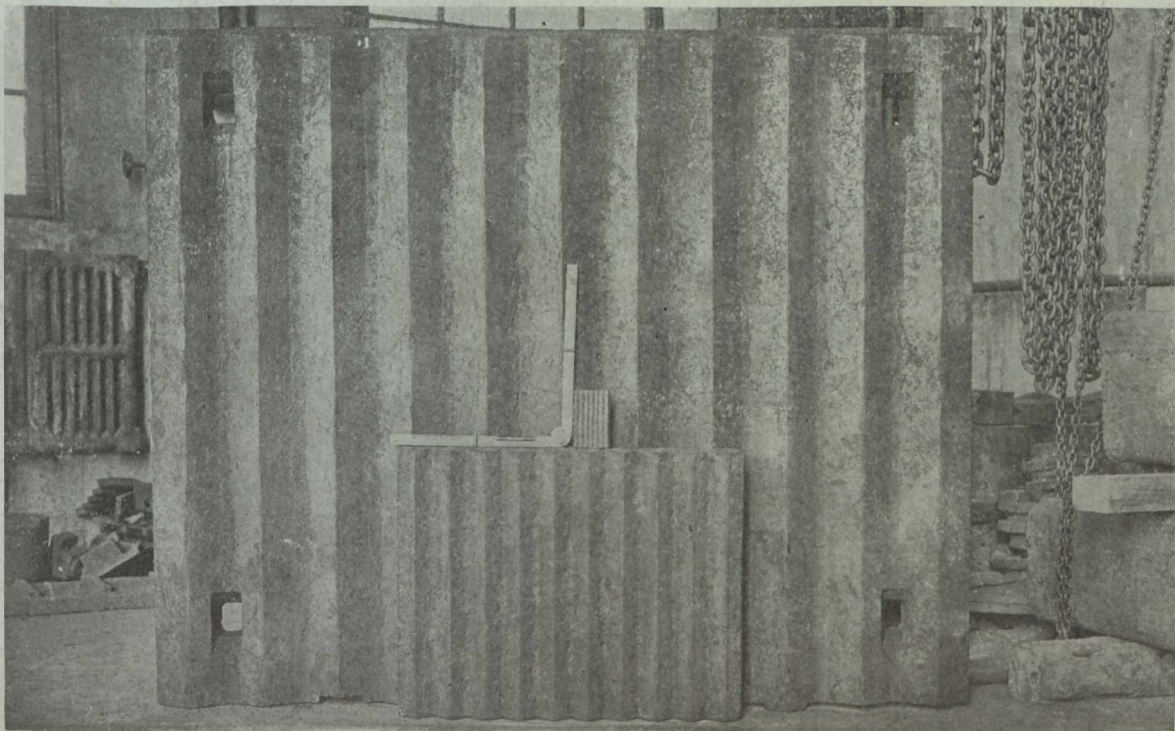


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Vol. XLI.

Gardenvale, P. Q., August 6, 1920.

No. 31.



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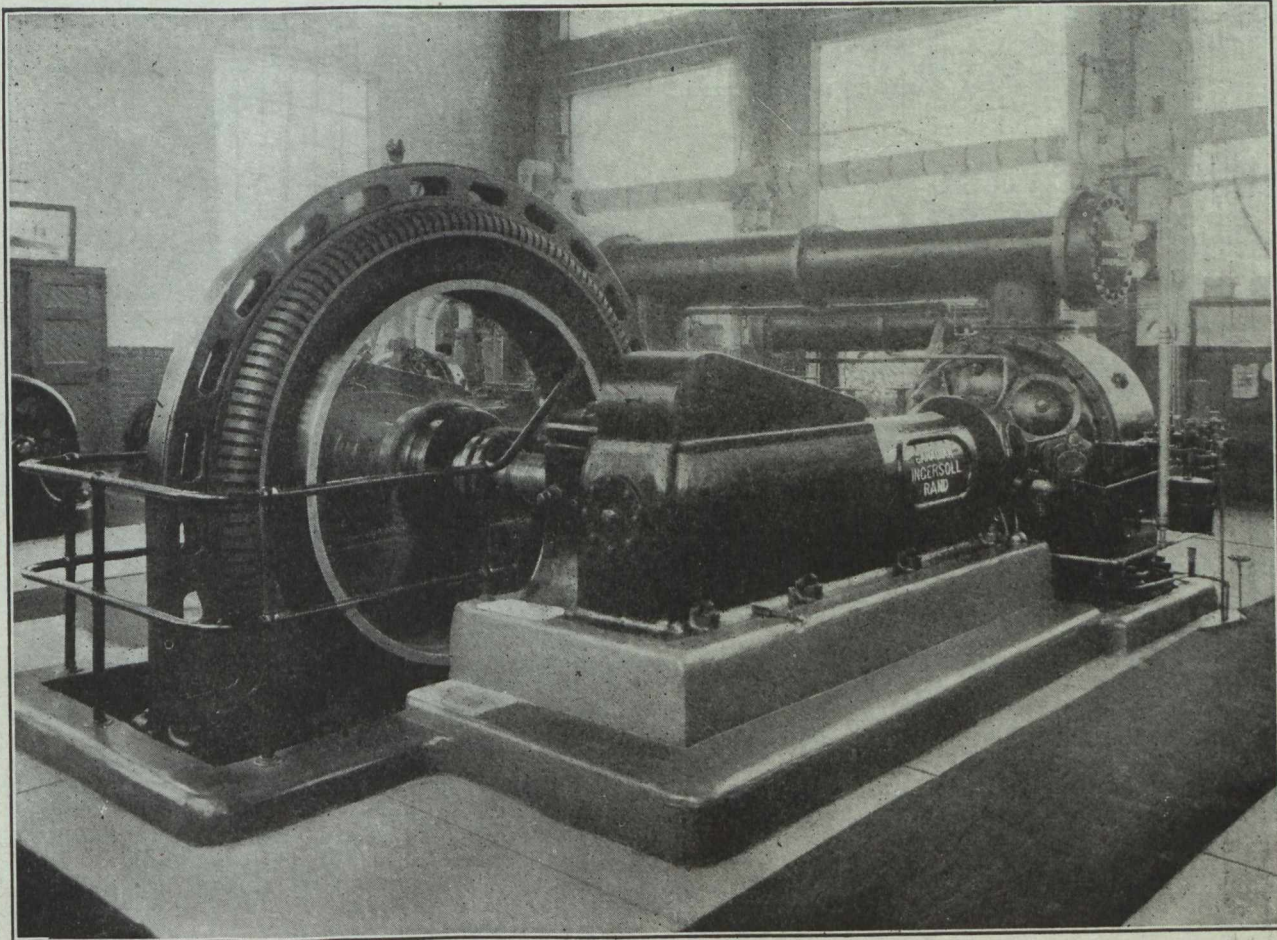
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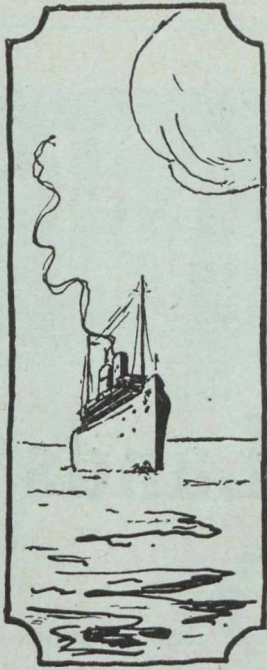
Recent Publications

- Iron Ore Occurrences in Canada, Vol. II. Compiled by E. Lindeman, M.E., and L. L. Bolton, M.A., B.Sc. Introductory by A. H. A. Robinson, B.A.Sc.
- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (British Columbia). Vol. V., by W. A. Parks, Ph.D.
- Peat, Lignite and Coal; their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Mineral Production Reports, by J. McLeish, B.A.
- The Coal-fields and Coal Industry of Eastern Canada, by F. W. Gray.
- 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.
- Clay Resources of Southern Saskatchewan, by N. B. Davis, M.A., B.Sc.
- Summary Report of the Mines Branch, 1918.
- The Mineral Springs of Canada. Part II., by R. T. Elworthy, B.Sc.
- The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—
- Fuel Testing Laboratory.**—Testing value of Canadian fuels for steam raising and production of power gas; analyses, and other chemical and physical examinations of solid, liquid and gaseous fuels are also made.
- Ore-Dressing Laboratory.**—Testing of Canadian ores and minerals, to ascertain most economical methods of treatment.
- Chemical Laboratory.**—Analysing and assaying of all mineral substances and their manufactured products. Copies of schedules of fees, which are slightly in excess of those charged by private practitioners, may be had on application.
- Ceramic Laboratory.**—Equipment is such that complete physical tests on clays and shale of the Dominion can be made, to determine their value from an economic standpoint.
- Structural Materials Laboratory.**—Experimental work on sands, cements and limes is also undertaken.
- Applications for reports and particulars relative to having investigations made in the several laboratories should be addressed to The Director, Mines Branch, Department of Mines, Ottawa.

