of 1,500,000 shares of a par value of one dollar per share, is now in the process of formation. Messrs. Harry A. Cochrane of New York city and Mr. Edward D. Seldon, of Rochester, together with their associates are the purchasers of this property. An up-to-date mining plant is to be installed and the initial plan of development consists of sinking a shaft to a depth of 300-ft., where lateral work will be undertaken.

A considerable amount of money has been spent on these claims and five veins carrying good gold values have been uncovered on the surface. On one of these veins, a shaft has been sunk to a depth of one hundred feet and the results obtained were considered highly satisfactory. The Hurd consists of two claims of forty acres each, and lies about a quarter of a mile south of the Wright-Hargraves.

May Take Over Alexandra.

It is reported here that the old Alexandra property, situated in Lot 5, concession 4, of the township of Coleman, will be taken over by one of the largest mining companies in the Cobalt camp, which company is said to be negotiating for the purchase of the property.

Bailey.

Rumors are current in the Cobalt camp to the effect that the prolonged legal entanglements in the Bailey Cobalt property are about to be satisfactorily settled, and that there is a possibility of the property being reopened in the not far distant future.

Machinery Arriving for Kirkland Porphyry.

The motors and part of the other equipment for an electrically driven mining plant for the Kirkland Porphyry property are arriving and operations at the mine are proving exceptionally satisfactory. Sinking is being carried on at the present time and a hoist and whim are being used for hoisting purposes. The shaft is being driven down at the rate of about two and a half feet per day. The orebody has well defined walls and nearly every bucket of ore raised shows visible gold. The property was formerly known as the Orr.

BRITISH COLUMBIA.

For the first time in six months, during the week ended September 7 ore receipts at the Consolidated Mining and Smelting Co's smelting works at Trail, West Kootenay, exceeded ten thousand tons in a seven-day week. The custom at this smeltery is to divide

the month into four periods, three of seven days each ending on the seventh, fourteenth, and twenty-first, respectively, of the month, while the remaining nine or ten days of the month constitute the fourth week. With receipts of 10,864 tons of ore during the first week of September, the total for the expired portion of the calendar year was brought up to 249,235 tons. While this return to a comparatively large quantity of ore received weekly (the total for the ten-day period ended August 31 having been 14,082 tons) is gratifying, it is not satisfactory to note that in comparison with that of the corresponding period of 1916, this year's aggregate receipts do not show to advantage; on the contrary there has been a decrease of 84,113 tons. However, now that the smelting of copper-bearing ores has been resumed at Trail, as a result of the supply of coke having again become sufficiently large to admit of copper blast furnaces being again operated, it may be expected that ore receipts will be larger during the remainder of this year than they were during the last four months of 1916.

East Kootenay.

A review of the mineral production of East Kootenay during the eight expired months of the year—to the end of August—shows that while the output of coal has been considerably less, that of ore has been much greater. The coal figures for August of this year are not yet available, but for seven months ended July 31 the gross production of coal (that is, including the coal made into coke) from Crowsnest mines was approximately 301,000 long tons, or about 43,000 tons a calendar month, which compares with a monthly average production of 73,522 tons for the whole of 1916. Of course, the suspension of coal-mining during the several months of this year the miners were on strike is the cause of this decrease, which, happily, is not being continued, except perhaps in very much smaller degree, now that the coal-miners are again working steadily.

The position in connection with metalliferous mineral production, though, is very different, for the total quantity of ore from East Kootenay mines received at the Consolidated Mining and Smelting Co's smeltery at Trail, whence is sent practically all ore shipped from the metal mines of the district, during eight months of 1917, to the end of August, was 94,081 tons, or an average of 11,760 tons a month, against 99,531 tons, or an average of 8,294 tons a month, for the whole of 1916. Given a continuance of production at a similar rate throughout the remainder of this year, there will be an increase in 1917, as compared with 1916, of more than 40,000 tons, or rather better than 40 per cent. The present outlook is that it will be even greater than this, but it is unsafe to base a confident forecast on such uncertain conditions as attend the operation of mines these days, so it will be best to await the close of the year for a sure record of progress, rather than now take it for granted that advancement will be made to the extent suggested above as possible. It should be stated that by far the greater part of the ore produced in East Kootenay district comes from the Consolidated Mining and Smelting Co's Sullivan lead-zinc mine, the output of which during the eight expired months of this year has been 90,830 tons as compared with 97,658 tons during the whole of 1916. The same company's St. Eugene mine has shipped to Trail in eight months of this year 1198 tons of ore against 979 tons during the whole of 1916. The only other mine in the district that has shipped

