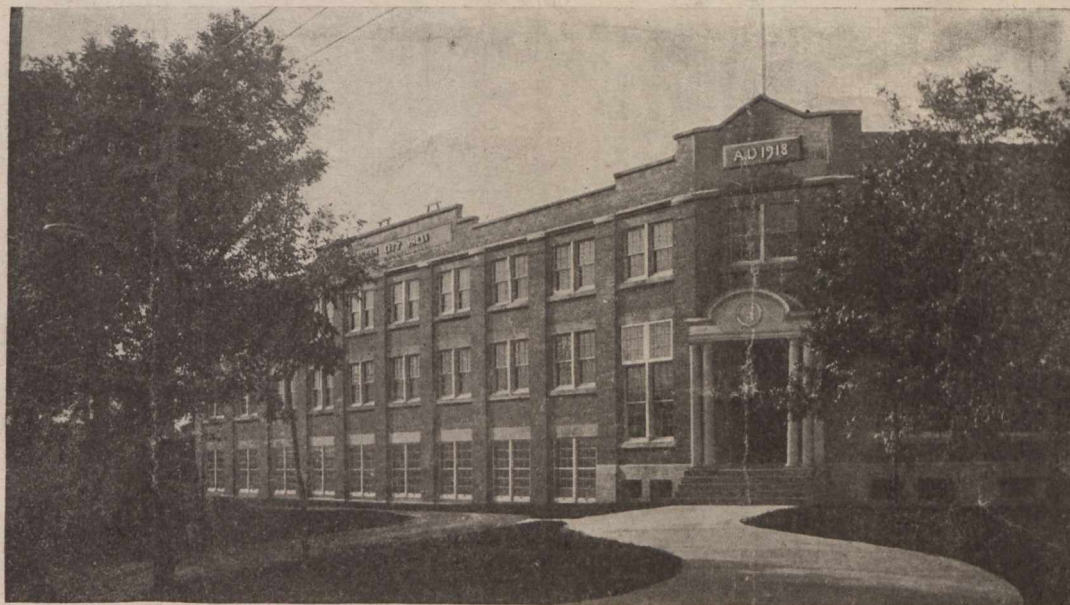


# CANADIAN MINING JOURNAL

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No. 51



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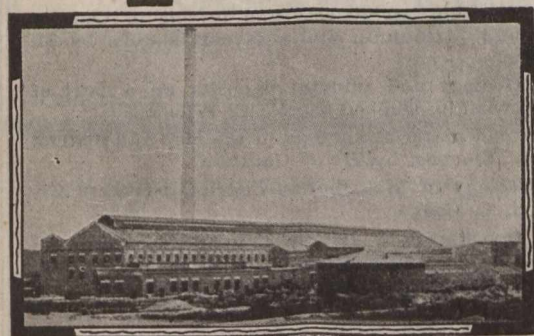
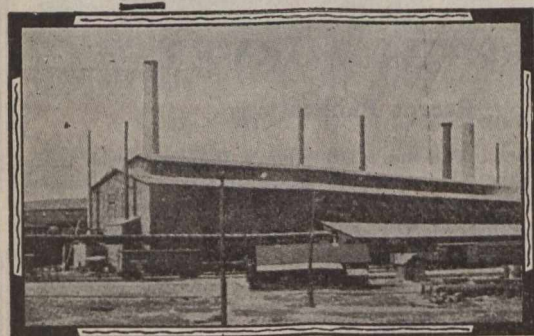
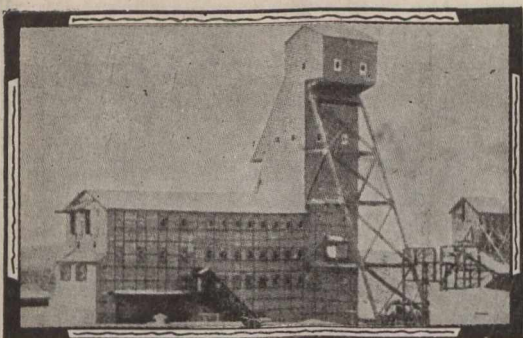
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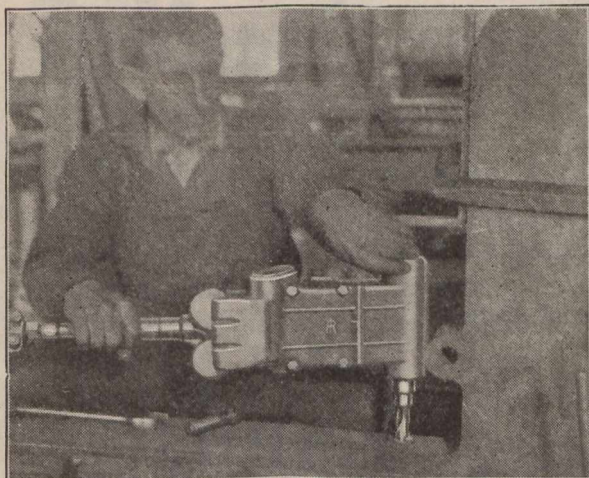
- Results of forty-one Steaming Tests conducted at the Fuel Testing Station, by John Blizard and E. S. Malloch.
- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (British Columbia). Vol. V., by W. A. Parks, Ph.D.
- Peat, Lignite and Coal; their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Mineral Production Reports, by J. McLeish, B.A.
- The Coal-fields and Coal Industry of Eastern Canada, by F. W. Gray.
- The Value of Peat Fuel for the Generation of Steam, by J. Blizard, B.Sc.
- Analyses of Canadian Fuels. Parts I to V, by E. Stansfield, M.Sc., and J. H. H. Nicolls, M.Sc.
- Graphite, by H. S. Spence.
- Summary Report of the Mines Branch, 1918.
- The Helium Sources of the British Empire, by D. J. McLennan and others.
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### GEOLOGICAL SURVEY

#### Recent Publications

- Summary Report. The annual Summary Report of the Geological Survey is now printed in parts. Applicants should therefore, state what particular geologist's report is required, or what subjects they are interested in.
- Memoir 105. Amisk-Athapuskow Lake district, by E. L. Bruce.
- Memoir 108. The Mackenzie River basin, by Charles Camsell and Wyatt Malcolm.
- Memoir 110. Preliminary report on the economic geology of Hazelton district, British Columbia, by J. J. O'Neill.
- Memoir 111. The Silurian geology and faunas of Ontario peninsula and Manitoulin and adjacent islands, by M. Y. Williams.
- Memoir 113. Geology and mineral deposits on a part of Amherst township, Quebec, by M. E. Wilson.
- Memoir 114. Road material surveys in the city and district of Montreal, Quebec, by Henri Gauthier.
- Memoir 115. Geology of Matachewan district, Northern Ontario, by H. C. Cooke.
- Memoir 116. Investigations in the gas and oil fields of Alberta, Saskatchewan and Manitoba, by D. B. Dowling, S. E. Slipper and F. H. McLearn.
- Memoir 117. Geology and ore deposits of Ainsworth mining camp, British Columbia, by S. J. Schofield.
- Museum Bulletin 30. Gabbros of East Sooke and Rocky Point, by H. C. Cooke.
- Map 164A. St. John, New Brunswick. Topography.
- Map 183A. Harricanaw-Turgeon basin; Abitibi, Timiskaming and Pontiac, Que. Geology.
- Map 185A. Sandon (Slocan and Ainsworth Mining Divisions). Topography.
- Map 1584. Blairmore, Alberta. Geology.
- Map 1691. Buckingham, Hull and Labelle counties, Quebec. Geology.
- Map 1705. Thetford-Black Lake area, Quebec. Topography.
- Map 1707. New Glasgow, Pictou county, N.S. Topography.
- Map 1712. Foothills of Southern Alberta, St. Mary river to Highwood river. Geology.
- Map 1724. Sheep River, Alberta. Geology.
- Map 1726. Athapuskow Lake region. Geology.
- Map 1739. Portions of Bristol, Onslow, McNab, Fitzroy and Torbolton townships, Quebec and Ontario. Geology.
- Map 1742. Ainsworth, Kootenay district, B.C. Geology.
- Map 1793. Matachewan, Timiskaming district, Ontario. Geology.
- Applicants for publications not listed above should mention the precise area concerning which information is desired.
- 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.
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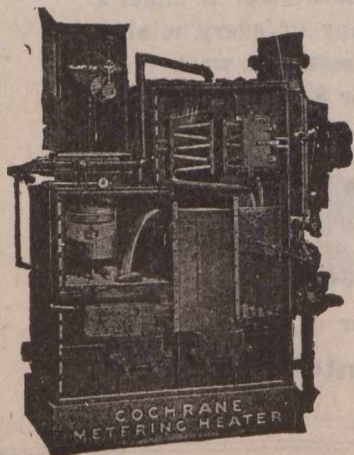
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Ontario in 1919 produced 38 per cent. of the total mineral output of Canada. Returns show the output of the mines and mineralogical works of the Province for the year 1919 to be worth \$58,583,916, of which the metallic production was \$41,590,759.

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For list of publications, illustrated reports, geological maps and mining laws, apply to

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Valuable economic minerals, of which the people of this country as a rule have little knowledge, are distributed in various sections served by the Canadian National Railways. The field of utility for these minerals is constantly expanding and entering more and more into the realm of manufacture.

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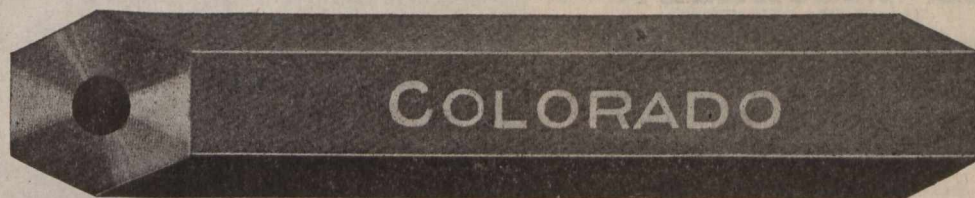
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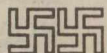
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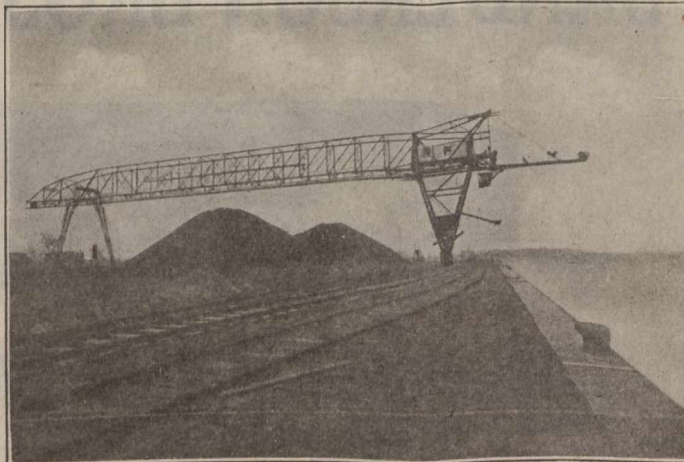
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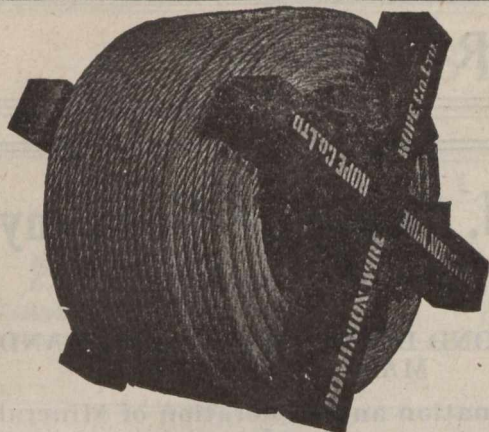
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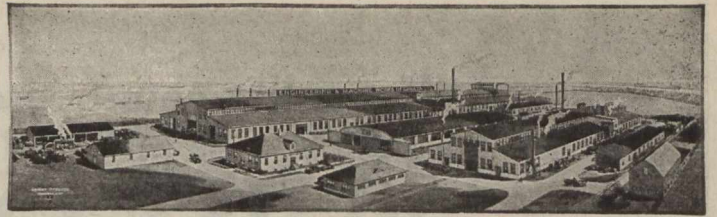
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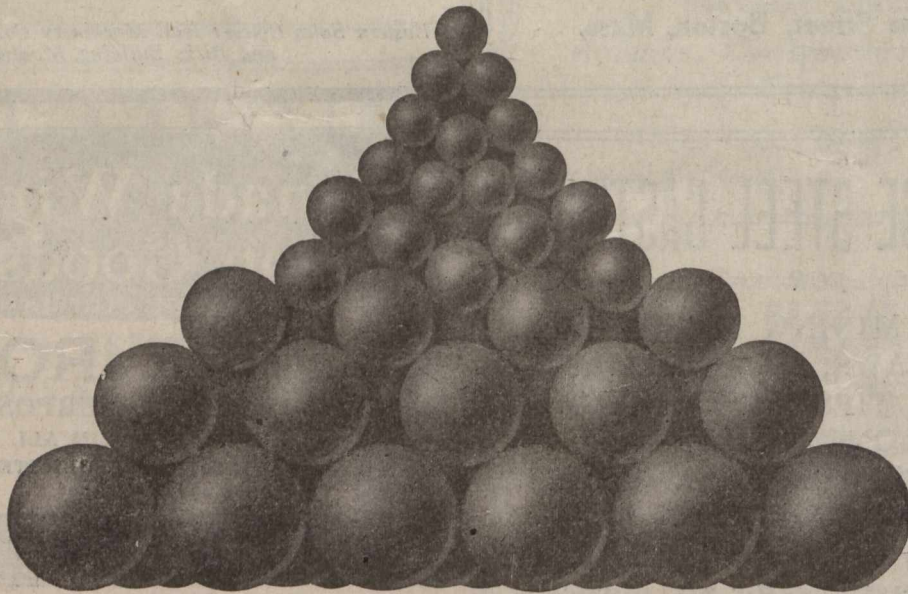


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PUBLISHED WEEKLY.

Devoted to the Science and Practice of Mining, Metallurgy and the Allied Industries; and more particularly to their progress in Canada.