GEOLOGICAL SURVEY

Recent Publications

- Summary Report. 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-Athapapuskow 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 Hig:wood river. Geology.
- Map 1724. Sheep River, Alberta. Geology.
- Map 1726. Athapapuskow 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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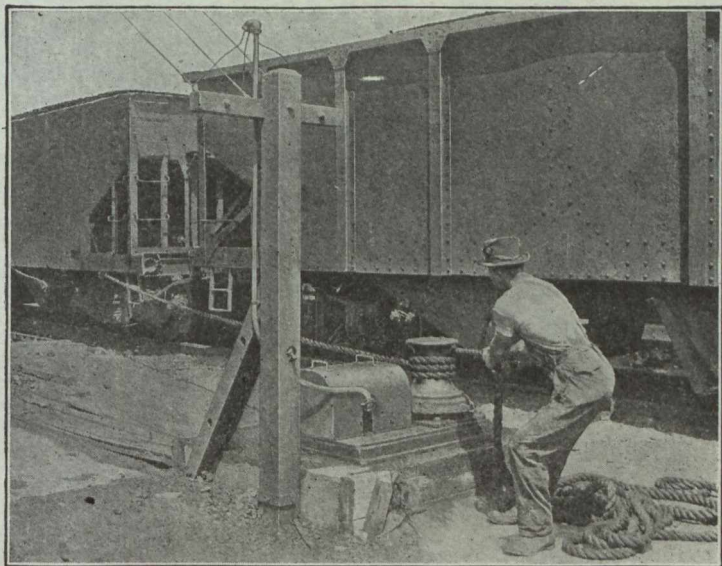
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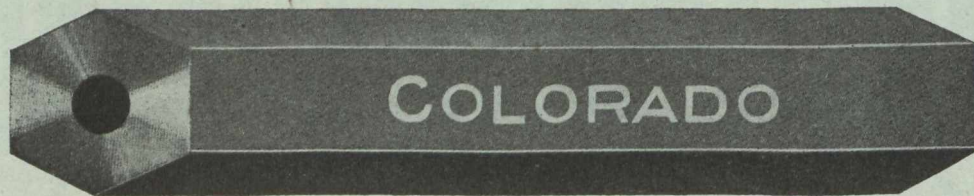
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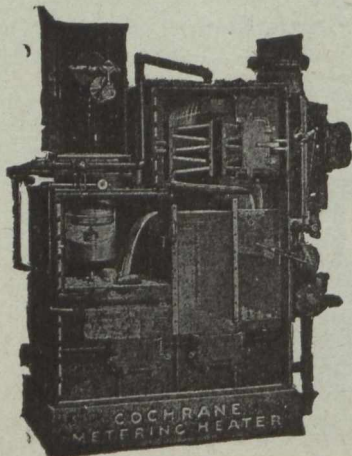
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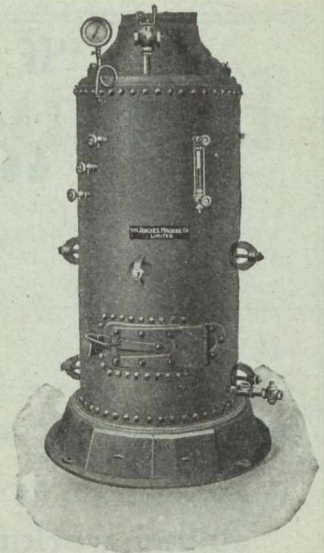
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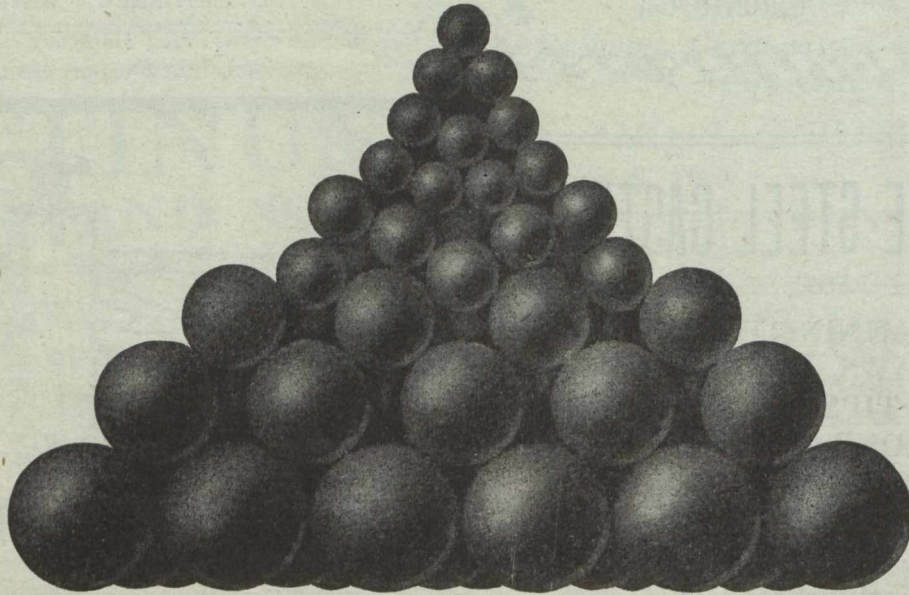
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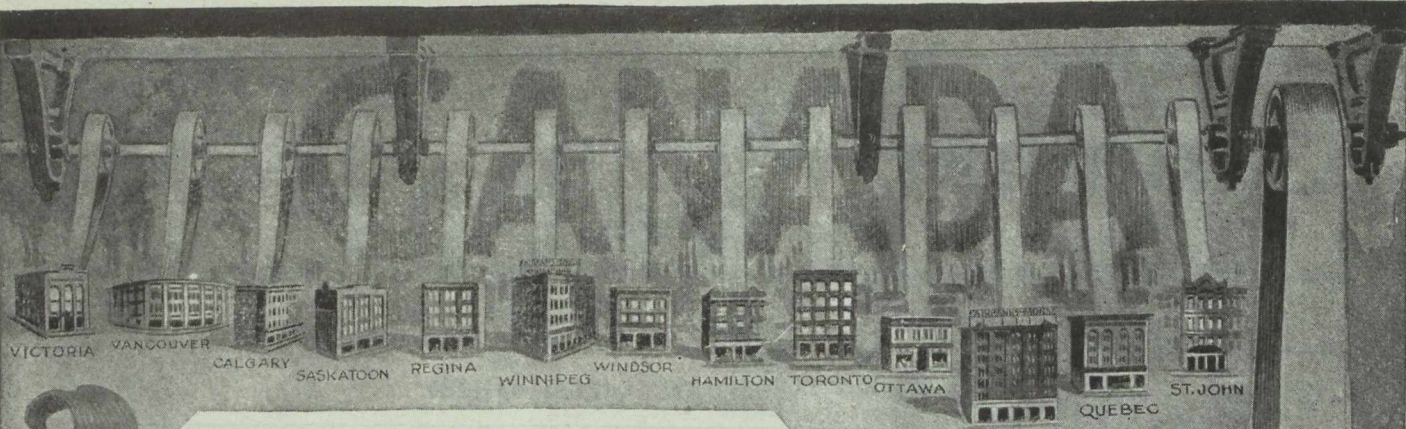
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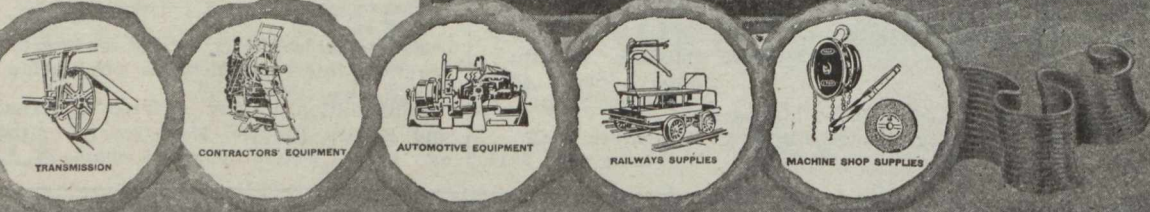
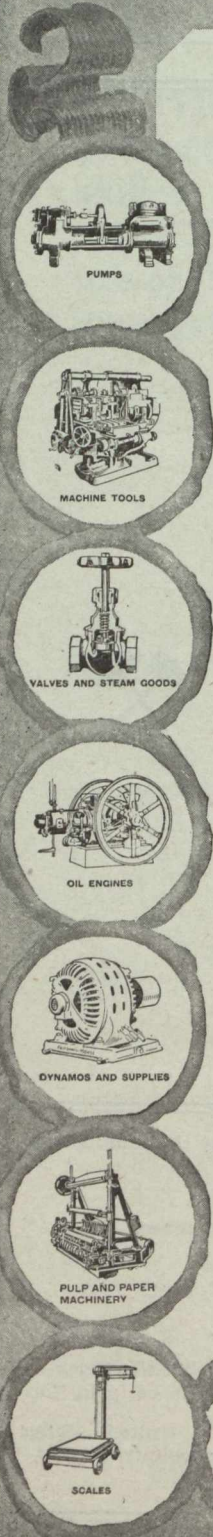
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EDITORIAL

NEWSPAPER ADVERTISING OF MINING STOCKS.

Humor is omnipresent to those who cannot divest themselves of the sense, and nowhere is it more often encountered than in reading the financial pages of our newspapers, and in the satellitic advertising it is usual to find on these pages, sometimes openly displayed for what it is, and at other times decently, or discreetly—as the reader prefers it—concealed.

As an example of advertising, naked and unashamed, and of humor also, to those who are merely watching but are not sitting in at the game, despite many invitations, we like the most recent announcement of the Little Gem Mining Company of Alaska, in Montreal's staidest newspaper. At the "instigation" of the brokers who are selling the stock of the company (the word is not ours, but we believe it is felicitously employed) a Mr. Robert Burns, whose qualifications for the work are not stated, but may be surmised, has been despatched to the mine in Alaska "for the sole purpose of definitely proving the value and prospects of the Little Gem Mine." Mr. Burns reports that the shipload of machinery is at Wasilla, from which it may be deduced that it escaped the earthquake that was suggested as being the only thing that could prevent the delivery of the machinery to the mine; and in his telegram states: "Miners enthusiastic over big developments and rich quality of ore found. Picked several pieces myself, no need to pan, can see gold plainly without glass piece. One inch square contained twelve pieces of gold on surface." Mr. Burns' acquaintance with gold-ore sampling and the use of the pocket lens may be deduced from internal evidence. The brokers state they do not consider it necessary to add anything to their client's report, and trustfully state: "We leave the matter in your hands as to whether you consider the proposition a desirable one or otherwise." The decision will be, as we imagine Mr. Burns' report to be, chiefly influenced by the reader's knowledge of the principles of gold recovery. There are gold mines in Canada, producing large quantities of gold monthly, where the most assiduous use of a "glass piece" would not reveal twelve pieces of gold on many inches of surface, and there have been mines also which have produced ore with "pieces of gold" as obvious as the plums in a pudding, but they did not pay dividends. We would not consider that Mr. Burns' telegram has "definitely proved the value and prospects of the Little Gem Mine."

As an example of discreeter advertising, is a paragraph in a Toronto newspaper regarding a property in Porcupine having "immense ore deposits which in size and formation greatly resemble those of the Hollinger Consolidated." Familiar phrase. "Considering the proven fact that values in the Porcupine Camp generally become more consistent, more evenly distributed and somewhat higher with depth," the paragraph enlarges on the possibility of greater values at depth than are indicated by assays of surface channellings. Is this feature of the Porcupine Camp a proven fact? If so, it is one of the most interesting developments of mining operations in that camp we have had occasion to come across.

A further piece of information is that the conditions in the Porcupine Camp resemble those of the South African fields, a fact that does not seem to have received previous prominence in Canadian circles, but, which, if admitted, would permit of much speculative comment.

Just below this upsetting paragraph is the advertisement of Peace River Petroleum Ltd., which takes comfort in the discovery of oil in the No. 1 well, Peace River Town, and in the fact that an enquiry for crude oil for local consumption has settled the question of "What will be done with the oil?" Is not that rather beside the question? The statement is made that No. 1 well "has oil and plenty of it" and that within thirty days a pump test will be made and the quantity of oil announced. The question that investors should ask following an announcement of this kind should be, not what will be done with the oil, but, how much oil will the wells yield? Any concern in Canada that has a well producing anything like a heavy flow of oil will not require to offer "last chances" on shares at fifty cents each.