more than one thousand tons of ore this year is the Paradise, in Windermere mining division, which has made an output of 1501 tons in eight months as compared with 428 tons in 1916.

The smeltery ore receipt returns show that in addition to the mines above mentioned, eight small mines have shipped ore this year, namely, the Burton and Quantrell, in Fort Steele division; the Couverapee and Monarch, in Golden division, and the Copper Butte, Isaac, Lead Queen, and Silver Belt, in Windermere division.

It is reported that the Consolidated Co. will shortly commence the erection in the district and equipment of a concentrator for the concentration of ore from its Sullivan mine. If such a plant be provided and regularly operated, it is to be expected that next year's increase in production from that mine will be even larger than that of 1917 over the output of 1916.

West Kootenay.

Ainsworth.—The New Canadian Metal Co., operating the Bluebell lead mine near the east shore of Kootenay lake is stated to be opening that mine at greater depth. The Nelson Daily News recently printed the following concerning the Bluebell: "Sinking to an additional vertical depth of 75 ft. below the level of Kootenay lake is being carried out at the Bluebell mine at Riondel. The additional depth of the shaft on the slope will be 100 ft., about one-half of which is completed. When the work shall have been finished, a total vertical depth of 375 ft. below the level of the lake will have been attained. At the greater depth one of the peculiar features of the ore is that a larger percentage of oxidized ore is being found. This ore does not concentrate well, being so light that it floats off the tables in a sort of white slime. Hence, Mr. S. S. Fowler, general manager for the company, is shipping as much of it to the smeltery in crude form, without concentration, as he can secure barges to ship it on. High metal prices and the desirable nature of the ore from a smelting viewpoint make it just practicable to mine and ship it in crude form. The geological explanation of the presence at depth of the oxidized ore is that Kootenay lake was originally a river, and the ore which is now being mined 300 ft. or so below the lake level was then near the surface."

Slocan.—During thirty-eight days ended September 7 a dozen mines in Slocan mining division together shipped to Trail 3465 tons of ore and concentrate, chiefly silver-lead. Those situated in the neighborhood of Silverton, Slocan lake, were the Galena Farm, Hewitt, Lucky Thought, Standard and Van-Roi, with a total of 1590 tons, nearly half of which was from the Standard. From Alamo, the Idaho-Alamo shipped 76 tons and the Queen Bess 513 tons. From Sandon the shipments totalled 911 tons, of which 365 tons was from the Surprise and 317 tons from the Slocan Star; the remainder came from the Freddy Lee (which about 25 years ago made the first bulk shipment of ore ever sent out from a Slocan mine), Gray Copper, Lone Bachelor, Reco, Sovereign and Wonderful. From the eastern part of the division shippers were Lucky Jim 238 tons and Rambler-Cariboo 137 tons.

A recent report from Spokane, Washington, is to the effect that Mr. B. Crilly, who has been actively associated with mining in West Kootenay for fifteen years or longer, in the early nineties with Lardeau mines and latterly successfully mining in Nelson division, has secured under lease and bond the Fisher Maiden group, situated about seven miles up Four-mile creek from

Silverton. As long ago as 1894 some 50 tons of ore was shipped from this property, which is credited with a total later output of about 1000 tons of ore, having a low lead content and from 90 ounces upward of silver to the ton. Official records mention a production of fifteen cars of ore in 1903 and five cars in 1904. The mine has been worked intermittently, but of late years little ore has been shipped from it, although it is stated there is a comparatively large quantity available for mining.

