

CANADIAN MINING JOURNAL

VOL. XXXIX

TORONTO

No. 5



The time sheets tell the story, but---are they accurate?

This is a vital question in every industrial organization, large or small—vital because it eats into the profits. Solve it and you have eliminated the greatest adverse factor to the successful operation of your plant. Neglect it and an ever-increasing overhead expense will be the result.

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Not only does it give you an accurate, legible and unchangeable record of your pay-roll data, but it also cuts down to a minimum the time needed to make up that data.

We are the largest makers of Time Recorders in the world and our advice is at your disposal—FREE at any time.

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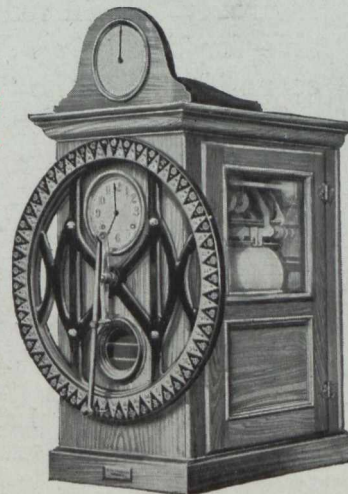
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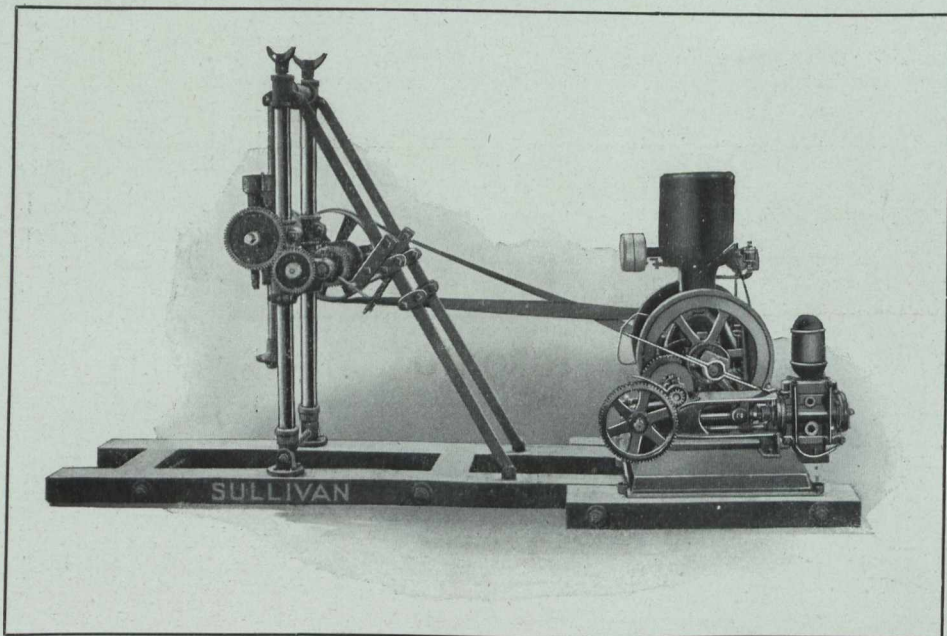
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The Sullivan Belted "Bravo"

If you need a core drill for prospecting to moderate depths, one you can take anywhere—and use on the surface or underground, send for this remodelled, gas-engine-driven "BRAVO."

For holes from 50 to 600 feet
 For cores from $\frac{1}{8}$ in. diameter to 2 in.
 Horse power of gas-engine 4
 Weight of drill 500 lbs.
 Weight of frame 640 lbs.
 Weight of engine with pump 1200 lbs.

Improvements in reduction gearing render this "Bravo" especially suitable for belt drive. The gas engine is unusually reliable, compact and economical. □ The "Bravo" has been for a generation, the most widely used and most dependable light diamond drill, in use in all parts of the world. It can be run by hand power, as well as by belt drive.

Described in our 68-page Diamond Drill Catalogue, No. 669—Ask us for your copy.

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Grinder No. 8.*

The "Little David" Pedestal Grinder will help you to get and maintain the greatest practicable freedom from drill stoppages due to broken drill shanks and pistons, as well as to get the best action when using water and hollow steels.

This grinder may also be used for general grinding purposes

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For Squaring Off Rock Drill Shanks,
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*Saves Piston Breakages
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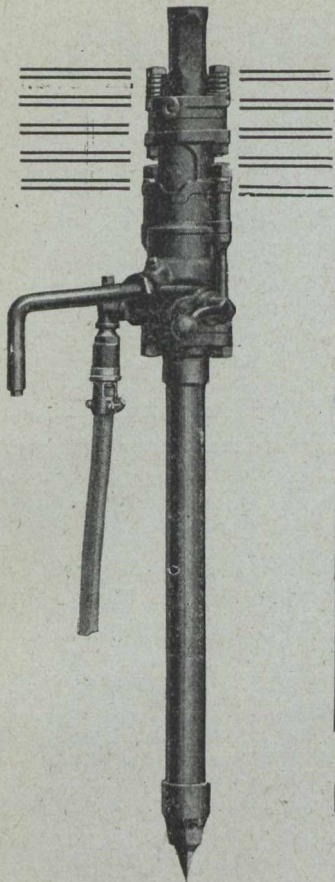
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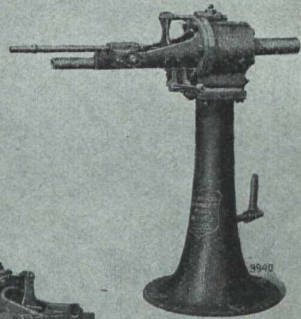
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LEYNER SHANK AND BIT PUNCH



Leyner Shank and Bit Punch punching out a drill bit



View showing Rack and Pinion Clutch removed

LEYNER SHANK AND BIT PUNCH

As already stated, the operation of the clamp is accomplished through the medium of a rack and pinion, the rack consisting of teeth cut on the top side of the piston rod attached to the pump piston. As the piston moves in and out, it revolves the pinion, which in turn operates the right and left hand feed screw, opening or closing the jaws of the clamp as the case may be.

To prevent dirt or other foreign material from interfering with the action of the rod and pinion, it has been covered by a suitable guard. Further, the protruding end of the rack operates in a rubber piece, eliminating the possibility of it becoming injured or injuring the operator.

Standard Equipment

The standard equipment comprises the machine complete, with punching pin 5/8" diameter for a distance of 2" at the end, the remainder of the pin being 3/4" diameter, two wrenches, automatic lubricator, an extension 3/8" pipe to which the air hose is attached. It does not include the air hose, this is extra.

LEYNER SHANK AND BIT PUNCH
"R" TYPE
For Punching Out the Holes in Bits
and Shanks of Hollow Drill Steel

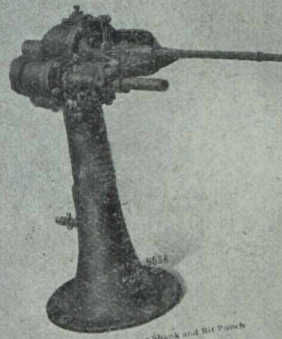
Ingersoll-Rand Company

11 Broadway, New York

Form No. 808

First Edition

October, 1917



Leyner Shank and Bit Punch

THE economic value of a drill steel punching machine does not stop with the saving of time and the elimination of annoyance in the steel sharpening plant—it is more far reaching. Down in the mine, out in the quarry, in the tunnel, subway, shaft, and on

Weight	400 lbs.
Height	22" x 44"
Stroke	47"
Clamping	6"
Unmended	1"
Rate	80 to 100 lbs.

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Punches either shanks or bits. It is quick in action. Handles all sizes of drill steel. One lever controls all operations. Air consumption low.

The Leyner Sharpener makes and sharpens the drill bits and shank, the Shank and Bit Punch will keep the holes open in hollow drill steel, and the Grinder will square up the drill

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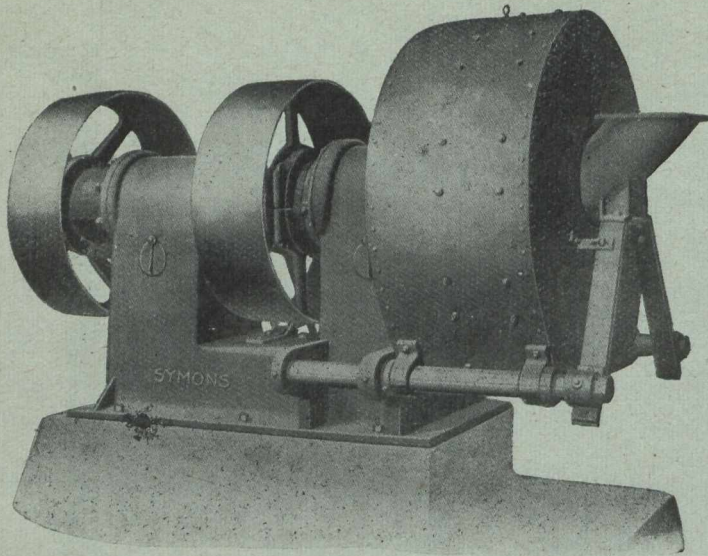
Ask our nearest office for Bulletins 4039, 4041 and 4122. They may point the way to important savings.

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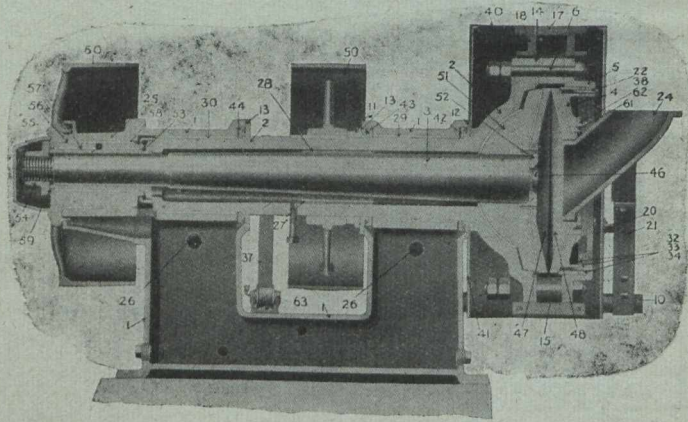
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Symons Disc Crushers

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We will offer specially attractive prices on the 36-inch Disc Crushers, in order to move this stock. This is a rare opportunity to buy a Disc Crusher at a Bargain.



The Disc Crusher Principle

The crushing is done between two discs of manganese steel. Fig. 2950 shows the discs in proper position. Fig. 2949 shows them in cross-section. They are dish-shaped and are set with their hollow or concave sides facing each other, forming a cavity between them.

These discs both rotate in the same direction at the same speed. The discs are supported at an angle to each other. This provides a wider opening between the edges of the discs at one part of their circumference than at the opposite part.

When stone is fed through the central feed opening it is thrown by centrifugal force, into the opening where the discs are widest apart. It is carried around with them to where they are closer together and is crushed in the operation. The smaller particles fly out from between the discs, into the encircling chute, while the larger particles are caught again and the operation repeated.

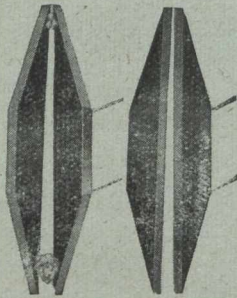


Fig. 2949 Fig. 2950

The 36 inch Symons Disc will take 5-inch ore or stone and reduce it to $\frac{3}{4}$ inch at one operation.


DAILY CAPACITIES

250	Tons to	$\frac{3}{4}$ inch
400	" "	1 "
500	" "	1 $\frac{1}{2}$ "
600	" "	2 "

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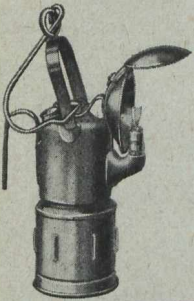
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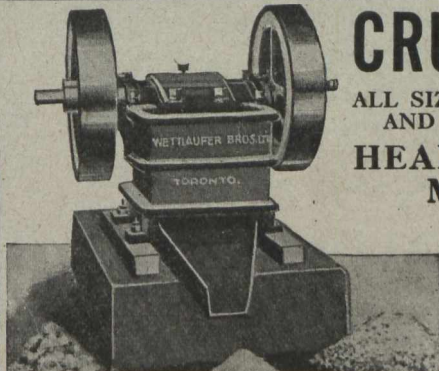
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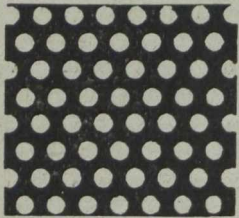
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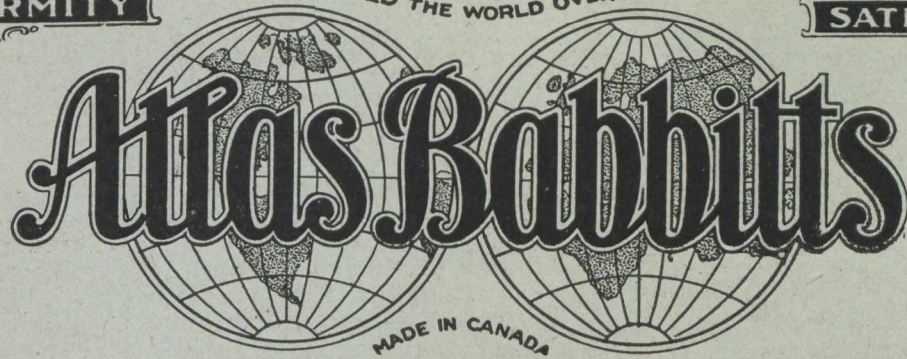

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2

The Minerals of Nova Scotia

THE MINERAL PROVINCE OF EASTERN CANADA

COAL, IRON, COPPER, GOLD, LEAD, SILVER, MANGANESE, GYPSUM, BARYTES, TUNGSTEN, ANTIMONY, GRAPHITE, ARSENIC, MINERAL PIGMENTS, DIATOMACEOUS EARTH.

Nova Scotia possesses extensive areas of mineral lands and offers a great field for those desirous of investment.

Coal Over six million tons of coal were produced in the province during 1916, making Nova Scotia by far the leader among the coal producing provinces of the Dominion.

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.

High grade cement making materials have been discovered in favorable situations for shipping.

Government core-drills can be had from the department for boring operations.

The available streams of Nova Scotia can supply at least 500,000 h.p. for industrial purposes.

Prospecting and Mining Rights are granted direct from the Crown on very favorable terms.

Copies of the Mining Law, Mines Reports, Maps and Other Literature may be had free on application to

HON. E. H. ARMSTRONG, - Halifax, N. S.

Commissioner of Public Works and Mines



PROVINCE OF QUEBEC

MINES BRANCH

Department of Colonization, Mines and Fisheries

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

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

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

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

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

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

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

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

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

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

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

HONOURABLE HONORE MERCIER,

MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.

The Flotation Process

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

Minerals Separation North American Corporation

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.

Notice is further given that no one is authorized to introduce our processes or apparatus into the United States, Canada or Mexico.

All applications should be made direct to

MINERALS SEPARATION NORTH AMERICAN CORPORATION

Head Office:
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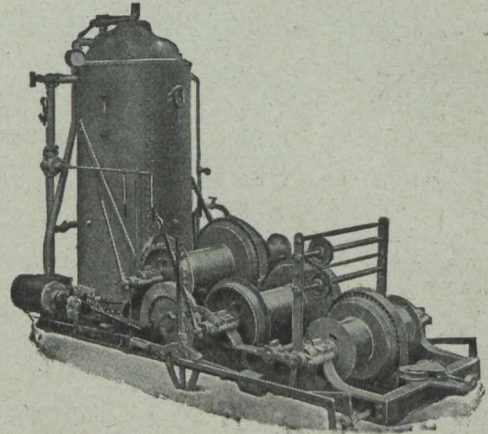
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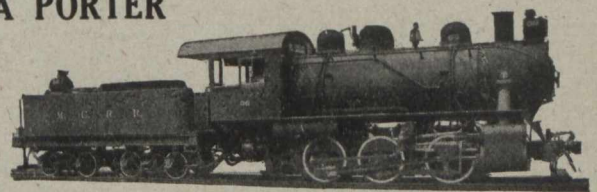
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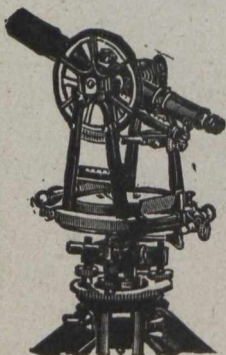


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THE CANADIAN MINING JOURNAL

VOL. XXXIX

TORONTO, March 1st, 1918.

No. 5

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The shortage of coal has directed a great deal of attention to the necessity of more fully utilizing inferior fuels. This should be done, as far as possible, without delay; but even greater attention should be given to means for more fully utilizing, especially during the war, the best grades of coal. Nova Scotia has splendid coal that should be more extensively used in Eastern Canada and the North Eastern States. Alberta and British Columbia coal mines can supply excellent coal for Western Canada and the North Western States. Ontario should get most of its coal from the nearby mines in the United States. This is no time to attempt to supply all Canada with Canadian fuel. The best interests of Canada and the United States demand more complete utilization of the best grades of coal near the points of production, regardless of the boundary line.

The annual meeting of the Canadian Mining Institute will be held at the Windsor Hotel, in Montreal, on March 6th, 7th and 8th.

Control of metals after the war is a matter that must receive careful attention. Before the war, Germany had acquired control of a very considerable portion of the metals used in Europe in addition to the needs of Germany itself. German metal merchants secured control of metals, ores and concentrates produced in various parts of the world, and so Germany was in an admirable position to secure what seemed to be ample stocks before declaring war. Fortunately, she failed to secure a sufficient supply of such metals as copper and nickel for such a war as this has become. We should see to it that, so far as we are able, Germany never again secures more Canadian metals than enough to supply her ordinary needs for peaceful pursuits.

Germany was for years a storehouse of metals gathered from all parts of the world, ready for war and controlling the market, so that German metal dealers could secure handsome profits on practically all the metals imported by European countries. The surplus stock was sold at prices fixed by the Germans, and an ample, or what was believed to be ample, supply for war purposes was always in their control. Thus they carried on a lucrative business, provided for their needs for industrial purposes and their supposed needs for war purposes and worked against the natural development of metal industries in other countries.

A merger of the Dominion Steel Corporation and the Nova Scotia Steel and Coal Company has been frequently talked of, and now seems likely to be accomplished. The officials concerned have not given out information which would indicate that the two companies have finally joined forces; but their replies to queries indicate that negotiations are well advanced.

As these two companies produce four-fifths of Eastern Canada's coal and nearly all the iron and steel of the Maritime Provinces, the merger is one of unusual importance. If it is accomplished, we may soon expect to see Nova Scotia take a much more prominent place in the industrial world. Already the Eastern Province has an enviable position as a producer of coal, iron and steel, and has played a big part in supplying these necessities; but there remains to be developed a host of subsidiary enterprises.

A greater variety of iron and steel products than is now obtainable in Canada will probably be one of the results of a merger of the two Nova Scotia companies. This will naturally be followed by the establishment in Nova Scotia of many manufacturing plants.

MEMORANDUM.

Re Mining Industry submitted by a Deputation representing the Canadian Mining Institute.
Feb. 8, 1918.

To the Right Hon. Sir Robert Borden, P.C., G.C.M.G.,
K.C., LL.D., Prime Minister of Canada,

The Council of the Canadian Mining Institute desires to present for your consideration the following matters directly connected with the Mining Industry, and which, it is believed, will be of material aid to the Dominion, not only in this time of its stress and burden, but also in the immediate future when the burdens of reconstruction and recuperation will bear heavily upon the Government and the people of this Dominion.

We realize that the great importance of increasing sources of revenue, and the need for the exercise of the strictest economy in the expenditures of the administrative departments is fully appreciated by your Government. It is believed that, of all Canadian industries, that of mining possesses the greatest possibilities for profitable expansion, inasmuch as no established business is entirely independent of the mineral industry or its products. Therefore, it is manifest that measures having for their object the stimulation of discovery and effective exploitation of Canadian mineral resources, should have your Government's immediate attention and be made rapidly effective, since effectiveness in this direction depends, to a very large degree, upon the policy and assistance extended by Government.

It is our opinion that this assistance can be best given through the Department of Mines, to which Department the task should be entrusted, and we also respectfully submit that much of the past and present dissipation of funds and energy can be avoided through non-duplication of effort by different branches of the Civil Service and Commissions. In the immediate past identical information has been sought through at least three different bureaus, two of which were not correlated with the Department of Mines. A unification of all such efforts through a recognized and extended Department of Mines is, therefore, greatly to be sought, and can unquestionably be obtained if your Government so desires. It is earnestly hoped that your Government may seriously consider the information which accompanies this request.

Strengthening of the Department of Mines: From the year 1841 to 1907 the Geological Survey of Canada carried on exclusively the obtaining of information respecting the mineral resources of Canada. Under a Minister of the Crown, and more directly under an officer known as the Director of the Geological Survey, excellent work was accomplished and a permanent record made.

In the year 1907 by 6 and 7 Edward VII, Chapter 29, "The Geology and Mines Act" was passed, whereby the Department of Mines was created and placed under the administration of a Minister who was also the head of another Department of the Government of Canada. Provision was thereby made, and, it is believed, erroneously made, for the division of the Department into two branches, one called "The Mines Branch," and the other called "The Geological Survey."