There is something about the sale of mining and oil stocks in Canada that is distinctly repugnant, but is not easily definable in words. The nauseating mixture of reading matter puffs with apparent paid advertising is a procedure that does not enhance the good reputation of any newspaper, and it is in effect a fraud upon the reader who is credulous regarding those things upon which he is uninformed, and who is not in a position to distinguish between obvious advertising and reading matter that, whether newspaper men admit it or not, carries with it editorial endorsement in default of any notice to the contrary.

Any publication in Canada that attempts to give an opinion on the worth of mining stocks meets two dangers, the possibility of adversely criticising a potentially profitable offering, or of endorsing a flotation without merit, and therefore the task is—with some notable exceptions—shirked. But, apart from the very real difficulties of intelligently appraising flotation values, it cannot be said that many of our newspapers perceptibly discourage the appearance of dubious flotation advertisements, or exercise any rigid censorship in protection of their readers.

THE COMMISSIONER OF MINES FOR NOVA SCOTIA.

The result of the Nova Scotia provincial elections shows that still another part of Canada is disposed to try the political experiment of group government. The opposition will be composed of a Labor and Farmer group, but whether they will coalesce remains to be seen. There are some irreconcilable differences between the farmer and the trades unionist in Nova Scotia. There has for many years been a fight in Nova Scotia between the two schools of labor thought, namely those who believe in general representation of the people through a candidate not bound to any particular social group, and those who believe in a straight labor ticket, and the preamble of a union constitution which declares as its first principle that "all wealth belongs to the producer." Both federal and provincial politics will hear much of the miner-labor group in the next few years.

Disclaiming entirely any political bias, and expressing a viewpoint based entirely upon his personal qualifications for the office, we regret the defeat at the polls of Mr. E. H. Armstrong, the Commissioner of Mines for Nova Scotia. Not himself a miner, and representing the constituency furthest removed from active mining operations, Mr. Armstrong by devotion to the duties of his office and from a sense of its importance, has assiduously studied mining practice and mining laws, and has carried through some much needed reforms in connection with mineral holdings in Nova Scotia, where the mineral grants and reservations are much involved by reason of the long history of mining in this province. In particular is Mr. Armstrong to be thanked for his courageous and active attitude towards the undersea coal leases. This subject bristled with difficulties and dangers, but Mr. Armstrong studied the problem from the viewpoint of provincial interests, and it is largely because of his insistence that the life of the undersea coalfield should not be endangered by conflict of corporate interests, and the general acceptance of his viewpoint in Nova Scotia, that the Dominion Steel Corporation and the Nova Scotia Steel & Coal Company have merged their coal holdings, thereby solving a difficulty which would otherwise have had to be remedied by legislative enactment.

Nova Scotia has been most unfortunate in lack of continuity of administrative and technical direction of its mining problems, both in government and in corporate circles, and, if Mr. Armstrong's laboriously gained knowledge of the Department of Mines is lost through his failure to be returned as a member of the Legislature, it will be necessary for some other person to begin where he began, and all who know Nova Scotia will admit that already sufficient has been lost by the necessity to educate new men for positions in which training and experience are not less important than ability.

The management of technical departments of government by laymen is one of the weaknesses of our form of government, and we believe that the appointment of a mining engineer to the position of minister of mines, and of a farmer to the position of a minister of agriculture is as logical and necessary as the appointment of a lawyer to be attorney-general. The Commissioner of Mines for Nova Scotia has, however, earned initiation into the profession of mining, and his place will be hard to fill.

LENIN ON THE INTELLECTUALS AND THE ENGINEER.

The "Social-Demokraten" of May 14th, reports a conversation between Jakob Friis, a noted Norwegian socialist and Lenin. The proletarian autocrat is described as having brown eyes, "with a little touch of red." "He is a little deaf in one ear, and therefore talks loudly. When he wishes to bring out an important point, he closes one eye while he thinks, and at the same time a knowing smile comes over his face." There is no trace of humor in Friis's account of this engaging personality with the pensive wink, for he describes Lenin's doorway as the "entrance to the Holy of Holies," and remarks "one never for a moment notices Lenin being conscious of his own greatness. So great is he." Lenin criticises the intellectual doubters who "confuse the mass of workers." "Can you demand," asks Friis, "the same revolutionary clarity in other countries as in Russia?" "Ah!" replies Lenin, "the war has been such a teacher."

After further conversation, during which master and disciple discuss murder, revolution and the destruction of the fabric of society as it now exists in the academic and detached way that takes away the breath of the uninitiated, Lenin expresses himself thus:

"Revolution is coming unavoidably in every country. But it will be probably easier in the countries of Western Europe than with us. There they have entirely different organized forces in their hands than we have. Temporarily Russia has taken the lead. But when the revolution is over in Western Europe, Russia will quickly lag behind in development. How is it with the intellectuals in Norway, are they strongly reactionary?"

"They have become better recently. Especially the French *Clarté* movement has awakened much interest. When the French authors begin to be Bolshevik the Norwegian authors will follow close behind them."

"Hm. I don't suppose that such a following of the fashions is much to trust to."

"Perhaps not, but at least among the engineers I think that there is a real important movement discernible."

"Yes, they are more or less on our side everywhere. In Germany there is almost an engineers' proletariat, so to speak. It is of the greatest importance to get the engineers on our side. In this country they had, for the most part, purely capitalistic interests. It will also require many years to build up industrial life here anew. It is to be hoped that you will have an easier time of it in Norway."

Lenin looked at the clock. I got up and thanked him for all his kindness to me during my stay in Moscow."

We live in difficult times, and world currents are moving, the origin of which is not always known to those who are carried along by them. An "engineers' proletariat" strikes us as a phrase of evil omen, proceeding from an evil source. Should the engineer abandon the traditions of service, and those constructive ideals that have placed him in the forefront of progress and all that pertains to the welfare of mankind, and run after the strange gods of selfishness and greed, and consort with those who have adopted as the war-cry the equivalents of "More and still more" and "Ourselves alone," there would be little hope for the world. The entrance of the engineer into political life has been a significant event of recent years, and we believe that, if the best minds of the profession realize their responsibility and do not hold aloof from a duty of citizenship that is innately repugnant to the scientific engineer, the political influence of the engineer will be a cleansing and stabilizing element in the melting-pot of North America. There is just a danger, however, that minor and inferior elements in the profession, if not dominated by its intellectual leaders, may stray into the wilderness of chaotic thinking that has engulfed so many at this date, and has not by any means run its epidemic course.

SULPHUR IN ILLUMINATING GAS.

Much discussion is taking place in Montreal on the alleged sulphurous character of the illuminating gas supplied by the Montreal Light, Heat & Power Company, which the company attributes to the unusually poor quality of the coal it is forced to use, because of the shortage of suitable gas coal. It may be remarked that the question of sulphur in city gas is not new in North America. At the meeting of the American Institute of Mining & Metallurgy in Chicago last September a symposium of papers was read on the occurrence of sulphur in coal, and there was a general agree-

ment among the members who took part in the discussion—most of whom, of course, were coal operators or representatives of coal operators—that the gas companies could not expect much longer to continue to receive coal containing as little sulphur as was the case formerly. One speaker strongly advocated the enlargement of the purification plants to enable them to deal with a larger percentage of sulphur in the gas coal supplied. This is equivalent to stating that there has been much exhaustion of the coal seams with low sulphur content, and that with higher sulphur coal on the market operating conditions will have to be made to suit. The elimination of sulphur from coal gas is more or less complete, according to the extent of purifying surface over which the gas passes, and the frequency of the removal of the spent oxide, all of which means larger purification installations and large expenditure.

NEWS OF THE ASBESTOS MINES

By Courtesy of "ASBESTOS."

H. W. Edmonson, formerly with the Federal Asbestos Company has been appointed manager, and about 100 hands are now employed.

W. A. Janitsch, formerly with the Government survey, Ottawa, and having had four years overseas service, has been appointed as superintendent of the Federal Asbestos Company, as successor to H. W. Edmonson.

Asbestos Mines, Limited, East Broughton, have about finished repairing the milling plant on the Boston property and are commencing to produce fibre. The mill is, at present operated with steam power, but the intention is to change this to electric power immediately, this change to be made while the old steam plan is in operation.

As the mill is about three-quarters of a mile from the pit, a track and locomotive haulage is in contemplation, but until this is ready, teams and auto trucks are used to convey the rock to the mill. A steam shovel is being used to load the rock into the teams, and later into cars.

The Quebec Asbestos Corporation of East Broughton, have recently added another 1-1/2 yard steam shovel to their pit equipment. This will allow the mill to load enough additional rock to operate their mill to full capacity day and night.

They are also installing a new set of rolls, using them as auxiliary crusher, and it is expected this will materially increase their production.

The plant is one of the best equipped in the East Broughton district, and is under the able management of E. E. Spafford.

Jos. Poulin, who about three years ago built and equipped a small mill and plant in East Broughton, and has been operating this successfully since, has sold out to Mr. Samuel W. Cohen and associates.

This plant is situated near the Fraser Mine of the Asbestos Corporation of Canada. G. P. Angus, until lately engineer with the Consolidated Asbestos Ltd., has been appointed manager.

GRAPHITE

New Mines Branch Monograph on an Important Canadian Mineral

(Photographs kindly loaned by the Department of Mines)

From numerous enquiries for copies of Report No. 18, Graphite, Its Properties, Occurrence, Refining and Uses," by F. Cirkel, the "Journal" has known that there was a demand for an authoritative monograph on this important Canadian mineral to take the place of the previously mentioned Report, now, and for some time past, out of print. It is therefore a matter of some importance that a new and up-to-date monograph on graphite has been issued by the Mines Branch, and preliminary reference was made to Mr. Hugh S. Spence's Report in the editorial columns of the last issue.

The annual production of graphite in Canada, as recorded in the annual statistics of the Mines Branch, is as follows:—

Annual Production of Graphite in Canada, 1886-1918.

Calendar Year.	Tons.	Value.
1886.....	500	\$4,000
1887.....	300	2,400
1888.....	150	1,200
1889.....	242	3,160
1890.....	175	5,200
1891.....	260	1,560
1892.....	167	3,763
1893.....	Nil	Nil
1894(a).....	3	223
1895.....	220	6,150
1896.....	139	9,455
1897.....	436	16,240
1898.....	...	13,698
1899.....	1,130	24,179
1900.....	1,922	31,040
1901.....	2,210	38,780
1902.....	1,095	28,300
1903.....	728	23,745
1904.....	452	11,760
1905.....	541	16,735
1906.....	387	18,300
1907.....	579	16,000
1908.....	251	5,565
1909.....	864	47,800
1910.....	1,392	74,087
1911.....	1,269	69,576
1912.....	2,060	117,122
1913.....	2,162	90,282
1914.....	1,647	107,203
1915.....	2,635	124,223
1916.....	3,955	325,362
1917.....	3,714	402,892
1918.....	3,114	248,970
1919.....	1,322	92,241

(a) Exports.