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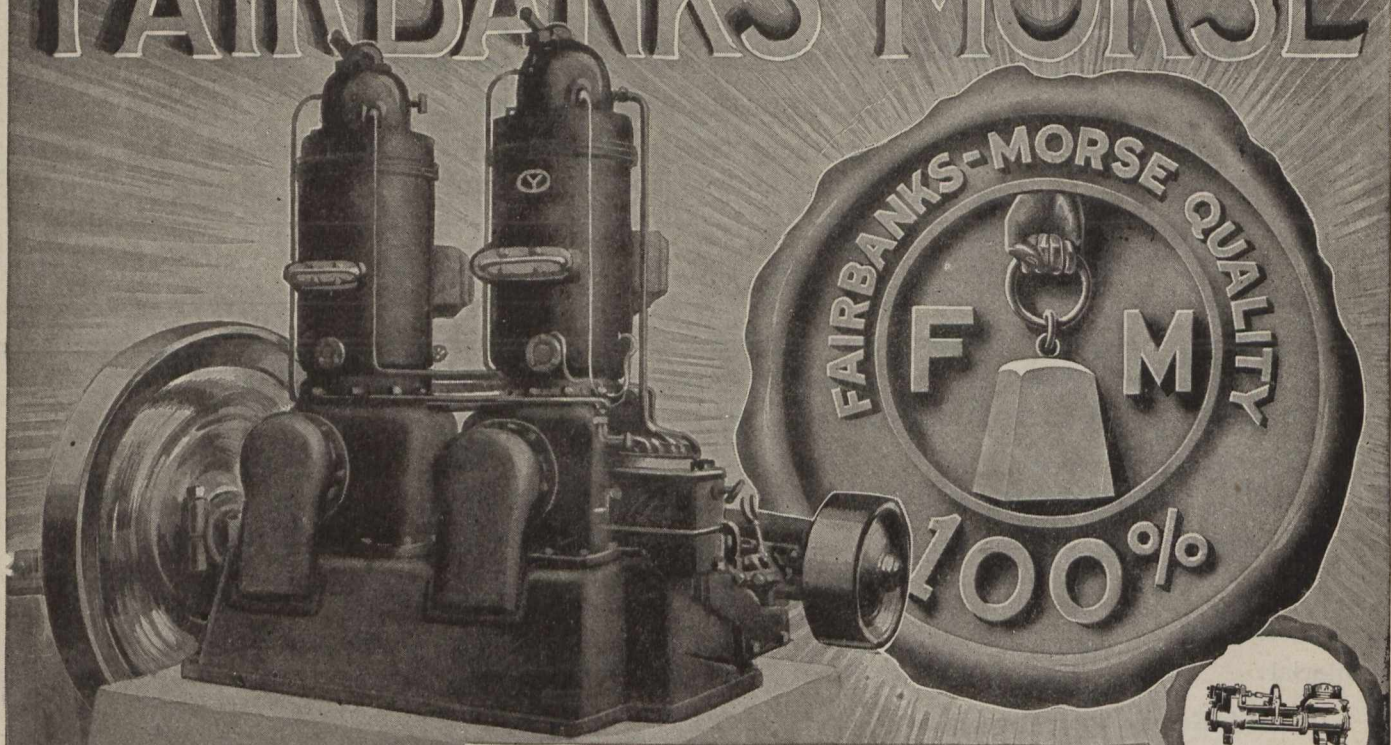
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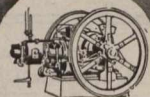
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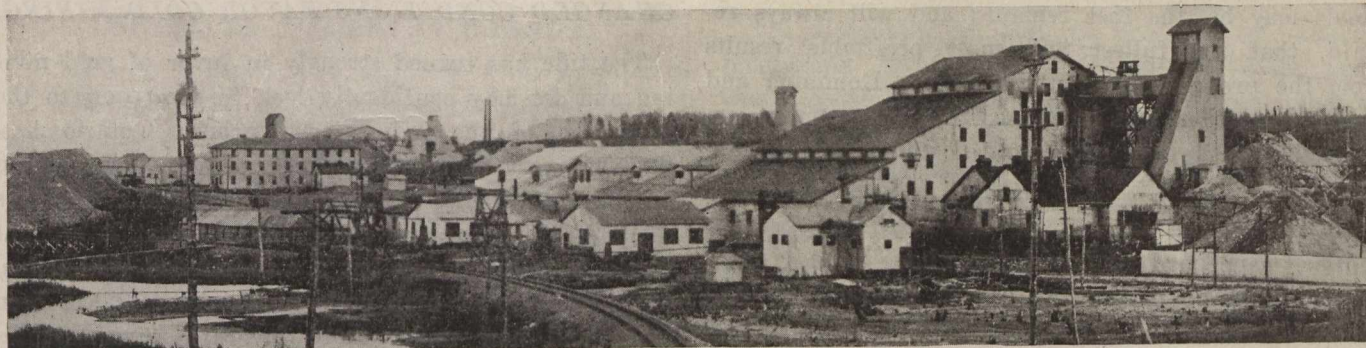


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## EDITORIAL

### British Empire Steel Corporation Ltd.

The formation of British Empire Steel Corporation, Ltd., will not, it is understood, now proceed to final consummation as originally projected. The most important clause in the agreement for consolidation which was approved by the directorates and shareholders of the Dominion Steel Corporation and the Nova Scotia Steel and Coal Company, was the provision, in Canadian funds, of twenty-five million dollars of new working capital. It was also part of the agreement that twenty million dollars of the new money was to be devoted to the development of the coal, iron-ore and limestone mines and quarries, and the steel-making and transportation operations of the two companies named in Nova Scotia.

The raising of the required sum, and its transference to Canada, has proved too difficult except at a ruinous discount in underwriting costs and exchange, and, also, the complexion of business has so changed since the project was mooted in the Spring as to make the flotation of stock issues in Britain more difficult than previously.

The attitude of the Street towards the securities of the constituent companies of the proposed consolidation has been as paradoxical and as little related to facts as that attitude usually is. When the idea was first mooted it was used to "bear" the securities, and when it was evident that the project was about to fail of fulfillment, it was again regarded as a reason for selling the securities affected. It is difficult to see how both views can be accurate. One thing which is quite certain at this time is that the securities of the coal and steel companies concerned, both senior and junior securities, are selling far below their intrinsic value when the physical assets are reckoned up.

The proximate reason for the consolidation which was projected was the necessity, arising from technical reasons, for the operation of the coal and iron-ore areas of the Dominion Steel Corporation and the Nova Scotia Steel and Coal Company under single management. This primary and compelling reason still exists, but it has been much emphasized in the

meantime by the advantages that have actually been experienced from close co-operation of the managements of the Dominion and Scotia companies, and reciprocal agreements with regard to the mining of abutting and intervening areas that have already led to increased production, lessened expenditures and the testing of areas that had been held out of operation by the exigencies of lease interference. The chief reason why the coal and iron-ore properties of the Dominion and Scotia companies can be best worked under single management is that their division was an initial error. The system under which the coal areas of these two companies have been divided up has had the effect of sundering that which nature intended should remain one. The separation of the coal areas has lessened their value, and consolidation would increase their value. What is true of the coal areas in Cape Breton is equally true of the iron-ore areas at Wabana. The merged value of the properties of the Dominion and Scotia companies—to their shareholders and to the public and the Province of Nova Scotia—is greater than their sum when separately calculated.

The "Canadian Mining Journal" has taken the view from the first mention of the consolidation of the Dominion and Scotia properties; held the view before consolidation was mooted, and still maintains, that the proposal was above everything a measure of necessity and self-defence.

We objected to unrestrained statements which intimated that the British Empire Steel Corporation would become a serious rival to the United States Steel Corporation, and would be able to compete with the world in sales of coal and steel products. The actual sentiment which probably inspired the glowing cables that came to this side from London, respecting the prospects of the proposed amalgamation, was a feeling that only through consolidation of conflicting interests and consequent economies could the coal of Nova Scotia, and the steel products made with the help of that coal, hope to enter the markets of the world.

No matter what the course of the consolidation pro-



posals may be, the fact remains, and will always remain, that the fullest and most profitable results from the properties and plants of the Dominion and Scotia companies will be missed and will remain unattainable until they are operated under single management.

So far as the interest of the Province of Nova Scotia is concerned, its Legislatures have already made it clear that no diminution of the productivity and profitableness of the coal areas owned by the Province will be allowed to occur through existing lease divisions, and power has been taken to make such corrections in lease allotments as may be found necessary to bring about thoroughly workmanlike and technically correct exploitation of the remaining unworked portion of the coal fields.

Our comment has touched only one side of the proposed merger, namely the consolidation of the Dominion and Scotia companies, because it is the essential aspect. The larger proposals, which included transportation and shipbuilding interests, were made possible only by the basis provided by the coal and steel companies in Nova Scotia. The advisability of extending the scope of the consolidation involves a matter of opinion, and this journal will not venture an opinion thereon as it is outside the scope of mining activities, and essentially a financial consideration. The considerations however that counsel consolidation of the coal and steel operations are not matters of opinion, but questions of fact. That this is so evident from the co-operation between the directorates and management of the Dominion and Scotia companies now existent. We would assume therefore that a consolidation of the two companies is a certainty of the future. There are other considerations, irrelevant to the main issue in the eyes of the mining engineer, but considered important in other respects, which may delay the actual event, but it must ultimately take place.

If the modified project, which is intimated may result from the abandonment of the original proposals, should include such users of steel products as the Halifax Shipyards and the nail factories in the Maritime Provinces, it would be a logical proceeding, and in line with a number of similar combinations that have taken place in Great Britain since the Armistice. All these projects have been the result of attempts to utilize the heat of coal fuel, and its by-products, by disposition of major operations of steel manufacture so that coke-oven gases, blast-furnace gases, producer gases and every other product of the combustion of coal shall be utilized to the last pound of recoverable chemical compounds, and the last heat unit.

At this time, with the steel market depressed and demand suppressed, the excellence of coal as an asset, and as a backlog to associated steel enterprises is manifest.

#### CHANGED CONDITIONS FAVOR GOLD MINING.

The tide has turned strongly in favor of gold mining and we may confidently look forward now to the expansion of the industry. Northern Ontario has, during a very unfavorable period of high prices, given substantial evidence of its coming greatness as a source of gold. The war and the conditions that it brought would have killed any but a well-founded gold industry. In spite of high costs much progress has been made and now under more favorable circumstances exploration and development should soon begin again. It will be some time before the work is well under way; but the improvement is already noticeable.

One factor which will obscure for the immediate future the great change in conditions is the shortage of power at the producing gold mines. An unusually dry fall has left the mines short of water for their power plants and it is impossible just now to take full advantage of the situation. Labor is plentiful and increased efficiency is to be expected; but the lack of water will seriously interfere with production and will prevent the operators from laying aside their troubles for a few months yet.

During the past week there has been some rain in the basins drained by the rivers that furnish power for the mines. This has given some additional water and is welcomed; but is regarded merely as a temporary relief. A real January thaw that will turn the quiet streams into torrents is much to be desired. It may come when there is abundance of snow; but until it does the production of gold will not increase with the speed that it otherwise would.—R. E. H.

#### CHRISTMAS, 1920.

The Editor takes a second opportunity to wish the readers of the "Canadian Mining Journal" a very Happy Christmas.

In our issue of a year ago it was observed that Canada was a good land and a vast one, well-known to the Canadian miner, who usually has seen it first. The goodness of the land is even more apparent than it was last Christmas. Within the year that has passed Canada's known possessions in gold, silver, petroleum, zinc and coal have been notably enlarged. New processes have added to the value of our minerals.

Compared with Europe and Asia our country is indeed a happy one. Neither civic disturbance or physical calamity has visited us. Our statesmen have upheld Canada's place among the nations of the world, and, because of paradoxical happenings and the unintentional functioning of the dead hand of precedent, Canada has been required to represent and interpret North America to a badly wounded civilization across the seas.

There are some drawbacks to national complacency, that need not be catalogued at this time, but, on the whole, there is no country in the world where the Christmas season brings more real basis for happiness than in Canada.

The "Journal" extends to its readers its heartiest seasonable greetings.



**PLATINUM METALS IN CANADA.**

This issue contains a description of the occurrence of platinum metals in Canada, being a chapter devoted to Canada in a recently published monograph of the platinum metals of the British Empire, the latest of a series of monographs prepared under the direction of the Mineral Resources Committee of the Imperial Institute. The platinum monograph is the work of Prof. A. D. Lumb, and is published by John Murray, London.

The monograph is interesting at this time in view of the larger quantity of platinum metals extracted in Canadian refineries revealed by the latest figures issued by the Ontario Bureau of Mines, and as containing some information — which we do not remember having seen previously published — of the platinum metals recovered from the matte of the Mond Nickel Company treated in Britain during the years 1915 to 1918.

**THE ANTHRACITIC COALS OF THE WEST.**

The Secretary of the Admiralty has stated in the British House of Commons that the Admiralty has not purchased a large anthracite property in British Columbia, and had no intention of doing so. There are some difficulties in the way, even if the Admiralty did intend a purchase, chief among which is that there is no anthracite in British Columbia. There are in the western coalfield, within the vicinity of the Rocky Mountains, a number of deposits of metamorphosed bituminous coal seams, having anthracitic characteristics, but the existence of the true anthracite has not been yet reported in Canada. The Groundhog Mountain field, which is the one referred to by the Secretary of the Admiralty, is described by Mr. D. B. Dowling as an important area situated on the headwaters of the Skeena, Naas and Stikine Rivers. The sediments which contain the coal seams rest on volcanic rocks, of probable Jurassic age. The coal-bearing rocks are much faulted, and by subsequent erosion the field has possibly been divided into a number of small separate blocks. The original area outlined by prospectors, and included in surveyed lines, is nearly 170 square miles. The coal, states Mr. Dowling, is all semi-anthracite, and "in some instances is classed as anthracite". The anthracitic qualities, like all the gradations in the quality of the coals of the great western fields, are presumably the result of heat and pressure upon the original coal material. The mother material was probably the same in the case of the sub-bituminous, bituminous and steam coals of the west, and the characteristics of the mineral as mined today are the result of different degrees of heat and pressure. In the case of true anthracite there is good reason to believe that the original material differed from the material from which bituminous coal was formed.

The University of Alberta proposes to undertake microscopic examination of the western coals, and if this investigation is carried out upon a scale that will include all the coals of the west, it should throw much light upon the original substance of the coal seams and the forces which have given them their characteristics.

**THE PELYCYPODA OF THE STRATA AROUND TORONTO.**

Part Six of the 29th Annual Report of the Ontario Department of Mines contains a description of the pelycypod fauna in great abundance in strata near Toronto, and particularly in the brick shales. The Report, which contains fine plates illustrating some 54 fossil shells, and technical descriptions of a much larger number, is the work of Beatrice Helen Stewart, and a prefatory note is made by Dr. W. A. Parks, whose assistance in the carrying on of the work and the preparation of the final text is acknowledged by the author. The present volume arose out of investigations commenced with the hope of more definitely fixing the stratigraphical relationship of the paleozoic rocks in the vicinity of Toronto, but the abundance of pelycypods observed was so marked that it was thought well to present first an account of this preponderating group, and to leave the question of correlation until more extensive data had been obtained.

While no definite attempt is made at correlation, the author suggests that the Toronto pelycypod fauna represent in general a horizon comparable with the Pulaski fauna of New York State, (of general Cincinnatian age) on the one hand, and the Maysville of the Ohio Valley on the other, but with a stronger commingling of Maysville forms.

The Ontario Department of Mines is to be congratulated on undertaking investigations of what may at this time be regarded as purely scientific interest, but may at any time be found to have economic value.

**NEW TYPE OF IRON DEPOSIT IN ALBERTA.**

A despatch from Edmonton states that in the Peace River country, where there is much iron "a solid bed of pig-iron, the depth of which is not known" has been discovered. Possibly this is the stock-yard of Gehenna, the product of Beelzebub's own private blast-furnace? The depth of the deposit is not known, but perhaps, like some fabled veins of precious metals it goes down to the original tap-hole. Dr. Allan mentioned the iron deposits of the Peace River Country at the Winnipeg Meeting of the Institute, but he omitted to mention this interesting and novel type of a differentiated magma.