By Section 6 of the said Statute, the functions of the Mines Branch are:—

(a) To collect and publish full statistics of the mineral production and of the mining and metallurgical industries of Canada, and such data regarding the economic minerals of Canada as relate to the processes and activities connected with their utilization, and to collect and preserve all available records of mines and mining works in Canada;

(b) To make detailed investigations of mining camps and areas containing economic minerals or deposits of other economic substances, for the purpose of determining the mode of occurrence, and the extent and character of the ore-bodies and deposits of the economic minerals or other economic substances;

(c) To prepare and publish such maps, plans, sections, diagrams, drawings and illustrations as are necessary to elucidate the reports issued by the Mines Branch;

(d) To make such chemical, mechanical and metallurgical investigations as are found expedient to aid the mining and metallurgical industry of Canada;

(e) To collect and prepare for exhibition in the Museum, specimens of the different ores and associated rocks and minerals of Canada, and such other materials as are necessary to afford an accurate exhibit of the mining and metallurgical resources and industries of Canada.

By Section 7, the functions of the Geological Survey are:—

(a) To make a full and scientific examination and survey of the geological structure and mineralogy of Canada; to collect, classify and arrange for exhibition in the Victoria Memorial Museum such specimens as are necessary to afford a complete and exact knowledge of the geology, mineralogy, palaeontology, ethnology, and fauna and flora of Canada, and to make such chemical and other researches as will best tend to ensure the carrying into effect the objects and purposes of this Act;

(b) To study and report upon the facts relating to water supply for irrigation and for domestic purposes, and to collect and preserve all available records of artesian or other wells;

(c) To map the forest areas of Canada, and to make and report upon investigations useful to the preservation of the forest resources of Canada;

(d) To prepare and publish such maps, plans, sections, diagrams and drawings as are necessary to illustrate and elucidate the reports of surveys and investigations;

(e) To carry on ethnological and palaeontological investigations.

It is interesting to note that by Section 4 of the Statute it was contemplated that there should be transferred to this Department for consideration and action, all related subjects from other Departments, with the object, apparently, of entrusting to the Department of Mines all that it was possible to assign to it within the terms of its functions. So much was this the case that by Section 21, the forestry resources of the Dominion were referred to this Department to be dealt with in the following manner:—

The Minister may, for the purpose of obtaining a basis for the representation of the mineral, mining and forestry resources, and of the geological features of any part of Canada, cause such measurements, observations, investigations and physiographic, explanatory and reconnaissance surveys to be made as are necessary for or in connection with the preparation of mining, geological and forestry maps, sketches, plans, sections or diagrams.

The reason why it is believed that the division of the functions of the Department of Mines, as by the Statute provided, is erroneous, is that in practice it has led to overlapping, to divided authority, and to friction arising out of sectional jealousies.

No Real Minister of Mines.

Probably the reason for these difficulties has been, as much as for any other, that the Minister has never been charged with the sole purpose of attending to the mining industry, has always had other manifold duties to perform, and has never been long enough in office to enable a continuity of policy, such as should have existed in respect to so important a subject.

It is enough to recall to your attention in this connection that there have been, in the last six years, no less than eight Ministers or Acting Ministers of Mines.

We are firmly convinced that if a Minister of Mines charged solely with the work of this Department were to give his undivided attention to it, much that has occurred would have been avoided, and will be avoided in the future.

The Conservation Commission.

The scope of the work of the Department of Mines is wide; but instead of encouraging the Department to fully perform its duty, from time to time, Commissions—some Statutory, some appointed by Order-in-Council, and some more or less self-appointed—have encroached upon the domain of the Department of Mines, have been encouraged by the Government of the day in so doing, have been granted sums of money to spend upon subjects and matters that should properly have been dealt with by the Department of Mines, but for which that Department could never obtain the necessary funds.

The first apparent inroad was made by the Government in the year 1909, when it passed an Act Respecting the Commission of Conservation, 8 and 9 Edward VII, Chapter 27. By Section 10 of that Statute, it is provided that:—

It shall be the duty of the Commission to take into consideration all questions which may be brought to its notice relating to the conservation and better utilization of the natural resources of Canada, to make such inventories, collect and disseminate such information, conduct such investigations, inside and outside of Canada, and frame such recommendations as seem conducive to the accomplishment of that end.

By Section 12, it is provided that no permanent officer or employee shall be appointed by the Commission. This was a modest programme. By 3 and 4 George V, Chapter 12, Section 1, all this was changed. We beg to refer you to a publication entitled "Catalogue of Publications revised to December 1st, 1913," and published by the Commission of Conservation of Canada, at page 27, and the annual reports since that date, and ask you to consider to what extent the work undertaken by the Commission might have been done by the Department of Mines.

We beg to call your attention, also, to the tendency to duplicate work rightfully belonging to the Department of Mines, evidenced by some of the publications of the Natural Resources Division of the Department of the Interior, and the Mines Branch of that Department.

The Munition Resources Commission.

A later encroachment, but by no means the least, upon the domain of the Department of Mines, was the appointment, since the outbreak of the war, of a Munitions Resources Commission, whose function it was, and is, to advise the Imperial Munitions Board on the available Canadian minerals for use for war purposes. There had previously been in existence a Shell Committee. This was disbanded and members of it were reappointed as the Munition Resources Commission, with the addition of one member from the Department of Mines, for the same purpose as mentioned.

We are of the opinion, and very firmly of the opinion, that the duties of this Commission, for which duties the Department of Mines was created and is essentially suitable, could have been well performed by that Department, with the co-operation of the Canadian Mining Institute and the Provincial Departments of Mines.

Dissemination of Energy Leads to Useless Waste.

All this dissemination of work and effort, this duplication of work, and misplacement of confidence, leads to large expense, useless extravagance and waste, and a destruction of the virtue, opportunity and effectiveness of a Department long in the field, well equipped and capable of doing the work that is being taken away from it. One can, of course, destroy the efficiency and reputation of any Department of the Government by robbing it of its duties, and having them performed by others supplied with moneys which should have been voted to the Department thus impaired. Every branch of mining, everything pertaining to minerals, all laboratory and technical work, and all research in respect to these matters, should be committed to the various divisions of the Department of Mines, each presided over by a qualified technologist. The Department is well equipped with laboratories, which could be enlarged as necessity demands.

National Importance of Mining:—In 1915, the mining, smelting, and related industries of Canada employed 104,425 men and yielded products of a value of \$265,046,000. In addition, and directly following this production, 50,393 men were employed in further manufacturing these products, giving to them an added value of \$103,912,000. That is to say, of a total of 2,723,000 wage-earners in Canada, one-ninth are employed in the mining and dependent industries.

As a further indication of the importance of the mineral industry from the national standpoint, it may be noted that, in 1915, the tonnage supplied to railways by the different industries was:

Products of mines	37.89%
Products of agriculture	18.79%
Products of forest	16.03%
Manufactures	14.76%

Raw Materials Should Be More Largely Utilized in Canada.

Whilst the imports of crude mineral products are only slightly in excess of a similar grade of exports, it is noted that a great quantity of manufactured products is imported; and much exported in a raw stage that should be more highly finished in Canada. That is to say, not only are we re-purchasing materials manufactured from our own exports, but are not obtaining the greatest return from what we do sell as a surplus above our requirements, e.g., asbestos, magnesite, nickel, copper, zinc. It is felt that by a more vigorous policy, the Department of Mines, by studying more intensively the preparation of raw materials, the need of consumers and possibilities of expanding consumption, could greatly stimulate and assist in having our raw materials marketed and exported in a more highly finished form with a consequent greatly enhanced return to the producer. For instance, at present most of our asbestos is exported in the raw state. Whilst the lower grades which go into heavier products will probably always have to be manufactured near the point of consumption, yet it would seem that the higher grades might be manufactured equally well in Canada, and to the great advantage of the country. The need for close co-operation between Canada and other parts of the Empire to insure that the metal requirements of the Empire, for both war and peace, be made from the joint resources, is now realized.

Trade After the War:—The Right Honorable Lloyd George, in recently proposing his peace terms before the Trades and Labor Council of Great Britain, said:

"Economical conditions at the end of the war will be in the highest degree difficult, owing to the diversion of human effort to war-like pursuits. There must follow a shortage of raw materials, which will increase the longer the war lasts, and it is inevitable that those countries which have control of raw materials will desire to help themselves and their friends first. Apart from this, whatever settlement is made, will be suitable only to the circumstances under which it is made, and as those circumstances change, changes in the settlement will be called for."

Alfred Ballin, organizer and administrator of the German shipping trust, in a recent letter to Dr. Ratheman, of Berlin, remarked as follows: "You do not believe in the silly assertion that after the war these British markets for raw materials will be open to us? What a prospect? Out of the British Empire are produced countless articles on which we have hitherto relied and which will be indispensable in the future if we are to swim and not to sink."

These quotations indicate why Canada should be ready after the war with all the raw materials that she possesses, not only for the use of the Empire and for export, but more essentially to manufacture them as far as practicable within the confines of the Dominion.

The control of the Canadian metal trade, as far as possible, should be in our own hands. When one reads the report of the Federal Trade Commission of the United States for 1916, on "Co-operation in American Export Trade," there is ground for alarm at the growth shown of outside influence in metal control before the war. There should undoubtedly be co-operation between Canada and other parts of the Empire to insure that the metal requirements of the Empire for both war and peace, be made from the joint resources; and, in this connection the Department of Mines should concern itself more directly with promoting commercial interests in connection with mining. Invaluable work has been done in the past, mainly in the study of resources; but the information in respect of resources should be correlated with that relating to trade, and in general all matters pertaining to the welfare, development and progress of mining, should be made the business of the Department. For the proper performance of this function it is essential that the two branches of the Department, as at present constituted, should be united.

Stimulation of Exploration for Minerals:—It is probably no exaggeration to state that two-thirds of the total area of Canada represents waste land which can never be of value unless it shall prove to be mineral-bearing. In Eastern Canada is a vast region comprising 1,800,000 square miles, underlain by rocks of pre-Cambrian age. In this pre-Cambrian region, where it extends into the States of Minnesota, Michigan, and Wisconsin have been found the immensely valuable copper deposits of Michigan, and the great iron ranges which have made the United States the foremost producing country of iron ore in the world. Along the thin line of settlement in Ontario, in the Canadian pre-Cambrian, exploration has resulted in the development of the greatest nickel-producing mines in the world, and two other uniquely rich mineral producing areas, namely, those of Cobalt and Porcupine. Recently, in the pre-Cambrian of Manitoba and Saskatchewan, exceedingly promising mineral discoveries have been made, and are being developed. As yet, however, a very small portion of this potentially rich mineral area has been systematically explored and

prospected, and every possible endeavor, therefore, should be made to facilitate and encourage endeavor in this direction. Incidentally it may be pointed out that much may be expected from thorough exploration of those sections of the country, underlain by pre-Cambrian rocks, that will become accessible upon the completion and operation of the new railway to Hudson's Bay. The establishment of a successful mining industry in this northern field would, moreover, contribute very materially to the profitable operation of the railway.

In the West, through British Columbia and northward into the Yukon, is the extension of the Cordillera Mountain system, which in Mexico and the United States has, it is estimated, produced minerals to the value of over \$3,500,000 for each mile in length of these mountains. Within Canadian territory the mountains comprising this system have an approximate length of 1,600 miles, by an average breadth of from 500 to 800 miles. Here, also, exploration has been of a very restricted character. These statements sufficiently indicate the opportunities that exist for mineral exploration in Canada, and the desirability of devoting special attention to the problem of inducing it. In this connection the practicability of training returned soldiers to become explorers, and of offering them certain inducements or incitements to adopt this calling, might be considered.

A Mines Act:—In order to encourage prospecting on Crown lands, under Federal control, it is essential that the provisions governing the securing of title should be of a satisfactory and permanent character. The Regulations in respect of tenure to mining lands have hitherto been established by Order-in-Council, and being subject to amendment under conditions that do not permit of the public being fully advised of such change, are detrimental because of their instability and of the uncertainty thereby occasioned. The Canadian Mining Institute has urged repeatedly upon the Government the wisdom of withdrawing the Orders-in-Council relating to mining, and substituting therefor laws in the form of a Statute. In 1910 the Minister of Mines charged the Institute with the preparation of such a Statute. It entered upon the task with diligence and care, and produced what, it is believed, embodies the desires of those engaged in mining in Canada. The result was printed and circulated by the Government, but has never been presented to the House. There were two sources of objection to its presentation—one the Department of the Interior, from which it would remove the disposition of mining lands, and the other, the member for the Yukon, who disagreed with that portion of the Bill applicable to placer mining in the Yukon. May we be permitted to again strongly urge upon the Government the desirability of bringing this Mines Act into effect.

We confidently believe that if careful consideration be given to the above representations, and remedies are provided along the lines suggested, there will result very great immediate economies to the State; very considerable additions to the efficiency of the Department of Mines; very large economical and financial gain to the Dominion of Canada at a time when this country needs every source of revenue from raw materials to the very limit of possibility. In our humble opinion, there is nothing that will increase the revenue of Canada more substantially than procedure of the Government along the lines above indicated.

All of which is respectfully submitted on behalf of the Council of the Canadian Mining Institute.

Preliminary Report on Production in 1917

By John McLeish.

It is customary to express the total mineral production and to make comparison of production in different years in terms of dollars, or total values.

On this basis of record and comparison the total value* of the metal and mineral production in 1917, as shown in this Preliminary Report, was \$192,982,837. Compared with a production in 1916 valued at \$177,201,534, an increase of \$15,781,303, or 8.9 per cent., is shown, while compared with a production in 1915, valued at \$137,109,171, there is shown an increase of \$55,873,666, or 40.8 per cent.

It must not be inferred, however, that because such a large increase is shown in the value of our mineral production, that our mines and quarries have actually increased their tonnage output at the same average rate. In fact, an examination of the record will show that the quantities of many important products were considerably less in 1917 than in 1916, and over two-thirds of the increase in value is to be attributed to coal, gypsum and cement, in which the quantities marketed were less than in the previous year.

The interrelation of industry is shown by the effect of a diminished coal and coke output on the metallurgical production, the falling off in production of copper and gold is in part attributable to this cause. Lead and silver also show much smaller output. As against these decreases there has been an important increase in the production of zinc and increases also in the production of cobalt, molybdenite and nickel.

In 1916 the metal production showed a very large increase over that of the previous year, but in 1917 the net result in value has been an increase of only \$311,387, making a total value of \$106,630,752.

The total value of the non-metallic production, including clay and quarry products, in 1917, was \$86,352,085, as compared with \$70,882,169 in 1916, showing an average increase of \$15,469,916, or 26 per cent. Practically every product, with the exception of the stone quarry output, shows an increased value of production; but in the case of coal, graphite, gypsum and cement, the quantities actually marketed were less, notwithstanding the increased values.

Copper.

The production of copper in 1917 amounted to 108,860,358 pounds valued at \$29,588,254 as against 117,150,028 pounds valued at \$31,867,150 in 1916, a decrease of 7.08 per cent. in quantity and 7.15 per cent. in value. Though less than the previous year the 1917 production was greater than any other previous record. In 1916 the increase over the production of 1915 had been 16.2 per cent. in quantity and 83.0 per cent. in value.

The electrolytic copper refinery installed at Trail, B.C., began operations about November 1st, 1916, with

a capacity of 10 tons of refined copper per day, which has been increased to 20 tons per day.

Of the total 1917 production 86,508,758 pounds was contained in blister copper and in matte produced in Canada and 22,351,600 pounds estimated as recovered from ores exported.

In addition to the recoveries from domestic ores there were also recovered in British Columbia smelters 5,033,630 pounds of copper from imported ores.

The production in Quebec from pyrite ores was 5,013,560 pounds valued at \$1,362,636 as against 5,703,347 pounds valued at \$1,551,424 in 1916. These are the quantities reported as being paid for; the actual metal contents were much higher.

The Ontario production is derived chiefly from the nickel-copper ores of the Sudbury district and of the Alexo mine in Temiskaming supplemented by a small recovery from the Cobalt district silver ores and by shipments made from a few copper properties under development. The total production in 1917 amounted to 42,796,213 pounds valued at \$11,632,014 as against 44,997,035 pounds valued at \$12,240,094 in 1916, a decrease of 4.0 per cent. in quantity.

There was an important copper production in Manitoba in 1917 derived from the ore deposits at Schist Lake north-west of the Pas, operated by the Mandy Mining Company. These sulphide ores as well as those at Flin Flon Lake in the same district have had a very large amount of development work expended upon them during the past two years. The ore shipments which amounted to 3,388 tons were made under great difficulty of transportation having been hauled 40 miles by sleigh in winter and then 190 miles by barge during summer and then 1,500 miles by rail to the smelter at Trail.

The British Columbia production was 57,717,535 pounds valued at \$15,687,631, as against 63,642,550 pounds valued at \$17,312,046 in 1916—a decrease in quantity of over 9 per cent.

The production included 40,720,413 pounds recovered in blister and matte and 16,997,122 pounds being the estimated recovery from ores shipped to United States smelters.

The production from the Yukon in 1917 amounted to 2,182,050 pounds valued at \$593,081, as against 2,807,096 pounds valued at \$763,586 in 1915. The production is derived from the mines of the Whitehorse district in southern Yukon.

Prices:—The New York price of electrolytic copper, which was 28¾ cents early in 1917, increased to a maximum of 32 cents towards the middle of February though small lots sold as high as 34 cents. Then there was a gradual falling off till it reached 24½ in July. The price remained uncertain until October, when the United States War Industries Board fixed, by agreement with the copper producers, the price at 23½ cents which remained the price for the last quarter of 1917.

*In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals copper, gold, lead, nickel, silver, and zinc is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

The Mineral Production of Canada in 1917.

(Subject to revision).

Metallic	Quantity	Value
Antimony, ore (exports)	*Tons. 774	\$ 50,476
Cobalt, metallic contained in oxide, etc.	Lbs. 1,089,134	1,742,614
Copper, value at 27.180 cents per lb.	" 108,860,358	29,588,254
Gold	Ozs. 747,366	15,449,426
Iron, pig from Canadian ore ..	Tons. 46,022	768,783
Iron ore sold for export.	" 169,192	590,336
Lead, value at 11.137 cents per lb.	Lbs. 32,072,269	3,571,889
Molybdenite MoS ₂ contents at \$1.00 per lb.) ..	" 271,530	271,530
Nickel, value at 40 cents per lb.	" 84,470,970	33,778,388
Platinum	Ozs. 49½	5,090
Silver, value at 81.4117 cents per oz.	" 22,150,680	18,034,419
Zinc, value at 8.901 cents per lb.	Lbs. 31,227,351	2,779,547
Total		106,630,752
Non-Metallic	Quantity	Value
Actinolite	Tons. 120	\$ 1,320
Arsenic, white and arsenic in ore ..	"	709,937
Asbestos	" 134,322	6,942,410
Asbestic	" 9,596	18,688
Barytes	" 958	(b) 16,000
Chromite (a)	" 36,352	490,001
Coal	" 14,015,588	47,643,646
Corundum	" 188	32,153
Feldspar, (not complete)	" 11,493	54,555
Fluorspar	" 4,249	68,756
Graphite	" 3,714	402,892
Grindstones	" 2,279	44,037
Gypsum	" 339,418	887,170
Magnesite	" 58,090	728,275
Manganese	" 158	14,836
Mica	"	350,732
Mineral pigments; iron oxides ..	" 9,372	81,685
Mineral water	"	145,276
Natural gas	M. cu. ft. 26,465,686	5,003,342
Petroleum	Brls. 205,332	478,937
Pyrites	Tons. 403,243	1,586,091
Quartz	" 205,851	440,444
Salt	" 138,909	1,047,792
Talc	" 15,812	76,539
Total		67,249,514
Structural Materials and Clay Products	Quantity	Value
Cement, Portland	Brls. 4,768,488	\$ 7,699,521
Clay products: \$4,603,755		
Brick: Common		2,017,046
Pressed and paving		589,406
Kaolin	Tons. 533	9,594
Pottery		122,878
Refractories: Fireclay, fire-brick, etc.		210,838
Sewerpipe		778,159
Tile		434,465
All other: Fireproofing hollow blocks, etc.		441,369
Lime	Bush. 6,338,212	1,517,918
Sand and Gravel	Tons. 7,157,279	1,908,773
Sand-lime brick	No. 12,432,990	143,393
Slate	Sq. 1,422	7,789
Stone:—\$3,221,422		
Granite		613,588
Limestone		2,291,692
Marble		55,820
Sandstone		260,322
Total structural materials and clay products....		19,102,571
All other Non-metallic		67,249,514
Total value Metallic		106,630,752

Grand Total, 1917

* Tons of 2,000 lbs.
(a) Shipments by mine operators. The final shipments of ores and concentrates (including customs mill shipments) were 23,327 short tons valued at \$572,115 and containing 3,465 tons of Cr₂O₃.

(b) Owing to delay in receipt of returns, the value of the production of barytes and the value of part of the production of asbestos is not included in the total value.

Gold.

The total production of gold in placer and mill bullion and in smelter production in 1917, is estimated at 747,366 fine ounces valued at \$15,449,426 as compared with 930,492 fine ounces valued at \$19,234,976 in 1917, a decrease of \$3,785,550, or 19.68 per cent. This has been the lowest since 1912 when the new Porcupine field caused a considerable increase in Canada's production of gold.

The 1916 production had been the largest since 1902 when the Yukon output began to decline. The maximum production recorded was \$27,908,153 in 1900 and the lowest since that year was \$8,382,780 in 1907.

Of the total production in 1917, \$4,199,563, or 27.5

per cent. were derived from placer and alluvial mining; \$9,433,033, or 61.0 per cent. in bullion and refined gold; and \$1,816,827 or 11.5 per cent. contained in matte, blister copper, residues and ores exported.

The production in Nova Scotia was only \$45,478 in 1917, about equal to that of 1913, which was the lowest ever recorded and showed a decrease of over 51 per cent. from that of 1916. The decrease is mostly attributed to the great increase in cost for labour and material.