The increased production during the war years came mostly from the Quebec mines, but during the year 1919 production from this source was virtually suspended, and the output came almost entirely from Ontario.

Imports of graphite into Canada are as follows:

Calendar Year.	Plumbago, not ground.	Ground and manufactures.	Crucibles, clay or plumbago.
1910.....	\$4,867	\$55,090	\$52,896
1911.....	4,940	51,192	56,814
1912.....	7,249	65,911	82,324
1913.....	9,375	72,887	73,971
1914.....	801	49,478	49,913
1915.....	3,436	41,681	106,761
1916.....	3,231	99,919	520,341
1917.....	47,218	123,991	798,004
1918.....	93,956	132,821	113,856
1919.....	6,604	80,970	59,914

The sharp increase in the imports of crucibles from 1915 to 1918 reflects the requirements of Canadian munitions industries, and the much increased value of graphite crucibles.

Attempts have been made to manufacture crucibles in Canada, in connection with which readers are referred to an article in our issue of January 16th last (see page 33) describing the plant of the Dominion Crucible Co. at St. John's, Quebec, a subsidiary of the Dominion Copper Products Co. The decreased demand for crucibles, and the lack of tariff protection, coupled with the 7½ per cent war tax on imported graphite (now removed) placed this young industry in a difficult position. The Dominion Copper Products Company is being wound up, having disposed of its assets to the Canadian Explosives Co., and the future of the crucible plant is uncertain. There is a possibility, however, that it may be used to manufacture foundry facings. It would be a pity to see the work of this plant discontinued, as it is so far virtually the only plant in Canada that has attempted to manufacture graphite crucibles.

DOMESTIC CONSUMPTION OF GRAPHITE

From data furnished to the Mines Branch in 1912-13, the total annual consumption of graphite by Canadian manufacturers at that time amounted to 950 short tons. Of this amount, 192 tons represented domestic, and 785 tons imported graphite.

The bulk of the graphite used went to the foundry facings, stove polish and paint trades. The following table shows the consumption by industries:—

	Number of firms using Domestic graphite.	Domestic tons.	Imported tons.	Total tons.
Explosives.	2	..	9	9
Foundries	267	78	351	429
Lubricants	13	1	17	18
Stove polish	12	20	270	290
Paints	18	81	109	190
Rubber goods	1	7	..	7
Various	6	5	2	7
Total	319	192	758	950

The above list of industries has since been increased by at least three, namely, dry battery, crucible, and pencil. The first-named uses chiefly artificial graphite produced at Niagara Falls, Ont. In crucibles, both domestic and imported graphite is used, and in pencils, imported amorphous graphite.

Prior to 1915, a certain amount of Ceylon plumbago was imported for use in the best grades of foundry facing, but the trade at the present time uses chiefly Mexican, Korean, American and domestic graphite.

The paint trade uses both artificial and imported amorphous graphite.

In powder and shot polishing, Mexican amorphous graphite is used.

Both flake and amorphous graphite is employed in lubricants. In addition, the Acheson Oildag Company, at Sarnia, Ont., manufacture so-called "deflocculated graphite"—a very finely divided artificial graphite—for use in their lubricating compound.

General Review of the Industry.

The great increase in the price of crucible flake, due to the war, did not lead, in Canada, to the increased mining activity that perhaps might have been anticipated. No new mines or mills came into operation, and a large proportion of the existent mills were idle or in only intermittent operation. This may be ascribed to a combination of causes, amongst which figures prominently the lack of success which has for years past attended efforts to evolve efficient mill processes for the refining of graphite in this country. This, coupled with great general increase in the cost of labour and materials in the last few years, has effectually discouraged the investment of capital in

an enterprise which, while offering possibilities during a period of excessive, war time prices, in ordinary times has yielded only slight returns and then only with the most capable of management and under exceptionally favourable conditions. In a number of instances, large mills, out of all proportion to the size of the ore-bodies as determined at the time of their construction, have been erected at great expense, and owing either to lack of ore, expense of running, or a combination of these causes, have been in only intermittent operation ever since.

More Efficient Concentration Processes Necessary.

Most of the mills erected in recent years have been equipped with a dry process of concentration, consisting in repeated crushing by rolls of flour mill type, with screening between successive crushing operations, as well as treatment on dry tables. Such an installation required an excessive amount of floor space and often an elaborate system of elevators, added to which the ore required to be kiln-dried prior to milling. The above called for a mill building of large size, relatively high power consumption and a large expenditure for fuel for firing the boilers, heating the plant in winter, and drying the ore. While wood fuel can usually be obtained in the vicinity of the mines, coal has sometimes been used for firing the boilers; this involved considerable expense for haulage, since many of the mills are situated at a considerable distance from rail.

Wet Concentration Displacing Dry Methods.

Dry methods for the concentration of graphite first came into prominence in Canada about the year 1906, and between 1906 and 1912 nine mills were installed with dry concentrating machinery. The process was



Open cut above workings of Globe Graphite Mining and Refining Company, concession VI, lot 21, township of North Elmsley, Ont. The banding in the limestone is well shown, and a well defined fold is exhibited in the cap rock above the shaft. Graphite bodies tend to occur at the crest of such folds.

adopted to supersede the wet system of buddles, originally employed in the older mills of the Buckingham district, in Quebec. Speaking generally, while there may have been some exceptions, dry concentration of graphite by the above methods has proved a failure in all respects. The expense involved has been high; a high grade of product has been obtained with difficulty and generally at the expense of an excessive loss of graphite in the tailings and the destruction of an undue proportion of the larger flake in the ore. Recent experience in the Alabama field, where a number of dry mills using similar or modified styles of concentrating machines have been erected in the last two or three years, has been along similar lines, and in various instances the dry installations have been discarded in favour of some form of wet concentration.

Some part of the failures that have attended efforts to develop the graphite industry in Canada has frequently been ascribed to the impersistence of the ore-bodies. While this is doubtless true in the case of a number of properties upon which mills have been erected, it is not to be inferred that all or even the majority of the known deposits are of such nature, and any such statement requires certain qualifications. For one thing, up to comparatively recently, few attempts to prove ore-bodies by diamond-drilling had been made, and opinions on the extent of deposits were based merely on outcrops or an insignificant amount of surface work.

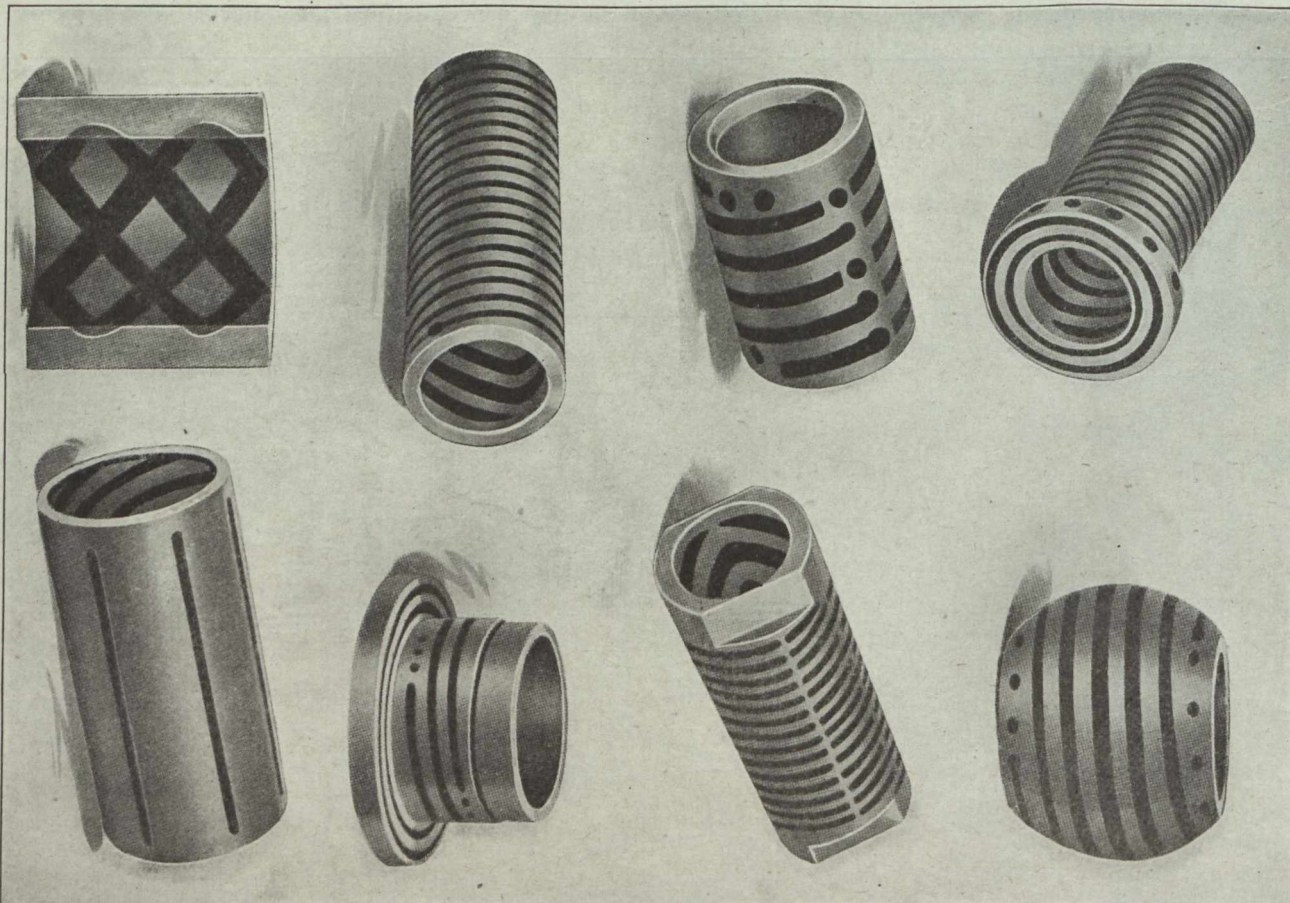
The great majority of Canadian graphite deposits are represented by graphitic gneisses and limestones,

originally bedded sediments, which have been subjected to an extreme degree of dynamic and contact metamorphism accompanied by intense squeezing, folding, fracturing, and intrusion, so that they together with the rocks intrusive into them, now form an exceedingly complex series with most involved structural relations. It is evident that little that is definite can be learned about the size and form of ore-bodies forming an integral part of such a complex from mere surface indications and even underground work will often fail to reveal anything of a really definite nature. Little underground mining has been carried out, however, the majority of workings being shallow and open-cast, so that our knowledge of the deposits is necessarily scanty. What holds good in the case of any one particular deposit, also, could probably not be taken as a criterion in the case of another, owing to local variations in the structural relations of the rocks.