**PERSONALS.**

Mr. H. H. Claudet who for some years has been in charge of the Ottawa Branch of the General Engineering Co. of New York, will, on the 1st of January, take over the office and laboratory at Ottawa and carry on the business independently.

Mr. R. M. Wolvin, President of the Dominion Steel Corporation will sail for England on the 23rd December in connection with the affairs of the British Empire Steel Corporation. Mr. D. H. McDougall, the President of the Nova Scotia Steel & Coal Company will leave for England on the 28th December in connection with the same matter.



# The Platinum Metals in Canada

By A. D. Lumb.

(Abstracted from a Monograph of the Mineral Resources Committee of the Imperial, Institute, London).

The occurrence of platinum in Canada was first observed in 1862, in the course of gold-mining operations on the Rivière-du-Loup and the Rivière-des-Plantes in the province of Quebec.

Since that time platinum has been found in a number of localities associated with auriferous gravels, but the crude metal has only been obtained commercially from the Similkameen district in British Columbia. These deposits first attracted attention in 1885. All the workings are alluvial, although the platinum has in several cases been traced to its parent source.

*Alberta.*—Platinum and gold in minute grains, closely intermixed, are found in the North Saskatchewan River, near Edmonton. In 1918 certain platinum occurrences were examined by the Munitions Resources Commission, visits being paid to Fort Saskatchewan and the Peace River district, in Alberta. These deposits, however, proved to be disappointing. In the former locality, which was carefully tested by drilling, the values of the samples obtained averaged less than 10 cents in gold and platinum per c. yd. of gravel.

*British Columbia.*—Platinum, associated with gold, which is the dominant metal, occurs in the Tulameen River and its tributaries, the principal of which is Slate Creek, others being Cedar Eagle, Bear and Granite Creeks. The metal is present in small rounded grains, or pellets. Chromite is often found intergrown with the platinum, olivine and pyroxene usually occurring in association. The heavy minerals remaining with platinum in the concentrate are titaniferous magnetite, chromite and native copper. The platinum is sometimes magnetic, probably due to the covering of the grains by small particles of magnetite.

The following analysis, according to G. C. Hoffmann is representative of an average sample of crude platinum from the Tulameen River:

	Per cent.
Platinum . . . . .	72.07
Palladium . . . . .	0.19
Rhodium . . . . .	2.57
Iridium . . . . .	1.14
Osmiridium . . . . .	10.51
Copper . . . . .	3.39
Iron . . . . .	8.59
Gangue (Chromite) . . . . .	1.69

Owing to the presence of osmiridium in considerable proportion, the ore is classed as "hard metal," and on that account fetches a high price. Many of the richer placers have become exhausted, and work is now carried on by a few individuals, principally Chinese, who work during the summer months only. In some cases high benches, 50 to 100 ft. above the creek bottom, are being worked. Much of the platinum and gold is of a coarse texture, with a rough surface, and the latter is sometimes found imbedded in quartz. Nuggets are sometimes found encrusted with chromite, and are thus liable to be overlooked. The deposits are therefore not of great age, and the metals have not been transported long distances from their sources.

Kemp is of opinion that the platinum is derived from pyroxenite dykes cutting through peridotites, which outcrop on Olivine and Grasshopper Mountains.

It is of interest to note that some diamonds and rubies have been discovered with the platinum in the Tulameen deposits. They are of good quality, but of small size, and occur in a matrix of dunite. American capital dominates the platinum industry in the district. In 1918, at the request of the Imperial Munitions Board, special investigations in this area were undertaken by members of the Geological Survey, and several prospecting bores were put down to bedrock. Full reports of the work done are not yet available, but it is understood that the results are considered to be promising, and to warrant further examination of the district.

Platinum was in 1918 discovered at Franklin Camp, near Grand Forks, B. C., in the "Black Lead," so-called, which is a mixture of augite, 75.13 per cent.; orthoclase and microcline, 17.06 per cent.; hornblende, 1.47 per cent.; and magnetite, 6.06 per cent., as determined by microscopic measurements on a typical specimen, with accessory minerals, chalcopyrite, bornite and apatite. A sample of chalcopyrite assayed 0.38 oz. crude platinum per ton. Samples of the "Black Lead" assayed from 0.02 to 0.17 oz. per ton.

At Burnt Basin, on the Mother Lode claim, an auriferous quartz vein carries platinum, in amounts varying from a trace to 0.25 oz. per ton. The quartz also contains chalcopyrite, pyrite, galena, sphalerite and molybdenite. Native platinum in small quantities has been found associated with gold in the following localities: Tranquille River, Fraser River, Rock Creek, Yale District, North Thompson and Clearwater Rivers. It has also been reported to occur in a dyke across the Kootenay River upon the Granite Poorman Mining Company's property a few miles from Nelson. At Siwash Creek, in the Tulameen district, small flakes of platinum, associated with chromite, often occur in shear zones in granite. Dredging for gold and platinum is being carried on, on the Peace River, North British Columbia.

According to J. B. Hobson the heavy concentrate produced on the Consolidated Caribo hydraulic mine at Quesnel, contains, besides gold and silver, platinum, palladium and osmiridium, one analysis giving a total value of \$3,873 per ton. The gold and silver being non-amalgamable are probably included in particles of pyrite and galena, whilst the platinum metals are found as minute grains or are enclosed in particles of chromite and magnetite. A system of "under-currents" is being installed to properly dress this concentrate.

In 1917 the recorded output of crude platinum from the placer gravels of the Tulameen district in British Columbia was 57 oz., that for 1918 being 39 oz. For the five years preceding 1892, this district produced on an average of over 1,500 oz. per year.

*Manitoba.*—Samples of gold ore containing platinum have been obtained in the Star Lake district of south-eastern Manitoba. Analyses of the samples from dif-



ferent auriferous reefs were made by the Department of Mines in 1917, and yielded platinum varying in amount from a trace to 0.1 oz. per ton. In addition to gold and platinum, the veins carry small quantities of galena, zinc blende, pyrite, chalcopyrite and arsenopyrite in a gangue consisting mainly of quartz.

Platinum is reported to occur in auriferous quartz veins in several mines and prospects in Le Pas district; a picked sample of ore from the mine of the Northern Manitoba and Development Company, assayed \$49 gold and \$17 platinum per ton. McCafferty's Prospect, about 5 miles away, contains platinumiferous quartz.

*Nova Scotia.*—According to E. R. Faribault in *Summary Report, 1918, Part F*, of the Canadian Department of Mines, platinum has been found, mostly in traces, in some of the old gold districts of Halifax county and, lately, in the tungsten concentrates of the Moose River mines. So far, all occurrences are in quartz veins in the lower quartzite and slate formation of the gold-bearing series of the Atlantic coast. The platinumiferous mineral is supposed to be sperrylite, with which is associated arsenopyrite.

*Ontario.*—Sudbury is one of the few places where platinum is profitably extracted from deposits *in situ*. The metal, which was first discovered in this region in 1889, is found mostly in combination with arsenic, as sperrylite associated mainly with chalcopyrite in the well-known copper and nickel-bearing deposits of the district.

The origin of the ore-bodies has not yet been settled. They are either marginal deposits in, or off-shoot deposits to, a norite laccolith, which has intruded sedimentary rocks, the ores consisting principally of chalcopyrite, pyrrhotite, and pentlandite. Metallic platinum, gold, silver and palladium occur in the ore, the last also, probably, as an arsenide. The highest platinum content is associated with the highest copper content; the highest palladium with the highest nickel. According to Roberts and Longyear the mean analysis of rocks of from sixteen drill holes gave an average ore content of: copper, 1.11 per cent.; nickel, 1.95 per cent.; silver, 0.223 oz.; gold, 0.022 oz.; and metallic platinum, 0.0068 oz. per ton. The ore is principally worked for its nickel and copper content and yields a large proportion of the world's supply of nickel. The ore is first smelted at the mines, and a portion of the low-grade matte so produced is then shipped to South Wales for final treatment, the remainder being sent to the recently-constructed refinery of the International Nickel Company, at Port Colborne, Ontario, and to the United States. It was stated in 1903 that this matte contained on the average 1.25 oz. of the platinum metals per ton of nickel content of the matte, of which about 80 per cent. was extracted. The Victoria Mine, owned by the Mond Nickel Co., is stated to carry a high percentage of the precious metals, as is also the Vermilion Mine, although in the latter case the ore body is very small. In 1917 the total output of copper-nickel ore from these deposits amounted to 1,506,828 tons, of which the Canadian Copper Co. raised 1,139,629 tons, the Mond Nickel Co. 361,335 tons, and the Alexo Mining Co. 5,864 tons. The nickel content of the ore of the Canadian Copper Co. was about 2.5 times that of the copper, whilst the ore mined by the other two companies contained the two metals in approximately equal proportions. The matte produced by the Alexo

Mining Co. is smelted by the Mond Nickel Co. According to the report of the Royal Ontario Nickel Commission, the matte produced by the Canadian Copper Co. in 1916 was estimated to contain 4,640 oz. platinum and 8,460 oz. palladium, corresponding to 0.10 oz. platinum and 0.15 oz. palladium per ton of matte, the International Nickel Co. recovering in that year 1,093 oz. platinum and 257 oz. allied metals. This company is now reported to have improved its methods of recovery. In 1918 the total matte shipment by the Canadian Copper Co. is stated to have contained, among other precious metals, 8,677 oz. platinum and 13,016 oz. palladium.

According to information supplied by the Mond Nickel Co., their nickel residues derived from the refining of the matte are taken over by Johnson, Matthey and Co., Ltd. During the years 1915-18 the residues disposed of were estimated to contain the following amounts of platinum metals:

	(In oz. troy).			
	1915	1916	1917	1918
Platinum . . . . .	3,078	3,782	4,913	4,465
Palladium . . . . .	5,474	—	—	—
Iridium and Rhodium . .	973	—	—	—

Messrs. Johnson, Matthey and Co., Ltd., have kindly supplied the following figures of platinum-extraction from these residues:

	Oz. troy.
1916 . . . . .	3,722
1917 . . . . .	4,719
1918 . . . . .	4,958

The British America Nickel Corporation, who are developing some large deposits in the same district, are also erecting a refinery near Hull on the Ottawa River. It is stated that they will employ the Hybinette process of electrolytic refining, and expect to obtain a high recovery of the precious metals.

With gradual improvements in the refining process, and with the refining of the whole of the matte produced, instead of a portion only, as at present, it seems probable that the production of platinum metals by the three nickel companies may in time exceed 10,000 oz. per annum.

The 1919 report of the Ontario Bureau of Mines shows that in 1918 the International Nickel Co. treated 62,250 tons of matte for 650 fine oz. of platinum, 787 oz. of platinum, and 473 oz. of metals of the rhodium group. This cannot be used as a basis of calculation, as the proportions are not constant.

On the Quinn claims, near the Croesus Mine, Munro Township, is auriferous quartz containing platinum. Five assays gave a platinum content of value ranging from \$180 to 1,800 per ton (with platinum at from \$40 to \$50 per oz.). The Abro Mine in the Timiskaming district in 1915 shipped between 5,000 and 6,000 tons of ore, containing 0.03 oz. of palladium and platinum per ton. The ore consists of pyrrhotite, chalcopyrite and pentlandite, in a gangue of altered peridotite and serpentinite.

*Yukon Territory.*—Platinum occurs associated with gold in small quantities in most of the tributaries of the Yukon River, notably at the mouth of the Hootalinqua River, and in the River Lewis.

*Newfoundland.*

Chromite derived from the serpentized area in the region of Mount Cormack, situated in the central part of the island, has been found to contain small quantities of platinum.



# The Kirkland Lake Gold Area

"Interesting and Important Description."

Part Four of the 29th Annual Report of the Ontario Department of Mines for 1919, just issued, is a report on the Kirkland Lake Gold Area, by A. G. Burrows and P. E. Hopkins, being a second report by these officers of the Bureau of Mines and supplementary to one published in 1914.

The Report is summarised in a preface by Dr. W. S. Miller, who names the work as being "One of the most interesting and important descriptions of a Canadian mining area that has been published for some years, at least." Dr. Miller's preface is as follows:

"The authors, A. G. Burrows and P. E. Hopkins, of the Geological Staff of the Ontario Department of Mines, have had wide experience in the pre-Cambrian gold and silver areas of the Province.

"The Kirkland Lake Area can be classed as Ontario's fourth most important metal-producing area, being preceded, in order of seniority, by Sudbury, Cobalt and Porcupine. The development of the area was retarded during the period of the war, systematic work having been begun only about a year previous to the outbreak of the great conflict. To the end of the year 1919 the output of gold, with some silver, had a value of nearly \$3,000,000.

"Exploration in the Kirkland Lake Area has shown that there are three principal zones of mineralization, or, to use a more definite term, of metallization. The main or central zone extends in a northeast-southwest direction along the southern expansion of Kirkland lake for a distance of over two and a quarter miles. The southern zone is distant about three-quarters of a mile from the main zone and the northern about two miles. The gold production up to the present has come from the central zone.

"According to the authors, the central zone shows a major fracturing along which are situated the principal mines. This fracturing crosses all the rocks in the zone, including feldspar-porphry, syenite, lamprophyre and conglomerate. In addition to the major fracture there are branch or minor fractures now represented by branch veins or lodes.

"The fracture zone, where examined, usually contains several fault planes which often form the boundaries of ore bodies. The fault planes along which the ore deposits have been formed dip to the south, generally at angles of 80 deg. to 85 deg. At several mines development has been carried on with regard to two prominent fault planes, called footwall and hanging-wall planes. These planes are from a few feet to 40 feet or more apart, ore occurring sometimes over the whole width, or, as is more common, near one wall or the other, depending on subsidiary slip or fault planes. Ore has also been found beyond the recognizable fault planes or so-called vein boundaries. Mineral-bearing solutions with accompanying vapours have filled fissures and more or less replaced the rock in the fracture zone. The quantity of vein quartz in the ore deposits is

relatively small as compared with the mineralized porphyry or other rocks that make up the ore bodies.

"The minerals in the ore bodies, other than the primary constituents of the rocks, are quartz, of two or more ages, calcite, ankerite, sericite, chlorite, iron pyrites, copper pyrites, small quantities of galena and zinc blende, molybdenite, graphite and barite. The ore minerals are native gold with the tellurides, calaverite, kalgoorlite and hessite. Other tellurides are altaite, coloradoite and tetradymite.

"The authors say that the gold deposits at Kirkland lake in their mineral constituents resemble those of the Sierra Nevada, Cal., and that it is probable that they were not formed at as high temperatures as those of Porcupine, Ont. Granite, syenite and porphyry in the Kirkland Lake Area are believed to represent different facies of one magma. While the gold-bearing deposits were formed subsequent to the intrusion of the porphyry, they are believed to be genetically connected with this rock."

The map which accompanies the Report, in addition to a number of maps and sections that are bound in the volume, is on a scale of 600 ft. to the inch, and is almost two feet square. The mapping has been very carefully done, and Dr. Miller's characterisation of the Report is not overdrawn.