The production in Quebec is made partly from the pyrites ores of the Eastern Townships and partly from the zinc-lead ores of Notre Dame des Ange, Portneuf county. Much of this gold is not paid for by the smelters.

The Ontario production of gold was \$8,916,113 being about 58 per cent. of the total production for Canada and though it shows a decrease of 12 per cent. from that of 1916, it was the second highest ever recorded.

The production from Manitoba \$9,137 though small, points to the possibility of this province becoming an important producer. The gold was derived from the gold and copper ores of Herb and Schist lakes of the new Pas mining division in northern Manitoba.

The production in British Columbia in 1917 was \$2,776,558, a decrease of nearly 39 per cent. which was due not only to the high cost of supplies but also in part to labour troubles in that province and the closing down for several months of the Rossland mines which contribute largely to the output of gold.

The production from the Yukon Territory amounted to \$3,671,008, or a decrease of over 16 per cent., and included in addition to the alluvial gold, a small recovery from the gold and copper ores of the Whitehorse district and the gold-silver-lead ore of the Mayo district.

The exports of gold bullion, gold bearing dust, nuggets, gold in ore, etc., in 1917 are reported by the Customs Department as \$15,929,051.

Lead.

The earlier estimates of the production of lead in 1917 included the recoveries of considerable quantities of lead from imported ores. The total production in 1917 of lead in bullion credited to Canadian mines together with the lead estimated as recoverable from ores exported was 32,072,269 pounds, which, at the average price of lead in Montreal, 11.137 cents per pound, would be worth \$3,571,889. The corresponding production in 1916 was 41,497,615 pounds, valued at \$3,532,692, an average price of 8.513 cents. The decrease in quantity was 9,425,346 pounds, or 22.7 per cent., but on account of the higher price there was a slight increase in total value.

There is such a divergence between the records of lead contents of ores and concentrates shipped and recoveries at smelters from domestic and imported ores that the following records are presented for comparison:

	1916	1917
	Pounds	Pounds
(1) Production: Smelter recoveries from Canadian ore and recoverable lead in ore exported	41,497,615	32,072,269
(2) Lead contents of ores and concentrates shipped from mines in Canada	54,124,628	37,624,567
(3) Total production of lead bullion in Canada (including lead from imported ores) ..	43,100,236	41,427,304

The 1917 production included 30,077,230 pounds of lead in bullion of which a large portion was electrolytically refined and 1,995,039 pounds recoverable from ores exported. The lead bullion was produced chiefly at Trail with small contributions from smelters at Kingston and Galetta, Ont. (The total production of the smelters, including lead from imported ores, was, as noted above, 41,427,304 pounds.) The lead ores exported were derived from Notre Dame Des Ange, Que., the Surprise mine, Slocan, B.C., and the Silver King mine at Mayo, Yukon.

The total mine shipments of lead ores and concentrates was about 58,801 tons containing 37,624,567 pounds of lead as compared with shipments in 1916 of 84,516 tons containing 54,124,628 pounds of lead.

The exports of lead in 1917 were lead contained in ore concentrates, bullion, etc., 13,410,400 pounds valued at \$925,056. Exports in 1916 were: Lead in ore, etc., 9,048,400 pounds valued at \$558,180 and pig lead 112,100 pounds valued at \$7,710.

The average price of lead in January was 9.50 cents per pound advancing to a maximum of 14.62 cents in June, and falling again to 7.92 in November, and 7.96 in December, the average for the year being 11.137 cents. This is the producer's price for lead in car lots as per quotations furnished by Messrs. Robertson and Company.

Nickel.

The production of nickel in 1917 has, as usual, been derived from the ores of the Sudbury district, supplemented by the recovery of a small quantity of metallic nickel, nickel oxide and other nickel salts as by-products in the treatment of ores from the silver-cobalt-nickel ores of the Cobalt district.

The total production was 84,470,970 pounds worth at 40 cents per pound \$33,778,388, compared with 82,958,564 pounds valued at \$29,035,497, or 35 cents per pound in 1916.

Sudbury District: The total production of nickel-copper matte at the smelter of the Canadian Copper Company and the Mond Nickel Company in the Sudbury District was 78,897 tons containing 83,773,319 pounds of nickel and 42,392,588 pounds of copper, the average percentage of the combined metals in the matte being about 80—the tonnage of ore smelted (part being previously roasted) was 1,453,661 tons which, as usual, included a small tonnage from the Alexo mine in the Timiskaming District. The production in 1916 was 80,011 tons of matte derived from 1,521,689 tons of nickel copper ores smelted, the matte containing 82,596,862 pounds of nickel and 44,859,321 pounds of copper.

The refinery under construction at Port Colborne, Ont., by the International Nickel Company had not been completed at the close of the year. The British American Nickel Corporation continued the development of its nickel properties, particularly at the Murray mine, and work was begun on the first unit of the smelter a mile distant from the Murray mine. It is expected that construction work on the refinery will be begun early in 1918.

Nickel was recovered as a by-product in smelters at Deloro, Thorold and Welland, from the silver-cobalt-nickel ores of the Cobalt district. Complete returns have not yet been received, but the total nickel contents of nickel oxide, nickel sulphate and metallic nickel produced have been estimated at about 697,000 pounds.

The products recovered in 1916 included 79,360 pounds of metallic nickel; 323,418 pounds of nickel oxide and 232,450 pounds of nickel sulphate having a total reported value of \$132,896 and containing 361,701 pounds of nickel metal.

The exports of nickel in ore matte or other form are reported by the Customs Department as 81,272,400 pounds valued at \$8,708,650.

The imports of nickel into the United States during the eleven months ending November, 1917, which included small quantities from other sources as well as from Canada, are recorded as 69,265,880 pounds contained in ore, matte, or other form valued at \$8,869,824, or an average of 12.81 cents per pound. The exports of nickel and nickel oxide, etc., during the same period, were 21,430,306 pounds valued at \$8,702,727 or an average of 40.61 cents per pound of which about 66 per cent. were consigned to Great Britain and 30 per cent. to Italy and France.

The values per pound of these exports to different countries ranged from 38.5 cents to 48.6 cents per pound. The average value per pound of exports in 1916 was 38.775 cents the range being from 37.13 cents to 45.21 cents. The average export value in 1914 was 34.26 cents.

The price of refined nickel in New York according to quotations published by the Engineering and Mining Journal continued at from 45 to 50 cents per pound for ordinary forms with 5 cents more per pound asked for electrolytic nickel, until March 7 from which date the quotation was from 50 to 55 cents.

Silver.

The production of silver in 1917 was 22,150,680 ounces valued at \$18,034,419 as against 25,459,741 ounces, valued at \$16,717,121 in 1916, a decrease



CAPTAIN O. E. LEROY

(Killed in action)

of 13.0 per cent. in quantity, but an increase of 7.9 per cent. in value.

The high value of the production in 1917 was exceeded only in 1912 and 1913, when the Cobalt camp was at the maximum of its output.

The production in Ontario amounted to 19,254,616 ounces valued at \$15,676,531, or 87.0 per cent. of the total production for Canada. In 1911, the year of its maximum production, the percentage was 93.8. The production was from the ores of Cobalt and adjoining silver camps, with the exception of 80,863 ounces, the output of the gold and copper mines.

Of the Cobalt district, production amounting to 19,173,753 ounces, 85.3 per cent, or 16,363,605 ounces were recovered in smelters and reduction works in Canada, and the balance 14.7 per cent., or 2,810,148 ounces were exported for smelting. Of the bullion produced in Ontario 9,929,326 ounces, or 60.7 per cent. was recovered in the mills of Cobalt and 6,434,279, or 39.3 per cent. recovered in southern Ontario smelters.

The production in Quebec was 217,191 ounces valued at \$176,830, as against 98,610 ounces valued at \$64,748 in 1916, and is derived from the pyritic ores of the Eastern Townships and the zinc-lead ores of Notre Dame des Ange, Portneuf county.

In British Columbia the production was 2,580,521 ounces valued at \$2,100,983 as against 3,392,872 ounces valued at \$2,227,794 in 1916, showing a decrease in quantity of over 23.0 per cent. and in value of 5.7 per cent. This production includes refined silver, silver contained in smelter products and estimated recoveries from ores exported.

The Yukon production amounted to 90,772 ounces valued at \$73,904 as against 360,101 ounces valued at \$236,446 in 1916, and included the silver derived from the placer operations with also a certain amount recovered from the gold and copper ores of Whitehorse and the silver-lead ores shipped from Mayo.

The exports of silver bullion and silver in ore, etc., as reported by the Customs Department were 21,718,784 ounces valued at \$17,621,398 as against exports in 1916 of 25,279,359 ounces valued at \$15,637,885.

The monthly average price of silver varied between a minimum of 73.861 cents per ounce in March and a maximum of 100.740 cents in September, averaging for the year 81.417 cents as compared with an average of 65.661 cents in 1916.

Zinc.

During the past two years there has been a recovery of refined zinc in Canada at the zinc refinery erected by the Consolidated Mining & Smelting Company at Trail, B.C. Prior to 1916 all zinc ore mined in Canada was exported for smelting and refining. The establishment of the Trail plant has resulted in the mining and treatment of a much larger tonnage of zinc ores and a portion of the present production is still being exported for treatment.

The total recovery during 1917 in Canada of refined zinc together with the zinc contained in ores exported (less 20 per cent. allowed for smelter losses) amounted in 1917 to 31,227,351 pounds, which, at the average price of spelter in New York, 8.901 cents per pound, would have a total value of \$2,779,547. The corresponding production in 1916 was 23,364,760 pounds, valued at \$2,991,623, or an average of 12.804 cents per pound.

Quebec, in 1917, is credited with 1,161,062 pounds, and British Columbia with 30,066,289 pounds. In 1916 the Quebec production was 1,663,200 pounds and British Columbia 21,701,560 pounds.

The total zinc ore shipments from mines in 1917 were about 116,660 tons containing, without any deduction whatever 61,920,149 pounds of zinc. The total ore shipments in 1916 were 82,077 tons containing 48,498,078 pounds of zinc.

Iron Ore.

The total shipments of iron ores from Canadian mines during 1917 were 215,242 short tons valued at \$758,261, as compared with shipments of 275,176 tons valued at \$715,107, in 1916. The 1917 shipments included 198,092 tons from mines in Ontario and 17,150 tons from mines in Quebec, and of the latter amount a considerable tonnage was from old stock piles. The ores comprised 197,602 tons of hematite and roasted hematite and siderite, 12,664 tons of magnetite and 4,978 tons of titaniferous ores.

The principal operating properties were the Helen and Magpie mines of the Algoma Steel Corporation, all of the ores mined being first roasted before shipment. The Moose Mountain Company continued development and experimental work in concentration and briquetting but made only small shipments.

In Quebec shipments of ilmenite were made from Ivry-on-the-Lake in Terrebonne county and of titaniferous ore from St. Urbain on the north shore of the St. Lawrence. Shipments of magnetite were also made from stock piles at the Bristol mine in Pontiac county and a small tonnage from Ironsides, in Hull township.

In the Great Lakes area the ore prices for 1917 were: Old Range Bessemer \$5.95 per gross ton: Messabi Bessemer \$5.75; Old Range Non-Bessemer \$5.20 and Messabi Non-Bessemer \$5.05—an increase of \$1.50 over the 1916 prices. The same quotations have been continued into 1918.

Mine operators reported 169,192 tons of ore exported to the United States and 46,050 tons shipped to Canadian furnaces.

The Customs Department shows exports of iron ores 164,004 tons valued at \$660,673 and imports amounting to 2,251,397 tons valued at \$5,124,889.

The total quantity of iron ore charged to blast furnaces in 1917 was 2,176,296 tons of which 92,065 tons were of domestic origin and 2,084,231 tons imported. The imported ore included 874,134 tons of Newfoundland ore and 1,210,097 tons of "Lake ore."

Shipments of iron ore from Wabana mines, Newfoundland, in 1917 by the two Canadian companies operating there were 883,346 short tons, as against 1,012,060 tons in 1916, all of which went to Sydney and North Sydney in Cape Breton.

Pig Iron.

The production of pig iron in blast furnaces during 1917 was supplemented by a small production of high grade low phosphorous pig iron in electric furnaces made from shell turnings and other steel scrap. The total production from both sources (not including the output of spiegeleisen, or other ferro-alloys) was approximately 1,171,789 short tons (1,046,240 gross), final returns not yet having been received from all manufacturers of electric pig iron. Of the total, 1,156,789 tons were produced in blast furnaces and the balance in electric furnaces. In 1916 the production all made in blast furnaces was 1,169,257 short tons (1,043,979 long tons).

The small increase in pig iron production in 1917 was therefore due entirely to the electric furnace production, there having been an actual falling off in the blast furnace output.

The production in Nova Scotia in 1917 was 472,147 tons as against 470,055 tons in 1916. In Ontario the production by blast furnaces in 1917 was 691,632 tons as against 699,202 tons in 1916.

By grades the 1917 production included: Basic 14,092 tons; Bessemer 961,656 tons; Foundry and malleable, etc., 181,041 tons; electric furnace pig (subject to revision), 15,000 tons. The 1916 production included: Basic 953,627 tons; Bessemer 31,388 tons; foundry and malleable, etc., 184,242 tons.

The blast furnace plants operated were the same as in the previous year, viz.: the Dominion Iron & Steel Company at Sydney, N.S., the Nova Scotia Steel & Coal Company, at North Sydney; The Standard Iron Company at Deseronto, Ont., The Steel Company of Canada, at Hamilton, Ont., The Canadian Furnace Company, at Port Colborne, Ont., and the Algoma Steel Corporation, at Sault Ste. Marie, Ont.

Pig iron was made in electric furnaces by: The Canada Cement Company, Ltd., Montréal; Fraser, Brace & Company, Ltd., Shawinigan Falls, Que.; British Forgings, Ltd., Toronto, Ont.; Electro Foundries, Ltd., Orillia, Ont., and Turnbull Electro Metals, Ltd., St. Catharines, Ont.

The total production in electric furnaces of pig iron, ferro-alloys and steel ingots and castings was in 1917 about 99,000 short tons.

The production of ferro-alloys in Canada in 1917, chiefly ferro-silicon but including also spiegeleisen, ferro-molybdenum and ferro-phosphorous, all with the exception of the spiegeleisen being made in electric furnaces, reached a total of 40,341 tons valued at \$3,408,906, as against a total in 1916 of 28,628 tons valued at \$1,777,615.

The exports during 1917 of pig iron were 12,081 tons, valued at \$423,814, or an average of \$35.08 per ton and of ferro-alloys 33,212 tons valued at \$2,616,924, or an average of \$78.79 per ton.

The imports during 1917 included 82,758 tons of pig iron valued at \$2,744,055, or an average of \$33.16 per ton; 632 tons of charcoal pig iron valued at \$19,447, or an average of \$30.77 per ton, and 12,828 tons of ferro-alloys valued at \$2,029,990, or an average of \$158.25 per ton, making a total import of pig iron and ferro-alloys of 96,218 tons valued at \$4,793,492. The United States trade records show exports to Canada during the eleven months ending November, 1917, of pig iron and ferro-alloys amounting to 130,087 gross tons (145,697 short tons) valued at \$5,170,005, a figure considerably higher than the Canadian record.

Steel.

The estimated production of steel ingots and direct steel castings in 1917, final returns for all operations not yet having been received, was 1,736,514 short tons, (1,550,459 gross tons) of which 1,690,170 tons were ingots and 46,344 tons direct steel castings.

The total production in 1916 was 1,428,249 tons compared with which the 1917 production shows an increase of 308,265 tons, or 21.6 per cent.

The total production of electric steel in 1917 was probably not less than 50,000 tons as against 19,639 tons in 1916 and 5,625 tons in 1915.

The exports of steel ingots, or billets, ingots and blooms, during the nine months ending December (such exports not being separately classified previous to April, 1917) were 41,558 tons valued at \$1,831,917. The recorded imports of iron and steel ingots and billets during the year was 20,429 tons valued at \$1,378,576. This item is also much lower than the United States trade

record which shows exports to Canada during eleven months ending December of 143,209 gross tons (160,394 short tons) of billets, ingots and blooms of steel valued at \$11,418,033.

Asbestos.

The production of asbestos continues to increase under the stimulation of war demand. The product has been marketed at much higher prices and the total sales show a substantial increase. Stocks on hand at the end of 1917 were slightly in excess of those reported at the end of 1916.

In addition to the production in the Province of Quebec which is derived from the asbestos areas at Black Lake, Thetford, Robertsonville, East Broughton and Danville, there is also included in the record of production, as given herewith, a small output of crude asbestos amounting to 10 tons valued at \$2,150 produced and shipped from the Porcupine District in the Province of Ontario. These Ontario operations have been discontinued for the present but indicate the possibilities of sources of supply other than the well known areas in Quebec.

Exports of asbestos during the calendar year 1917 were 93,932 tons, valued at \$4,903,326, or an average of \$52.20 per ton and asbestos sand and waste 52,088 tons valued at \$430,956; or an average of \$8.27 per ton. There was also an export of manufactures of asbestos valued at \$55,666.



Lieut. W. M. Goodwin, M.C.

The exports in 1916 were 96,775 tons of asbestos valued at \$3,872,463, or an average of \$40.01 per ton and asbestos sand and waste 33,564 tons valued at \$241,272, or an average of \$7.18 per ton; also manufactures of asbestos valued at \$4,741.

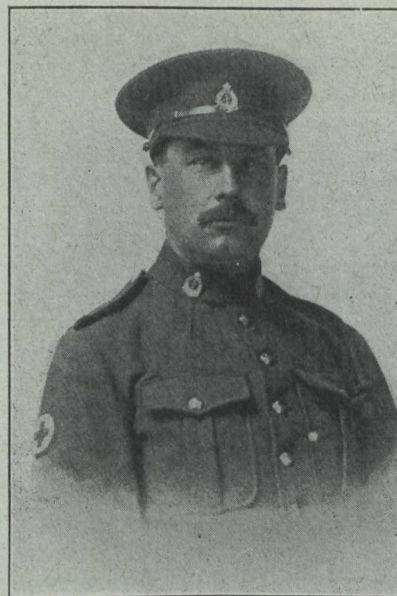
Chromite.

The total shipments of ores and concentrates by mine operators was 36,352 tons valued at \$490,001 containing approximately 8,626 tons, or an average of about 23.7 per cent., Cr_2O_3 . A portion of these shipments was made to the Customs mill at Lakeside, Black Lake, operated by the Mutual Chemical Company and the final shipments from the District of ores and concentrates was 23,327 short tons valued at \$572,115, and containing approximately 8,465 tons of Cr_2O_3 , or an average of 36 per cent.

Most of the concentrates shipped averaged 50 per cent. Cr_2O_3 , while a large percentage of the ore shipments averaged about 32 per cent.

The production was, as usual, obtained from the Eastern Townships of Quebec, chiefly at Black Lake and Thetford, with an important contribution from the new area at St. Cyr in the township of Cleveland, Richmond county.

The mine operators' shipments in 1916 were 27,517 tons, valued at \$311,460, and containing approximately 6,759 tons, or an average of 24.5 per cent. Cr_2O_3 .



Lieut. Isidore Duchesne Drake-Daimpre.

Of this amount, 14,242 tons were sold to a customs concentrator, and the final shipments of ores and concentrates during the year was 14,321 tons.

The exports of chromite as reported by the Customs Department were 19,229 tons valued at \$342,528 as against 12,633 tons valued at \$152,534 exported in 1916.

Coal and Coke.

Coal:—The total production of marketable coal during 1917 (comprising sales and shipments, colliery consumption and coal used in making coke or used otherwise by colliery operators) was less than the 1916 production by 467,807 tons, or 3.2 per cent. in quantity, but greater in total value by \$8,826,165, or 22.7 per cent.

Production, imports and exports and consumption during 1916 and 1917 were as follows:

	1916.		1917.	
	Short tons.	Value.	Short tons.	Value.
Production ...	14,483,395	\$38,817,481	14,015,588	\$47,643,646
Exports	2,135,359	7,099,387	1,733,156	7,387,192
Imports	17,580,603	38,289,666	20,857,460	70,562,357
Consumption .	29,928,139	.....	33,139,892	.....

The exports fell off by 402,203 tons, or 18.8 per cent., the imports were increased by 3,276,857 tons, or 18.6 per cent., the apparent consumption increased by 3,211,253 tons, or 10.7 per cent.

The total output of coal, including waste and unmarketable slack was, in 1917, 14,411,011 tons, as against 14,815,703 tons in 1916.

The 1917 production included 108,225 tons of anthracite, all from one mine in Alberta; 11,135,095 tons of bituminous coal, and 2,772,268 tons of lignite coal.

The provinces of New Brunswick, Saskatchewan, Alberta, and the Yukon made greater production of coal during 1917, and with the exception of the Yukon, show the highest annual production on record. The total increases in these provinces was 284,781 tons. The total decrease in Nova Scotia and British Columbia was 752,588 tons, leaving a net decrease as already shown.

The Nova Scotia production fell off 587,456 tons, or 8.5 per cent., as compared with 1916: New Brunswick increased 45,120 tons, or 31.4 per cent.; Saskatchewan increased 74,004 tons, or 26.3 per cent.; Alberta increased 164,085 tons, or 3.6 per cent., notwithstanding the serious loss of output due to strikes; the British



Capt. Stuart M. Thorne.



Capt. George C. Riley, 6th Howitzer Brigade.
Formerly Secretary of the Montreal Branch, C.M.I.

Columbia production fell off 165,132 tons, or 6.4 per cent.; the Yukon production, though small, shows a large percentage increase.