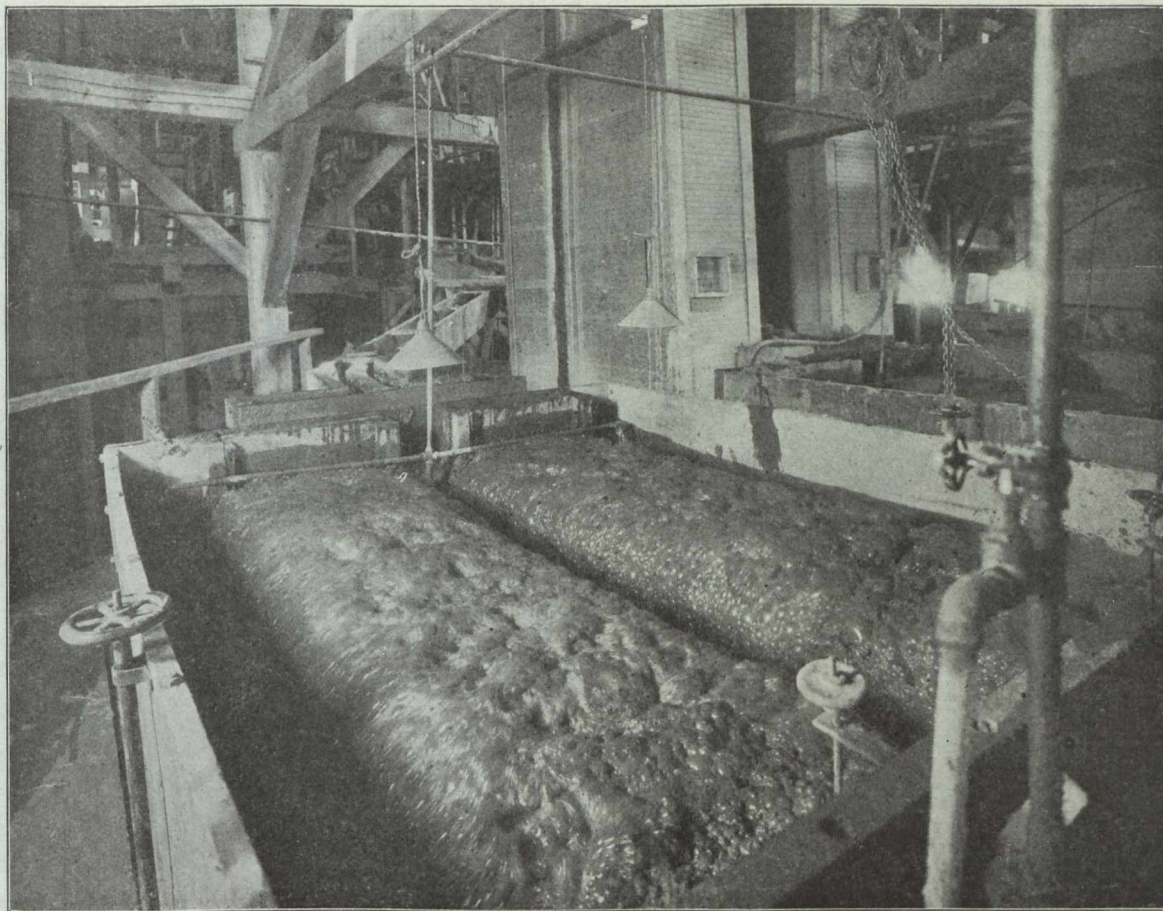
Diamond Drill Prospecting Advocated.

Hence, apart from actual mining operations, diamond-drilling is the only reliable method of ascertaining the extent of graphite ore-bodies, and it is apparent that this fact is becoming recognized, five properties having been drilled during the past few years—three of them in the last half of 1918.

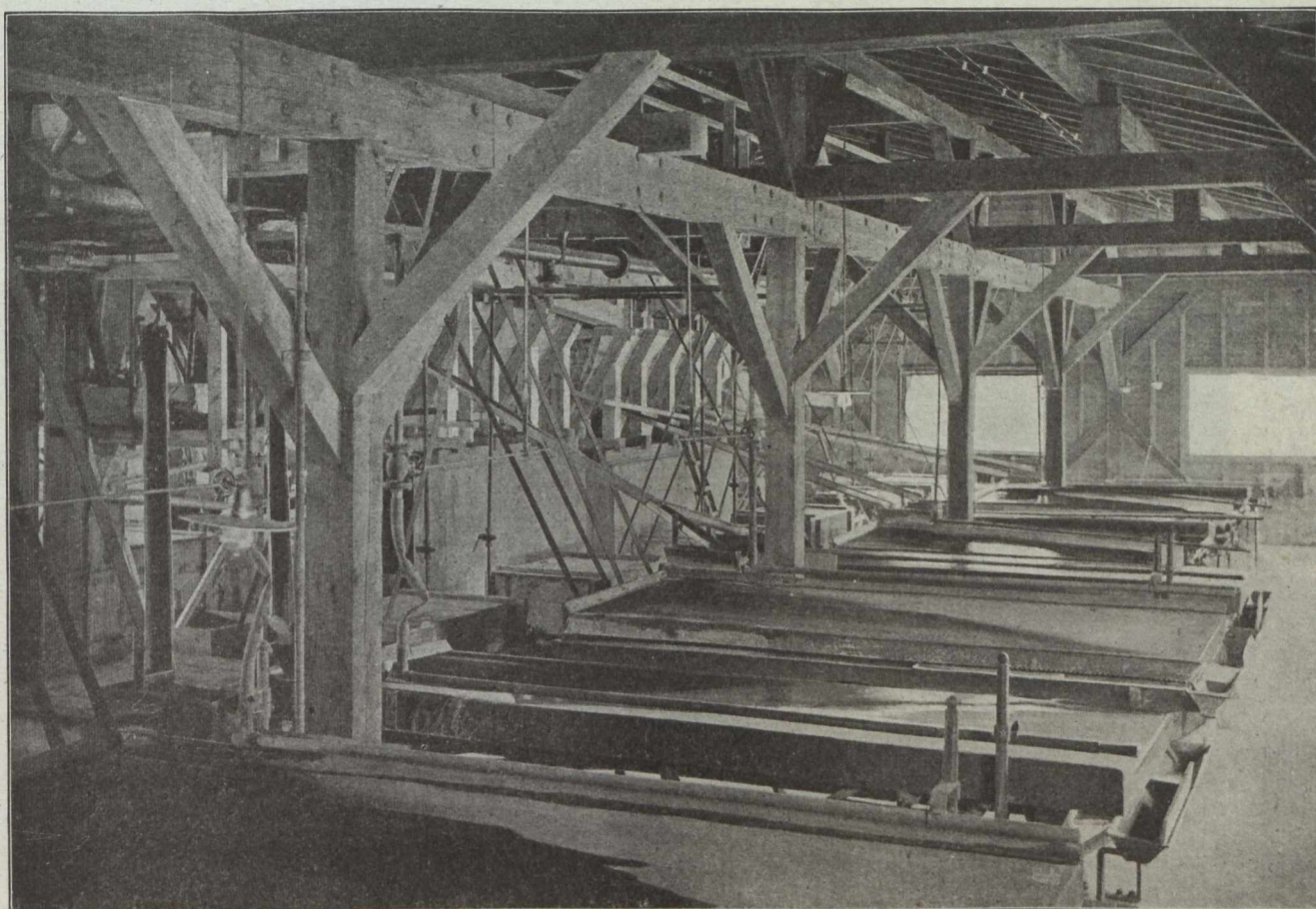
An additional feature that has some bearing on the question of the impersistence of ore-bodies is that Canadian graphite deposits, as a general thing, are apt to vary considerably in richness, and that operators usually confine their attention to the better class of ore (10-20 per cent grade) and regard the leaner



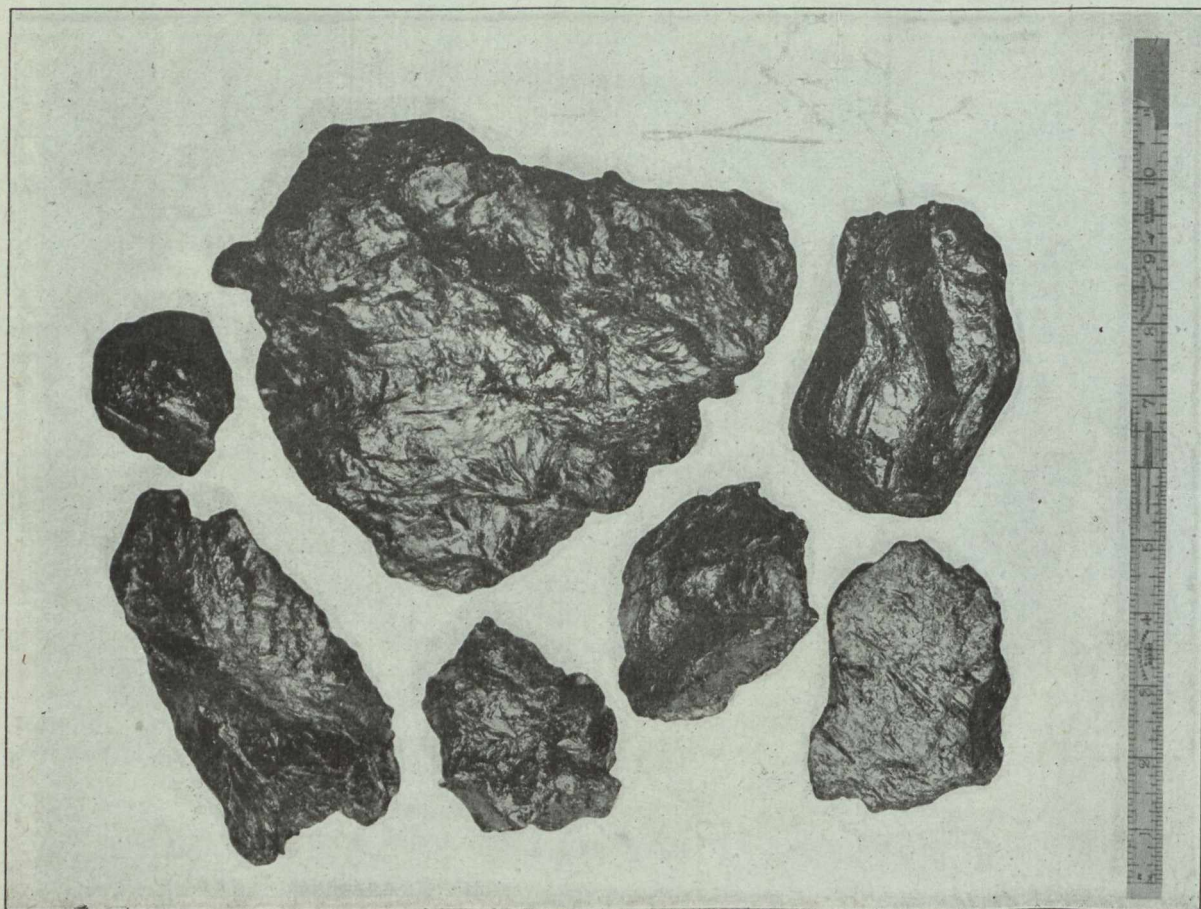
Graphite-lined bushings.