BOSTON CREEK.

Discussing the dispute which has resulted in the delay of development of gold properties at Boston Creek, the "Toronto Star" quotes Mr. J. Papassimakes as follows:

"Mr. Eugene M. Richardson of New York is the president, Mr. Wm. B. Albright of New York is the vice-president, and Mr. H. D. Symmes of Niagara Falls, Ont., is the managing director of Boston Creek Mines, Limited. In May last, being a substantial shareholder, and a director of the Boston Creek Mines, Limited, I became dissatisfied with the conduct of the property under the officers entrusted with it, and also with the newspaper campaign which was being carried on, without objection by these officials, for the purpose of selling stock, and took steps to force the officials to remedy so far as possible the various matters connected with the administration of the affairs of the company, which I believed were mismanaged. For this purpose on May 9th last I sent a registered letter to the officials urging the holding of the annual meeting of the shareholders, the issuing of an annual report, and a statement of the result of operations on the property, with the idea of thereby securing for the shareholders either official confirmation or denial of the claims being made in the stock selling campaign. However, no meeting has been held, and no report of mine conditions or finances has been given to the shareholders."

The chief claim of the Boston Creek Mines comprises about forty acres, adjoining which are other mining properties owned by the R. A. P. Prospecting, Developing, and Mining Company in part, and by Mr. Papassimakes personally in part. The property immediately adjoining that of the Boston Creek Mines, Limited, was known as mining claim 5,163, and by consent of the R. A. P. syndicate, of which Mr. Papassimakes is a member, the shaft on this property was turned over for a time for the use of the Boston Creek Company, in order to give them access to their own property at depth, and to raise a shaft on the Boston Creek claims.

SILVER PRICES.

	New York. cents.	London. pence.
September—		
6	95½	48½
7	96½	49
8	96½	49
10	97½	49½
11	98½	50
12	98½	50
13	98½	50
14	100½	51
15	100½	51
17	102½	52
18	103½	52½
19	105½	53½
20	106½	54
21	108½	55

PRODUCTION OF IRON AND STEEL IN CANADA 1917.

(January to June).

The Mines Branch of the Department of Mines, Ottawa, has received from the producers complete returns of the production of pig iron in Canada and with the exception of two small plants complete returns of the production of steel ingots and castings during the first six months of 1917.

The total production of pig iron during the first six months was 586,998 short tons, as against 562,097 tons during the first six months of 1916. The average monthly production in 1917 was 97,833 tons, as against an average monthly production throughout 1916 of 97,438 tons.

Furnaces were in blast at Sydney and North Sydney, N. S., Hamilton, Port Colborne, Sault Ste. Marie, and Deseronto, Ont. The Deseronto furnace went into blast in May, having been out during the first four months. Small quantities of pig iron were also produced in electric furnaces from scrap steel at Orillia, Ont. and Montreal, Que.

The total production of steel ingots and direct castings during the first six months was 836,149 short tons, as against 589,553 tons during the first six months of 1916. The average monthly production during the first six months of 1917 was 139,358 tons as against an average monthly production throughout 1916 of 106,268 tons.

The production of steel, in electric furnaces included above were 18,797 tons during the first six months of 1917 as against a total of 19,639 tons produced throughout 1916.

TORONTO MARKETS.

Cobalt oxide, black, \$1.50 per lb.

Cobalt oxide, grey, \$1.65 per lb.

Cobalt metal, \$2.25 per lb.

Nickel metal, 45 to 50 cents per lb.

White arsenic, 15 cents per lb.

Sept 24, 1917—(Quotations from Canada Metal Co., Toronto)

Spelter, 11 cents per lb.

Lead, 12 cents per lb.

Tin, 63 cents per lb.

Antimony, 18 cents per lb.

Copper, casting, 32 cents per lb.

Electrolytic, 33 cents per lb.

Ingot brass, yellow, 20 cents; red, 25½ cents per lb.

Sept. 24, 1917—(Quotations from Elias Rogers Co., Toronto)

Coal, anthracite, \$9.50 per ton.