The total imports in 1917 included 15,537,262 tons of bituminous coal, valued at \$42,452,771, or an average of \$2.72 per ton, as against 13,009,788 tons valued at \$17,073,303, or an average of \$1.24 in 1916, showing an increase in 1917 of 2,527,474 tons, or 19.4 per cent.; and 5,320,198 tons of anthracite, valued at \$28,109,586, or an average of \$5.28 per ton, as against 4,570,815 tons, valued at \$22,216,363, or an average of \$4.86 in 1916, an increase in 1917 of 749,383 tons, or 14.1 per cent.

WALLINGFORD MICA AND MINING CO.

Mr. E. Wallingford, manager of the Wallingford Mica and Mining Co., Ltd., operating mica mines at Perkins' Mills, Quebec, reports an excellent demand for mica and great activity at the company's mines. At the old Wallingford mine, a four-drill compressor was installed and over 100 tons of culled mica produced in 15 months of 1916 and 1917. Crosscutting was carried on at the same time in the old pit at 180 ft. depth to lodes, one of which is rich in very fine soft amber mica.

Development work was also carried on successfully at the Rainville, or Wallingford No. 2 mine, which is on the east half of lot 15, Range 8, North Templeton. Nine veins were found, and one of these deposits now being worked yields very large mica. Mr. Wallingford reports that one crystal, 5 ft. 4 in. in diameter, yielded over 3 tons of mica of the amber variety.

The company has about 20 men employed in the mines, and 30 to 40 cullers. Twice as many men would be used if they could be obtained. Much of the mica is used for war purposes.

Mr. W. E. Simpson, of Cobalt, has arranged to periodically visit the Kaladar district as consulting engineer for the Cobalt-Frontenac Mining Co.

Sir Boverton Redwood, Bart., Director of Petroleum Research for Great Britain, has been appointed by the Government Director of Technical Investigations, in the recently-created Petroleum Executive, with a view to his dealing with technical questions of the highest importance, including the co-ordination of the work of petroleum production and that of petroleum research.

Mr. Ross H. McMaster, assistant general manager of the Steel Company of Canada, has left for Washington, where he will act on the new Canadian War Mission Board, of which Lloyd Harris, of Brantford, is the chairman.

The late W. H. Brethour, who recently lost his life by being frozen when on the Atlin trail, near Carcross, was born in North Saanich, Vancouver Island, B.C., on March 31, 1879. On the outbreak of the South African war he offered his services to the country, and went with the First Canadian Contingent to the seat of hostilities, where he remained until six months after the declaration of peace.

On returning home he took up the study of mining engineering, putting himself through the University of California. His professional career started with the Douglas Island mines, in Alaska, which concern he was with until he transferred his connections to the Guggenheims, at Atlin. Three years ago he was sent to South America by a French mining company for the winter months to report on gold finds at the headwaters of the Amazon, after which he returned to the Yukon and continued work on the placer gold claims of the Company on Otter Creek, in Atlin mining division of British Columbia. After years of hard work on construction he completed his task and had just finished a successful mining season when he was so suddenly called away.

The deceased was a son of Mr. John Brethour, of Sidney, and was well known on the whole of the peninsula.



Lt.-Col. J. E. Leckie, D.S.O.

Molybdenite Deposits of Quyon District, Quebec

By M. E. Wilson.

The numerous uses to which molybdenum and its compounds and alloys are now being applied, especially in the manufacture of certain special types of steel in much demand for military purposes, and the consequent high price paid in some countries, has brought about during the war a widespread search for molybdenite, the principal ore of molybdenum. As a result numerous occurrences of this mineral have been found in various parts of Canada and notably in the Ottawa Valley to the north and west of Ottawa. Of these discoveries, probably the most important is that occurring on lots 9 and 10 in the 10th Range of Onslow Township, 3 miles north of the village of Quyon. From this property approximately 300,000 lbs. (estimated) of molybdenite concentrates has been produced in less than two years' operation.

The presence of a knob of molybdenite-bearing rock in the rear of the farm buildings on the farm of Mr. Robert Steel, lot 9, Range VII, Onslow township, had been known to the inhabitants of the district for many years; but it was not until 1915 that attention was directed to the occurrence. In the autumn of that year Messrs. Arch. MacLean and Authur Latimer procured an option on the property and the following March sold their option to Messrs Harvey Fitzsimmons of Ottawa and Henry Wood of Denver, Colorado, who formed the Canadian-Woods Molybdenite Company to purchase and operate the property.

The newly organized company immediately began shipping ore to the concentrating plant of Henry Wood, in Denver, and to the ore dressing laboratory of the Department of Mines in Ottawa. A few car loads of ore were also shipped to the plant of the International Molybdenite Company at Renfrew, Ontario. Later, in 1916, a mill having a capacity of approximately 50 tons per day was built on the property and a second concentrating plant was secured by installing Wood's flotation machines in the plant of the Canada Cement Company at Hull, Quebec.

Early in 1917 Mr. C. A. Foster, of Haileybury, Ont., procured an option on the mine from the Canadian-Woods Molybdenite Company and later purchased the property on behalf of an American syndicate operating under the title Dominion Molybdenite Company. During the summer of 1917 this company car-

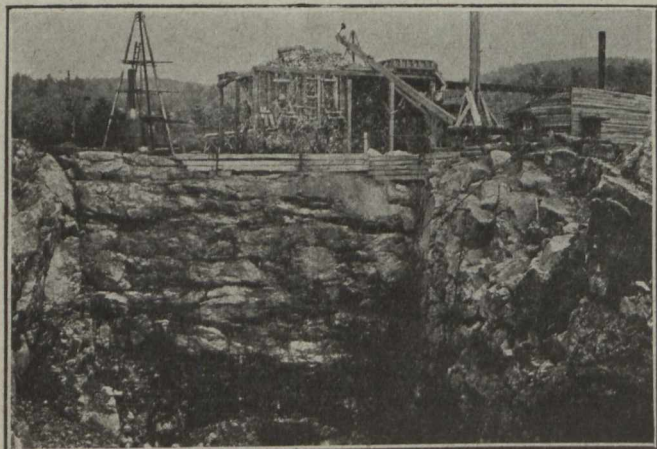
ried on extensive diamond drilling operations to determine the extent of the deposits and enlarged the capacity of the mill to 200 tons per day. In the new mill, the Callow system of concentration was installed in place of the Wood flotation machines.

Geological Relationships of Quyon Molybdenite Deposits.

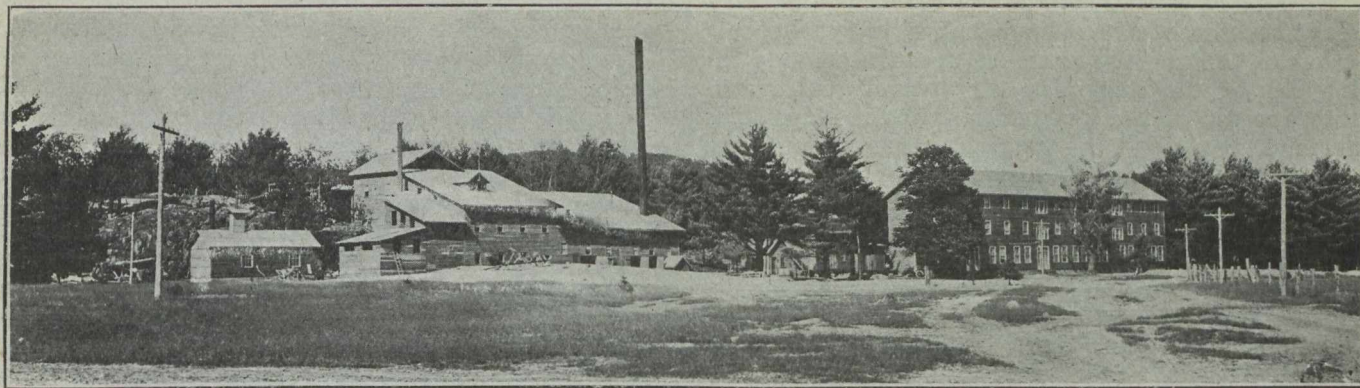
The Quyon district lies on the southern border of the Laurentian highlands, which occupy the greater part of north eastern Canada, and in common with the greater part of this great upland is underlain, for the most part, by those ancient Pre-Cambrian formations which, because of their highly deformed or otherwise metamorphosed condition are commonly grouped together as the "basal complex." The detailed succession of formations within this complex as represented in eastern Ontario and the southern Laurentians of Quebec has not yet been completely worked out; but the results of investigations in scattered localities seem to indicate that four principal groups of rock are represented as follows: (1) A group of recrystallized marine sediments known as the Grenville series. (2) A group of igneous pyroxenic rocks, gabbro, anorthosite, pyroxene, syenite, etc., intrusive into the Grenville series. (3) Batholithic masses of granite and syenite intrusive into the rocks of groups 1 and 2, and (4) Masses of diopside, scapolite and other lime-silicate minerals (pyroxenite), formed by the contact action of rocks of groups 2 and 3 on the limestone member of the Grenville series. It is the third of these groups that is of special interest in this connection since it is with these rocks that the Quyon molybdenite deposits are associated.

In the region northwest of Ottawa the border of the Laurentian highlands is marked by a steep, rocky, northwesterly trending escarpment, several hundred feet in height, which rises in striking contrast with the flat, clay-covered lowland to the southward. This remarkable topographic feature parallels the north shore of the Ottawa River as far as the western part of the township of Onslow, where it terminates abruptly, giving place to the more characteristic, poorly defined highland border consisting of rocky knobs protruding through clay flats.

At the western termination of this escarpment in the 7th Range of Onslow township a stock-like mass of fine, pink quartz-syenite, in which numerous masses of an older coarse porphyritic syenite are included, is exposed throughout an area approximately one mile wide from north to south and two miles long from east to west. The larger part of this mass lies in the upland above the escarpment; but two outliers outcrop in the lowland below. Within this pink syenite and in the adjacent intruded rocks, molybdenite occurs in thin seams, in small aggregates and disseminated in masses of siliceous, pyritic rock which have apparently segregated from the syenite. Five deposits of this segregated type in all have been discovered: three in a low ridge protruding through a sandy, wooded flat at the north end of lots 9 and 10, Range VII, Onslow, and two on the slope of the main syenite mass which forms a part of the Laurentian escarpment, a few hundred yards to the northeastward. Most of these



Main Pit, Dominion Molybdenite Mine, July, 1917.



Concentrating Mill, Dominion Molybdenite Co., Quyon, Quebec.

occurrences are too limited in extent to be of commercial importance. It is the main segregated mass, outcropping in the low eastward tending ridge at the south end of lots 9 and 10, from which most of the molybdenite produced from the property of the Dominion Molybdenite Company has been mined.

Character of the Quyon Molybdenite Deposits.

The molybdenite deposits of the segregated type are irregular, poorly-defined masses, generally elongated in a north-northeasterly direction. They are known as deposits number 1 to 5 in the order of their importance. The number 1 deposit is exposed on the faces and bottom of the number 1 pit, and is approximately 50 ft. wide and 200 ft. long. The number 2 deposit outcrops on the hill slope at the north end of lot 9 and is approximately 150 ft. long and from 5 to 25 ft. wide. Deposits number 3 and 4 are smaller masses, 15 and 4 ft. in width respectively, outcropping on lot 9 to the northwest of the main pit. Deposit number 5 is a small, irregular mass 10 ft. in diameter exposed near the bottom of the Laurentian escarpment on lot 11, Range VII, in Onslow township.

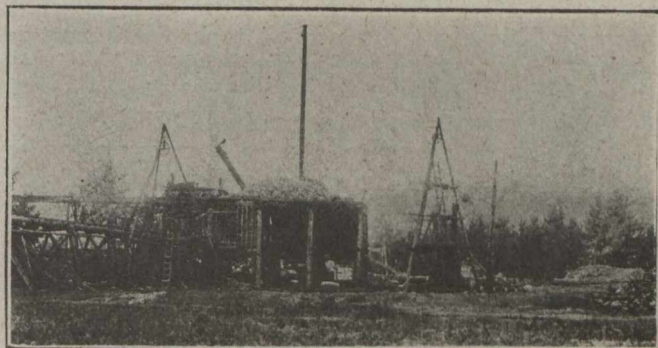
The ore consists for the most part of granular quartz and feldspar—chiefly microcline—in which pyrite, pyrrhotite, fluorite and molybdenite occur, partly in disseminated form and partly in aggregates up to several feet in diameter. In places within the deposits, crystals of a dark green pyroxene, some of which are radially disposed, are abundantly developed. At a few points coarse aggregates of a black biotite were observed. Where masses of pyrite occur in the rock, the pyrite cubes very commonly assume a peculiar net-like distribution, the interspaces of the net being filled with quartz, magnetite and limonite. The molybdenite and other sulphides disseminated in the lean ore are very commonly distributed in linear zones parallel to the longer direction of the deposit so that the rock exhibits a banded structure. It is obvious that the proportion of molybdenite in deposits of such irregularity varies greatly in different parts of each ore mass and that it is not possible to definitely estimate the percentage of molybdenite contained in an orebody from the proportions recovered from the parts of the deposit already mined. It is probable, however, that at the time the writer made his examination of the deposits, the average molybdenite content of the ore exposed on the bottom of the No. 1 pit did not exceed three-quarters of one per cent., and that the average contained in the exposed surface of the No. 2 deposit was probably less than one-half per cent.

Origin of Quyon Molybdenite Deposits.

It has been suggested* that the Quyon molybdenite

deposits possibly represent metamorphosed and mineralized blocks of Grenville limestone included in the Onslow syenite mass, an hypothesis that might be inferred from the presence of pyroxene and fluorite, two common mineral constituents of contact metamorphic deposits. However, the pyroxene contained in the molybdenite deposits is an iron-magnesium variety such as commonly occurs in igneous rocks and not the lime variety common in metamorphic deposits. Furthermore, since the feldspar present is largely microcline, it is probable that the lime content of the molybdenite ore deposits, taken as a whole, is limited largely to the fluorite and is not greatly in excess of that contained in most igneous rocks of the syenite class. On the other hand, the similarity in the mineralogical composition of the ore rock to the quartz syenite enclosing the deposits; the complete gradations from the quartz syenite into ore rock which occur everywhere along the margins of the ore deposits; and the presence of small aggregates of quartz, fluorite and molybdenite—miniature ore deposits—at numerous points within the syenite, would seem to indicate that the material contained in the ore deposits had originally formed a part of the syenite mass and had segregated together into the ore masses.

Why the material aggregates composing the ore deposits accumulated at certain points is not at all apparent. The syenitic wall rock of most of the deposits contains inclusions of the older porphyritic syenite, and it is possible that the presence of these masses may have been a factor in the precipitation of the ore material; but inclusions of the older syenite are so common in the Onslow mass that it is also possible that their association with the ore deposits is wholly accidental. The ridge in which the main orebody is situated at its western end is composed of the pink quartz syenite. At its eastern end, on the other



Diamond drills in operation on Dominion Molybdenite property

*Camsell, C. Sum. Rep. Geo. Surv., 1916, p. 207.

hand, it consists of the older porphyritic syenite cut by dikes of the quartz-syenite, so that the orebody in reality lies on the margin of the area of continuous syenite exposed in the western part of the ridge and what might represent a marginal segregation from this mass. The border of this area of continuous syenite in other directions, however, is buried beneath the sandy flat surrounding the ridge, and whether or not similar relationships hold at other points on the border of the mass cannot be determined. As far as the writer was able to observe, therefore, all that can be concluded with regard to the factors determining the development of the ore masses at certain points is that it is possible that in part, at least, their development was controlled by the contact relationships of the Onslow syenite with the older porphyritic syenite which it intrudes.

SHAWINIGAN COMPANIES HAVE SUCCESSFUL YEAR.

The rapid development of the Shawinigan Water and Power Company is again demonstrated by the report for the year ending December last, presented to shareholders at the annual meeting. Gross earnings for the year amounted to \$2,902,210, compared with \$2,325,872 for 1916, an increase of \$576,338, or 25 per cent. Operating expenses, maintenance, and taxes amounted to \$752,842, leaving \$2,149,367, from which was deducted fixed charges totalling \$698,503, and depreciation reserve of \$100,000, leaving the net profits for the year at \$1,350,864.

President J. E. Aldred, in his report, said in part:

"A new works has been constructed at Shawinigan Falls by the Canadian Aloxite Company, Limited, a subsidiary of the Carborundum Company of America. This plant will require about 12,000 horse-power, will employ a large number of hands, and is an important addition to the industries at Shawinigan Falls. The works are now substantially completed, and the installation of equipment is going on. It is expected that within a short time the plant will be in full operation.

"The Canada Carbide Company has enjoyed the best year in its existence, not only in respect of output, but also as regards the financial result. In spite of the largely increased cost of manufacture, due to the increased cost of raw materials, the company has been able to attain satisfactory results. Its output is now at the highest point in the history of the company, and it is anticipated that the next year will prove to be even more successful than 1917.

"Closely allied with the Canada Carbide Company, is the Canadian Electrode Company, which manufactures carbon electrodes, largely for use in the Carbide furnaces. This plant has proved to be an important factor in the operation at Shawinigan, and has in its turn made a satisfactory result, not only in output of product, but in profit on that product. The Canadian Electro Products Company is also now operating on a satisfactory basis. Various accidents and delays occurred in attaining results, and for some time the plant was operating under serious handicaps. A new contract, however, has been made with the Imperial Munitions Board, extending the operation of the plant throughout 1918. This contract has been made under such terms and conditions that the results will prove very advantageous to the company.

"There has developed, during the past year, a situation in the electric power business, which has become

especially favorable to all water-power enterprises. The coal situation in the United States has become uncertain; large industries are shut down for want of coal; public service enterprises driven by steam, have been obliged to reduce their output on account of the scarcity of coal. It is obvious that the effect of this condition will be lasting and manufacturer's using electricity will so far as possible prefer to obtain it from reliable waterpowers. In general, it may be stated as regards hydro-electric development, that time is on its side, and the future cannot fail to be advantageous to it.

"The policy of your company has been to develop industries in the Province of Quebec, and particularly in the valley of the St. Maurice River, looking forward to intense industrial activity in this section of the country, based on the favorable natural conditions which exist in this section.

"While a great amount of power is being used in the manufacture of chemicals, aluminum and other commodities now being used for war purposes, it should be noted that in almost every instance these works were in full operation previous to the war, and will doubtless be in full operation after the war as well."

Mr. J. G. Dickenson, general manager of the O'Brien Mine, Cobalt, and the Miller Lake-O'Brien Mine, Gowganda, has returned to Cobalt after a six weeks' trip of inspection of the O'Brien Company's properties in Arizona, California and New Mexico.

Mr. C. J. Girvin, of Denver, Colorado, was in Toronto last week, and is now visiting Northern Ontario mining districts.



Major Neil R. Macdonald (by his intimates and friends affectionately termed "Fog-horn"), of the "Black Devils," 8th Canadian Infantry Battalion.

The Magnesite Industry of Quebec

By Howells Frechette, M.Sc.

In the table of output of twenty-three products of the mines of Quebec, magnesite occupied, in 1913, the 21st place in order of value. In 1916 it had risen to the 5th place. In 1913, only 515 tons, valued at \$3,335, was produced, while in 1916, 53,976 tons was produced, valued at \$525,966.*

This immense increase of production is directly attributable to the war. In 1913, the United States produced less than 10,000 tons of crude magnesite, while importing crude and calcined magnesite equivalent to about 350,000 tons of the crude mineral. Owing to blockade, embargo and scarcity of bottoms, the importation from Europe was greatly curtailed. There was a serious shortage resulting in the employment of substitutes for magnesite, where possible, and also in greatly increased production of this mineral in the Western States of the Union and in Canada.

In Western Canada fairly large deposits of hydro-magnesite occur widely distributed. Most of these are distant from railroads and markets. One deposit at Atlin was worked to a very limited extent within the past three years.

Character of Magnesite Mined in Quebec.

Quebec possesses the only known workable deposits of magnesite in Eastern Canada. These are situated in Argenteuil county, about midway between Ottawa and Montreal, to the north of the Ottawa River. They occur in the Grenville series of the Archean formation. The magnesite is very similar in appearance to the crystalline limestone of this series, being coarsely crystalline and usually white, though sometimes blueish grey or yellowish. The magnesite rock forming the deposits is composed essentially of the mineral magnesite (magnesium carbonate). Dolomite (lime-magnesium carbonate) is the principal accessory mineral, being practically always present, sometimes constituting a large proportion of the rock. Serpentine, diopside and other minerals are frequently found disseminated, generally in small quantity, through sections of the deposits.

The following analyses will serve to illustrate the general composition of the magnesite rock:

Insoluble mineral matter	2.20	3.08	2.00	2.00	.74
Iron Oxide	.13	.29	.57	.50	.24
Alumina	.03	.35	1.47	.80	.36
Lime	8.80	10.06	5.80	6.95	10.05
Magnesia	39.12	37.76	41.34	40.76	38.52
Carbon dioxide	49.72‡	49.39†	49.66†	49.88†	49.86†

‡By difference.

†Calculated.

The insoluble siliceous matter, the iron and the alumina are usually low in percentage. The lime, even in selected samples, is seldom below six per cent.

* According to the Preliminary Report on the Mineral Production of Canada, issued by the Mines Branch, Ottawa, the production of magnesite in the Province of Quebec during 1917 was 58,090 tons of crude, caustic calcined and dead burned, valued at \$728,275.
H. F.

According to Dr. M. E. Wilson,§ these deposits are associated with the metamorphosed group of sediments, crystalline limestone, garnet gneiss, and quartzite, composing the Grenville series, and in three localities the magnesite is found in close proximity to outcrops of the pyroxenic rocks of the Buckingham series. It is probable that these deposits were formed by the replacement of the lime by magnesia in crystalline limestone, the transformation being first to dolomite and finally to magnesite.

North American Magnesite Company.