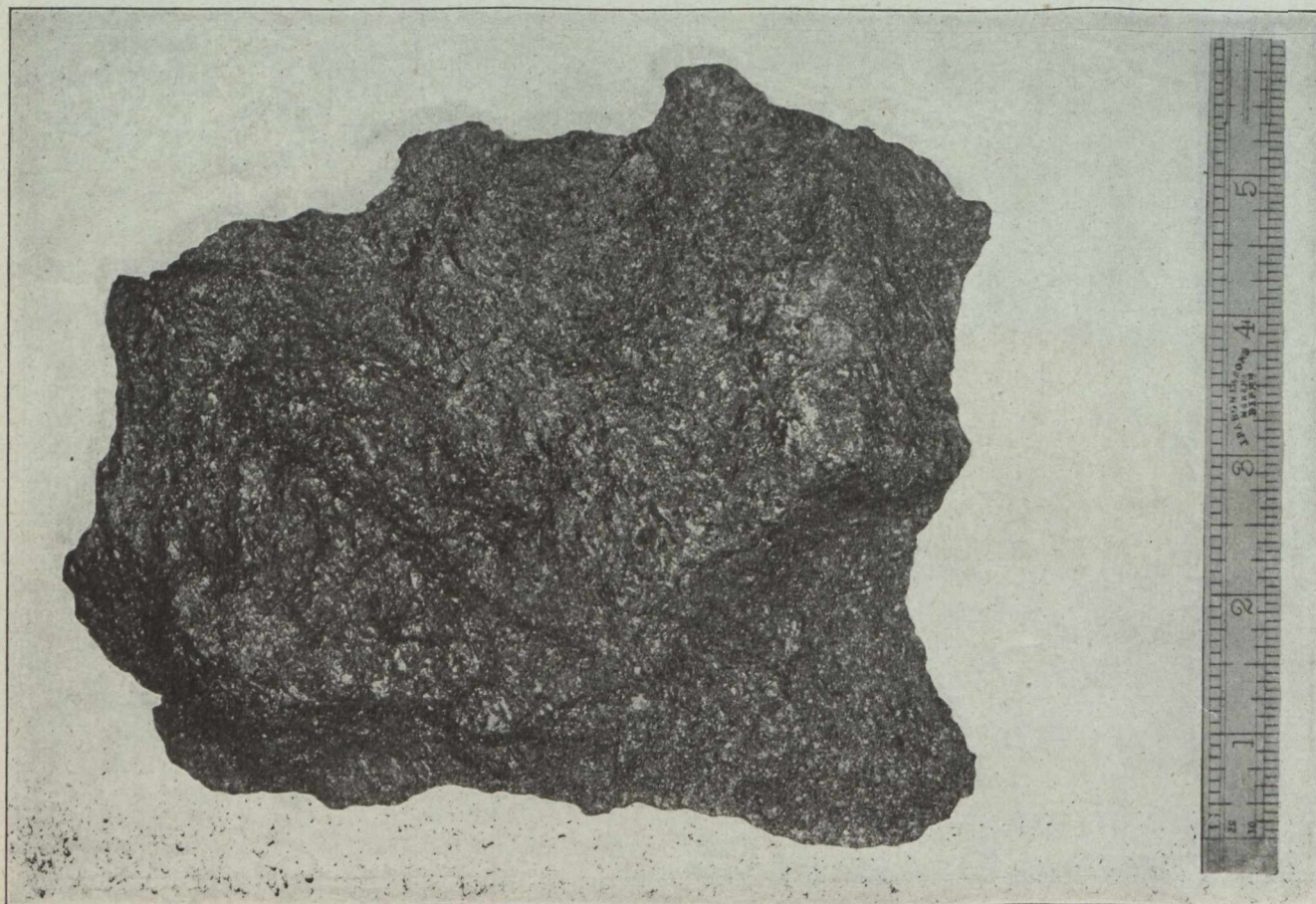
Callow pneumatic flotation cells in operation, showing concentrates passing over in froth.



Section of mill, showing Krupp-Ferraris tables, slime-tables and hydraulic classifiers, New Quebec Graphite Company, Buckingham, Que.



Typical high grade, Canadian flake graphite ore, 15-20 per cent carbon, from the Buckingham district, Que.



Foliated plumbago, range III, lot 18, township of Low, Que. This plumbago is of good quality, but is hardly as dense as that from Ceylon.

portions of an ore-body as not worth taking out. This practice has arisen through the difficulties and expense attending the concentration and refining of graphite, it being found that ore running over 10 per cent of graphite might be considered of commercial grade, while anything much under this percentage was too expensive to treat. Frequently, in the case of the graphitic gneiss ore-bodies, the rich ore occurs as a succession of streaks or lense-shaped bodies, that gradually merge into the adjacent non-graphitic country rock, and are separated along their strike by patches of lower grade ore or barren rock. With cheaper methods of concentration, much of this lower grade ore (5-10 per cent graphite) might very well be utilized; in this connection, it may be noted that the milling ore in Alabama does not average over 3 per cent of graphite, the Pennsylvania ore from 3 to 5 per cent and the New York ore 5 to 6 per cent. The two former are, however, soft and extremely easy to

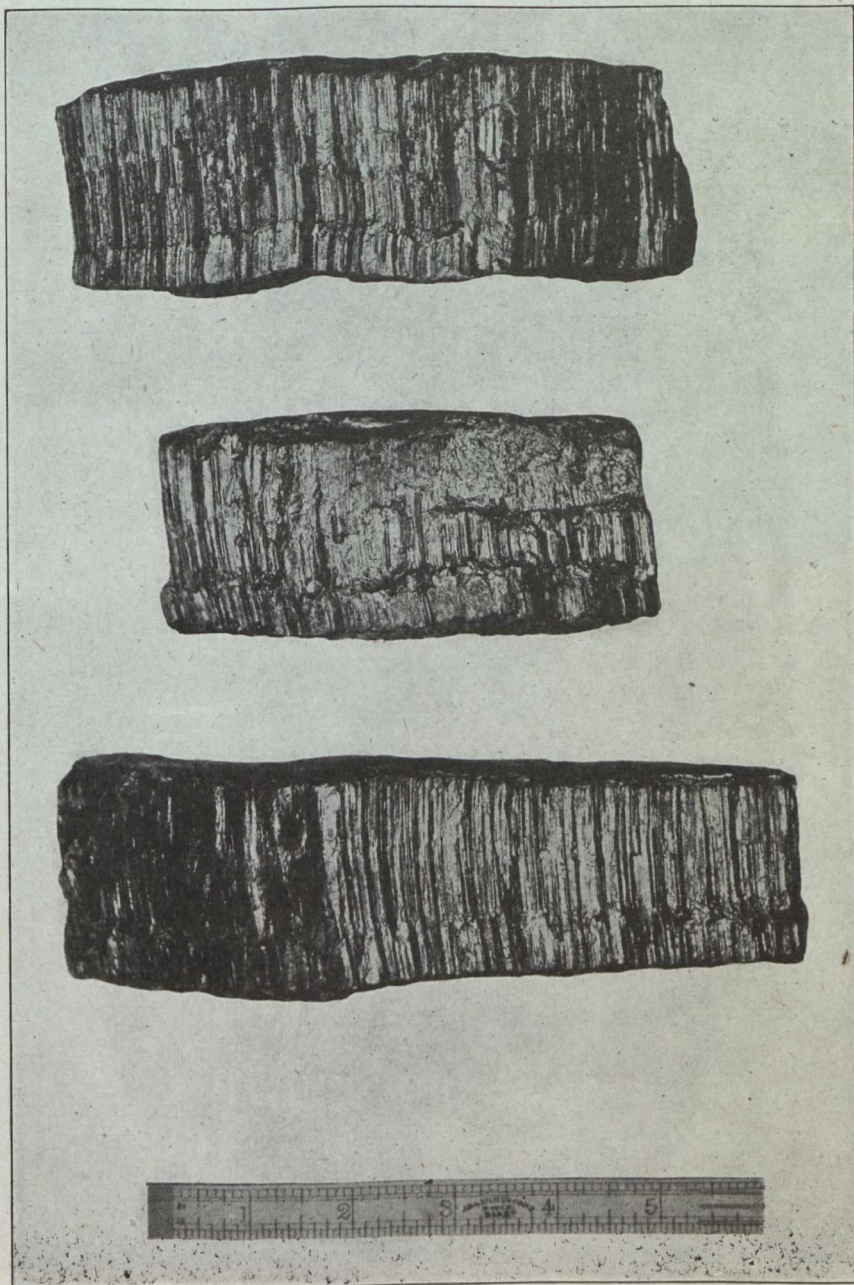
crush, whereas the Canadian gneiss ores are unweathered and hard.

While, therefore, the statement that Canadian graphite ore-bodies are generally small and impersistent is correct in the sense that what has heretofore been considered milling ore is apt to occur in rather small and irregular bodies, such bodies are often bordered or connected by masses of ore of lower grade, representing material whose graphite content may possibly be capable of profitable recovery by improved methods of concentration.

Oil Flotation.