A natural-size colored reproduction of high-grade gold ore in red porphyry and syenite, typical of the Kirkland Lake area, adds to the general typographical excellence of the Report, and is as fine an example of color printing as one could desire to see.

The authors state that Kirkland Lake is second among Ontario's gold camps in importance, and rapidly developing. "It is characterised by the richness of its ore." It is part of a large mineralized region that extends roughly from Matachewan in the southwest to Larder Lake and beyond into Quebec Province in the east. In places the older gold-bearing rocks are covered by deposits of newer formations, conglomerate, greywacke, and slate of the Cobalt series that have not been removed by erosion, and "consequently cover possible gold deposits."

In regard to the main mineralized belt which runs through Kirkland Lake, the significant statement is made that operations at the Kirkland Lake mine in October 1920 have indicated promising ore at a depth of 900 ft., where the same general mineralization has been encountered.

The operating properties are each described in detail, and flow-sheets are given, with much information on capitalization, ore yields, distances driven underground, etc. This detailed and interesting information is very full. The illustrations are well chosen and of much interest to the student of geology, apart from local significance.

The Report shows evidence of much conscientious and thorough work, and has been well edited and printed. It will doubtless be very welcome to those who are engaged in mining in the district,



# Notes on Steel Plate Picking Belts

By JOHN S. WATTS, New Glasgow, N.S.

The following are a few random notes, on the designing, and operation of steel plate picking belts, and contain pointers, derived from a fairly long experience with these machines, which should be useful to the designer and operator.

In designing the floor, the weight of the picking belt, in the absence of more precise information, may be taken as 350 pounds per foot of length, plus 150 pounds per lineal for the weight of the coal, or a total of 500 pounds, per foot of length, for a belt five feet wide.

Good average practise is to run these belts at forty-five feet per minute, and, at this speed, the delivery of coal, with a steady continuous feed to the belt, would be 170 tons per hour, allowing that the stream of coal will average six inches thick. The actual delivery attained will, however, be usually rather less than this, as it is scarcely possible to attain a steady feed to the belt.

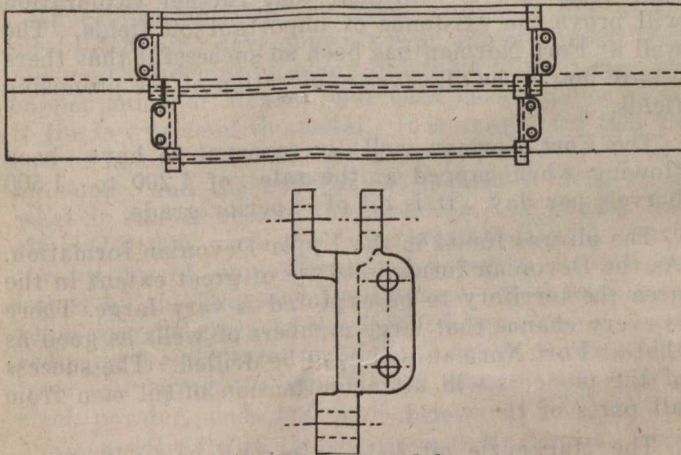


Fig. 1 (top) and 2.

A higher delivery can be got by allowing the stream to run thicker, but anything over six inches will prevent proper picking out of the refuse from the coal.

Frequently the belts are fitted with a hinged loading jib, which can be raised or lowered, to deliver the coal into cars below, or into a hopper above, the picking belt floor level. The maximum inclination up which the coal can be conveyed, may be taken as eighteen degrees, but depends largely upon the class of coal being handled. If necessary the angle may be increased by rivetting angles to the plates of the belt, about every four feet, to prevent the coal sliding backward.

A common but unsatisfactory way to fit the links, is to have them all made with single eyes at both ends, and spaced alternately out and in, with long pins passing thro both links, as indicated in figure 1.

This method is unsatisfactory, for the following reasons, first, when it becomes necessary to take out a plate to tighten up the belt, two plates must be removed. Second, the long pins are apt to bend under the pull of the sprockets; are difficult to assemble, as the four holes are never exactly in line; and are so much additional weight to be hauled without any corresponding gain in carrying capacity. The sprocket can only mesh with every alternate link, making the wear on the teeth twice as rapid as it would be if every link meshed with a tooth.

The better method, is to make the links with a double eye at one end and a single eye at the other end, as indicated in figure 2. In this design the pins need only be long enough to pass thro the double eye, are light, easily assembled, and dismantled, and all the plates are alike. As the links are all on the same center lines, the sprocket can have teeth to mesh with every link.

The fit of the chain on the sprocket, with the single eye link, is much inferior to that of the double eye link, and in actual operation the belt fitted with single eye links, has to be kept very tight to prevent the links from jumping the sprocket teeth. A study of figure 3, will show the advantage of this latter type is that the teeth of the sprocket being central, permits the sprocket being reversed when the teeth are worn, thus doubling the useful life of the sprocket.

For handling iron ore or similar material in large heavy lumps, the plates should be reinforced, and a

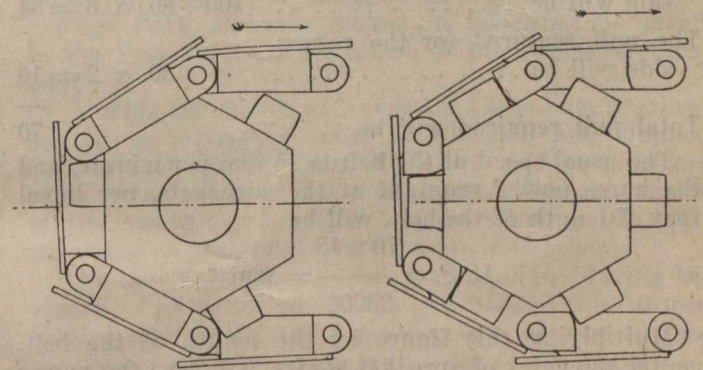


FIGURE 3

handy way to do this, is to use two plates with a 2" strip of hardwood between them.

When handling very heavy material, it will pay to have belt run entirely on rollers, both on the conveying and return sides. The rollers should be kept inside of the width of the plates, so as not to increase the distance which the pickers have to reach over to pick out the refuse.

## Horse Power Required for Steel Plate Picking Belts.

There has been, so far as I know, no data published, either in the technical journals, or in the catalogs of the makers, upon which to base an estimate of the horse power required for driving the machinery in a colliery bankhead, and I am therefore giving the following figures, based on actual experience, which will serve to give as close an approximation, as the varying conditions will permit, to the actual power required to drive a steel plate picking belt, the error being, if anything, more likely to be over than under the actual amount.

Taking as our basis, the following dimensions, which are in this district, (Nova Scotia) at any rate, practically standard, that is, a width of plate of five feet, and a pitch of links of six inches, the weight per foot of the moving parts, will be about 160 pounds, that is the weight of the plates, links and pins, per lineal foot of



belt. One half of this is on the upper or conveying side, and the other eighty pounds is in the return side. Allowing that the coal on the belt will average about six inches deep, and allowing for voids will weigh forty pounds per cubic foot, we will have per lineal foot of belt, a weight of coal equal to  $5 \times 1 \frac{1}{2} \times 40 = 100$  pounds.

The upper or conveying side of the belt is usually supported on rollers spaced about two feet centers, the plates between the rollers dragging on the flanges of the guard angles, and the pull required to move this upper side is made up as to one half sliding friction between the plates and guard angles and the other half the friction of the roller spindles in their bearings.

The co-efficient of sliding friction for steel on steel, un-lubricating, being .4, and that of the roller spindle bearings .2, the co-efficient of friction for the upper side as a whole may be taken as .3.

The return side of the belt is usually entirely supported by the rollers spaced about four feet apart, and the friction is that due to the load on the roller spindles, the co-efficient of friction being about .2.

The pull required for the loaded side will be . . . . .  $(100+80) \times .3 = 54$

The pull required for the return side will be . . . . .  $80 \times .2 = 16$

Total pull required will be . . . . .  $70$

The usual speed of the belt is 45 feet per minute, and the horse power required at the sprockets, per lineal foot of length of the belt, will be

$$\text{H. P.} = \frac{70 \times 45}{33000} = .096$$

Multiplying this figure by the length of the belt, center to center of sprocket shafts, will give the power required at the sprockets, and this amount must be added about 5 p.c., to overcome the friction of the driving gears, bearings, etcetra. For a picking belt of average length (about fifty feet), the total horse power may be taken as about 1 HP per foot of length.

The method of arriving at this figure has been given to enable the reader to make any required modifications made necessary by variations from the standard practise, as given above.

The co-efficients of friction used, are those incurred in starting up the machine from rest, loaded, and may be taken as the maximum under normal conditions. But in wet exposed places, where the bearings may become frozen in extreme cold weather, it is desirable to provide for a momentary over-load of one hundred per cent to start the belt.

When the picking belt is fitted with hinge loading jib, and this is used to load the coal into a storage hopper, above the level of the belt, the extra horse power required when the loading jib is inclined upwards, will be,

$$\text{HP} = \frac{w \times h}{33000}$$

Where  $w$  = weight of coal delivered in pounds per minute and  $h$  = height to which coal is raised in feet.

As the weight of coal delivered, is usually specified in tons per hour, it may be preferable to have the formulae to use this latter figure and calling

$W$  = weight of coal delivered in tons per hour, the formula becomes

$$\frac{W \times h \times 200}{33000 \times 60} = \frac{W \times h}{990}$$

or, approximately, one-thousandth of a horse power for each ton per hour, raised one foot.

**DEPUTY MINISTER OF MINES ADDRESSES TORONTO BRANCH, C. I. M. & M.**

**Oil discovery is one of great importance.**

Mr. Chas. Camsell, Deputy Minister of Mines, in addressing a meeting of the Toronto branch of the Canadian Institute of Mining and Metallurgy on Saturday last, said that he regarded the discovery of oil at Fort Norman this fall as the most important mineral discovery made in Canada in recent years. Mr. Camsell speaks not only with the authority of Deputy Minister of Mines, but as a geologist who worked many months in the Mackenzie River basin. He knows that there are evidences of oil in many parts of that area, and is confident that further exploration will prove the existence of important oil fields. The well at Fort Norman has been so successful that there is sure now to be vigorous exploration of the promising fields.

The Fort Norman well is reported to have been flowing when capped at the rate of 1,200 to 1,500 barrels per day. It is oil of superior grade.

The oil was found in the Upper Devonian formation. As the Devonian formations are of great extent in the area the territory to be explored is very large. There is every chance that large numbers of wells as good as that at Fort Norman will soon be drilled. The success of the pioneers will attract attention of oil men from all parts of the world.

The Mackenzie oil field is too far away to be a factor in production for some years at least. If exploration proves the presence of large quantities of oil, however, methods will be devised for bringing the oil to market.

Fort Norman is near the Arctic circle, nine hundred miles beyond the end of steel. It is known, however, that the Mackenzie river is navigable for several hundred miles. An extension of the railroad to Slave Lake would make Fort Norman easy of access. The shipping of oil is a problem that is already arousing comment, and feasible routes for pipe lines are being compared.

**Three sea planes for Mackenzie exploration.**

Mr. Chas. Camsell confirms the report that arrangements are being made to use airplanes to convey geologists to their distant fields of work next summer. It has been in some cases possible to do only about six weeks work in distant territories in a summer, the greater part of the field season being taken up in reaching and returning from the far northern areas being explored. It is hoped that by utilizing airplanes of the type used in the trans-continent flight, the geologists will this summer be able to use their time to great advantage.

The planes used will be of the boat type, and of a size to permit the carrying of five men. It should be possible with these sea planes to make Fort Norman easily in a day from the rail end.—R. E. H.



# Northern Ontario Letter

## THE SILVER MINES.

### The Cobalt Field.

A strengthening in the demand for silver during the third week of December has given rise to a more optimistic view of the mining industry in the Cobalt district. An improved power supply as a result of half an inch of rain falling at the beginning of the week has also improved the power situation. Added to this, is an abundant supply of labor for all branches of work.

Wages continue at the highest level in the history of these mines, and up to the present no reductions have taken place. It is learned, however, from the Central Council of Workmen that in order to keep all the mines in operation the men are favorably disposed to negotiate with a view to meeting the operators on reasonable grounds. On this matter, the mine workers have appeared to adopt a most sensible view and it is felt that accordingly as the cost of living recedes the men will be generally agreeable to also accept a reduction in wages.

In connection with the silver situation, one of the most interesting developments is an announcement from Mexico City declaring about one-third of the silver and copper mines of Mexico have been closed down owing to the low price of the metal. It is announced that the cost of mining silver in that country is close to 80 cents an ounce, and the government is taking steps to do what it can to relieve the situation. It is said that about 500,000 workers are threatened with being thrown out of employment, according to a statement issued by the Treasury Department. It is announced relief may be given in the form of presidential decree reducing freight rates and federal taxes and annulling laws restricting the importation of material such as steel, powder, acids and tools.

As compared with the situation in Mexico, the mines of the Cobalt district are about on an equal basis insofar as operating costs are concerned. The leading mines of Cobalt are able to produce their silver at under 60 cents an ounce, but a number of the smaller properties, like many of the Mexican mines, find costs up around 80 cents per ounce. By narrowing down operations and selecting the richer part of their ore, these small mines have continued to operate.

Official announcement is made to the Journal that the Kerr Lake mine will curtail production for the time being. Development work, however, will be continued, and employment thereby provided for as many of the company's employees as possible. The development work will include further work to determine the extent of the three veins of high grade ore opened up at surface last fall and which have not yet been developed underground. Recent reports indicated a general closing down at the Kerr Lake, but manager H. A. Kee, who has just returned from a trip to the head office in New York, corrected the wrong impression.

Announcement is made that the Dominion Reduction plant will curtail operations this week. The plant has been operated chiefly on ore coming from the Kerr Lake mine, and the discontinuance of production from the latter property renders it necessary for the Dominion Reduction to curtail.

A winze is being put down on the Chambers-Ferland property on the vein recently encountered in the cross-cut at the 385-ft. level. The work is several feet below

the floor of the cross-cut and is expected to reach the conglomerate formation this week. The silver so far discovered is continued in small veinlets which extend up into the layer of slate formation in which the cross-cut was passing. These veinlets are believed to be offshoots of a high-grade deposit lying in the conglomerate, and for that reason the present work is considered to be important.

Work has just been commenced on the Haileybury Frontier property in South Lorrain where an effort is to be made to mine the cobalt metal which occurs in large veins. The enterprise has been undertaken by Horace F. Strong, of Haileybury, together with associates of Buffalo. The property lies in the vicinity of the Keeley Silver Mines and it is believed more or less silver may be recovered as a by-product during the course of producing the cobalt metal.

Production of silver from the Nipissing mine for the month of November showed a substantial increase over the October output. This achievement is all the more significant in view of the low price of silver which prevailed, it being kept in mind that the increase for November is shown in dollars and not in the number of ounces produced, the comparison being \$184,578 produced in October and \$190,219 in November.

Hugh Park, manager, makes the following statement to the President and Directors of the Nipissing Company:—

“During the month of November the company mined ore of an estimated value of \$190,219 and shipped bullion and residue from Nipissing and customs ore of an estimated net value of \$232,526. The silver value of the month's production was estimated at 69 cents per ounce as compared with 82 cents in October.