The principal operators are the North American Magnesite Co., Ltd., and the Scottish-Canadian Magnesite Co., Ltd. Messrs. Fitzsimons, Boshart and Inglee have also made some shipments.

The North American Magnesite Company owns and operates quarries on lot 15, range IX, and lot 18, range XI, Grenville township, and operates under lease, a quarry on the north end of lot 13, range I, Harrington township. From all these quarries crude magnesite is shipped. Hauling to the railway at Calumet is done by wagons or sleighs, the distances from the various quarries ranging from nine to sixteen miles.

Caustic Magnesia and Dead Burned Magnesite.

At the quarries on lot 15, range IX, some of the magnesite is calcined in a Keystone lime kiln and shipped as caustic magnesia. The company also produces dead burned magnesite at Longue Pointe, near Montreal. The burning is accomplished in one of the rotary cement kilns of the Canada Cement Co., Ltd.

Scottish-Canadian Magnesite Company.

The Scottish-Canadian Magnesite Company owns and operates quarries on lot 15, range X, and lot 15, range XI, Grenville township. The crude magnesite is transported to Grenville, a distance of fourteen miles, over a narrow gauge railway. Dead burned magnesite is produced by this company at the plant of the Canada Cement Co., at Hull.

Magnesite Available.

Dr. Wilson, in his report already referred to, makes the following summarized statement of the number of tons of magnesite and magnesite-dolomite in sight in the various properties referred to above.*

Property.	Magnesite containing less than 12 per cent. CaO tons.	Magnesite-dolomite containing more than 12 per cent. CaO tons.
Lot 13, range I, Harrington Tp.	25,000	8,000
Lot 18, range XI, Grenville Tp..	15,000	6,000
Lot 15, range XI, Grenville Tp..	418,000	186,300
Lot 15, range X, Grenville Tp...	2,500	4,000
Lot 15, range IX, Grenville Tp...	226,400	279,400
Total	686,900	483,700

§ "Magnesite Deposits of Grenville District, Argenteuil County, Quebec." Memoir 98, Geological Survey, Department of Mines
* It must be noted in this connection that these estimates have no definite relationship to the amount of magnesite present on the various properties since some deposits have been more extensively developed by diamond drilling and other development operations.

Method of Mining Magnesite.

Quarrying is carried out by open cast methods, the rock being broken down by blasting and sledging to "one man size." In working the quarries endeavor is made to avoid those parts of the deposits in which the lime content runs high. The quarried material is cobbled to free it from excessive amounts of serpentine and highly dolomitic rock.

Magnesite and Its Products.

The magnesite is placed on the market in three forms: 1. Crude magnesite. 2. Light burned magnesite or caustic magnesia; and 3. Dead burned magnesite.

1. **Crude magnesite** is the hand-picked product of the quarry. It is shipped in lumps weighing 100 pounds or less.

2. **Caustic magnesia or light burned magnesite** is produced by calcining the crude rock in a retort or shaft kiln at a temperature of about 1100°C. The carbon dioxide is not completely driven off, about 2 or 3 per cent. remaining. It is shipped in lump form or pulverized.

3. **Dead burned magnesite** is that from which practically all of the carbon dioxide has been expelled by calcining at a very high temperature. For the uses to which dead burned magnesite is put, it is desirable that it be fully shrunk, or in other words, in as dense a form as possible. The shrinkage is due to incipient fusion, or sintering. Since the Grenville magnesite contains such small quantities of fluxing impurities, it is practically impossible to shrink it without the previous addition of some other material. The practice at Hull and at Longue Pointe is as follows:

Method of Burning Magnesite.

Crushed magnesite, mixed with approximately five per cent. of its weight of oxide of iron, in the form of magnetite, is ground in a ball mill to a fineness of "100 mesh size." This finely ground and intimately mixed material is fed at a uniform rate into the rotary cement kiln, through which it passes in counter direction to the flames. During its passage through the kiln, which requires in the neighborhood of three-quarters of an hour, the magnesite yields its carbon dioxide and the residual magnesia combines with the oxide of iron. The result is the magnesia is rendered somewhat less refractory and, when subjected to the intense heat near the firing end of the kiln, the small particles soften slightly, shrink in bulk and develop a tendency to agglomerate. Small balls, averaging half an inch in diameter, are formed as the material is tumbled along its course through the rotating kiln. From the kiln they fall into a bucket conveyor which delivers them to the shipping shed.

Uses of Magnesite.

The great bulk of magnesite consumed is used either in the caustic or dead burned state, the calcining being done by the mining companies or by firms making a business of preparing refractory materials for the market.

The crude rock is used in the preparation of various magnesian chemicals, such as Epsom salt and magnesium chloride. It is used for the production of the metal magnesium by the electrolytic process. It is also employed in the manufacturing of wood pulp by the sulphite process. The magnesite may be used in the calcined form for the foregoing purposes.

When finely ground caustic magnesia is mixed with a solution of magnesium chloride it forms a cement,

known as Sorel, or oxychloride cement, which sets rapidly. This property has found for it a very extensive use as a flooring material.

The dead burned magnesite is used exclusively as a refractory material, especially for linings for open hearth steel furnaces and for electric and other furnaces where a very high temperature is employed. These linings may be prepared in place by building up layer upon layer of magnesite to which some bonding material has been added and subjecting it, during the procedure, to high temperature, or the magnesite may first be made up in the form of bricks and built into place in the usual manner.

During 1917 the price of crude magnesite averaged between \$10.50 and \$11.00 f.o.b. Calumet, Quebec, the caustic magnesia \$25 and the dead burned magnesite as high as \$40 per ton.

KILLED IN ACTION.

Six members of the Canadian Mining Institute were killed in action during the past year: Lieut. C. St. G. Campbell, J. S. Fleming, Capt. G. G. Gibbins, Col. T. C. Irving, Lieut. O. E. LeRoy, and Lieut. C. P. McDougall.

In this issue appear reproductions of a number of photographs of members of the Canadian Mining Institute, who are serving, or have served, at the front. We publish these by courtesy of the Institute. We will be pleased to receive, for publication, photographs of members who have joined the colors. About 125 members of the Institute are now on military service.



Lieut. C. St. G. Campbell, R.F.C., who has been reported missing since April 6th, 1917.

Province of



Quebec

Department of Colonization, Mines and Fisheries
QUEBEC

Mineral Production and Mines

Value of the Annual Mineral Production of the Province of Quebec for past years:

Years.	Value.
1900	\$ 2,546,076
1904	3,023,568
1908	5,458,998
1912	11,187,110
1916	13,287,024

The growth of the mineral industry of the Province, as indicated by the growth in the value of the production is remarkable, and yet it is insignificant compared to the potentialities and possibilities of our resources.

Quebec **Asbestos** mines produce over 80 per cent. of the world's supply of this substance.

Quebec **cupriferous pyrite** mines have been producing continuously for forty years, and one of them is 4,000 feet deep.

Quebec **Molybdenite** production is now on a solid basis, and one of the mines is the largest individual producer in the world.

Quebec **Amber mica** takes "first rank" for electrical machinery. It is the strongest, the most elastic and the best isolator.

Quebec **Magnesite** production has grown from 515 tons, valued at \$3,335 in 1913, to 65,000 tons, valued at \$725,000 in 1917.

Quebec **Metallurgical Industry** includes one of the world's large reduction works of **Aluminum**; a manufacture of **magnesium metal**; numerous steel furnaces, both electric and fuel.

Address all inquiries for technical and statistical information to,

HON. HONORÉ MERCIER,
MINISTER OF COLONIZATION, MINES AND FISHERIES,
QUEBEC.

Molybdenite from Quebec

The Province of Quebec holds a prominent position as a producer of molybdenite. This is the source of the metal molybdenum, which is in great demand for the manufacture of war material. It imparts to steel special qualities of hardness and toughness, making it very resistant. Molybdenum steel is used extensively in the manufacture of large gun and rifle barrels. Moreover, molybdenum imparts to steel the quality of retaining its temper when heated to a redness, which enables it to be used for high speed cutting tools. This has revolutionized machine-shop practice, for whereas with ordinary crucible tool steel the

Molybdenite mining in Quebec first assumed importance in 1916 when ore yielding 129,275 lb. molybdenum sulphide was produced. Nearly all of this molybdenite came from the Moss mine at Quyon, near Ottawa. The property, which is in Onslow township, had been long known to contain molybdenite; but it was not until March 1916 that any development work was undertaken. A few weeks later a carload of ore was shipped to Denver, Colorado, to be concentrated in the plant of Henry E. Wood & Co. During 1916 several shipments were made to Denver and to the ore dressing laboratories of the Mines Department at Ottawa and to the



A MOLYBDENITE CRYSTAL FROM QUEBEC

average speed of cutting is from 30 to 40 feet a minute; high speed steel tools can cut 500 feet.

In 1917, the Province of Quebec produced over 70 tons of molybdenite. Several deposits are being worked in the region north-west of Ottawa, and at one of these, the Moss Mine, at Quyon, operated by the Dominion Molybdenite Company, a very complete concentrator has been installed. This mill is now treating 150 tons a day, by wet crushing and Callow cells. This process, after a period of experimentation, has given extremely satisfactory results, and it is claimed that a practically complete extraction of the molybdenite contents has been obtained. A large tonnage of ore has been blocked out by systematic diamond drilling, and the Moss mine deposit appears to be one of the most important molybdenite mines in the world.

Other important deposits, on which much exploration and development work was done in 1917, occur in the townships of Onslow, Huddersfield, Egan, Aldfield, Preissac, La Corne. In the course of the year 1918, several new producers will probably be added to the present ones. The Province of Quebec bids fair to become the world's most important producer of molybdenite.

concentrating plant of the International Molybdenum Company at Renfrew. The property was operated for some time by the Canadian-Wood Molybdenite Co. During 1917 a new company, the Dominion Molybdenite company, took over the property and is now operating the mine and has installed a concentrating plant. Mr. Clement A. Foster is manager for the new company, and Mr. M. W. Hotekin is assistant manager.

The Moss mine is about three miles from Quyon, a station on the Waltham Branch of the C.P.R., 33 miles from Ottawa.

Mr. Thos. Denis, Superintendent of Mines of Quebec, says of the ore. "The molybdenite is found disseminated in the rock in small flakes and powder. The dissemination is irregular, but very persistent, varying from a lean ore of one-tenth of one per cent., to highly concentrated nests or pockets running twenty per cent. or more in molybdenite." It is said that exploration by drilling indicates a very large body of ore that will average seven-tenths of one per cent. molybdenite.

There is much pyrrhotite and pyrite with the ore; but fortunately there is very little mica.

The molybdenite produced in Canada during the past two years has nearly all been taken by the Imperial Munitions Board at a price fixed in England. Recently the embargo on molybdenite has been removed and it should now be possible to export considerable quantities of molybdenite or ferro-molybdenum to the United States. Our exports to England have been largely in the form of ferro-molybdenum, this alloy being manufactured at Orillia and Belleville.

At a meeting of the New York section of the American Institute of Mining Engineers held on Sept. 27, 1917, the following comments on molybdenum were

employed in small quantities by the electrical and scientific instrument trades. Its salts figure as chemical reagents, pottery colorants and medicines. A salt of molybdenum is used as an explosive preservative.

"It is hoped that the war will prove to the steel workers the valuable properties of the metal, and by creating a demand for it, develop dependable sources and stabilize the supply. Tungsten, its chief competitor, has in the past enjoyed the advantage of a much better established production.

"The position of being the chief molybdenum producer has changed with remarkable frequency recently.



MOLYBDENITE ORE FROM MOSS MINE, QUYON, QUEBEC. DOMINION MOLYBDENITE CO.

presented in a paper prepared by S. H. Ball and published in a recent bulletin of the A. I. M. E.

"Molybdenum, perhaps more than any other metal, has had its production increased by the war. The 1916 production was in tonnage over twenty times, and in value perhaps 100 times, that of 1902. Its use for munitions prior to the war is shown by the fact that the principal consumers prior to 1914 were Krupp and Creusot. The 3 or 4 per cent. of molybdenum used by the Germans in their heavy artillery, and even in rifle barrels, notably prolongs the life of these weapons.

"The most important use of molybdenum in peacetime is in steel and other alloys. Its consumption in tool steel appears to be at a standstill, but many feel that in this field the metal has not as yet had its final trial. The use of alloys containing molybdenum in automobile parts is increasing. The metal is also em-

In 1910 Queensland accounted for 50 per cent. of the production; New South Wales and Norway each almost 25 per cent., and Sweden and the United States produced small amounts. Active prospecting, fostered by war prices, caused the United States to take the lead in 1915, but this year Canada is apparently the most important producer. According to Mr. F. L. Hess, the world's 1915 production was equivalent to 222.6 tons of metal."

The Canadian Government has decided to license, until further notice, the free export of molybdenum, tungsten, their ores, concentrates and products to approved consignees in the United States and France. It is necessary for exporter to obtain license from Commission of Customs, Ottawa, previous to shipment and from the Bureau of Imports, War Trade Board, Bond Bldg., Washington, a license to import into the United States.

Province of



Quebec

Department of Colonization, Mines and Fisheries
QUEBEC

Mineral Lands

Area of the Province.....	703,653	Square Miles
Crown Lands open to Prospection	650,000	“ “

All Lands Patented for Farming since 1880 are also open.

Each prospector can stake **200 acres** of mining lands in claims of 40 acres.

Terms of Quebec Mining Law are very favorable to the prospector.

Of the 703,653 square miles of the area of the Province, over 600,000 are underlain by Pre-Cambrian rocks.

It is in Pre-Cambrian rocks that occur the Silver deposits of Cobalt; the Gold deposits of Porcupine; the Nickel ores of Sudbury; the Copper ores of Bruce mines; the Iron ores of Lake Superior, and the Province of Quebec possesses 600,000 square miles of such rocks awaiting the prospector to reveal their riches.

Copies of Mining Laws, "Information for Prospectors"; Reports of the Mines Branch, and reports on economic geology of many regions may be obtained from the Department, as well as technical and administrative information.

Address all inquiries and requests for reports to,

HON. HONORÉ MERCIER,
MINISTER OF COLONIZATION, MINES AND FISHERIES,
QUEBEC.

ASBESTOS CORPORATION IN 1917.

Mr. W. G. Ross, president of the Asbestos Corporation of Canada, says of operations during 1917:

Under the adverse conditions that our company had to operate during the last twelve months, the results may be considered satisfactory. The statement of Profit and Loss for the year shows a net surplus of \$253,789, as compared with \$215,476 for the previous year, an increase of \$38,313, after making provision for the Income Tax, Renewals and Betterments, and Interest on Bonds.

In order to cope with the demand for raw asbestos, which, for the time being, continues to grow, we decided to open the East Broughton property, known as the Fraser mine. This necessitated the erection of a mill. As the old Dominion mill at Black Lake had not been operated for some years, owing to the fact that centralization of operations at Black Lake had resulted in all rock quarried being milled at the British-Canadian mills, and as the erection of a new building would have been very expensive, in view of the present high cost of building materials, it was decided to move the Dominion mill from Black Lake to East Broughton. This has now been accomplished. Due to delays in getting the necessary electrical equipment, motors, etc. (these being only delivered late in the year), it was not possible to obtain any results this year. This mill, however, is now completed, and the development of the mine is now being proceeded with.

Our Kings, Beaver and British-Canadian properties were operating throughout the year to the fullest extent commensurate with labor at the company's disposal. Due to want of men, it was not possible to



The late Lieut. C. H. McDougall, killed in action early in May, 1917.

operate double shifts at all the properties. Had they been available, the output would have been larger.

The demand for our products continues excellent. Given more reasonable weather and working conditions during 1918, better results may be expected, provided always that transportation facilities do not grow worse. The shortage of cars, during the last months of the year, seriously affected our company's business.

The company subscribed for and was allotted a further \$200,000 of the Dominion of Canada Victory Loan Bonds, and purchased \$190,500 of the company's own bonds at market prices.

Quarterly dividends at the rate of four per cent. per annum, on the preferred stock, involving \$160,000, were declared and paid during the year.

THE LEAD ORE SMELTING SITUATION.

By E. Jacobs.

In both British Columbia and the State of Idaho there is trouble and dissatisfaction in regard to the charges and actions of operators of lead ore smelting works, and in both countries the combined action of mine-owners is urged with the object of securing government regulation of smelting works. The grounds on which government control is urged, though, are entirely different as regards Idaho from those on which strong complaint is made in the West Kootenay district of British Columbia.

Last year the Bunker Hill Mining and Concentrating Co., operating in the Coeur d'Alene district of Idaho, commenced smelting at its own newly established smelting works certain of its own ores of a grade it claims its contract with the American Smelting and Mining Co. does not compel it to ship to that company's smelting works. The A. S. and R. Co. brought an injunction suit with the result that a judge of the United States Court has granted a preliminary interlocutory order requiring delivery to the A. S. and R. Co. of the "normal" product of the Bunker Hill and Sullivan mines, pending trial of a suit to determine what goods of ore are "normal" product and so covered by that contract.

Following other editorial comment on the subject, Northwest Mining Truth, of Spokane, observes: "Mining Truth has reiterated the seriousness of the situation for more than two years and hopes that at some not too remote date the mining interests of this section will awake to the grave danger that threatens. It seems patent to us that the only efficacious manner in which the rapacity of the Trust can be finally curbed is by government regulation of smelters. That they are public necessities goes without saying and we believe the country is now in mood to take up the miners' demands to good purpose. Mining Truth will, therefore, commence a campaign to that end with its next issue, and will introduce the first resolution on the subject at the forthcoming Northwest Mining convention in this city. We ask the earnest attention of all mining men and their active support if our presentation of the subject meets with approval."

The stated reason for advocating Government control in Canada is stated by The Kootenaian, of Kaslo, West Kootenay, to be an increase in the "flat rate" for smelting, to be charged by the Consolidated Mining and Smelting Co., Trail, of \$5 a ton, with sundry deductions additional to those heretofore made. The Kootenaian reflects strongly on the Consolidated Company in this connection, and urges general organization to protect the independent producer.

The Position of the Dominion Coal Co. in Nova Scotia

By F. W. Gray.

The "Halifax Herald" is, by way of being a general, not to say an impartial, iconoclast, and in connection with the mooted merger of the interests of the Dominion Steel Corporation with those of the Nova Scotia Steel and Coal Co., it has once more trotted out the hackneyed accusation that when the Nova Scotia Legislature put the seal of its approval on the incorporation of the Dominion Coal Company, and granted a 99 years' lease of the consolidated coal areas, that it bartered away the rights of the people of Nova Scotia for "the mess of pottage of 12½ cents royalty" and created a monopoly which has acted in restraint of trade and against the public interest.

What are the facts? When the Dominion Coal Company was incorporated, in 1893, the coal production of Nova Scotia was about 2,000,000 tons per annum, and the Dominion Coal Company itself contributed 800,000 tons to this total. In 1913, when the peak of coal production was reached in the province, the total production had risen to 7,263,000 tons, of which total the Dominion Coal Company contributed 4,739,000 tons, or 65 per cent.—not counting the output from the Springhill Collieries. At the time when incorporation was granted, the Dominion Coal Company undertook to pay for the privilege of the 99 years' lease a royalty of 12½ cents per ton, whereas all other operators paid 10 cents per ton, with an undertaking that the Government would receive a minimum annual royalty not less in amount than the total royalty monies collected from all the independent companies operating the consolidated areas in the year preceding amalgamation. If this limiting clause is to be taken as any indication of the extent of the future hopes of those who framed it, it must be admitted that their expectations were more than realized, for year by year the coal production of the Dominion Coal Company increased until the outputs of the years preceding 1893 have become merely a memory.

In the 20 years from 1893 to the end of 1912 inclusive, the Dominion Coal Company mined approximately 50,000,000 tons of coal, on which it paid 12½ cents per ton royalty. In the same period all the other operators put together mined approximately 35,000,000 tons of coal, on which they paid 10 cents per ton royalty. From the 1st of January, 1913, the Government imposed a royalty of 12½ cents per ton on all coal mined in the province. From the standpoint of the Government it would appear that the bargain with the Dominion Coal Company was justified by the results.

As to the effect of the Dominion Coal Company's operations on the people of the province, it may be confidently stated that if this large company had not been formed, and if coal-mining operations had been continued in the intermittent and detached manner which preceded the formation of the company, the production of coal would to-day be much smaller, the selling price per ton would be much higher, and the value of the mining areas would be infinitely less.

Several years ago the writer expressed the following conclusions*, which are now quoted as being written at a time when the consolidation of the Dominion and Scotia interests was not being talked of, and can there-

fore be regarded as being uninfluenced by any other considerations than those which relate to the beneficial effects of so-called "monopolies" as they have been exemplified in the history of the coal trade in Nova Scotia.

Generally reviewing the economics of the industry, the writer stated:

"From the standpoint of the investor, the operation of coal mines in Nova Scotia in the past has not been encouraging. Some of the coal companies, during prosperous times, and in the earlier and less expensive operation of their collieries, paid regular and handsome dividends over many years.

"In very few instances, however, in the history of coal mining companies in Nova Scotia has there been any likelihood of a redemption of the original capital outlay, and a very moderate interest return is all the investor has been able to hope for. The majority of the companies now operating have been compelled to undergo financial reorganization. Several companies have suffered complete financial disaster, in some cases brought about by physical conditions beyond control, and in other cases by unskilled management, or the unjustifiable optimism of promoters.

"Generally speaking, however, the mines of Nova Scotia have been well managed from an engineering point of view, and the meagre financial return in the past has been due to alterations in the fiscal policies of Canada and the United States, resulting in temporary disorganization of markets, to the remoteness of the principal markets, the interference, or stoppage, of coast-wise shipments by ice in the winter, and the comparatively low selling price of coal in Eastern Canada.