Much interest has been shown in the last year or two in the possibilities of oil flotation for the concentration of graphite ores, and it has been demonstrated that by this system flake graphites can be treated both cheaply and efficiently. The elimination of the preliminary drying of the ore, necessary in all methods of dry concentration and in surface tension or film flotation, is an important consideration from the standpoints of expense and mill capacity. Additional features are, that a much smaller mill building, involving less initial expenditure, is required to treat an equal tonnage of ore as compared with dry concentration; that there are fewer machines and appliances requiring constant attention and repairs, and that a smaller force of men is required for operation of the plant. A number of the graphite mills in Alabama are employing oil flotation machines of one type or another at the present time, and the system has also been applied successfully to Pennsylvania ore. In both cases, the ore treated is of relatively low grade, carrying only 3 to 5 per cent of graphite. Oil flotation has also been installed recently (September, 1918) at the mill of the American Graphite Company, in New York state, and is reported to be giving every satisfaction. The New York ore is similar in its general characteristics—hardness, texture and associated minerals—to the Canadian graphitic gneiss ores. A number of tests with oil flotation have lately been made on Canadian ores, and a Callow plant was installed in August, 1914, at one of the mines in the Buckingham district. Unfortunately, however, the mill was destroyed by fire before the system had had an opportunity of being properly tried out. Three Canadian mills have since been equipped with this system of oil flotation.

Thus, while it must be admitted that graphite enterprises in Canada in the past have been attended by numerous failures, this result has, in many cases, been due



Fibrous or columnar plumbago, range VII, lot 21, township of Buckingham, Que.

largely to inefficient and expensive methods of concentration that rendered profitable the treatment of only the richer portions of ore-bodies; could not be depended upon to produce either a clean or a standard grade of product; made poor recovery of the graphite in the ore; necessitated frequent shut downs of the mills to effect repairs. In not a few cases, also, capital was expended on the erection of mills without proper investigation of the amount of ore available.

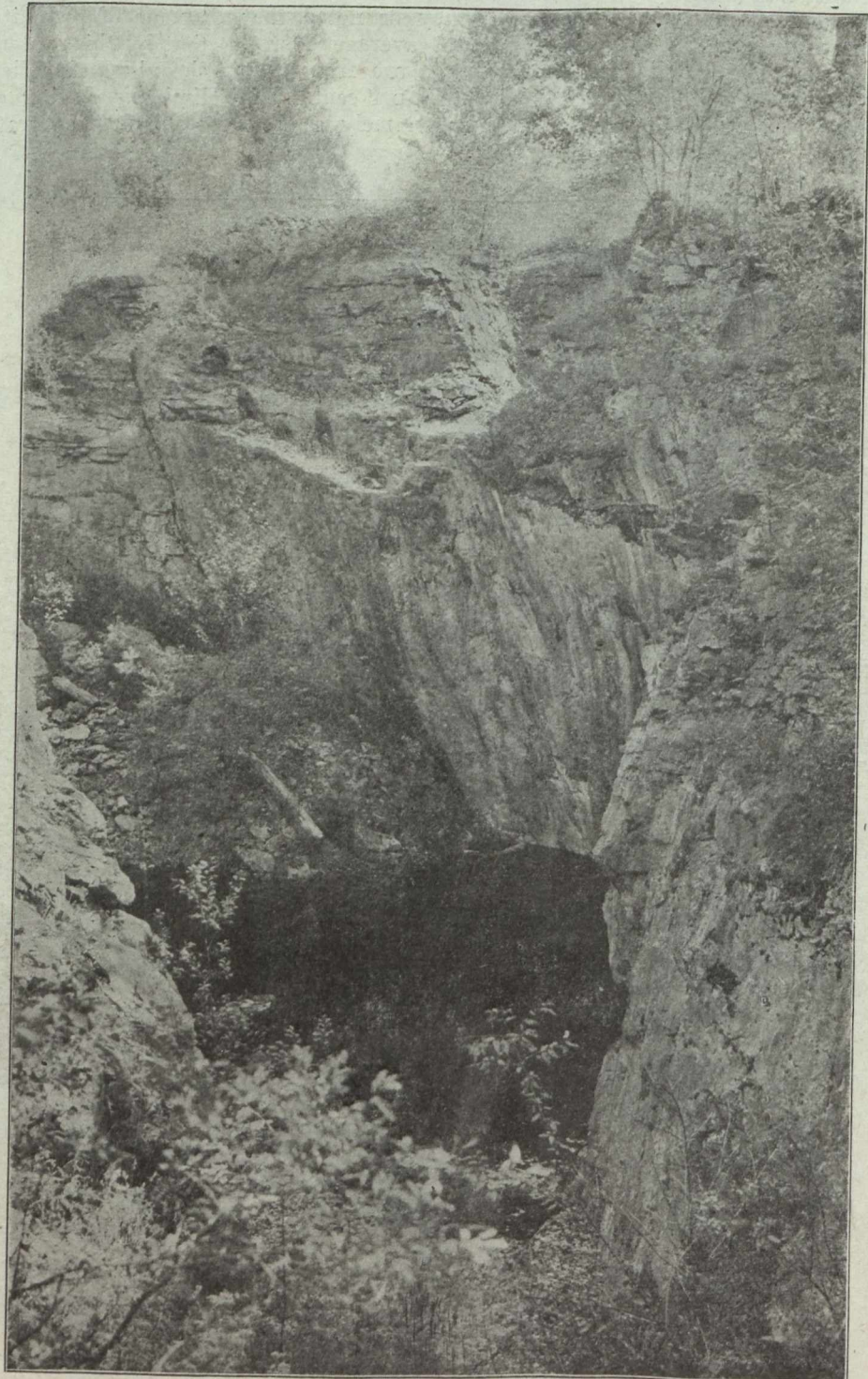
A pronounced recrudescence of interest in the possibilities of Canadian graphite has lately been evidenced, and it is to be hoped that, with efficient management and a proper appreciation of the difficulties attending the development of deposits and the treatment of graphite ores, the industry may recover from its depression, and the production of flake graphite proceed on more profitable lines than heretofore. The fact, however, must not be ignored that the prices that have been obtained for crucible flake graphite during the war period have been abnormal, and that with reduced ocean freight and insurance rates, Canadian and American graphite generally may expect to find a serious competitor in Madagascar flake. The production of this material has risen rapidly during the last four years, despite embargoes and transportation difficulties, and the resources of graphite appear to be very large. Cheap native labour, also, even with the somewhat crude concentrating and refining methods that are largely employed, enable the Madagascar product to be placed on vessels at a very low cost.

The fact, too, that in steel melting, electric furnaces have in recent years come into decided prominence in the United States (hitherto, the principal market for Canadian graphite) and that there are indications that in the brass industry, also, electric melting may ultimately largely supersede crucible melting, must not be lost sight of when the development of the Canadian graphite industry is considered.

Review of Market Conditions, 1914-1918.

Graphite, at the present day, is employed in so many branches of industry that the supply can hardly meet the demand. At the same time, any one particular type of graphite (crystalline, flake, amorphous, or artificial) is particularly adapted to certain lines of work, and thus the various industries have come to utilize

only that kind which best suits their needs. A case in point is the crucible industry. In the first crucibles made, Bavarian flake graphite was used, but, with the discovery of the Ceylon plumbago deposits, flake graphite was largely discarded in favour of the crystalline form. In the same way, pencils were formerly made from either crystalline or flake graphite, but are now manufactured almost solely from amorphous graphite. During 1918, in the United States, curtailment of imports of Ceylon plumbago led to the use of an increased proportion of flake graphite in crucibles, and experiments have been undertaken by the Bureau of Standards with a view to



Main pit of Miller mine, range V, lot 10, township of Grenville, Que. The ore-body is stated to have followed the well defined slip face on the far side of the pit

determining whether plumbago cannot be replaced to a still larger extent by flake without any serious detriment to the quality of the crucibles so made.

Thus, while in many of the industrial uses of graphite, a certain type of graphite is considered essential for best results, in those industries which consume the bulk of the graphite used, some one of the other forms of graphite than that at present employed could probably be substituted, either wholly or in part, without serious detriment. (See A. V. Bleining, *Chemical and Metallurgical Engineering*, Sept. 27, 1918, p. 467.)

The Report points out the dependence of Canadian producers of graphite on the United States market, and reviews at length the war-time restrictions intended to discourage the importation of foreign graphite and encourage domestic production in the United States and Canada. The two countries seem to have worked as a unit, and, whether domestic producers in North America can hold their own against importations from Ceylon and Madagascar or not, it is certain that as a result of the impetus of the war a great deal more is known about the graphite deposits, and their economic possibilities than was the case before the war.

All restrictions governing the importation of foreign graphite and the required use of twenty per cent or more of Canadian or Domestic flake in the United States were removed in January, 1919. Restrictions against importation of foreign crucibles were also removed.

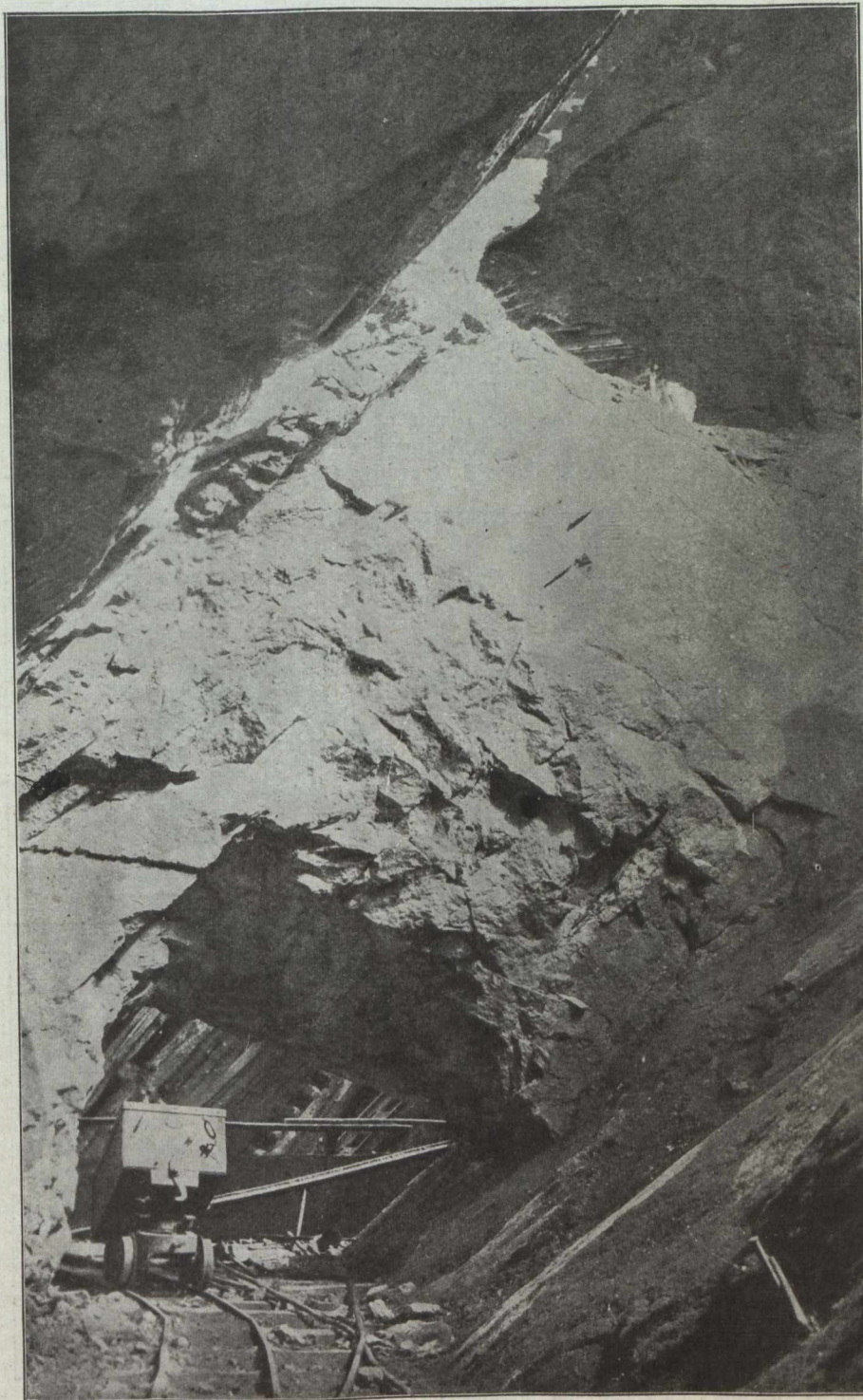
Limitation of Economic Possibilities of Graphite Deposits.