Coal, bituminous, nominal, \$9.00 per ton.

In Nicola Valley district the coal mines are stated to now be doing better, with an improved market for their coal. Renewed attention to metal mining in Nicola division is also promised.

FOR SALE

\$300,000.00 Worth of Released Machinery
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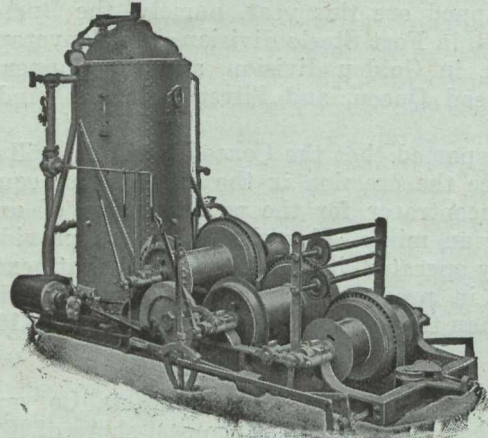
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The above constitutes a few only of the various articles for sale.

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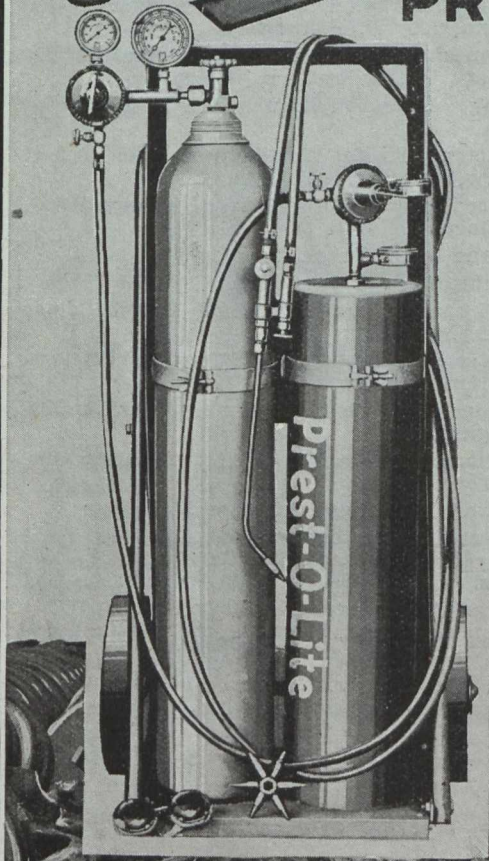
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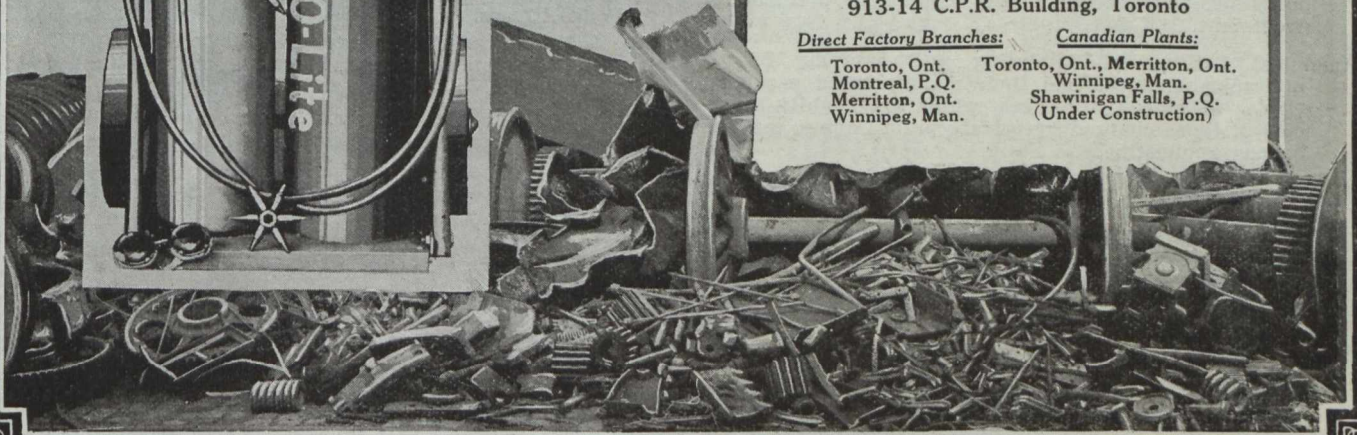
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The Petroleum and Natural Gas Resources of Canada: Vols. I. and II., by F. G. Clapp, M.A., and others.