“No new veins of importance were found during the month. Production was obtained from the older stopes, assisted to some extent by development work being done on several small veins on both sides of the Lake.

“The low grade mill treated 6,000 tons. The high grade plant treated 192 tons. The refinery shipped 250,067 fine ounces of bullion. The following is an estimate of production for the month:—

Washing plant . . . . .	\$ 64,130
Low grade mill . . . . .	91,749
Residue . . . . .	34,340
<b>Total . . . . .</b>	<b>\$190,219</b>

As regard the present situation at the Nipissing, the company has shipped 360,933 ounces of bullion already in December. Also, a dividend of five per cent plus a bonus of equal amount has been declared payable January 20th to shareholders of record Dec. 31st. This double disbursement will call for the distribution of \$600,000.

### Ore and Bullion Shipments.

During the week ended Dec. 17th, two Cobalt companies shipped three cars containing approximately 217,666 pounds of ore. The Coniagas was the heaviest shipper, as shown in the following summary:—

Shipper	Cars	Pds.
Coniagas . . . . .	2	141,393
Bailey . . . . .	1	76,273
<b>Totals . . . . .</b>	<b>3</b>	<b>217,666</b>

During the corresponding period, and including Saturday the 18th, the Nipissing and Mining Corporation were again very heavy shippers of bullion, sending out an aggregate of 252 bars containing 299,852 ounces of silver and divided as follows:—



Shipper	Bars	Ounces
Nipissing . . . . .	153	200,283
Mining Corporation . . . . .	98	99,569
Totals . . . . .	252	299,852

### THE GOLD MINES. The Porcupine District.

Gold miners in the Porcupine field are finding no difficulty in getting all the workmen they require. It is now possible to retain the services of efficient men, and in this way a favorable reflection on mining costs is indicated for the early future.

It is clear, however, that throughout the present winter, costs may not decline to any important extent, the reason being that the operating companies are obliged to go to much added expense in providing auxiliary power. Coal is pouring in and general activity is assured throughout the winter in spite of the hydro-electric shortage.

Preliminary estimates indicate a production of more than 10 million dollars from the three leading Porcupine mines during the year just drawing to a close. This is made up approximately as follows \$6,000,000 from the Hollinger, \$2,050,000 from the McIntyre and about \$2,000,000 from the Dome. In addition to this production, the companies have received upwards of \$1,000,000 in premium on United States funds for which they sold their gold.

Development work on the new orebody on the McIntyre which is believed to be the eastward continuation of the No. 84 vein of the Hollinger is steadily adding to the proven worth of the McIntyre mine. This orebody has a higher average gold content than vein No. 5 which has formerly been the chief source of production from this property. These favorable results are accepted as indicating new possibilities on the Plenaurum property which adjoins the McIntyre on the east, and which is under option to the McIntyre company. In the meantime, the mill on the McIntyre is treating an average of about 500 tons of ore daily and producing about \$170,000 a month. A feature in connection with the company's plans to utilize auxiliary power as much as possible during the winter is a report this week that coal is to be secured from the Blue Diamond coal property at Brule, Alberta, which property is owned jointly by the McIntyre and the Temiskaming Mining Co.

In a statement just sent out by the Clifton-Porcupine Mines, the shareholders are informed as follows:—"Under the financial conditions which have prevailed during the last few months, it has been found impossible to dispose of treasury stock in sufficient quantity to provide the funds to carry on development on an adequate basis. The underwriters of our stocks have carried on an extensive advertising and selling campaign at a considerable loss to themselves in an endeavor to market the stock and provide adequate funds for our treasury. The result, however, has been disappointing.

"Your directors have accordingly deemed it advisable to suspend all operations at the mine for the present, conserving the funds still in the treasury until such time as it is found expedient to resume work. The adverse operating conditions with which gold mines have had to contend during recent years are rapidly being overcome. The labor shortage, which was the biggest handicap, no longer exists. Costs of material are declining. We are accordingly encouraged to be-

lieve that the time is not far distant when money will be more easily obtained for the development of gold mining properties. The results of work so far done give us reason to believe that the Clifton property can be made a profitable gold producer with the expenditure of a further reasonable amount of time and money. It is the intention of the Directors to seize on the first favorable opportunity to complete the financing of the company and proceed with the development of the property."

Employment of hand steel at the Dome Mines has proved to be exceptionally costly and has been discontinued to a large extent. Some of the imported Cornish miners have been engaged on machines and their work is said to be less efficient than the experienced drill runners in this country.

#### The Kirkland Lake District.

Production from the three producing mines of the Kirkland Lake district will exceed \$1,000,000 for the year just drawing to a close. Of this the Lake Shore will account for about \$500,000; the Kirkland Lake for about \$300,000 and the Teck-Hughes about \$260,000. Added to this is the big new mill of the Wright-Hargreaves which will be ready to open early in the new year, and with the Tough-Oakes likely to open in the spring. By late summer the Ontario-Kirkland mill will also be ready for operation, and the coming year promises to see the production from this field almost doubled.

Concerning the Boston Creek district, the following summarizes work being done at the leading property:—

An interesting find of almost pure chalcopryrite has just been made in the West cross-cut at the 500-ft. level of the main shaft of the Miller Independence mine. The mineral occurs in the form of a small solid vein lying alongside a vein of calcite. Assays in bulk show 32.48 p.c. copper together with \$2.80 in gold and 1.3 ounces of silver per ton of ore.

This discovery is of particular interest not only because of the comparatively high copper content as well as gold and silver value (pure chalcopryrite assaying 34.6 p.c. copper), but also because it co-relates operation underground to the west at the 500-ft. level with the presence of a copper-bearing vein at the surface in the western party of the property. This vein on surface can be traced in a north-westerly direction through the neighboring properties as far west as the old Patricia mine. Assays on surface, however, have seldom exceeded 3 and 4 p.c. and it is thereby evident the mineralization is increasing with depth.

Work has been resumed on what was the first inclined shaft started, and which is located almost in the middle of the property. This shaft was originally thought to be following the dip of the vein on which it was started, but was subsequently found to flatten to such an extent as to give the impression that it almost followed the strike, and further work here was abandoned. The ore here is rich in both free gold and tellurides and the intention is to clean out the accumulation of rock originally broken and lying in place, then to do some further exploratory work and, with the information thus gained, to follow the ore to depth in the direction of the greatest "dip." A small hoist has already been installed and the work is progressing well.

During the holiday season a small laboratory crushing and testing plant will be installed which will consist of a Sturtevant Crusher, a set of rolls and a small concentrating table. The function of this plant will be to deal with samples of larger bulk than those merely intended for assay.



## British Columbia Letter

The standardization of equipment used in coal mines for rescue purposes, which was proposed by Hon. Wm. Sloan, Minister of Mines for British Columbia, in correspondence with the United States Bureau of Mines, probably will be discussed at a conference held next Summer during the Annual International Mine Rescue and First Aid Meet.

There has been no decision as yet regarding the date or the place at which this Meet will take place, but it is expected to be arranged for the early part of September somewhere in the Middle States. The suggested Conference will be attended by representatives both of the operators and the miners associated with the coal mining industry. They will come from the United States and Canada. Mr. Sloan, who stands as sponsor of the idea, is likely to be present with one or more officials of his department.

Discussion will centre, not so much on the possibility of fixing on a single type of Mine Rescue Apparatus, as on the possibility of establishing a standard, acceptable internationally, for the training of men in the use of such Apparatus. That it is out of the question to take any instrument and arbitrarily say it is the last word and must be used to the exclusion of all other types is admitted. Action of that kind would mean the throttling of competition and the striffling of the ambitions of those who are constantly striving to improve the protective machines used by miners who venture into deadly underground air to rescue their fellowmen. It is not that end that the Conference has in view, but the exchanging of ideas in the hope that it may be possible to adopt in America a simple formula, recognized in collieries wherever situated on the continent, for the training of men in mine rescue work.

Mr. Sloan feels that an improvement along these lines can be arrived at. He does not presume to say definitely what, in his opinion, should be done but, broadly, his views are those outlined. He is confident, as also are the officials of the United States Bureau of Mines, that much good will come from the contemplated informal round-table discussion.

David Brown has resigned his position as Manager of the Reserve Mine of the Canadian Western Fuel Co. in order to accept a leading and active part in the development of new coal fields situated north of the City of Kamloops.

Recent oil discoveries in the Mackenzie River basin, Northwestern Canada, have caused considerable stir throughout the Dominion. The first party of what is likely to develop into a rush of oil prospectors into this region, has been passed through the hands of the Royal Northwest Mounted Police. The northern patrols of this organization has been charged with seeing that no one goes through their lines who is not experienced in northern travel and who lacks the equipment necessary to life during the winter. The attention of frontiersmen at present is centred on the Great Slave Lake and Fort Norman section where oil has actually, according to authentic reports, been found in commercial quantities.

But this part of the Canadian Northwest is not the only district attractive to oil hunters. There is a report that a representative of the Imperial Oil Co. has made application for the lease of approximately 10,000 acres of land situated near the confluence of

the Pouce Coupé and Peace Rivers, where indications are impressive. Development is planned for next season in this locality and, as a result, others are looking to the same region.

The Dominion Government has passed an order-in-council limiting the amount of oil land that may be held by lease to 640 acres. Whether this was passed before or after the Imperial Oil Co's application already referred to is not known. If the regulation became law before the Company's action the alienation of 10,000 acres in one swoop is out of the question and the chances of the individual prospector are improved.

That the incorporation of the Mackenzie River Petroleum Co. Ltd., has been decided upon is announced. This concern will ask for power for the production and storage of oil and natural gas and for authority to transport and market the same. It also will require of the Dominion Government the power required to construct a pipe line from a point near the mouth of Rat River near its junction with the Peel, a tributary of the Mackenzie River. The project, it is understood, contemplates the carrying of the pipe line through Alaska to tidewater at St. Michel, or somewhere in that vicinity.

## A Montreal Letter

By ALEXANDER GRAY  
Flotation Recovery of Coal Fines.

How flotation has progressed since physicists, chemists—and lawyers—busied themselves with the "phenomena of froths!"

Less than twenty years ago economists began to think about the wastage of minerals. Prior to that sapient mining men waived whatever was problematical, accepted losses in recovery, preferred the "simple life."

About the time John Ballot, a through-going, courteous Cape Colonial, was in continuous session with Henry Livingstone Sulman, in London not Germany, when flotation was deemed too nebulous for financiers to consider. I have vivid recollection of an effort to induce Old Country coal owners to adopt modern practice in the cleaning and classification of their coals.

A plain-spoken Pennsylvanian, whose jigs and washing apparatus were in use at 1,100 plants in the "Keystone," "Buckeye," and adjoining States, thought he could learn something by visiting English, Scottish and Welsh collieries. He told me what his mechanism had accomplished. I told him to "pick out the dirtiest coal country" in the United Kingdom.

When he returned to London, after being to Scotland, Staffordshire, and elsewhere, his report was: "I've seen more of waste and of slavery than I thought would ever be permitted — women and children in the mines and on picking belts — coal that can be saved going to waste heaps, and obsolete machinery we began to discard in the States a quarter of a century ago."

To the best of my recollection, one washer of German origin, had been installed in Staffordshire! The response of several coal owners to the suggestion that too much coal was going to waste, was "We've got all the coal business we can handle, and we don't have to clean our coal." When we gave the Manager of the "dirtiest" colliery a demonstration, and presented him with a coking product from what was going to his heaps, in reality, 25 per cent of the total tonnage raised was going to those heaps. He was incredulous, but he also declined to pay us a shilling a ton for all we saved



of what was then being wasted. He was ca'canny, very much so, and rather than supplicate Mr. Lloyd George, then in the Home Office, to take up the matter of "slavery" and waste as a national economy, the Pennsylvanian practical genius betook himself to Tamaqua.

Ludicrous hardly expresses our feelings when the Scot saw the 4 and 6 per cent. ash classifications were handed to him as examples of what he was putting to waste and he dubiously declared he had his "doots."

In the meanwhile, altered conditions have arisen in every "black country" — coal has become a necessitous luxury — and flotation, the "visionary" ideal of the earlier years of this country, promises to effect a more radical departure than the Pennsylvanian proposed. If scrap heaps and garbage piles are no longer despicable, why not the millions of tons of "waste," discarded as such by coal operators? The Mineral Separation Scientists having effected notable savings with sulphide ores, evidently sought new mining "worlds to conquer"; for the latest technical journals from London contain the following account of the company meeting held there on November 24. the remarks being those of Chairman Francis L. Gibbs:

"We have come to an agreement with the Powell Duffryn Company, of South Wales, under which they have granted to us an option over all the waste heaps and current waste belonging to them in the Aberdare Valley, and the option provides that this material may be treated on a large scale under a half joint account arrangement between the Powell Duffryn Company and ourselves. A pilot plant on a commercial scale has been erected at Aberaman for carrying out exhaustive tests on this material. The cost of this plant and the testing work are being equally borne by the Powell Duffryn Company and ourselves. The quantity of material under option to us under this arrangement is very large, and we anticipate that this enterprise will eventually become a very important one.

Plants are in the course of erection under agreement with the Ashington Coal Company in Durham, and at the Kirkby works of the Midland Coal Products, Ltd., and a plant of considerable size will also in the near future be erected at the East Bristol Collieries. In addition to these, numerous other collieries are in negotiation with us for the erection of plants. One of the most important agreements which we have completed is with the Skinningrove Iron Company for the treatment of their coking coal. The decision to put in this plant was arrived at by that company after extensive experiments had been carried out in our London laboratory and at their works in the North of England.

#### Options on Millions of Tons.

We are also engaged in the examination of many large waste heaps in various parts of the country, and some of these show promise of a large business on sound commercial lines being developed. The waste coal heaps over which we have acquired options amount to several millions of tons, and negotiations are now being conducted for further quantities of this material. Systematic and thorough sampling of the heaps is essential in every case, and our engineers are already engaged upon this important work. We anticipate that it will not be long now before we shall be in a position to form an estimate of the commercial value of what we have under examination, and although, of course, we must expect that some of this raw material will not contain sufficient coal to treat profitably, we have good reason to suppose that many of these heaps will prove to be very profitable.

"Our coal business is also gaining ground abroad. In France a pilot plant with a capacity of 100 tons in 24 hours, is almost completed at the Noeux property of Vicoigne and Noeux, the great French colliery owners. This agreement was made by Minerals et Metaux, our agents in France. In Spain a new company in which we hold a large interest has been formed, and, as is subsequently mentioned in my speech, is making very satisfactory progress. In China the Chinese Engineering and Mining Company is about to instal a plant of 250 tons daily capacity, and one of our engineers is now on his way to China in order to take charge of the erection and subsequent operations of this plant. All these plants at home and abroad which I have referred to will at a later date, it is anticipated, be replaced by plants having a very much larger capacity.

The foregoing represents a short summary of our coal business to date, and I may add that we have been, and are being, approached by very many of the large colliery owners in Great Britain, and that we have important proposals for the adoption of our coal-washing methods before us from the Brazilian Government and from collieries in South Africa, India, Japan and elsewhere. Our coal business may therefore, even at this early stage, be safely said to have become established."