"Within the past twenty years the price of coal has varied very little, it being one of the few commodities that has not materially increased in selling value.

"It is doubtful whether the market for Nova Scotian coal has ever yielded the operators a greater price than \$2.50 per ton at the pit mouth, and the average price realized, after allowing for waste and slack coal, is very much less than this figure. A comparison with normal European pit mouth selling prices will show how moderate this figure is, if due consideration is accorded to the higher cost of labor and materials in Canada.

"The margin of profit has been too small to permit of the accumulation of proper reserves to provide against the troubles inseparable from mining coal, or to allow of adequate depreciation reserves for the amortization of capital liabilities and the depletion of coal areas. Therefore, periods of financial depression or mining accidents have too often forced the abandonment of mining operations and have involved investors in losses.

"The formation of the Dominion Coal Company was an evolution from these conditions, and whether it be a retrograde tendency or not, the logic of events has indicated the chief hope of settled prosperity in the Nova Scotian coal trade to lie in the further development of strong corporations, with adequate financial reserves. There is no reason to anticipate anything but a long and successful career for the coal companies of the province if these essential qualifications are given the consideration they deserve.

"Whatever financial stability attaches to the coal companies of Nova Scotia to-day, is a testamentary benefit conferred by the General Mining Association; a monopoly that, with all its faults, rendered it pos-

*See Bulletin No. 14, Mines Branch, Ottawa.

sible to conceive mining operations on a comprehensive basis, eliminated suicidal competition in selling prices, and enabled mine workings to be laid out with the maximum of economy, with due regard to the conservation of the vast coal reserves which sporadic individual operations have tended to endanger by uncoordinated effort.

"The price of coal in Eastern Canada has always been dependent on the selling price in the United States, but it is candidly admitted, to-day, that coal has in the past been mined in the United States, and sold there and in Canada, at a price actually below the cost of production, when all the factors of that cost are taken into consideration."

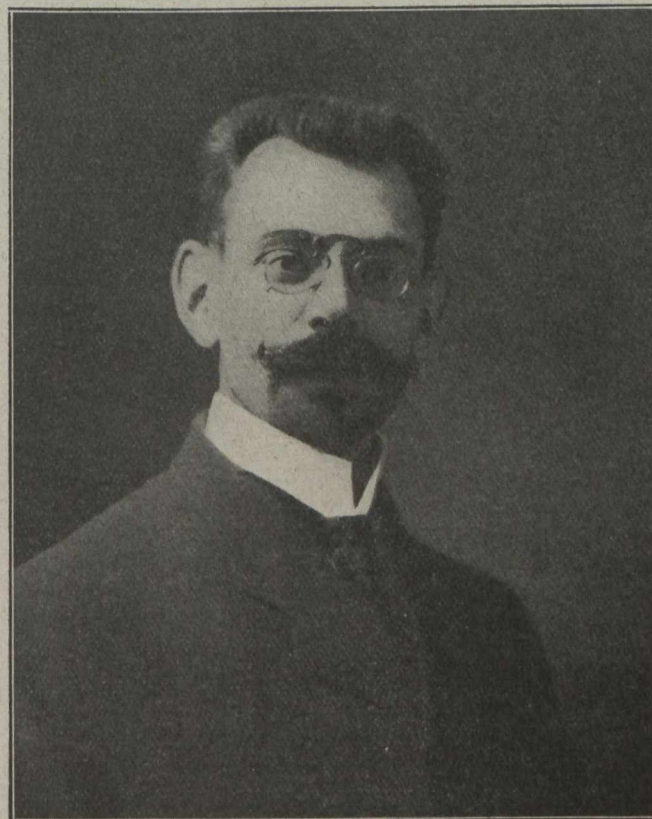
That the "chief hope of settled prosperity in the Nova Scotian coal trade lies in the further development of strong corporations with adequate financial reserves" was never so apparent as it is to-day. The coal industry of the province is to-day in a period of recession. It has entered that phase of coal mining economics when the first pickings have become exhausted; when the thicker seams, and the easily accessible areas have practically disappeared; an era of rising costs of extraction, of increasing cost of wages and materials has commenced. The future of the coal industry of the province lies chiefly in the submarine areas, and the winning of these will call for large plans, for long views, for the expenditure of immense sums of money with the knowledge that such capital expenditure can only be recouped over long periods of time. Engineering plans will be required years in advance of their consummation, and some of the most far-reaching and fascinating projects of the mining engineer may see fruition off the shores of Cape Breton Island.

Operations conceived on the necessary scale are, however, only possible to large companies having the financial reserves to ensure their corporate existence and stability. The legislators of Nova Scotia never did a saner thing than when they incorporated the Dominion Coal Company, and gave that company the extended tenure of its lands and areas which made it possible to issue stocks and bonds secured on those areas. Ninety-nine years may seem a long time, and judged by the life of man, it is so long as to be tantamount to a freehold tenure, but it must be remembered that a corporation is an entity, created by the law with the right of continuous succession, an entity that may, and probably will, outlast all those who created it. It is now 25 years since the Dominion Coal Company was formed. That is to say, one-quarter of its lease period has expired, and to those who know the vast extent of the areas which this company, and this company alone, can operate, the criticism of the lease period which would naturally arise is that it is too short, too contracted to allow of the full development of the potentialities of the coal areas which it controls.

In a work descriptive of the Dominion Coal Company's operations, published in 1908, the writer stated with reference particularly to the Glace Bay Basin, that had this been worked as a virgin field by the Dominion Coal Company, or a similar consolidation of interests, the result would have been a marked conservation of our national coal resources, and incidentally, cheaper coal.* This statement cannot be controverted. It is so obviously correct; for, as the writer further stated at that time, "One could hardly

conceive from an engineering or economic standpoint a group of mines where an amalgamation of interests was more desirable, or where independent operation was more likely to have disastrous future consequences, alike as regards the profits of the operators, the revenue of the Provincial Government, or the price of coal to the consumer."

The foregoing remarks are not intended to have any bearing upon the rumored merger of the large Sydney interests; but as a reply to the "Herald's" accusation that the legislation which formed the Dominion Coal Company was ill-advised. So far as the effect of the Dominion Coal Company upon the other operators of the province is concerned, it cannot be accused of monopoly, of price-cutting, or of squeezing out the little fellow. Actually the Dominion Coal Company has been the "big brother" of the smaller coal companies. It has borne the brunt of evil times, has stabilized the industry, and in many cases has, more than any other factor in the province, made it possible for the little operators to exist at all. The Dominion Coal Company did not at any time unfairly compete with other mines in the province. Instead, it went altogether outside of the province, and developed new avenues of trade. If the Dominion Coal Company has been a monopoly, it has been a very benevolent one; but it never was a monopoly. It has, it is true, exerted a preponderating influence in the provincial coal trade, but its influence has been a stimulating one, nor can its effect on the ethics of the trade and the technical excellence of mining practice be characterized as otherwise than beneficial.



THEO. C. DENIS,
Superintendent of Mines of Quebec.

*The Dominion Coal Company. "Mining and Transportation, 1909. Mines Publishing Co., Toronto.

The Asbestos Industry

By Jacob A. Jacobs.

The value of asbestos as a material for making incombustible thread, rope and cloth has long been known, but it is only in recent years that extensive use has been made of it. Now the architect, builder, steam-fitter and electrician recognize asbestos as a splendid material for resisting weather, fire, acids and other agencies of destruction, and they use it for very many purposes. The variety of uses is fast increasing and scarcely a month passes without some new application being found. Not many years ago asbestos was a mineralogical curiosity. Now it is a necessary article of commerce.

When asbestos was first discovered in the Eastern Townships of Quebec, over thirty years ago, its uses were so little known that the output of one quarry at Thetford could hardly be marketed to advantage, and the world knew but little of its commercial value. Gradually, however, manufacturers and others have come to realize its importance until now the demand is in excess of the supply.

In the production of asbestos, Canada occupies a leading position, as at least ninety per cent. of the world's supply of that commodity comes from the Serpentine Belt that crosses the Eastern Townships of Quebec, through the counties of Richmond, Wolfe, Megantic and Beauce, and on which are located the asbestos mines of the Danville, Black Lake, Thetford and East Broughton districts.

The mines are worked as open pits, or quarries, the rock being hoisted by means of derricks. Some mines near Thetford have already reached a depth of over 250 feet, with no indication of the pay rock running out.

The separation of asbestos from the hard serpentine in which it occurs is simple and inexpensive in comparison with the extraction of metallic ores.

After the rock is blasted the best of the vein material is extracted by means of hand hammers, and sent to the cobbing sheds to be sorted and cleaned. This is known as Crude, and brings the highest price.

The balance of the rock, classified as Fibre or Mill rock, passes to the crushers, thence to the driers and again through secondary crushers, screens, and pulverizers. From the pulverizers it passes over shaking screens from which the asbestos, now well opened out, is drawn up by vacuum fans and discharged into dusting machines. From there it passes over grading screens into bags and is then ready for market.

The percentage of marketable asbestos from the mill rock will average from 7 to 10 per cent. Of the total tonnage produced, the proportion of Crude asbestos to the whole is from 2 to 4 per cent.

Grades of Asbestos.

Asbestos is considered in two classes: Crude and Fibre.

Crude—Of the Crude Asbestos, the first handpicking is composed of fibres $\frac{3}{4}$ of an inch and over. The second picking, under $\frac{3}{4}$ inch, includes all that can be separated by hand.

Then comes the defiberized, or machine separated asbestos, generally classified as follows:

Fibre and Shingle Stock—Holding the longest fibres, fit for lining, but rarely used for weaving except in case of extra quality.

Paper Stock—Containing the short fibres, and used in the manufacture of paper, felts, lumber and many other articles.

Asbestic—Or crushed serpentine rock, which is used in the manufacture of plaster, cement, fire-proof brick, etc.

Canadian asbestos has a density of 2.5; it is white or greenish in color, but the separate fibres are white, lustrous and silky, anywhere from $\frac{1}{4}$ to 3 inches in length. Single threads, or fibres, sometimes attain 5 or 6 inches in length. The veins run irregularly in every direction in the serpentine and extend sometimes a hundred feet or more.

While the Crude, or vein asbestos, is the most valuable by weight, the flaky fibrous substance that impregnates the rock in asbestos deposits is found in much larger quantities than the Crude and makes up the greater part of the production. This is generally known as Fibre, or Mill asbestos.

When asbestos was first mined, only fibres of $\frac{1}{4}$ or $\frac{1}{2}$ inch were utilized; a proportion of 1 to 3 per cent. of useful matter was considered of value, and 3 per cent. was considered a high average. Now that the whole of the fibrous matter is obtained by means of improved machinery, this proportion runs from 6 to 15 per cent and even more than this is utilized for the manufacturing of asbestos used in building operations.

Production of Asbestos in Quebec.

The production of asbestos in Canada during recent years is shown in the following table. There will probably be an increase in value of 25 per cent. in 1918:

Year	Tons.	Value.
1903	29.261	\$ 916.970
1904	35.479	1,186.970
1905	48.960	1,476.450
1906	61.675	2,143.653
1907	61.985	2,455.919
1908	65.157	2,551.596
1909	63.965	2,296.584
1910	80.605	2,667.829
1911	102.224	3,026.306
1912	111.175	3,059.084
1913	136.609	3,830.504
1914	107.701	2,895.935
1915	113.115	3,544.362
1916	133.339	5,182,905
1917	Considerable increase in value. Figures not completed yet. Estimated \$7,200,000	

Uses of Asbestos.

The enumeration of the many uses to which asbestos is now put would make a book. For hundreds of articles for household use, and for the house itself, covered with asbestos slates or shingles, and sheathed and lined with the fire-proof plaster or board, this wonderful material has become indispensable. Some of the uses may be mentioned as follows:

Cloth—Asbestos thread, made from the highest quality of crude, is woven into many kinds of cloth and fabric, from the lighter curtains of filmy lace to the heavy drop curtains for theatres, amusement halls and the like, and for the fire-proofing of the thousands of moving picture shows now being introduced

throughout all civilized countries. Asbestos cloth is also used for clothing for firemen and employees of smelting works, blast and iron works and acid works. There is no material so useful for the safety of life and property as asbestos.

Insulation—Where perfect insulation is required, as in the case of covering for electric wires, no better non-conductor can be found. It is not affected by many of the chemical agents likely to attack most insulations. It also makes the best covering for piping in connection with refrigerating plants, or for steam pipes, boilers and other places where a prevention of radiation or cooling is required, being used in this case as a binder for magnesia coverings.

Paints—Under the name of "Plastic," etc., asbestos is now used in the manufacture of certain paints, the fibrous structure having the property of holding up the heavier pigments in the paint. When used with paint containing lead and zinc it adds certain properties which no other pigments can give.

Paper—Over 90,000 tons of asbestos paper was used last year in building construction. This paper is damp-proof as well as fire-proof and its use is highly recommended by insurance companies.

Plaster—Asbestos, or refuse, when mixed with caustic lime, produces a perfect fire-proof wall plaster for either inside or outside work, and its cheapness will make its use more general as the economical qualities become more known.

Fire-Proof Brick—Composed of hydraulic lime, sand and asbestos. These bricks are now used where high temperatures are required, as in lining for furnaces, fire-boxes, etc. No other material will resist extreme heat so well.

Conveyor Belts—Owing to their fire-proof and wearing qualities, and their recognized superiority to rubber, leather, or canvas. Asbestos conveyor belts are used where hot clinkers and other substances have to be mechanically disposed of. The durability of these belts also commends them in all cases where crushed rock, copper or other ores have to be handled in bulk.

Floorings—Asbestile tiles and boards are used for floorings. They are impervious to heat or water and their elasticity is as high as wood. They have the hardness of cement, greater durability than asphalt, are light in weight, will not crack and are non-conductors of sound.

Household Goods—Asbestos felting is made into many articles for the house, such as: Table covers, stove mats, rugs, gas logs, fibre for grates, etc.

Asbestos Lumber—In modern building constructions, Asbestos wood is now largely used because of its fire-proof and water-proof qualities. It also enters into the making of electrical switch-boards, cut-offs, etc., and in the protection of trolley and electric cars against short circuiting.

Rope—Used in the manufacture of twine, cord and wirecorded rope required by fire departments.

Asbestos fabric has a greater tensile strength than cotton fabric, a statement which is evident when you consider that an asbestos fireproof rope of $\frac{3}{8}$ inch diameter has a tensile strength of 1650 pounds.

The additional mention of automobile brake linings, filters, imitation leather, mattresses for engine lagging, cigar lighters, protected metal, cement, fire-proof linings for stoves and automobile tires, does not nearly complete the list of uses in which asbestos has a part. In fact, it would be difficult to name them all.

SPECIAL CORRESPONDENCE

NORTHERN ONTARIO.

Trethewey Co. Will Develop Gowganda Property.

Camps are being erected on the Castle property at Gowganda, and arrangements are being made for an extensive campaign of exploration and development. This property recently passed under control of the Trethewey Mining company, of Cobalt. The mining plant which is to be installed on the property has arrived at Elk Lake and is being transported over the winter roads to the property, a distance of about twenty-five miles. The Castle adjoins the Miller Lake-O'Brien.

Developing Hill Gold Mines Property in Munro.

About thirty men are employed at the property of the Hill Gold Mines, near Painkiller Lake, in Munro Township. The shaft has reached a depth of about 75 ft., and the mineralization of the vein is satisfactory. Camp buildings for the accommodation of about fifty men have been erected, and the work of transporting supplies to the property over the winter road from Matheson is in full swing. Operations will be pushed vigorously at this property from this time forward.

Better Road to Gowganda is Needed.

The rate for the handling of freight from the end of the steel at Elk Lake to Gowganda has recently been increased from 75 cents per cwt. to \$1 per cwt. An urgent plea is being made for a macadamized road to this camp, to be built during the coming summer. The inadequacy of the transportation facilities to this district has always been a retarding factor in the promising district, and anything that is done in the way of relieving this condition is hailed with pleasure by the large number of property owners in the camp. A large number of promising prospects are undergoing more or less development at the present time, and with the added burden of one cent per pound for freight, the results have to be exceptionally promising to induce extensive development.

More Satisfactory Results at Dome Lake Mine.

Developments at the Dome Lake Mine, in Porcupine, are more satisfactory at the present time than for some time past. At the 500-ft. level, in a crosscut, ore of a considerably higher grade than that obtaining in other portions of the mine has been encountered. The development is important, in view of the fact that it has been contended by the management that the geological conditions strongly indicated greater possibilities at depth.

Kirkland Lake Gold Mines, Ltd.

It is rumored that the Mining Corporation of Canada will unite with the Beaver Consolidated Mining company in the development of the Kirkland Lake Gold Mines, Limited. It is stated that preliminary negotiations have already been begun and that the chances of them being successfully consummated are exceedingly bright.

Development of Burnside Property Begun.

Work has commenced on the Burnside property, at Kirkland Lake, which is under option to the Cobalt-Aladdin Mining company. The connections with the Sylvanite plant, which is to be used in the development of the Burnside, were completed about two weeks ago. A new shaft is to be sunk on a vein a short distance west of the old number one shaft. This working will be driven to a depth of 155 ft., at which point a cross-

cut will be run north to the boundary of the Tough-Oakes, where the No. 1 vein of the latter property is expected to be picked up. The old No. 1 shaft will also be driven to deeper levels, and the ultimate plan of the management is to connect these two shafts at the depth of 155 ft. There are fourteen known veins outcropping on the surface of the Burnside in a number of which high gold values occur. Geological conditions on the Burnside are identical with those prevailing on the Tough-Oakes, and the opening up of the neighbor of the pioneer mine of the district will prove an interesting step in the development of the Kirkland Lake camp.

Elliot-Kirkland Vein Cut at 425 Ft.

The crosscut at the 425-foot level of the Elliot-Kirkland mine has cut the downward continuation of the vein. At the point where encountered, the vein was found to be about twenty-eight feet in width. While results of the values encountered have not been given out as yet, the vein is well mineralized, the composition being similar to that encountered in the crosscut at the 300-ft. level.

Planning Railroad for Kirkland Lake.

A conference of the mine managers of the Kirkland Lake camp and officials of the T. & N. O. Railway was recently held with a view to determining the ultimate location of the branch of the railway which it is anticipated will be constructed when conditions become more favorable. The idea in view by the mine managers was to enable them to construct their plants in such a manner as to make as few changes as possible necessary when the spur line is completed.

Cobalt Silver Output Continues Large.

The daily production of silver in the Cobalt camp is being maintained at a rate of approximately 53,350 ounces per day, or 1,500,000 ounces per month. At this rate, with the prevailing price for the white metal, the value of the product bids fair to exceed in value the output of any previous year in the history of the camp.

Nipissing.

During the month of January, the Nipissing mining company, Cobalt, produced ore of an estimated net value of \$307,019, and made shipments from Nipissing and customs ore of net value of \$310,881. Operations underground were of a similar nature to the previous month. No new veins were found, but most of the month's development work continued to be satisfactory. Part of the month's production came from shaft No. 63, on the property which has recently been placed in working order. Exploration in new areas will be carried on from this shaft. A diamond drill was in operation during most of the month on claim R.L. 407, the work being done mainly to determine formations. Further work has been planned in other sections of the property which will keep this drill busy most of the winter. Both high and low grade mills occupied part of the month in making their annual clean-ups, but are now treating 1918 production. During the month of January, the high-grade mill treated 53 tons and shipped 348,954 fine ounces of silver. The low-grade mill treated 6,396 tons. The value of the production for the month was as follows: Washing plant, \$178,404; low-grade mill, \$128,615.

Dome Mines.

Operations at the Dome Mines have been resumed on a small scale. The work being done at the present time is the driving of the main shaft from the 800-ft. level to a depth of 1000 ft. It is reported this working

will ultimately be carried to the 1500-ft. level. When the desired depth is reached, an extensive exploration programme will be undertaken. Should ore be opened up as indicated by diamond drill cores, development work on a large scale can then be gone ahead with. The 35-ft. sump below the 800-ft. level has already been timbered and sinking is now under way. The work is being done by the company itself, and not by a firm of contractors, as reported.

Peterson Lake Will Instal Oil Flotation Plant.

Plans have been completed for the installation of the oil flotation plant at the Peterson Lake Mining company's property, at Cobalt. The treatment of the tailings from the operations of the Seneca Superior mine, it is estimated, will give the company a net profit of \$30,000. The cost of installation of the plant is expected to be in the neighborhood of \$15,000.

Temiskaming.

One of the first changes at the Temiskaming Mine, as a result of the switching of control, is that the resident manager, Mr. J. W. Moffet, will be replaced by Mr. McReavy, manager of the Trethewey Mine. Mr. Moffet is also manager of the Beaver.

Alexo Make Large Output of Nickel Ore.

During the month of January, the Alexo Nickel mine, at Porquis Junction, about thirty miles east from Porcupine, and within a mile or so of the T. & N. O. Railway, shipped 21 cars containing 1,625,700 pounds of ore to the Mond Nickel company, at Coniston. This is by far the heaviest month's shipments in the history of the company, being over 400,000 heavier than the previous record month, which was October, 1917. During the past nine months the company has shipped 115 cars of ore containing approximately 9,642,200 pounds.

Davidson.

The management of the Davidson mining company, at Porcupine, expect to have their sixty-ton mill in operation by the end of the present month. The financial statement covering a period of seventeen months, ending December 31st, 1917, shows that over \$83,000 was expended in development work. Plant and machinery were valued at \$39,982, and the buildings \$19,000. The company is clear of debt. Developments during the seventeen months comprised 3,096 feet, of which 1,330 ft. was cross-cutting, 1,094 ft. drifting, 395 ft. raising and 277 ft. sinking. Diamond drilling comprised 2,115 ft., and surface work 15,885 ft. It is estimated the company have about 100,000 tons of ore of a satisfactory average value.