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

Map 57A. Frank, Alberta (showing the landslide of 1903).

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

Map 151A. Nansen and Victoria Creeks, Nisling River, Yukon Territory.

Map 152A. Kluane Lake, Yukon Territory.

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 166A. Portion of Flathead Coal Area, Kootenay District, B.C. Topography.

Map 182A. Portion of Flathead Coal Area. Geology.

Map 186A. Explored Routes between Lake Athabaska and Great Slave Lake on the Tazin, Taltson, Slave and Peace Rivers.

Map 1667. Slocan Mining Area, Kootenay District, B.C.

Map 1677. Coleraine Sheet, Megantic and Wolfe Counties, Quebec.

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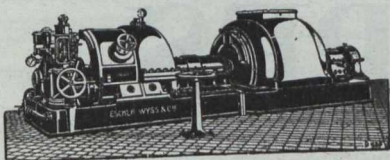
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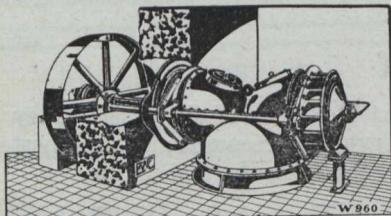
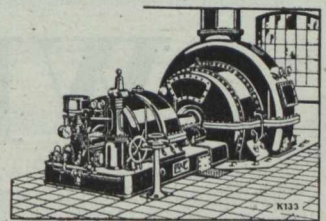
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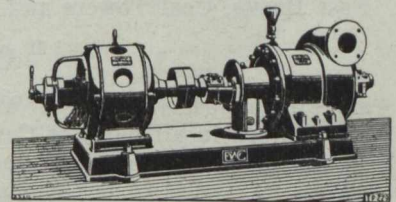
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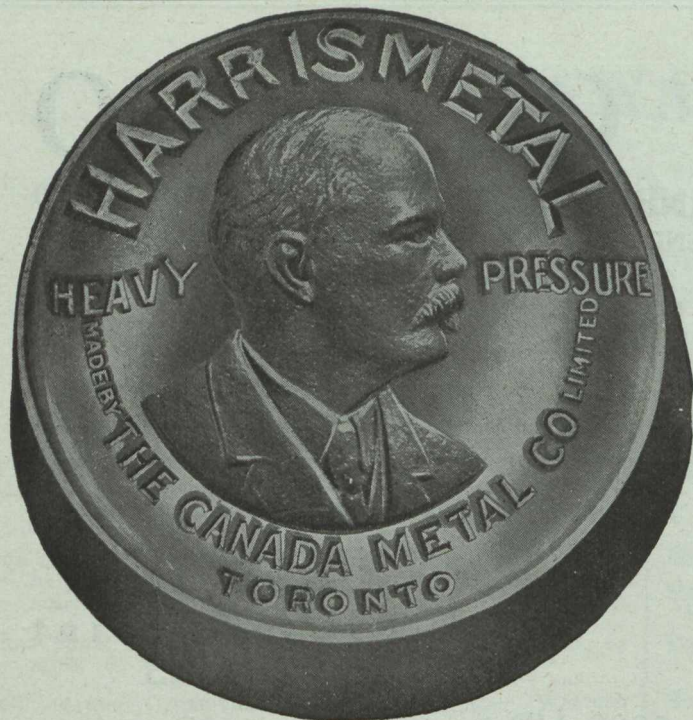
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Curtis & Harvey (Can.), Ltd.
Canadian Explosives, Ltd.
- Coal Mining Machinery—**
Can. Ingersoll-Rand Co., Ltd.
Sullivan Machinery Co.
- Coal Pick Machines—**
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.
- Compressors—Air—**
Can. Fairbanks-Morse Co.
Escher Wyss & Co.
Smart-Turner Machine Co.
Can. Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
- Concrete Mixers—**
Can. Fairbanks-Morse Co.
Northern Canada Supply Co.
Wettlaufer Bros.
- Condensers—**
Smart-Turner Machine Co.
Northern Canada Supply Co.
- Converters—**
Northern Canada Supply Co.
- Conveyer—Trough—Belt—**
Can. Fairbanks-Morse Co.
Hendrick Mfg. Co.
- Cranes—**
Can. Fairbanks-Morse Co.
Smart-Turner Machine Co.
M. Beatty & Sons, Ltd.
- Crane Ropes—**
Allan, Whyte & Co.
Can. B. K. Morton.
- Grinding Plates —**
Hull Iron & Steel Foundries, Ltd.
- Crushers—**
Can. Fairbanks-Morse Co.
Lymans, Ltd.
Mussens, Limited.
Hull Iron & Steel Foundries, Ltd.
Wettlaufer Bros.
- Cyaniding Process—**
Koering Cyaniding Process Co.