#### In the Sump.

"The Canada Copper plant at Allenby, B.C., has shut down." Metal markets have collapsed.

Casualty stations are being crowded.

The "Bannister" route-gravity incline or whatever those who are heading for the sump may choose to term it, is expeditious, if undignified.

Those who craved deflation are getting it with variations. No stabilizer having been invented to keep prices in the upper air when those who went on strike against the high cost of everything declined to "pay, pay, pay," only associated Bankers complacently affirm that "the earth and the fullness thereof" are here in form and substance.

Part of which is sedative, but most of which is otherwise.

The process has all the attributes of the "refinement of cruelty." With rare exceptions metals cannot be produced for current market prices. Inventories will not be carried by banking accommodations. With the holiday season over, surplus stocks it is thought, will have to be jettisoned. There is more emergent selling—and only emergent buying—yet the farmers will have it that speculators have forced down staples until it is unprofitable to raise them.

"Vengeance is mine," says the Liquidator. The era of inflation has been rudely ended. Even creditor nations tobogganed things, the "bannister" being inadequate for what was toppling.

"Wages will be the last to fall," was the forecast of Judge Gary. That was some time ago. Unemployment has intervened. "Take it or leave it," wage is being proffered those who do not wish to remain idle.

There is one certain element: The bargain hunter is alert. He seeks plums and usually takes the ripe ones. Canada, however, distraught in some respects, has the greatest nickel and asbestos mines; the largest gold mine; the biggest lead-zinc mine, and one or two more coming along; an abundance of iron and coal on our eastern shore and more coal than can be availed of in the West,—to say nothing of its silver mines,—so, with solvent banks and the sinews of industrial warfare, "we should worry!"







## TORONTO MINING QUOTATIONS.

## Silver.

The following are the closing quotations for active gold, silver and oil stocks on the Standard Mining Exchange on December 21st, 1920.

	Ask	Bid
Adanac Silver Mines, Ltd. . . . .		1 $\frac{3}{4}$
Bailey . . . . .	4	3 $\frac{1}{4}$
Beaver Consolidated . . . . .		27
Chambers-Ferland. . . . .	6 $\frac{1}{2}$	5 $\frac{1}{2}$
Cobalt Provincial. . . . .	37	
Coniagas. . . . .	2.00	
Crown Reserve . . . . .	18	
Gifford . . . . .	1 $\frac{1}{4}$	1
Hargraves . . . . .	17 $\frac{8}{8}$	1 $\frac{1}{4}$
La Rose. . . . .	25	20
McKin.-Dar.-Savage . . . . .	25	22
Mining Corp. of Can. . . . .	1.00	96
Nipissing. . . . .	8.60	8.40
Ophir . . . . .	2	1 $\frac{1}{2}$
Peterson Lake . . . . .	10 $\frac{1}{4}$	9 $\frac{1}{2}$
Temiskaming. . . . .	26	25
Trethewey. . . . .	17	16

## Gold.

Apex . . . . .	2	1 $\frac{1}{4}$
Atlas. . . . .	15	14
Dome Extension. . . . .	45	
Dome Lake . . . . .		2
Dome Mines . . . . .	12.00	11.50
Gold Reef . . . . .	3 $\frac{1}{2}$	2 $\frac{1}{4}$
Hollinger Cons. . . . .	5.55	5.51
Keora . . . . .	14 $\frac{1}{4}$	14
Kirkland Lake . . . . .	39 $\frac{1}{2}$	35
Lake Shore M. Ltd. . . . .		1.03
McIntyre. . . . .	1.85	1.81
Moneta . . . . .	9 $\frac{1}{2}$	9
Newray Mines, Ltd. . . . .	5	3 $\frac{1}{2}$
Porcupine Imp. . . . .	$\frac{1}{2}$	
Porcupine V.N.T. . . . .	18	17 $\frac{1}{2}$
Preston East Dome . . . . .	3	2
Schumacher . . . . .	17 $\frac{3}{4}$	16 $\frac{1}{2}$
Teck-Hughes . . . . .	15	11
Thompson Krist . . . . .	6 $\frac{1}{2}$	5 $\frac{1}{4}$
West Dome . . . . .	6	5
West Tree Mines Ltd. . . . .		5 $\frac{1}{2}$

## Oils.

Ajax Oil . . . . .	30	23
Eureka . . . . .	30	
Petrol Oil, Old . . . . .		30
Rockwood Oil, Gas . . . . .	3	2
Vacuum G. . . . .	15	13 $\frac{1}{2}$

## METAL QUOTATIONS.

Fair prices for Ingot Metals in Montreal, Dec. 21 1920. (In less than carload lots).

	Cent per lb.
Copper, electro . . . . .	18 $\frac{3}{4}$
Copper casting . . . . .	18 $\frac{1}{2}$
Tin . . . . .	41
Lead . . . . .	6 $\frac{3}{4}$
Zinc . . . . .	7 $\frac{3}{4}$
Aluminum . . . . .	34
Antimony . . . . .	7 $\frac{3}{4}$

## COAL PRICES.

**Toronto.**—Demand is slack and little business is being done. Following prices are representative, smokeless \$9.50 to \$10.00; slack, \$8.50 to \$8.75; lump, \$9.00 to \$10.00. Anthracite is \$8 to \$12 at the mines.

**Montreal.**—Bituminous is offered at \$14.50 at the coal yards, to which carting costs are to be added. Anthracite is selling at \$18.75 delivered to customers. Bituminous prices are likely to decline, and some deliveries are being obtained on contracts made last Spring, but which have remained unfulfilled owing to the preference of the mines to do business at higher prices obtainable. The treatment of Canadian buyers by the mines in the United States indicates that these so-called "contracts" have little real binding power. Pool prices at the mines range from as low as \$3.00 to \$5.00, the average being around \$3.75. Seward's Journal, of New York, states that some operators are closing down rather than sell coal at the prices it will command at present, and that "operators have been able to keep going by shipping heavily on contracts when "spot" orders were not forthcoming." Truly the conception of what constitutes a contract must differ across the line from the Canadian idea.

## COPPER DEPOSITS IN WESTERN IDAHO.

We are in receipt of a copy of a Report of the "Copper Deposits of the Seven Devils and Adjacent Districts," published by the Bureau of Mines & Geology of Idaho in co-operation with the U. S. Geological Survey. Prof. Francis A. Thomson, of the University of Idaho at Moscow, is Secretary of the Bureau, and the Report in question is Bulletin No. 1.

The Seven Devils Quadrangle in the Snake River Copper Belt was examined in the Summer of 1919, up to which date no topographic mapping had been undertaken in the quadrangle by the U. S. Geological Survey. The work is stated to have been unique in that triangulation and level control, topographic and geological mapping were all done for the first time in the district, and in one season.

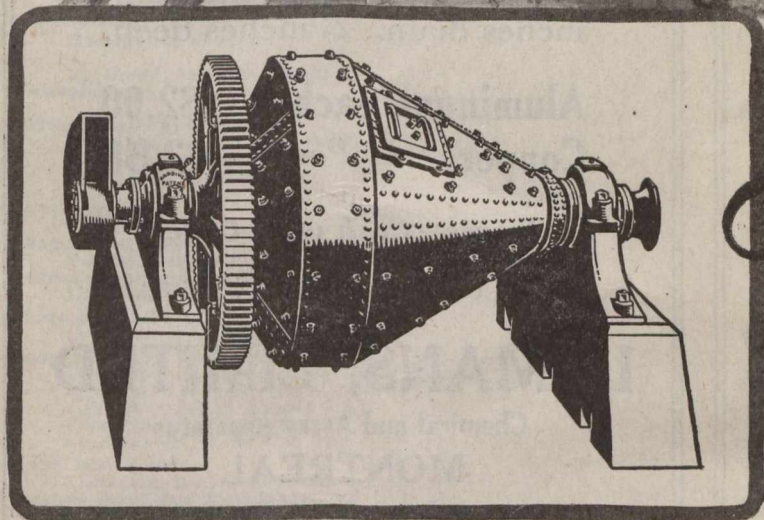
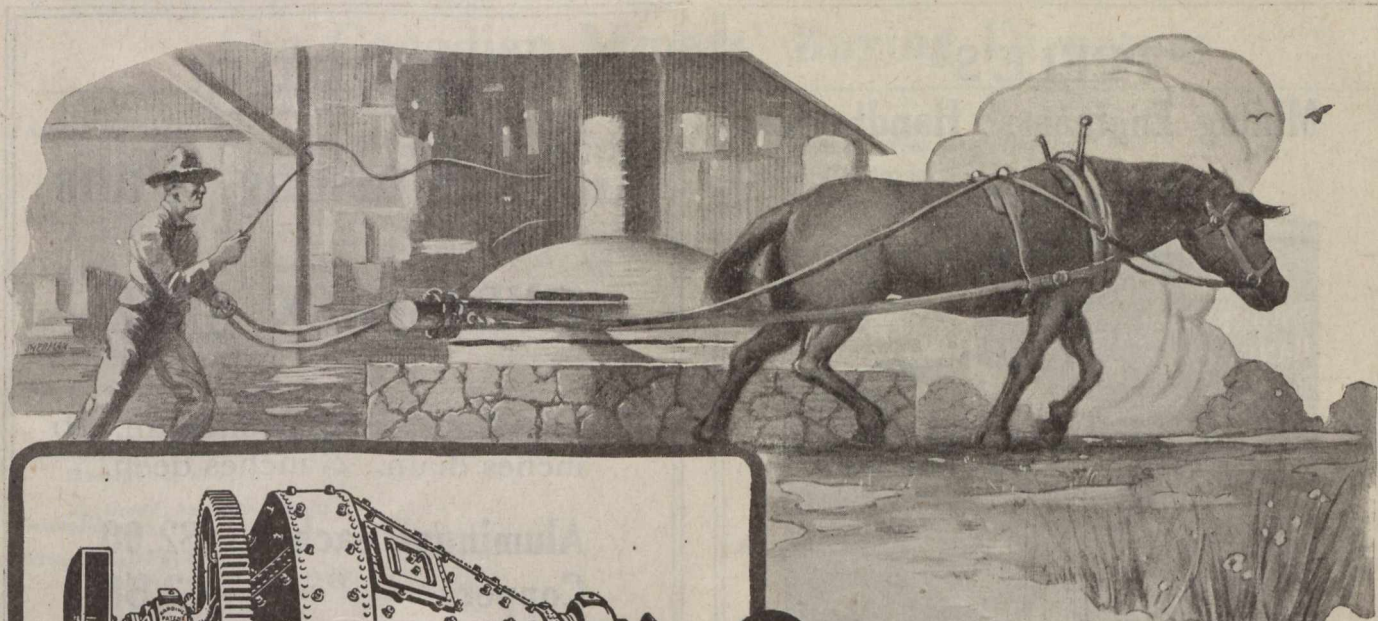
The country examined is said to possess the most rugged relief in the United States, a fall of 7,500 feet in less than six miles, the last 2,000 feet of the fall almost vertical, being mentioned as typical of the district, of which the Snake River Canyon is a prominent and most scenic feature.

The ore deposits are classifiable under four heads, namely, mineralized shear zones, fissure veins, disseminated deposits of large size, and contact metamorphic deposits, from which last-named type the copper so far produced by the district has come.

The origin of the ores and their petrological characteristics are fully described and illustrated by microphotographs. Gold and silver are associated with the copper ores.

One of the deposits, the Red Ledge occurrence, described as a typical disseminated sulphide ore-body, of low-grade but very large dimensions, is remotely and difficultly situated. The genesis of this ore-body is given much consideration, and to those who are interested in ore bodies in Canada, of similar nature, this first Bulletin of the Idaho Bureau of Mines, apart from its definite economic importance to Idaho, appears to have importance of a wider character; and, with the courtesy that is a pleasant characteristic of the professional relations of mining scientists in North America, will doubtless be forwarded to any reader in Canada who desires to peruse it.





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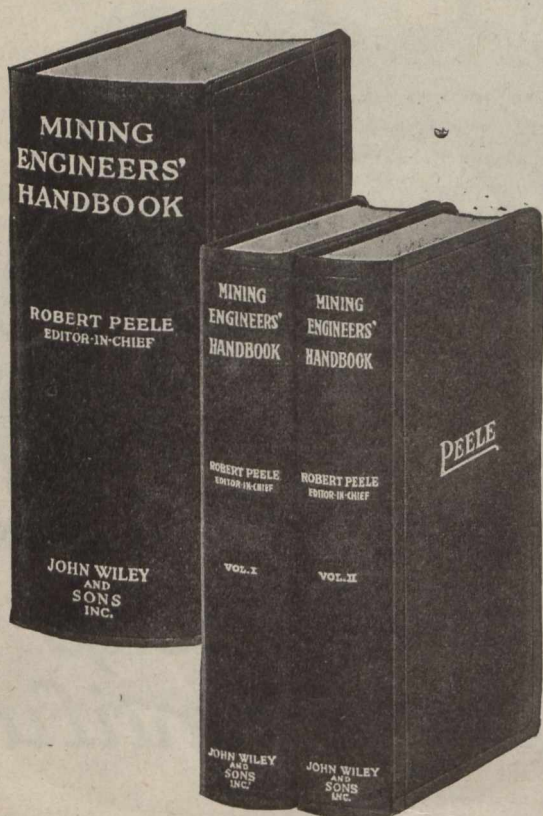
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# PROVINCE OF QUEBEC

## 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 the date of the staking, the prospector, to retain his rights, must take out a mining license.

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

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

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

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

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

HONOURABLE J. E. PERRAULT,  
MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.

# BRITISH COLUMBIA

## The Mineral Province of Western Canada

Has produced Minerals valued as follows: Placer Gold, \$75,722,603; Lode Gold, \$100,272,431; Silver, \$50,432,304; Lead, \$43,821,106; Copper, \$153,680,965; Zinc, \$16,818,487; Coal and Coke, \$199,123,323; Building Stone, Brick, Cement, etc., \$29,991,757; Miscellaneous Minerals, \$786,918; making its mineral production to the end of 1919 show an

### Aggregate Value of \$670,649,894

The substantial progress of the Mining Industry of this Province is strikingly exhibited in the following figures, which show the value of production for successive five-year periods: For all years to 1895, inclusive, \$94,547,241; for five years, 1896-1900, \$57,605,967; for five years, 1901-1905, \$96,509,968; for five years, 1906-1910, \$125,534,474; for five years, 1911-1915, \$142,072,603; for the year 1916, \$42,290,462; for the year 1917, \$37,010,392; for the year 1918, \$41,782,474; for the year 1919, \$33,296,313.

### Production During last ten years, \$322,829,310

Lode-mining has only been in progress for about twenty-five years, and not 20 per cent. of the Province has been even prospected; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than those of any other Province in the Dominion, or any Colony in the British Empire.

Mineral locations are granted to discoverers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full information, together with Mining Reports and Maps, may be obtained gratis by addressing

THE HON. THE MINISTER OF MINES  
VICTORIA, British Columbia.