Porcupine Crown.

There is a growing belief in the Porcupine camp that further curtailment in the operations at the Porcupine Crown will soon be deemed advisable. The high rate of wages being paid at the Hollinger and McIntyre Porcupine Mines, it is contended, is absorbing the larger portion of the available supply of workmen. The two latter mines, owing to their physical condition, can afford to pay a higher rate of wages than many others in a less fortunate position, and in some instances wages amount to as much as eight dollars per day. This forms an economic barrier to a like policy at mines like Porcupine Crown.

Schumacher.

Mr. A. S. Wookey, manager of the Schumacher mine, Porcupine, having enlisted, the management of this property is now in the hands of Mr. T. J. Harwood, who for ten years was manager of the LaRose Mine, at Cobalt, and is well known throughout the North

Country through his connection with this mine. For about three years, Mr. Wookey has managed the Schumacher, and under his supervision the mine has developed from a prospect to a thorough-going mine with large ore reserves, a large, up-to-date mill, and with a future only second to the Hollinger, Dome and McIntyre. The milling record of the mine is second to none in the country and has resulted in a substantial margin of profit being realized in spite of the burdens of war. During the past few months the mill has been treating around 180 tons of ore per day, the profits of which have been sufficient to carry on extensive underground operations. The management decided, several months ago, to continue the main workings of the mine to the 1000-ft. level, but the mill construction during the past summer, together with the shortage of labor, have deferred this plan. Whether or not the new management will follow out this plan of operations has not yet been announced. In Mr. Wookey, the Porcupine camp is losing, temporarily, one of its most efficient mine managers.

Kirkland Lake.

A small part of the machinery for the new mill to be installed at the Kirkland Lake Gold has arrived, but at the present time operations at the property are at a standstill, and up until the present time nothing definite has been given out as to when a resumption of operations can be expected. This property belongs to the Beaver mining company, of Cobalt, and is considered to have exceptional merit. The main shaft has reached a depth of 700 ft., and where the ore body was cut at this point, the values were found to compare favorably with those of other levels of the mine. Considerable lateral work has been done on a number of levels above the 700 ft., with highly satisfactory results.

Wright-Hargraves Cuts Orebody at 200 Ft.

According to latest advice received from the Wright-Hargraves mine, at Kirkland Lake, the main orebody had been encountered at a depth of two hundred feet in the number three shaft. The orebody was found to be sixteen feet in width, the mineralization of the vein being very similar to that found at other points on the property. The number three shaft will be continued to a depth of 300 ft., after which it is planned to drift east to connect up with the number two or main working at that level, a distance of nine hundred feet. Until such time as this is accomplished it will be difficult to estimate the ore reserves of the mine. However, a large portion of the ore already encountered runs over \$20 to the ton, and a considerable quantity is said to carry values of over \$50 to the ton, which makes the outlook exceedingly good. Within the next few months the management should be able to intelligently estimate the ore blocked out and there would appear to be every reason to believe that the total will be well up in seven figures. This property is rapidly developing into one of the leading mines of the Kirkland Lake district.

McIntyre.

One of the outstanding features of the report of the McIntyre-Porcupine Mines for the period covering the last half of the year 1917, is the large amount of development work done. During this six-months' period nearly three-quarters of a mile of underground work was done. Increased production was also shown in the report, but at the same time increased costs held

the profits below the previous six-months by some \$7,000. The development work was stated to be satisfactory. In connection with the Plenaurnum property, it is announced that the option has been extended to Dec. 31st, 1918. The Jupiter shaft has been completed to the 1000-ft. level, and a station is now being cut at this point. When this work is completed, a drift will be started east to explore the plenaurnum and the eastern portion of the Jupiter. The total footage of underground work accomplished during the last half of the year was 3,796. In addition to this, 2,739 ft. of diamond drilling was done. Development work throughout the property continued highly satisfactory. Drift No. 1026, on the 1000-ft. level of the main shaft, has penetrated the Jupiter claim for a distance of 600 ft. Owing to this drift being the main haulage way for ore coming from the Jupiter claims, it has been taken off the vein and is being driven through the quartz-porphry to make a direct connection with the Jupiter shaft. The territory lying to the north is being explored by diamond drill from this drift. Preparations are under way to sink the main shaft to a depth of 1,300 ft.

Hollinger.

The annual report of the Hollinger Consolidated Mines, of Porcupine, issued early this month, should prove pleasing to the shareholders of the company, particularly the statement made by the President, Mr. N. A. Timmins, that: "If labor conditions become no worse, an early resumption of dividends may be expected." Although holders of the stock did not receive much in dividends during the year just passed, it is gratifying to note that the ore reserves of the mine have increased from \$34,185,000 to \$40,231,000, or an increase of forty per cent. on the authorized capital of the company. Besides this, since the time of discontinuing the dividends a deficit of \$269,590, which stood on the books at the beginning of 1917, has been wiped out and a surplus of \$713,734 has been added. The expenditures for plant amounted to \$673,000, and \$131,224 was charged to capital development, with \$100,000 written off for plant depreciation. During the year just closed the company exposed \$10,300,000 in new ore. The estimate of the ore reserves was based on the territory above the 800-ft. level, while the president intimates that the ground below that level, being unexplored virgin territory, has enormous speculative value.

A portion of the new milling equipment is being tried out at the mine, and one unit of twenty stamps has already been tested and found to be operating satisfactorily. The plan adopted is to try one section at a time, and as one section of the new mill is found satisfactory, another is brought into play, and this will be continued until such time as new installation, with a capacity of one thousand tons per day, is brought into play. However, owing to the scarcity of labor as each section of the new mill is brought into use, a similar portion of the old mill is closed down, thus it will be seen that it is not certain that production will be greatly increased until such time as efficient labor becomes more plentiful. Wherever practicable, either on surface or underground, most modern equipment is being installed tending toward greater speed with smaller working forces. Thus, the Hollinger should be able to continue a very large output, despite the hardships of a prolonged war.

BRITISH COLUMBIA.

In the course of his address to the Legislative Assembly of British Columbia, when opening the Provincial Parliament, last month, His Honor the Lieutenant-Governor made the following references to matters relating to the mining industry:

"Owing to the existing conditions under which the precious and base metals in the Esquimalt and Nanaimo Railway belt, Vancouver Island, are held jointly by the railway company and the Province, you will be asked to consider the situation, to the end that the area involved may be given more attention by prospectors and investors.

"The disabilities against the acquisition of mineral claims under the mining laws of the Province now existing in Strathcona Park, Vancouver Island, will be removed, subject to restrictions as to the acquisition of surface and timber rights.

"My Government is securing the services of an expert to advise on the electro-thermic treatment of iron ores, and measures for the encouragement of iron and steel industries will be presented for your consideration."

Plans for Steel Works.—A press despatch from Vancouver, published in Victoria, reads as follows: "Mr. H. R. Tudhope, a member of the Orillia manufacturing firm which is behind the proposal to establish an electric smelting and steel-plate mill in Vancouver, accompanied by Mr. W. L. Renton, general manager of the Pacific Steel Co., and former vice-president and manager of the Electric Steel and Metals Co., of Welland, have returned to Vancouver from Victoria, where they had a lengthy session with Premier Brewster, Hon. J. W. de B. Farris, K.C., and Hon. William Sloan, Minister of Mines.

"Hon. Mr. Sloan expects to name within the next day or two the metallurgical expert who is to give an independent opinion upon the various questions involved in the proposals for establishing an electrical smelter and steel-plate mill. In the meantime, it is said, the representatives of the steel interests discussed with the members of the Cabinet most interested in the proposal many of the features and problems in connection with the proposal, and were accorded a friendly and sympathetic hearing.

"The Tudhope interests are behind both the Pacific Steel Company at Eburne and the Aetna Steel Works at Port Moody, both of which plants are now undergoing change from oil-burning furnaces to electrical furnaces and other improvements to increase their production of steel fivefold. Pending the opening of iron ore deposits which the new furnaces being installed are said to be capable of handling, the two plants are working on scrap material, which is melted and rolled into rods, angle irons and other forms of iron and steel needed in ship work."

Vancouver Island Moves, Too.—Public bodies on Vancouver Island are also active, in efforts to secure the establishment of an iron and steel industry on the Island. A representative Central Iron Committee has been formed and a numerous delegation from it has waited on the Provincial Minister of Mines with the object of ascertaining what action the Provincial Government proposes to take with respect to utilizing the iron ore deposits of the Province. This committee has formulated proposals which are, briefly, to ask the Provincial Government to immediately proceed with the selection of a fully qualified iron expert and metallurgist to examine and report on the iron ore de-

posits of Vancouver Island and the adjacent islands as well as the necessary elements required for the production from those deposits of pig iron, and to appropriate the necessary money for the carrying on of these experiments, such experts to be independent and not associated directly or indirectly with any corporation or person connected with the iron and steel industry; that the Government immediately place a reserve on all unstaked iron lands on Vancouver Island or adjacent islands; that power be given the Minister of Mines to take steps to operate these iron mine claims and that the Government restrict the exportation of raw iron ores similar to the way the exportation of timber from the Province is now being restrained.

It is considered by the committee that the first logical step in their undertaking is to secure to the Province its resources by means of amending legislation which the local Government will be urged to bring down in course of the present session of the Legislature. The object of this is to forestall the stealing away of the iron resources through purchase by agents of existing corporations, to whom an industry of the proportions desired here would eventually become a competing factor. Being able thus to guarantee an unrestricted supply of raw material, the committee proposes to approach the Dominion Government for aid to development by way of a bonus, or such assistance as may seem advisable, as a war measure.

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, 17 cents per lb.

Feb. 26, 1918—(Quotations from Canada Metal Co., Toronto).

Spelter, 11 cents per lb.
Lead, 9 cents per lb.
Tin, 88 cents per lb.
Antimony, 17 cents per lb.
Copper, casting, 31 cents per lb.
Electrolytic, 32 cents per lb.
Ingot brass, yellow, 20 cents; red, 26 cents per lb.

Feb. 26, 1918—(Quotations from Elias Rogers Co., Toronto).

Coal, anthracite, \$10.00 per ton.
Coal, bituminous, nominal, \$9.50 per ton.

SILVER PRICES.

	New York cents.	London pence.
Feb. 14	85½	42¾
Feb. 15	85½	42¾
Feb. 16	85½	42½
Feb. 18	85½	42½
Feb. 19	85½	42½
Feb. 20	85½	42½
Feb. 21	85½	42½

NEW YORK MARKETS.

Connellsville Coke—
Furnace, *6.00.
Foundry, *7.00.
Crushed, over 1-inch:
Beehive, *7.30.
*Fixed under Lever Act.
Straits Tin, spot, f.o.b. none offering.
Copper—
Prime Lake, 23.50.

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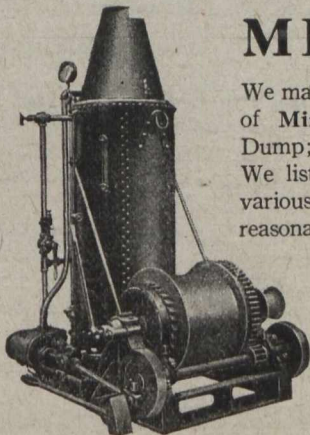
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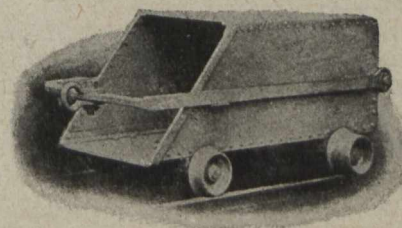


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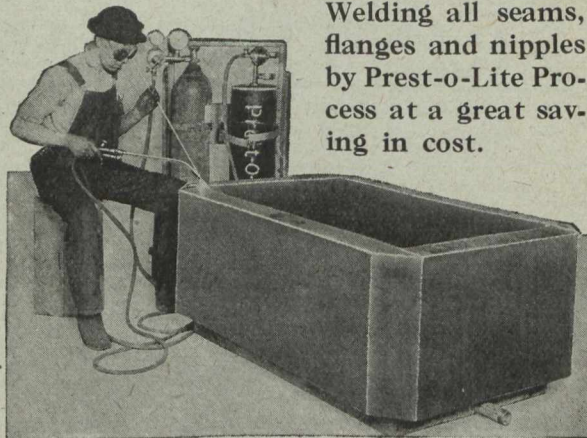
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 Sq. and rectangular, 33.50.
 Copper wire—Base prices.
 nominal, 27.00.
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 Rods, 24.75 to 26.75.
 Low brass—
 Sheets and wire, 30.00 to 32.00.
 Rods, 30.75 to 32.75.
 Brazed tubing—
 Brass, 34.75 to 36.75.
 Bronze, 39.75 to 41.75.
 Seamless tubing—Base prices.
 Brass, 35.50 to 37.50.
 Copper, 38.00 to 40.00.
 Bronze, 42.50 to 43.50.
 Full lead sheets, 9.25.
 Cut lead sheets, 9.50.
 Sheet zinc, f.o.b. smelter, 15.00.

STANDARD MINING EXCHANGE.

Messrs. J. P. Bickell & Co. report the following closing quotations on the Standard Stock and Mining Exchange, Feb. 25, 1918:

Gold.		
	Bid.	Asked.
Apex .....	.047 $\frac{1}{8}$	.05 $\frac{1}{4}$
Boston Creek .....	..	..
Dome Extension .....	.09 $\frac{3}{4}$	.10 $\frac{1}{2}$
Dome Lake .....	.26	.27
Dome Mines	8.50	8.75
Imperial .....	.017 $\frac{1}{8}$	.02 $\frac{1}{4}$
McIntyre	1.40	1.41
Hollinger	4.95	5.00
New Ray .....	.21	.21 $\frac{1}{2}$
Porcupine Crown .....	.17 $\frac{1}{2}$	.20
Vipond .....	.22	.25
Preston East Dome .....	.03 $\frac{3}{8}$	.03 $\frac{1}{4}$
Teck-Hughes .....	.50	.51
West Dome .....	.11 $\frac{1}{4}$	.11 $\frac{3}{4}$
Silver.		
	Bid.	Asked.
Adanac .....	.09	.10
Bailey .....	.04	.05
Beaver .....	.24 $\frac{1}{2}$	.26
Buffalo .....	..	..
Ferland .....	..	.10 $\frac{1}{2}$
Coniagas	3.15	..
Crown Reserve .....	.21	.25
Gifford .....	.03 $\frac{1}{4}$	.03 $\frac{3}{4}$
Great Northern .....	.03 $\frac{1}{2}$	.04
Hargraves .....	.06 $\frac{3}{4}$	.067 $\frac{1}{8}$
Hudson Bay .....	..	37.00
Kerr Lake	5.45	5.70
La Rose .....	.31	.36
McKinley .....	.51	.52
Nipissing	8.35	8.40
Peterson Lake .....	.09 $\frac{1}{4}$	.10
Right of Way .....	.03 $\frac{1}{2}$	.03 $\frac{3}{4}$
Seneca Superior .....	..	.01 $\frac{1}{2}$
Temiskaming .....	.28	.28 $\frac{3}{4}$
Trethewey15 $\frac{1}{4}$.15 $\frac{3}{4}$
Wettlaufer05 $\frac{1}{2}$.06 $\frac{1}{2}$
Provincial50 $\frac{1}{2}$.51 $\frac{1}{2}$
Mining Corporation	3.70	3.80

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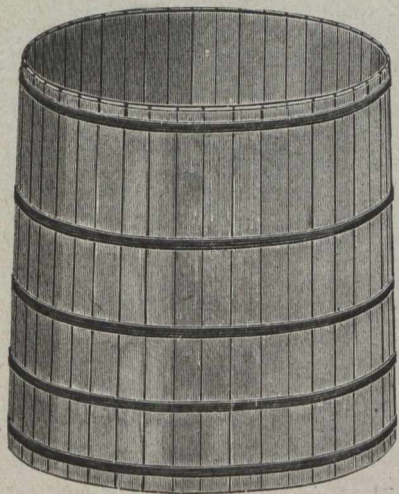
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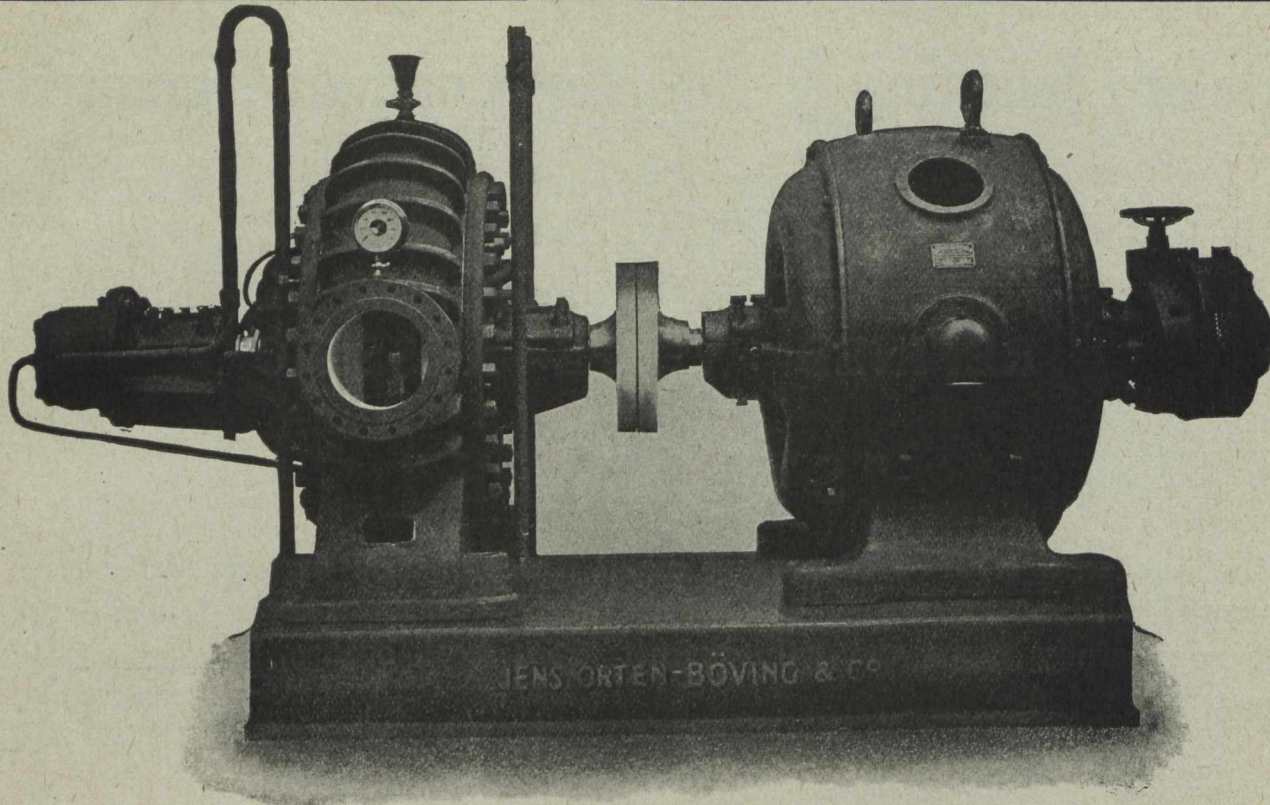
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Pursuant to Power Commission Act, 6 Geo. V., Chapter 19, Section 37, 1916, and amendments thereto, and the Rules and Regulations of the Hydro-Electric Power Commission covering the design and construction of electrical machinery, apparatus, appliances, devices, material and equipment for use in the generation, transmission, distribution or use of electric power or energy in the Province of Ontario, in connection with any electrical installation or wiring for electric light, heat or power, where the electric pressure delivered to or from the same exceeds 10 volts, manufacturers of, jobbers, agents and dealers in electrical machinery, apparatus, appliances, devices, material and equipment, and others interested are hereby notified that the Commission orders that on and after three months from date of this notice no such electrical machinery, apparatus, appliances, devices, material or equipment used, or to be used, as above may be used or disposed of in the Province of Ontario unless and until the design and construction of same has been submitted to the Hydro-Electric Power Commission of Ontario, and approval of such has formally been obtained.

By order,

The Hydro-Electric Power Commission of Ontario

W. W. POPE, Secretary

Toronto, December 26, 1917.