- Derricks—**
Can. Fairbanks-Morse Co.
Smart-Turner Machine Co.
M. Beatty & Sons, Ltd.
- Diamond Drill Contractors—**
Diamond Drill Contracting Co.
Smith & Travers.
Sullivan Machinery Co.
- Dredger Pins—**
Armstrong, Whitworth of Canada, Ltd.
- Dredging Machinery—**
M. Beatty & Sons.
- Dredging Ropes—**
Allan, Whyte & Co.
Can. B. K. Morton.
- Drills, Air and Hammer—**
Can. Ingersoll-Rand Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
- Drills—Core —**
Can. Ingersoll-Rand Co., Ltd.
Standard Diamond Drill Co.
Sullivan Machinery Co.
- Drills—Diamond—**
Sullivan Machinery Co.
Northern Canada Supply Co.
- Drill Steel—Mining—**
Armstrong, Whitworth of Can., Ltd.
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- Drill Steel Sharpeners—**
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Northern Canada Supply Co.
Sullivan Machinery Co.
- Drills—Electric—**
Can. Ingersoll-Rand Co., Ltd.
Sullivan Machinery Co.
- Drills—High Speed and Carbon—**
Armstrong Whitworth of Can., Ltd.
Can. Fairbanks-Morse Co.
Can. B. K. Morton
- Dynamite—**
Curtis & Harvey (Canada), Ltd.
Canadian Explosives.
Northern Canada Supply Co.
- Ejectors—**
Can. Fairbanks-Morse Co.
Can. Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
- Elevators—**
M. Beatty & Sons.
Sullivan Machinery Co.
Northern Canada Supply Co.
Wettlaufer Bros.
- Engineering Instruments—**
C. L. Berger & Sons.
- Engineers & Contractors—**
Foundation Co., Ltd., of Montreal.
- Engines—Automatic—**
Can. Fairbanks-Morse Co.
Smart-Turner Machine Co.
- Engines—Gas and Gasoline—**
Can. Fairbanks-Morse Co.
Alex. Fleck.
Sullivan Machinery Co.
Smart-Turner Machine Co.
- Engines—Haulage—**
Can. Fairbanks-Morse Co.
Can. Ingersoll-Rand Co., Ltd.
- Engines—Marine—**
Can. Fairbanks-Morse Co.
Smart-Turner Machine Co.
- Engines—Steam—**
Smart-Turner Machine Co.
M. Beatty & Sons.
- Fans—Ventilating—**
Can. Fairbanks-Morse Co.
- Flotation Oils—**
Georgia Pine Turpentine Co. of New York
- Forges—**
Can. Fairbanks-Morse Co.
Northern Canada Supply Co.
Ltd.
- Forging—**
M. Beatty & Sons.
Smart-Turner Machine Co.
- Furnaces—Assay—**
Lymans, Ltd.
- Fuse—**
Curtis & Harvey (Canada), Ltd.