## Canadian Miners' Buying Directory.—(Continued)

- Cables—Wire:**  
Standard Underground Cable Co. of Canada, Ltd.  
Canada Wire & Cable Co.  
Fraser & Chalmers of Canada, Ltd.  
Northern Electric Co., Ltd.  
Osborn, Sam'l (Canada) Limited.  
R. T. Gilman & Co.
- Cable Railway Systems:**  
Canada Wire & Cable Co.  
Canadian Mead-Morrison Co., Limited.
- Cam Shafts:**  
Canada Foundries & Forgings, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Peacock Brothers Limited.
- Car Dumps:**  
Sullivan Machinery Co.  
R. T. Gilman & Co.  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Mead-Morrison Co., Limited.
- Carbide of Calcium:**  
Canada Carbide Company, Ltd.
- Cars:**  
Canadian Foundries and Forgings, Ltd.  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Mead-Morrison Co., Limited.  
John J. Gartshore  
MacKinnon Steel Co., Ltd.  
The Electric Steel & Metals Co.  
Northern Canada Supply Co.  
Osborn, Sam'l (Canada) Limited.  
Marsh Engineering Works  
Mine and Smelter Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
R. T. Gilman & Co.  
The Wabli Iron Works
- Car Wheels and Axles:**  
Canadian Car Foundry Co., Ltd.  
Burnett & Crampton  
Hull Iron & Steel Foundries, Ltd.  
John J. Gartshore  
Marsh Engineering Works, Ltd.  
Peacock Brothers Limited.  
Osborn, Sam'l (Canada) Limited.  
The Electric Steel & Metals Co.  
The Wabli Iron Works
- Carriers (Gravity):**  
Jones & Glassco
- Castings—Brass**  
The Canada Metal Co., Ltd.
- Castings (Iron and Steel)**  
Burnett & Crampton  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Osborn, Sam'l (Canada) Limited.  
Peacock Brothers Limited.  
The Electric Steel & Metals Co.  
The Wabli Iron Works
- Cement and Concrete Waterproofing:**  
Spielman Agencies, Regd.
- Cement Machinery:**  
Northern Canada Supply Co.  
Hadfields, Limited  
Hull Iron & Steel Foundries, Ltd.  
Osborn, Sam'l (Canada) Limited.  
Fraser & Chalmers of Canada, Ltd.  
Canadian Fairbanks-Morse Co., Ltd.  
The Electric Steel & Metals Co.  
R. T. Gilman & Co.  
Burnett & Crampton
- Chains:**  
Jones & Glassco  
Northern Canada Supply Co.  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Link-Belt Co., Ltd.  
Greening, B., Wire Co., Ltd.
- Chain Drives:**  
Jones & Glassco (Regd.)
- Chain Drives—Silent and Steel Roller:**  
Canadian Link-Belt Co., Ltd.  
Hans Renold of Canada, Limited, Montreal, Que.
- Chemical Apparatus:**  
Mine and Smelter Supply Co.
- Chemists:**  
Canadian Laboratories  
Campbell & Deyell  
Thos. Heyes & Sons  
Milton Hersey Co.  
Ledoux & Co.  
Constant, C. L. Company
- Chrome Ore:**  
The Electric Steel & Metals Co.  
Everett & Co.
- Classifiers:**  
Mine and Smelter Supply Co.  
Mussens, Limited  
Fraser & Chalmers of Canada, Ltd.  
The Wabli Iron Works  
R. T. Gilman & Co.  
The Dorr Company
- Clutches:**  
Canadian Link-Belt Co., Ltd.  
Hans Renold of Canada, Limited, Montreal, Que.
- Coal:**  
Demolinon Coal Co.  
Nova Scotia Steel & Coal Co.
- Coal Cutters:**  
Osborn, Sam'l (Canada) Limited.  
Sullivan Machinery Co.  
Canadian Ingersoll-Rand Co., Ltd.
- Coal Crushers:**  
Canadian Mead-Morrison Co., Limited  
Canadian Link-Belt Co., Ltd.  
Peacock Brothers Limited.
- Coal Mining Explosives:**  
Canadian Explosives, Ltd.  
Giant Powder Company of Canada, Ltd.
- Coal Mining Machinery:**  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
Osborn, Sam'l (Canada) Limited.  
Canadian Ingersoll-Rand Co., Ltd.  
Sullivan Machinery Co.  
Marsh Engineering Works  
Hadfields, Ltd.  
Hendrick Mfg. Co.  
Fraser & Chalmers of Canada, Limited.  
Mussens, Limited  
R. T. Gilman & Co.
- Coal and Coke Handling Machinery**  
Canadian Mead-Morrison Co., Limited.  
Canadian Link-Belt Co., Ltd.
- Coal Pockets:**  
Canadian Mead-Morrison Co., Limited.
- Coal Pick Machines:**  
Sullivan Machinery Co.
- Coal Screening Plants:**  
Canadian Link-Belt Co., Ltd.  
Canadian Mead-Morrison Co., Limited.
- Cobalt Oxide:**  
Conlagas Reduction Co.  
Everitt & Co.
- Compressors—Air:**  
Canadian Fairbanks-Morse Co., Ltd.  
Smart-Turner Machine Co.  
Canadian Ingersoll-Rand Co., Ltd.  
Northern Canada Supply Co.  
MacGovern & Co., Inc.  
R. T. Gilman & Co.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
The Mine & Smelter Supply Co.
- Concrete Mixers:**  
Canadian Fairbanks-Morse Co., Ltd.  
Northern Canada Supply Co.  
Gould, Shapley & Muir Co., Ltd.  
MacGovern & Co., Inc.  
Mussens, Limited  
R. T. Gilman & Co.
- Condensers:**  
Canadian Fairbanks-Morse Co., Ltd.  
Smart-Turner Machine Co.  
Northern Canada Supply Co.  
MacGovern & Co., Inc.
- Concentrating Tables:**  
The Mine & Smelter Supply Co.  
Deister Concentrator Co.  
The Wabli Iron Works
- Converters:**  
Northern Canada Supply Co.  
MacGovern & Co., Inc.
- Conveyors—McCaslin Gravity Bucket:**  
Canadian Mead-Morrison Co., Limited.
- Contractors' Supplies:**  
Canadian Fairbanks-Morse Co., Ltd.
- Consulters and Engineers:**  
Hersey Milton Co., Ltd.
- Conveyors:**  
Canadian Link-Belt Co., Ltd.  
The Mine & Smelter Supply Co.  
Jones & Glassco (Regd.)
- Conveyor Belts:**  
Gutta Percha & Rubber, Ltd.
- Conveyor Flights:**  
Canadian Link-Belt Co., Ltd.  
Hendrick Mfg. Co., Ltd.
- Conveyor—Trough—Belt:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Link-Belt Co., Ltd.  
Hendrick Mfg. Co.  
Mussens, Limited  
Jones & Glassco (Roller, Belt and Chain)  
Hendrick Mfg. Co.  
The Wabli Iron Works
- Conical Mills:**  
Hardinge Conical Mill Co.
- Copper:**  
The Canada Metal Co., Ltd.  
Consolidated Mining & Smelting Co.
- Couplings:**  
Hans Renold of Canada, Limited, Montreal, Que.
- Cranes:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Mead-Morrison Co., Limited.  
Canadian Link-Belt Company  
R. T. Gilman & Co.  
Smart-Turner Machine Co.
- Crane Ropes:**  
Allan Whyte & Co.  
Canada Wire & Cable Co.  
Greening, B., Wire Co., Ltd.
- Crucibles:**  
Canadian Fairbanks-Morse Co., Ltd.  
The Mine & Smelter Supply Co.
- Crusher Balls:**  
Canada Foundries & Forgings, Ltd.  
Hull Iron & Steel Foundries, Limited, Hull, Que.  
Osborn, Sam'l (Canada) Limited.  
Swedish Steel & Importing Co., Ltd.
- Crushers:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Hardinge Conical Mill Co.  
Osborn, Sam'l (Canada) Limited.  
The Electric Steel & Metals Co., Ltd.  
R. T. Gilman & Co.  
Lyman, Ltd.  
Mussens, Limited



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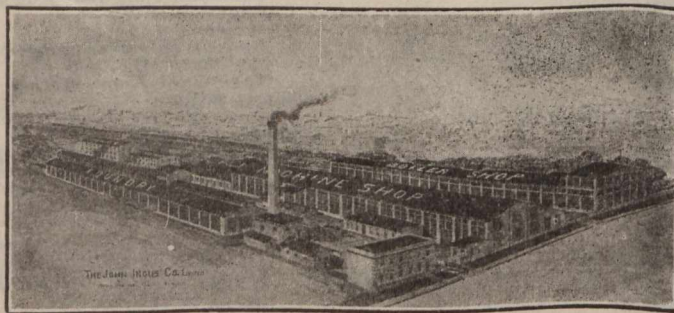
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## Canadian Miners' Buying Directory.—(Continued)

- The Mine & Smelter Supply Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works
- Cut Gears:**  
Hans Renold of Canada, Limited, Montreal, Que.
- Cyanide:**  
American Cyanamid Company.
- Cyanide Plant Equipment:**  
The Dorr Co.  
The Mine & Smelter Supply Co.
- D. C. Units:**  
MacGovern Co.
- Derricks:**  
Smart-Turner Machine Co.  
Canadian Mead-Morrison Co., Limited.  
Marsh Engineering Works  
R. T. Gilman & Co.  
Canadian Fairbanks-Morse Co., Ltd.  
Mussens, Limited
- Diamond Drill Contractors:**  
Diamond Drill Contracting Co.  
E. J. Longyear Company  
Smith & Travers  
Sullivan Machinery Co.
- Diamond Tools:**  
Diamond Drill Carbon Co.
- Diamond Importers:**  
Diamond Drill Carbon Co.
- Digesters:**  
Canadian Chicago Bridge and Iron Works
- Dies:**  
Canada Foundries & Forgings, Ltd.  
Hull Iron & Steel Foundries, Ltd.
- Dredger Pins:**  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
The Electric Steel & Metals Co.  
Hadfields, Limited
- Dredging Machinery:**  
Canadian Steel Foundries, Ltd.  
Canadian Mead-Morrison Co., Limited  
Hadfields, Limited  
Hull Iron & Steel Foundries, Ltd.  
R. T. Gilman & Co.
- Dredging Ropes:**  
Allan, Whyte & Co.  
Greening, B., Wire Co., Ltd.  
R. T. Gilman & Co.
- Drills, Air and Hammer:**  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
Sullivan Machinery Co.  
Northern Canada Supply Co.  
Osborn, Sam'l (Canada) Limited.  
The Mine & Smelter Supply Co.  
Mussens, Limited
- Drills—Core:**  
Canadian Ingersoll-Rand Co., Ltd.  
E. J. Longyear Company  
Standard Diamond Drill Co.  
Sullivan Machinery Co.
- Drills—Diamond:**  
Sullivan Machinery Co.  
Northern Canada Supply Co.  
E. J. Longyear Company
- Drill Steel—Mining:**  
H. A. Drury Co., Ltd.  
Hadfields, Limited  
International High Speed Steel Co., Rockway  
Osborn, Sam'l (Canada) Limited.  
Mussens, Limited  
Swedish Steel & Importing Co., Ltd.
- Drill Steel Sharpeners:**  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
Northern Canada Supply Co.  
Sullivan Machinery Co.  
Osborn, Sam'l (Canada) Limited.  
The Wabi Iron Works
- Drills—Electric:**  
Canadian Fairbanks-Morse Co., Ltd.  
Sullivan Machinery Co.  
Northern Electric Co., Ltd.
- Drills—High Speed and Carbon:**  
Canadian Fairbanks-Morse Co., Ltd.  
Osborn, Sam'l (Canada) Limited.  
H. A. Drury Co., Ltd.  
Hadfields, Limited
- Dynamite:**  
Canadian Explosives  
Giant Powder Company of Canada, Ltd.  
Northern Canada Supply Co.
- Dynamos:**  
Canadian Fairbanks-Morse Co., Ltd.  
MacGovern & Company
- Ejectors:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Ingersoll-Rand Co., Ltd.  
Northern Canada Supply Co.
- Elevators:**  
Canadian Mead-Morrison Co., Limited.  
Canadian Link-Belt Co., Ltd.  
Sullivan Machinery Co.  
Northern Canada Supply Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, Ltd.  
Jones & Glassco (Regd.)  
Mussens, Limited  
The Wabi Iron Works
- Engineering Instruments:**  
C. L. Berger & Sons
- Engines—Automatic:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Mead-Morrison Co., Limited  
Fraser & Chalmers of Canada, Ltd.
- Engines—Gas and Gasoline:**  
Canadian Fairbanks-Morse Co., Ltd.  
Alex. Fleck  
Fraser & Chalmers of Canada, Ltd.  
Osborn, Sam'l (Canada) Limited.  
Sullivan Machinery Co.  
Gould, Shapley & Muir Co., Ltd.  
MacGovern & Co., Inc.  
The Mine & Smelter Supply Co.
- Engines—Haulage:**  
Canadian Ingersoll-Rand Co., Ltd., Mont.  
Canadian Mead-Morrison Co., Limited.  
Marsh Engineering Works  
Fraser & Chalmers of Canada, Ltd.
- Engines—Marine:**  
Canadian Fairbanks-Morse Co., Ltd.  
MacGovern & Co., Inc.  
Swedish Steel & Importing Co., Ltd.
- Engines—Steam:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Mead-Morrison Co., Limited.  
R. T. Gilman & Co.  
MacGovern & Co., Inc.  
Fraser & Chalmers of Canada, Ltd.
- Engines—Stationery:**  
Swedish Steel & Importing Co., Ltd.
- Engineers:**  
General Engineering Co., New York  
The Dorr Co.
- Ferro-Alloys (all Classes):**  
Everitt & Co.
- Feed Water Heaters:**  
MacGovern & Co.
- Fire Fighting Supplies:**  
Gutta Percha & Rubber, Ltd.
- Flashlights—Electric:**  
Spielman Agencies, Regd.
- Flood Lamps:**  
Northern Electric Co., Ltd.
- Flourspar:**  
The Consolidated Mining & Smelting Co.  
Everitt & Co.
- Forges:**  
Canadian Fairbanks-Morse Co., Ltd.  
Northern Canada Supply Co.
- Forging:**  
Canadian Mead-Morrison Co., Limited.  
Canadian Foundries and Forgings, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Smart-Turner Machine Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, Ltd.
- Frogs:**  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
John J. Gartshore
- Frequency Changers:**  
MacGovern & Co., Inc.
- Furnaces—Assay:**  
Canadian Fairbanks-Morse Co., Ltd.  
Lymans, Limited  
Mine & Smelter Supply Co.
- Fuse:**  
Canadian Explosives  
Giant Powder Company of Canada, Ltd.  
Northern Canada Supply Co.
- Gaskets:**  
Gutta Percha & Rubber, Ltd.
- Gears:**  
Hans Renold of Canada, Limited, Montreal, Que.  
Jones & Glassco (Regd.)
- Gears (Cast):**  
Hull Iron & Steel Foundries, Ltd.  
Canadian Link-Belt Co., Ltd.
- Gears, Machine Cut:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Steel Foundries, Ltd.  
The Electric Steel & Metals Co.  
The Hamilton Gear & Machine Co.  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works
- Granulators:**  
Hardinge Conical Mill Co.
- Grinding Wheels:**  
Canadian Fairbanks-Morse Co., Ltd.
- Gold Refiners**  
Goldsmith Bros