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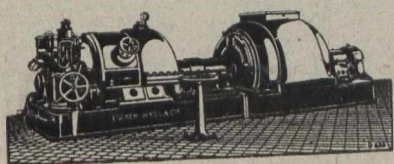
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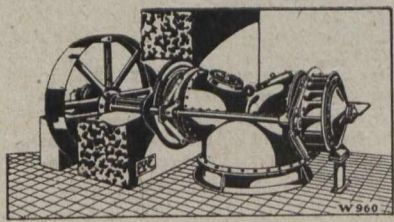
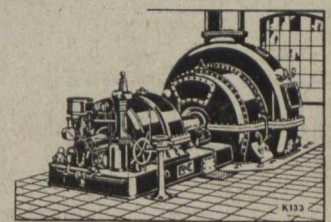
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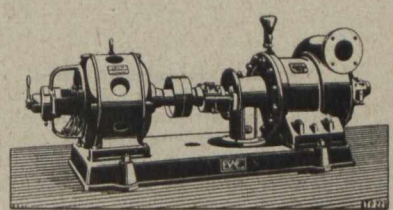
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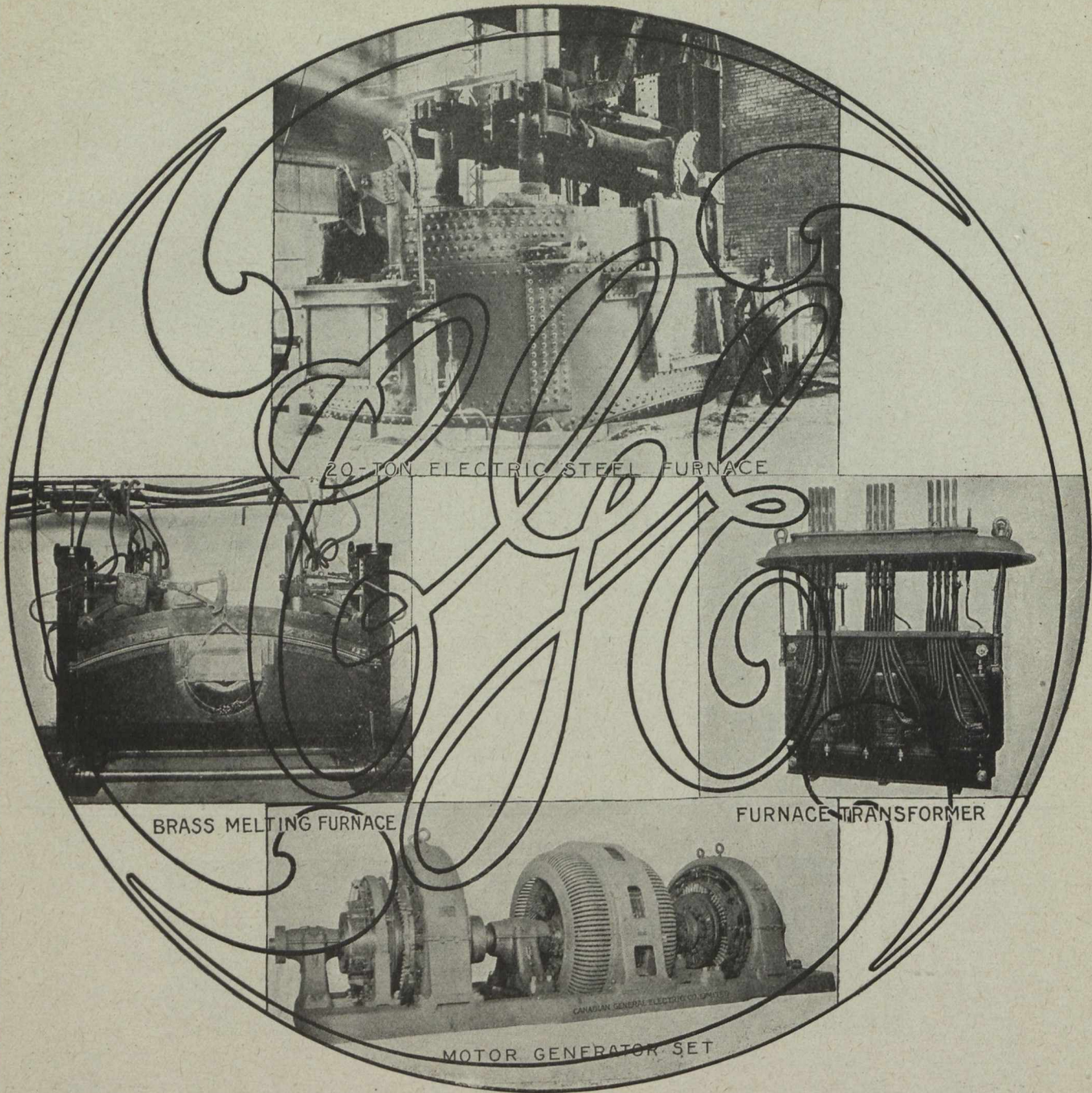
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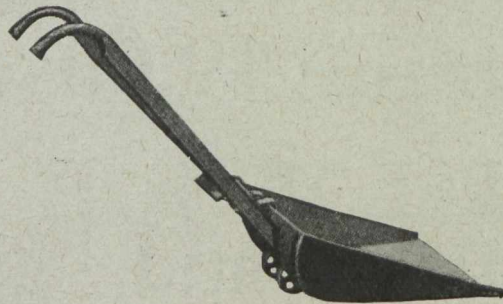
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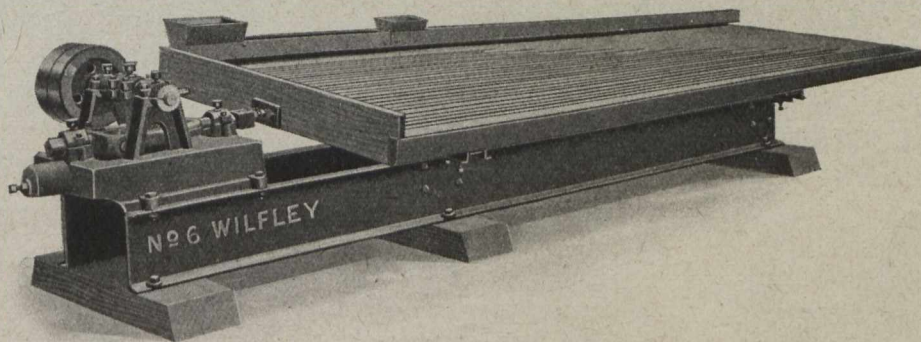
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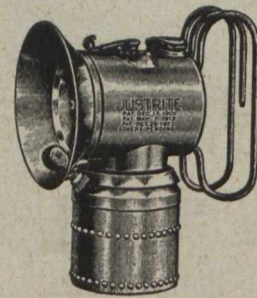
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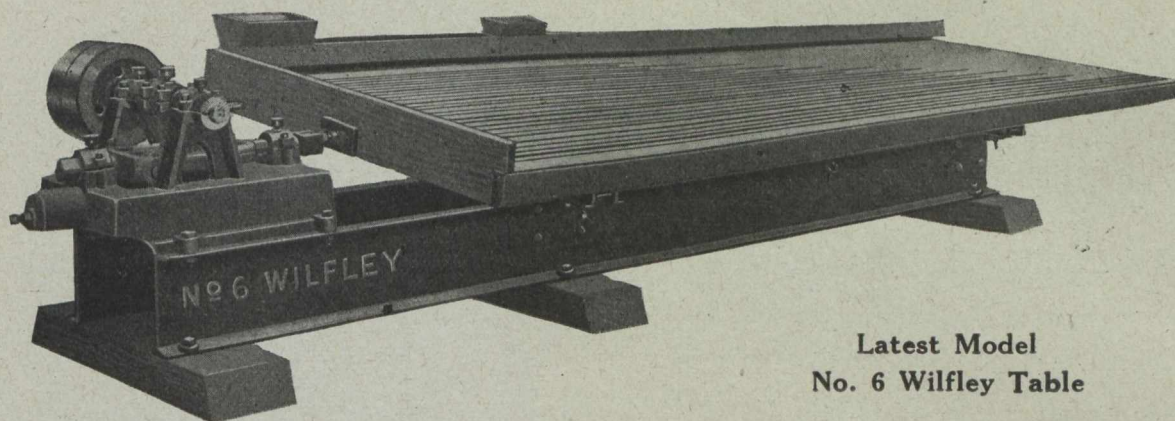
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Recent Publications

- Iron Ore Occurrences in Canada, Vol. 1. Compiled by E. Lipdeman, M.E., and L. L. Bolton, M.A., B.Sc. Introductory by A. H. A. Robinson, B.A.Sc.
- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (Western Provinces). Vol. IV., by W. A. Parks, Ph.D.
- Feldspar in Canada. Report on, by H. S. de Schmid, M.E.
- Peat, Lignite and Coal; their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Mineral Production Reports, by J. McLeish, B.A.
- The Coal-fields and Coal Industry of Eastern Canada, by F. W. Gray.
- The Value of Peat Fuel for the Generation of Steam. Bulletin No. 17, by John Blizard, B.Sc.
- Cobalt Alloys with Non-corrosive Properties. Report on, by H. T. Kalmus, B.Sc., Ph.D.
- Mining of Thin Coal Seams of Eastern Canada, by J. F. K. Brown.
- The Mineral Waters of Canada. Vol. I., by John Satterly, M.A., D.Sc., and R. T. Elworthy, B.Sc.

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

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

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

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

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

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

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

GEOLOGICAL SURVEY

Recent Publications

- Memoir 92. Part of the District of Lake St. John, Quebec, by John A. Dresser.
- Memoir 93. The Southern Plains of Alberta, by D. B. Dowling.
- Memoir 95. Onaping Map-Area, by W. H. Collins.
- Memoir 96. Sooke and Duncan Map-areas, Vancouver Island, by C. H. Clapp.
- Memoir 97. Scroggie, Barker, Thistle and Kirkman Creeks, Yukon Territory, by D. D. Cairnes.
- Memoir 98. Magnesite Deposits of Grenville District, Argenteuil County, Quebec, by M. E. Wilson.
- Memoir 99. Road material surveys in 1915, by L. Reinecke.
- Memoir 101. Pleistocene and recent deposits in the vicinity of Ottawa, with a description of the soils, by W. A. Johnston.
- Memoir 102. Espanola district, Ontario, by Terence T. Quirke.
- Map 63A. Moncton Sheet, Westmorland and Albert Counties, New Brunswick. Topography.
- Map 154A. Southwestern Yukon.
- Map 157A. East Sooke, Vancouver Island, British Columbia. Topography.
- Map 161A. Beaverton Sheet, Ontario, York and Victoria Counties, Ontario. Topography.
- Map 162A. Sutton Sheet, York and Simcoe Counties, Ontario. Topography.
- Map 163A. Barrie sheet, Simcoe county, Ontario. Topography.
- Map 167A. East Sooke, Vancouver Island. Geology.
- Map 168A. Deposits of stone and gravel available for a highway between Ottawa and Prescott, Ontario.
- Map 1662. Ottawa, Carleton and Ottawa counties.
- Map 1665. Stone available for road material, Hull to Grenville, Quebec.
- Map 1667. Slocan Mining Area, Kootenay District, B.C.
- Map 1677. Coleraine Sheet, Megantic and Wolfe Counties, Quebec.
- Map 1692. Amisk and Athapapuskow lakes, Saskatchewan and Manitoba.
- Maps 1697 and 1698. Explored routes in a belt traversed by the Canadian Northern Ontario railway,—in two sheets: Sheet 1 Gogama to Missonga, Sudbury district; Sheet 2 Oatland to Penhurst, Algoma district, Ontario.
- Applicants for publications not listed above should mention the precise area concerning which information is desired.
- Maps published within recent years may be had, printed on linen, at the nominal cost of ten cents each.
- The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon.
- Communications should be addressed to **The Director, Geological Survey, Ottawa.**

To Users of the Callow Pneumatic Flotation Cell

USERS of the Callow Cell are naturally interested in knowing how the decision of the United States Circuit Court of Appeals for the Third District, in the Miami case, will affect their interests.

As we understand the prevailing opinion of Judge Woolley in the Miami case he has interpreted the Supreme Court decision in the Hyde case as meaning that "*invention resides not alone in the critical proportion of oil, but also in air and agitation,*" and again, "*in the co-action of the critical proportion of oil and air effected by 'an agitation greater than, and different from that which had been resorted to before,' resulting in a froth concentrate of economical value,*" and further, that the Supreme Court did not limit the patent to "*agitation by mechanical means,*" but to agitation of a violent and persistent kind; "*it mixes the oil with the metal of the ore. This is old. Then, by its greater intensity and longer duration, it stirs the pulp into a froth.*"

Thus, this decision of the Third Circuit Court of Appeals has a most important bearing upon the art, because it holds that the mixing of the oil with the mineral is old, but it **leaves open the use of oil in connection with aeration-cells.**

Meanwhile the idea of a "*critical*" proportion of oil has been dis-

proved by practice in several mills within a short time after it was promulgated.

Judge Woolley says further, concerning the Callow Cell: "*Aeration is direct, and is not the result of or caused by agitation. On the contrary, agitation results from aeration and such agitation, though present in some measure, is not even approximately of the violence and duration of the agitation of the patent. The operation in the Callow Cell certainly possesses these distinguishing features from operation of the process where aeration is caused by agitation.*"

The Court further confirms this important dictum by saying: "*If the only agitation to which the pulp was subjected (after such agitation as in the prior art was necessary to mix the oil and ore) was the agitation of the Callow Cells, we would not say that that agitation amounted to or was the equivalent of the violent agitation of the patent disclosure and constituted infringement.*"

Apparently users of the Callow Cell may feel assured they do not infringe the method of agitation described in U.S. Patent No. 835,120 (less than 1% oil), No. 962,678 (soluble frothing agents), No. 1,099,699 (phenol or cresol in the cold without acid) since all three of the patents are of the same process, dependent upon a certain degree of violence and length of agitation and the production of the same characteristic froth, as set forth in their claims.

(Signed) J. M. Callow.



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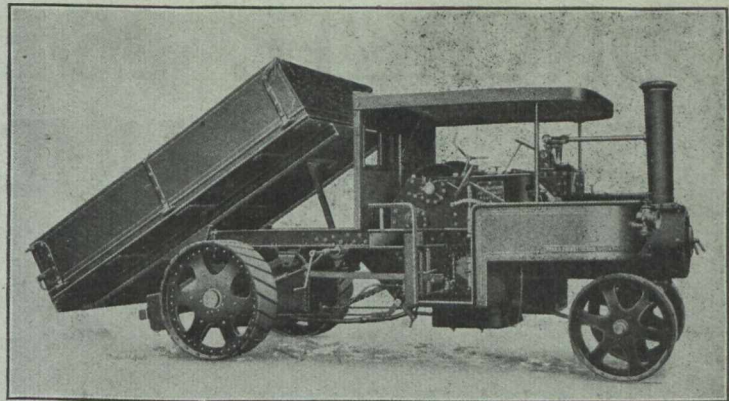
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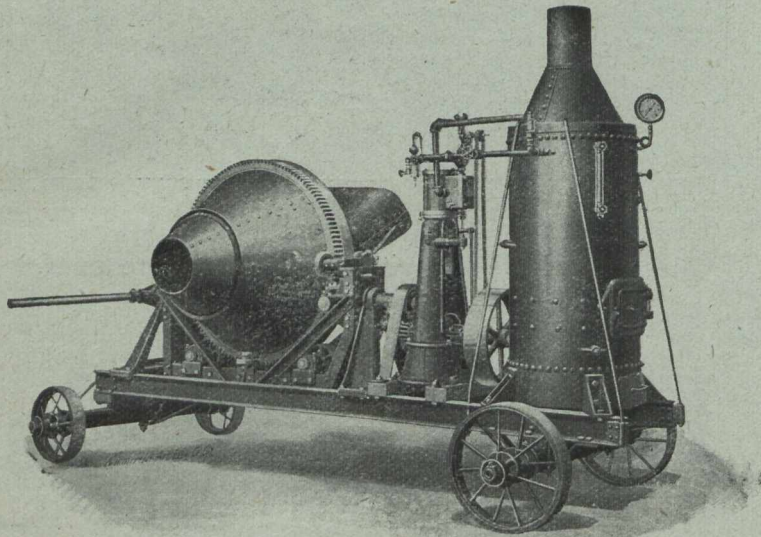
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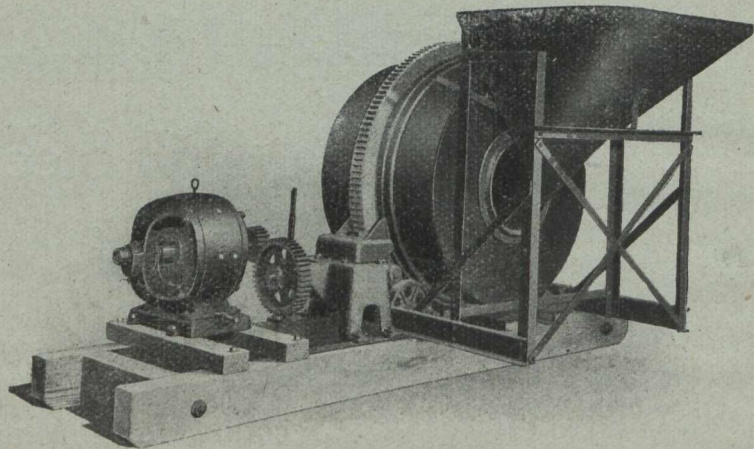
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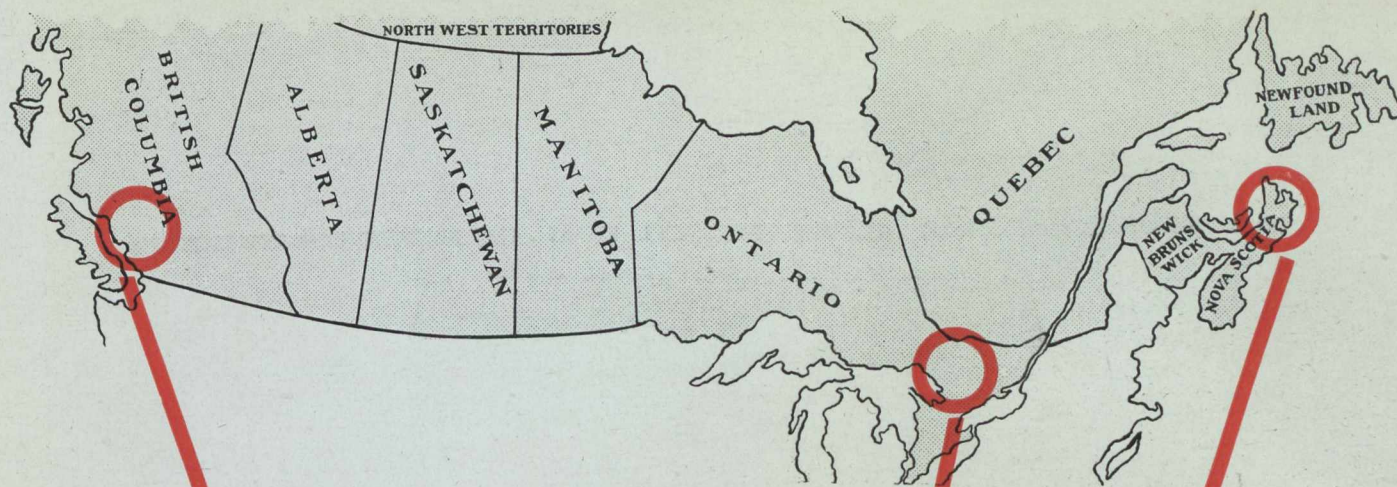
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- Steel Drills—**
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Northern Canada Supply Co.
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Marsh Engineering Works.
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Destination—Stellarton, N.S.
Buyer—Acadia Coal Co., Limited.

Material—Complete TRANSFORMER STATION, 600 k.w., 12,000—2,200—550 v., including switchboards, instruments, oil switches, insulators, electrolytic arresters, etc.

Shipment—Five days after inspection.

OUR MONTHLY LIST

Is your name on our mailing sheet?

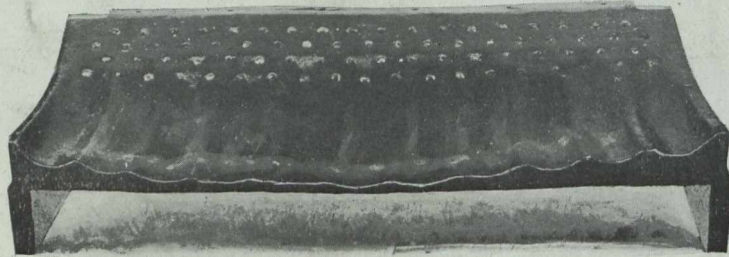
BURNS AND ROBERTS

Bank of Hamilton Building

TORONTO



A Plate with a Record



THE above illustration shows one of our Chromic Steel Grinding Plates for a No. 8 Krupp Ball Mill, after giving 1,000 hours longer wear than any plate used, and still in use.

Liners for Kominuters, Hardinge Conical Mills and Shoes and Dies made from the same material giving the same results.

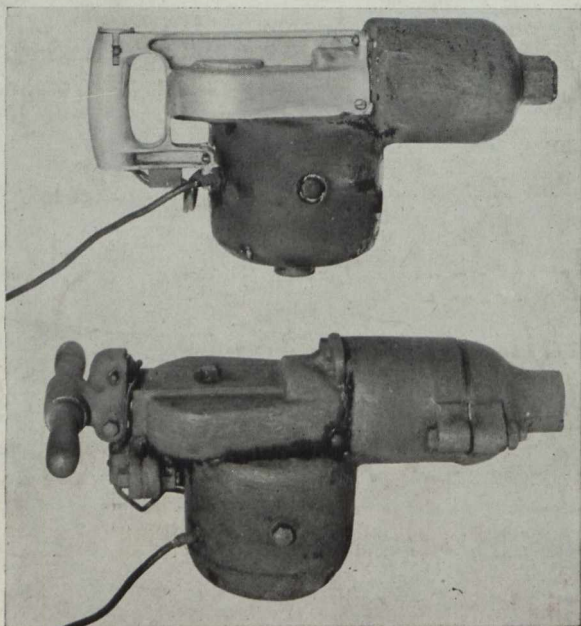
CHEGUN Hard Iron Liners for all types of Tube Mills.

Hull Iron & Steel Foundries, Ltd. HULL,
QUE.

Canadian Representatives: HARDINGE CONICAL MILL COMPANY

Aikenhead's

*Indispensable
for Mining
Operations*



Electro Magnetic Rock Hammers

These tools will do the work of pneumatic tools of like capacity at about 15% of the power cost and without the expense and inconvenience of compressor, air piping, hose, etc. Over hand work, the economy is from 80% to 90% and it is by no means uncommon for a tool to save its cost in a week.

Materials and workmanship are of the best and all parts are made to gauges and are interchangeable. Each tool is complete with flexible wire and plug and may be connected directly to any lamp socket.

FOR FULL PARTICULARS WRITE

Aikenhead Hardware Limited, 17-21 Temperance St., Toronto, Can.