Canadian Explosives.
Northern Canada Supply Co.
- Gears—**
Can. Fairbanks-Morse Co.
Smart-Turner Machine Co.
Northern Canada Supply Co.
Hull Iron & Steel Foundries, Ltd.
- Hammer Rock Drills—**
Mussens, Limited.
- Hangers—Cable—**
Standard Underground Cable Co. of Canada, Ltd.
- High Speed Steel—**
Armstrong, Whitworth of Canada, Limited.
- High Speed Steel Twist Drills—**
Northern Canada Supply Co.
Armstrong, Whitworth of Canada, Ltd.
- Hoists—Air, Electric and Steam—**
Can. Fairbanks-Morse Co.
Can. Ingersoll-Rand Co., Ltd.
Jones & Glassco.
M. Beatty & Sons.
Northern Canada Supply Co.
Wettlaufer Bros.
- Hoisting Engines—**
Can. Fairbanks-Morse Co.
Mussens, Limited.
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.
M. Beatty & Sons.
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Can. Fairbanks-Morse Co.
Northern Canada Supply Co.
- Ingot Copper—**
Canada Metal Co., Ltd.
Hoyt Metal Co.
- Insulating Compounds—**
Standard Underground Cable Co. of Canada, Ltd.
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Can. Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
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- Kominuters—**
Hull Iron & Steel Foundries, Ltd.
- Lamps—Carbon—**
J. S. Aspinall.
- Lamps—Electric—**
J. S. Aspinall.
- Lamps—Safety—**
Canadian Explosives.
- Lamps—Tungsten—**
J. S. Aspinall.
- Link Belt—**
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- Metal Merchants—**
Henry Bath & Son.
Geo. G. Blackwell, Sons & Co.
Consolidated Mining and Smelting Co. of Canada.
Canada Metal Co.
C. L. Constant Co.
- Monel Metal—**
International Nickel Co
- Nickel—**
International Nickel Co.
- Ore Sacks—**
Northern Canada Supply Co.
- Ore Testing Works—**
Ledoux & Co.
Can. Laboratories.
Milton Hersey Co., Ltd.
Campbell & Deyell.
Hoyt Metal Co.
- Ores and Metals—Buyers and Sellers of—**
C. L. Constant Co.
Geo. G. Blackwell.
Consolidated Mining and Smelting Co. of Canada.
Orford Copper Co.
Canada Metal Co.
Hoyt Metal Co.
- Perforated Metals—**
Northern Canada Supply Co.
Hendrick Mfg. Co.
- Pig Tin—**
Canada Metal Co., Ltd.
Hoyt Metal Co.
- Pig Lead—**
Canada Metal Co., Ltd.
Hoyt Metal Co.