## Canadian Miners' Buying Directory.—(Continued)

- Gold Trays:**  
Canada Chicago Bridge & Iron Works
- Hose (Air Drill):**  
Goodyear Tire & Rubber Co.  
Gutta Percha & Rubber, Ltd.
- Hose (Fire):**  
Goodyear Tire & Rubber Co.  
Gutta Percha & Rubber, Ltd.
- Hose (Packings)**  
Goodyear Tire & Rubber Co.  
Gutta Percha & Rubber, Ltd.
- Hose (Suction):**  
Goodyear Tire & Rubber Co.  
Gutta Percha & Rubber, Ltd.
- Hose (Steam):**  
Goodyear Tire & Rubber Co.  
Gutta Percha & Rubber, Ltd.
- Hose (Water):**  
Goodyear Tire & Rubber Co.  
Gutta Percha & Rubber, Ltd.
- Hammer Rock Drills:**  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
Osborn, Sam'l (Canada) Limited.  
Mussens, Limited  
The Mine & Smelter Supply Co.
- Hangers and Cable:**  
Standard Underground Cable Co. of Canada, Lt
- High Speed Steel:**  
Canadian Fairbanks-Morse Co. Ltd.  
H. A. Drury Co., Ltd.  
Osborn, Sam'l (Canada) Limited.  
Hadfields, Limited  
International High Speed Steel Co., Rockaway.
- High Speed Steel Twist Drills:**  
Canadian Fairbanks-Morse Co., Ltd.  
H. A. Drury Co., Ltd.  
Northern Canada Supply Co.  
Osborn, Sam'l (Canada) Limited.
- Hoists—Air, Electric and Steam:**  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
Jones & Glassco  
Canadian Mead-Morrison Co., Limited.  
Marsh Engineering Works  
Northern Canada Supply Co.  
Mine & Smelter Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
The Wabi Iron Works  
R. T. Gilman & Co.  
Mussens, Limited  
Canadian Link-Belt Co., Ltd.
- Hoisting Engines:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
The Electric Steel & Metals Co.  
Mussens, Limited  
Sullivan Machinery Co.  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Mead-Morrison Co., Limited  
Marsh Engineering Works  
Fraser & Chalmers of Canada, Ltd.  
The Mine & Smelter Supply Co.
- Hoisting Towers:**  
Canadian Mead-Morrison Co., Limited.
- Hose:**  
Canadian Fairbanks-Morse Co., Ltd.  
Gutta Percha & Rubber, Ltd.  
Northern Canada Supply Co
- Hose (Steam, Air, Water):**  
Gutta Percha & Rubber, Ltd.
- Hydraulic Machinery:**  
Canadian Fairbanks-Morse Co., Ltd.  
Hadfields, Limited  
MacGovern & Co., Inc.  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works
- Industrial Chemists:**  
Hersey, M. & Co., Ltd.
- Ingot Copper:**  
Canada Metal Co., Ltd.  
Hoyt Metal Co.
- Insulating Compounds:**  
Standard Underground Cable Co. of Canada, Ltd.
- Inspection and Testing:**  
Dominion Engineering & Inspection Co.
- Inspectors:**  
Hersey, M. & Co., Ltd.
- Jacks:**  
Canadian Fairbanks-Morse Co., Ltd.  
Can. Brakeshoe Co., Ltd.  
Northern Canada Supply Co.  
R. T. Gilman & Co.  
Mussens, Limited
- Jack Screws:**  
Canadian Foundries and Forgings, Ltd
- Laboratory Machinery:**  
Mine & Smelter Supply Co.
- Lamps—Acetylene:**  
Dewar Manufacturing Co., Inc.
- Lamps—Carbide:**  
Dewar Manufacturing Co., Inc.
- Lamps—Mirrors:**  
Canada Carbide Company, Limited  
Canadian Fairbanks-Morse Co., Ltd.  
Dewar Manufacturing Co., Inc.  
Northern Electric Co., Ltd.  
Mussens, Limited
- Lamps:**  
Dewar Manufacturing Co., Inc.
- Lanterns—Electric:**  
Spielman Agencies, Regd.
- Lead (Pig):**  
The Canada Metal Co., Ltd.  
Consolidated Mining & Smelting Co.  
Hoyt Metal Company.
- Levels:**  
C. L. Berger & Sons
- Locomotives (Steam, Compressed Air and Storage Stee**  
Canadian Fairbanks-Morse Co., Ltd.  
H. K. Porter Company  
R. T. Gilman & Co  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited
- Link Belt**  
Canadian Fairbanks-Morse Co. Ltd.  
Canadian Link-Belt Co., Ltd.  
Northern Canada Supply Co.  
Jones & Glassco
- Machinists:**  
Burnett & Crampton
- Machinery—Repair Shop:**  
Canadian Fairbanks-Morse Co., Ltd.
- Machine Shop Supplies:**  
Canadian Fairbanks-Morse Co., Ltd.
- Magnesium Metal:**  
Everitt & Co.  
Hull Iron & Steel Foundries, Ltd.
- Manganese Steel:**  
Canadian Steel Foundries, Ltd.  
The Electric Steel & Metals Co.  
Hadfields, Limited  
Osborn, Sam'l (Canada) Limited.  
Hull Iron & Steel Foundries, Ltd.  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works
- Metal Marking Machinery:**  
Canadian Fairbanks-Morse Co., Ltd.
- Metal Merchants:**  
Henry Bath & Son  
Geo. G. Blackwell, Sons & Co.  
Conlagas Reduction Co.  
Consolidated Mining & Smelting Co. of Canada  
Canada Metal Co.  
C. L. Constant Co.  
Everitt & Co.  
Hoyt Metal Company.
- Metallurgical Engineers:**  
General Engineering Co., New York  
The Dorr Co.
- Metallurgical Machinery:**  
General Engineering Co., New York  
The Dorr Co.  
The Mine & Smelter Supply Co.
- Metal Work, Heavy Plates:**  
Canada Chicago Bridge & Iron Works
- Mica:**  
Everitt & Co.  
Diamond Drill Carbon Co.
- Mining Engineers:**  
Hersey, M. Co., Ltd.
- Mining Drill Steel:**  
H. A. Drury Co., Ltd.  
Osborn, Sam'l (Canada) Limited.  
International High Speed Steel Co., Rockaway, N
- Mining Requisites:**  
Canadian Steel Foundries, Ltd.  
Dominion Wire Rope Co., Ltd.  
Hadfields, Limited  
Osborn, Sam'l (Canada) Limited.  
Hull Iron & Steel Foundries, Ltd.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
The Wabi Iron Works
- Mining Ropes:**  
Dominion Wire Rope Co., Ltd.
- Mine Surveying Instruments:**  
C. L. Berger & Sons
- Molybdenite:**  
Everitt & Co.
- Monel Metal (Wire, Rod, Sheet and Foundry Metal):**  
International Nickel Co.
- Motors:**  
Canadian Fairbanks-Morse Co., Ltd.  
R. T. Gilman & Co.  
MacGovern & Co.  
The Mine & Smelter Supply Co.  
The Wabi Iron Works



## Canadian Miners' Buying Directory.—(Continued)

- Motor Generator Sets—A.C. and D.C.**  
MacGovern & Co.
- Nails:**  
Canada Metal Co.
- Nickel:**  
International Nickel Co.  
Coniagas Reduction Co.  
The Mond Nickel Co., Ltd.
- Nickel Anodes:**  
The Mond Nickel Co., Ltd.
- Nickel Salts:**  
The Mond Nickel Co., Ltd.
- Nickel Sheets:**  
The International Nickel Co. of Canada  
The Mond Nickel Co., Ltd.
- Nickel Wire:**  
The Mond Nickel Co., Ltd.  
The International Nickel Co. of Canada
- Oil Analysts:**  
Constant, C. L. Co.
- Ore Handling Equipment:**  
Canadian Mead-Morrison Co., Limited.  
Canadian Link-Belt Co., Ltd.
- Ore Sacks:**  
Northern Canada Supply Co.
- Ore Testing Works:**  
Ledoux & Co.  
Can. Laboratories  
Milton Hersey Co.  
Campbell & Deyell  
General Engineering Co., New York  
Hoyt Metal Co.
- Ores and Metals—Buyers and Sellers of:**  
C. L. Constant Co.  
Geo. G. Blackwell  
Consolidated Mining and Smelting Co. of Canada  
Oxford Copper Co.  
Canada Metal Co.  
Hoyt Metal Co.  
Everitt & Co.  
Pennsylvania Smelting Co.
- Packing:**  
Canadian Fairbanks-Morse Co., Ltd.  
Gutta Percha & Rubber, Ltd.
- Paints—Special:**  
Spielman Agencies, Regd.
- Perforated Metals:**  
Northern Canada Supply Co.  
Hendrick Mfg. Co.  
Canada Wire and Iron Goods Company.  
Greening, B., Wire Co.
- Permissible Explosives:**  
Giant Powder Company of Canada, Ltd.
- Pig Tin:**  
Canada Metal Co., Ltd.  
Hoyt Metal Co.
- Pig Lead:**  
Canada Metal Co., Ltd.  
Hoyt Metal Co.  
Pennsylvania Manufacturing Co.
- Pillow Blocks:**  
Canadian Link-Belt Company
- Pipes:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canada Metal Co., Ltd.  
Consolidated M. & S. Co.  
Northern Canada Supply Co.  
R. T. Gilman & Co.
- Pipe Fittings:**  
Canadian Fairbanks-Morse Co., Ltd.
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- Pumps—Pneumatic:**  
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The Wabi Iron Works
- Pumps—Valves:**  
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- Pulleys, Shaftings and Hangings:**  
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Canadian Fairbanks-Morse Co., Ltd.  
The Wabi Iron Works
- Pulverizers—Laboratory:**  
Mine & Smelter Supply Co.  
The Wabi Iron Works  
Hardinge Conical Mill Co.
- Pumps—Boiler Feed:**  
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Canadian Fairbanks-Morse Co., Ltd.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
Mine & Smelter Supply Co.
- Pumps—Centrifugal:**  
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Smart-Turner Machine Co.  
Canadian Mead-Morrison Co., Limited.  
Canadian Ingersoll-Rand Co., Ltd.  
Mine & Smelter Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works
- Pumps—Diaphragm**  
The Dorr Company
- Pumps—Electric**  
Canadian Fairbanks-Morse Co., Ltd.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
Smart-Turner Machine Co.
- Pumps—Sand and Slime:**  
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Fraser & Chalmers of Canada, Ltd.  
Mine & Smelter Supply Co.  
The Electric Steel & Metals Co.  
The Wabi Iron Works  
Smart-Turner Machine Co.
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Dominion Wire Rope Co., Ltd.  
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Northern Canada Supply Co.  
Mussens, Limited

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Hull Iron & Steel Foundries, Ltd.  
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**Samplers:**

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Ledoux & Co.  
Milton Hersey Co.  
Thos. Heyes & Son  
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Mussens, Limited

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**Screens:**

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Hendrick Mfg. Co.  
Mine & Smelter Supply Co.  
Canada Wire and Iron Goods Company.  
Canadian Link-Belt Co., Ltd.

**Screens—Cross Patent Flanged Lip:**

Hendrick Mfg. Co.

**Screens—Perforated Metal:**

Hendrick Mfg. Co.

**Screens—Shaking:**

Canadian Link-Belt Co., Ltd.  
Hendrick Mfg. Co.

**Screens—Evolving:**

Canadian Link-Belt Co., Ltd.  
Hendrick Mfg. Co.

**Scheelite:**

Everitt & Co.

**Separators:**

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Fraser & Chalmers of Canada, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Peacock Brothers Limited.  
The Electric Steel & Metals Co.  
The Wabi Iron Works

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Jones & Glasco (Regd.)

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**Smelters:**

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MacKinnon Steel Co., Ltd.  
Marsh Engineering Works  
The Wabi Iron Works

**Solder—Bar and Wire:**

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Consolidated Mining & Smelting Co.

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The Electric Steel & Metals Co.

**Tanks:**

R. T. Gilman & Co.

**Tanks—Acid:**

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**Tanks (Wooden):**

Canadian Fairbanks-Morse Co., Ltd.  
Gould, Shapley & Muir Co., Ltd.  
Pacific Coast Pipe Co., Ltd.  
Mine & Smelter Supply Co.  
The Wabi Iron Works

**Tanks—Cyanide, Etc.:**

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Pacific Coast Pipe Co.  
MacKinnon Steel Co.  
Fraser & Chalmers of Canada, Ltd.  
Mine & Smelter Supply Co.  
The Wabi Iron Works

**Tanks—Steel:**

Canadian Fairbanks-Morse Co., Ltd.  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Chicago Bridge & Iron Works  
Marsh Engineering Works  
Osborn, Sam'l (Canada) Limited.  
MacKinnon Steel Co.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
Hendrick Mfg. Co.  
The Wabi Iron Works

**Tanks—Oil Storage:**

Canadian Chicago Bridge & Iron Works  
The Mine & Smelter Supply Co.

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Canadian Fairbanks-Morse Co., Ltd.  
Canadian Chicago Bridge & Iron Works  
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MacKinnon Steel Co.  
Mine & Smelter Supply Co.  
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Northern Electric Co., Ltd.

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Hardinge Conical Mill Co.

**Tube Mill Balls:**  
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Fraser & Chalmers of Canada, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Peacock Brothers Limited.

**Tube Mill Liners:**  
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**Turbines—Steam:**  
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**Twincones:**  
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**Weighing Larries:**  
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**Welding and Cutting—Oxy-Acetylene:**  
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**Winches—Power Driven:**  
Canadian Mead-Morrison Co., Limited.

**Winding Engines—Steam and Electric:**  
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Canadian Ingersoll-Rand Co., Ltd.  
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Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
Mussens, Limited  
R. T. Gilman & Co.  
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**Wire:**  
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**Wire—Bare and Insulated:**  
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**Wire Rope:**  
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R. T. Gilman & Co.  
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Dominion Wire Rope Co., Ltd.

**Wire Rope Fittings:**  
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**Wire Cloth:**  
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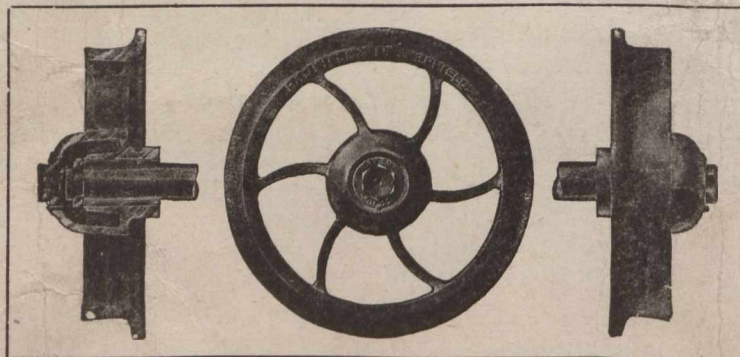
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