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<p>Pipes— Can. Fairbanks-Morse Co. Canada Metal Co., Ltd. Consolidated M. & S. Co. Pacific Coast Pipe Co., Ltd. Northern Canada Supply Co. Smart-Turner Machine Co.</p> <p>Pipe Fittings— Can. Fairbanks-Morse Co. Northern Canada Supply Co.</p> <p>Piston Rock Drills— Mussels, Limited.</p> <p>Pneumatic Tools— Can. Ingersoll-Rand Co., Ltd. Jones & Glassco. Jenckes Machine Co.</p> <p>Prospecting Mills and Machinery— Standard Diamond Drill Co.</p> <p>Pulleys, Shafting and Hangings— Can. Fairbanks-Morse Co. Jeffrey Mfg. Co. Northern Canada Supply Co.</p> <p>Pumps—Boiler Feed— Can. Fairbanks-Morse Co. Smart-Turner Machine Co. Northern Canada Supply Co. Can. Ingersoll-Rand Co., Ltd. Wettlaufer Bros.</p> <p>Pumps—Centrifugal— Can. Fairbanks-Morse Co. Escher Wyss & Co. Mussels, Limited. Smart-Turner Machine Co. M. Beatty & Sons. Can. Ingersoll-Rand Co., Ltd.</p>	<p>Pumps—Electric— Can. Fairbanks-Morse Co. Smart-Turner Machine Co. Can. Ingersoll-Rand Co., Ltd. Jenckes Machine Co.</p> <p>Pumps—Pneumatic— Can. Fairbanks-Morse Co. Smart-Turner Machine Co. Can. Ingersoll-Rand Co., Ltd. Sullivan Machinery Co.</p> <p>Pumps—Steam— Can. Fairbanks-Morse Co. Can. Ingersoll-Rand Co., Ltd. Mussels, Limited. Northern Canada Supply Co. Jenckes Machine Co.</p> <p>Pumps—Turbine— Can. Fairbanks-Morse Co. Smart-Turner Machine Co. Can. Ingersoll-Rand Co., Ltd. ada, Limited.</p> <p>Pumps—Vacuum— Can. Fairbanks-Morse Co. Smart-Turner Machine Co.</p> <p>Quarrying Machinery— Sullivan Machinery Co. Can. Ingersoll-Rand Co., Ltd. Jenckes Machine Co.</p> <p>Roofing— Can. Fairbanks-Morse Co. Northern Canada Supply Co.</p> <p>Rope—Manilla and Jute— Jones & Glassco. Northern Canada Supply Co. Allan, Whyte & Co.</p> <p>Rope—Wire— Allan, Whyte & Co. Northern Canada Supply Co. Can. B. K. Morton</p>	<p>Steel—High Speed— Can. B. K. Morton</p> <p>Samplers— C. L. Constant Co. Ledoux & Co. Milton Hersey Co. Thos. Heys & Son.</p> <p>Scales— Can. Fairbanks-Morse Co.</p> <p>Screens— Jeffrey Mfg. Co. Northern Canada Supply Co. Hendrick Mfg. Co.</p> <p>Screens—Cross Patent Flanged Lip— Hendrick Mfg. Co.</p> <p>Separators— Can. Fairbanks-Morse Co. Smart-Turner Machine Co.</p> <p>Sheet Lead— Canada Metal Co., Ltd.</p> <p>Sheets—Genuine Manganese Bronze— Hendrick Mfg. Co.</p> <p>Shovels—Steam— M. Beatty & Sons.</p> <p>Stacks—Smoke Stacks— Can. Fairbanks-Morse Co. Hendrick Mfg. Co. MacKinnon, Holmes & Co.</p> <p>Steel Barrels— Smart-Turner Machine Co.</p> <p>Steel Drills— Sullivan Machinery Co. Northern Canada Supply Co. Can. Ingersoll-Rand Co., Ltd. Can. B. K. Morton.</p>	<p>Steel Drums— Smart-Turner Machine Co.</p> <p>Steel—Tool— N. S. Steel & Coal Co. Armstrong, Whitworth of Can., Ltd.</p> <p>Surveying Instruments— W. F. Stanley. C. L. Berger.</p> <p>Tanks—Cyanide, Etc.— Hendrick Mfg. Co. Pacific Coast Pipe Co., Ltd. MacKinnon, Holmes & Co.</p> <p>Transits— C. L. Berger & Sons.</p> <p>Turbines— Escher Wyss & Co.</p> <p>Twist Drills—High Speed— Can. B. K. Morton Co.</p> <p>Valves— Can. Fairbanks-Morse Co.</p> <p>Winding Engines—Steam & Electric— Can. Ingersoll-Rand Co., Ltd. Jenckes Machine Co.</p> <p>Wire Cloth— Northern Canada Supply Co. B. Greening Wire Co., Ltd.</p> <p>Wire (Bare and Insulated)— Standard Underground Cable Co., of Canada, Ltd.</p> <p>Zinc Spelter— Canada Metal Co., Ltd. Hoyt Metal Co.</p>
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