Summarizing the economic possibilities of graphite deposits, in which, of course, local factors such as transportation, fuel costs and labor supply play an important part, the Report states that commercial flake graphite ores may be said to range all the way from 3 per cent carbon content upwards, although 3 per cent ore would be of exceptionally low grade, and only to be regarded as of economic importance in the case of large ore-bodies. The average content of the ores worked in Canada is 10 to 15 per cent, which is considerably higher than most of the deposits in the United States.

"The economic importance of a flake graphite deposit is in very large degree dependent upon a cheap and efficient concentrating process. Should oil flotation prove the solution of the difficulty which has long embarrassed the flake graphite industry in this country, large quantities of material, hitherto considered of too low grade to work will be converted into milling ore."

Graphite Occurrences and Mines in Canada.

The Report deals very fully with every graphite occurrence, mine and mill in Canada, and, as is proper because of the dominating position of the property in the industry, pays considerable attention to the Black Donald Mine in Renfrew Co., Ontario. The occurrences as summarized are referred to as follows:



100-foot level at mine of Globe Graphite Mining and Refining Company, concession VI, lot 21, township of North Elmsley, Ont. The pillar indicates the thickness of the ore-body in the east workings.

The graphite occurrences in Canada that have hitherto received any measure of attention lie in the eastern portion of the country. The disseminated flake deposits are found in the Provinces of Ontario and Quebec, and within a radius of 150 miles of Ottawa. The Canadian graphite industry at its inception (1866-70) centered in the more or less immediate vicinity of Buckingham, Que., about 25 miles east of Ottawa, but the earlier mills in this district have long been out of operation. In recent years, some half dozen mills have been in more or less intermittent operation in the Buckingham area, all engaged in the production of flake graphite. Crystalline graphite, or plumbago, also occurs in this region, but the veins, as a general thing, have been regarded as too narrow for profitable development. In more recent years, several flake graphite properties have been exploited in Ontario, in the region lying immediately to the west of Ottawa, and five mills have been erected in this section. Little, if any, crystalline graphite has been reported to occur in this district, the graphite all being of the flake variety. The occurrence on concession I, township of Brougham, in Renfrew county (Black-Donald mine), of a mass of high grade flake ore is noteworthy, since such a graphite body is probably unique among known graphite deposits. The ore consists of rather small flake, the greater part of which is too small for the requirements of the crucible trade, but containing local streaks of larger flake. The richness of the ore varies from 0 to 80 per cent graphite carbon, and the ore-body, which dips approximately

vertically and is enclosed in crystalline limestone, has an average width of about 40 feet.

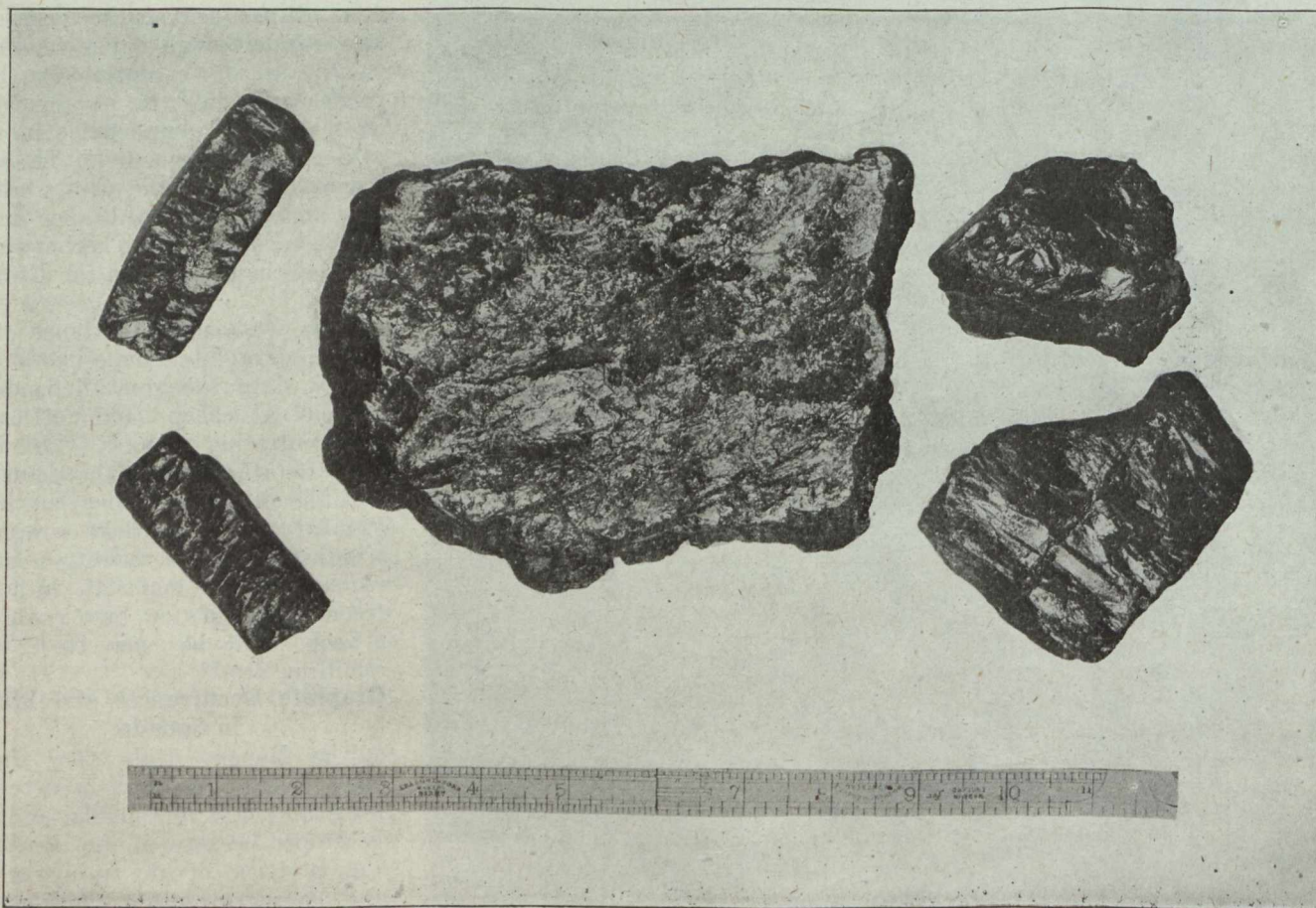
Flake graphite has also been reported from several points in British Columbia, but none of the occurrences have been worked. Crystalline graphite has been found at various localities in the Northwest Territories and Labrador, and a deposit of this material was worked during 1917 and 1918 on the south side of Baffin island. A small tonnage was secured during these operations and shipped to the crucible trade. The material is reported to be equal to the best Ceylon plumbago for this class of work.

Amorphous graphite was worked a number of years ago near St. John, New Brunswick. The ore here consists of impure, graphitic shales and slates, and the material found employment in foundry facings and paint stock.

The number of graphite mines and mills in operation during the last few years has averaged about half a dozen; in addition to which there has been intermittent work on a few deposits which, for one reason or another, have not reached the producing stage.

Mining Methods.

There is nothing unusual about the mining methods at Canadian graphite mines, and no really deep openings or shafts have been undertaken. Detailed particulars, with sections of the mine workings in illustration are given of the mine of the Globe Graphite Mining & Refining Co. North Elmsley Ont. and of the Black Donald Graphite Co.



Foliated plumbago, from near Lake harbour, Baffin island. This material is reported to be the equal of Ceylon plumbago for crucible work.

Concentration and Refining of Graphite.

Concentration of graphite is different to the concentration of metals from ores inasmuch as the value of the concentrate depends largely on the shape and size of the individual particles or flakes, and while the percentage of carbon content is, of course, an important consideration it is not more important than the separation of graphite from the ore in the form demanded by commerce.

The Report goes so fully into the various methods of concentration used that condensation is not possible, and those who are interested should obtain the Report for perusal. Film flotation, which is practised in the Alabama field, has been tried in Canada, but the presence of associated mica particles lessens the selective efficiency of this method in many Canadian ores. A desideratum appears to be the minimum amount of coarse grinding and the least possible attrition of the graphite particles in the separation processes.

Uses of Graphite.

The outstanding physical properties of graphite, namely its refractoriness, inertness, high electric and thermic conductivity and resistance to attack by chemical agents render it of extreme importance in a variety of modern industries, while its lustre, complete opacity even in the thinnest flakes, softness and slipperiness, are additional properties that have extended its usefulness to several important branches of industry.

In order of present importance, the principal uses of natural graphite are in the manufacture of crucibles, lubricants, pencils, foundry facing, paints, stove polish and dry batteries while small amounts are also used in electrotyping and as a boiler scale preventive. According to a competent authority, the world's production of natural graphite is divided among the more important of the industries mentioned above, approximately as follows:—

	Per cent.
Crucibles	75
Lubricants	10
Pencils	7
Foundry facing and stove polish	5
Paints	3

It is obviously impossible to ascertain the proportions with strict accuracy, and the consumption of several of the minor industries will doubtless reduce the above percentages slightly, without, however, materially altering the ratio.

The Report goes very fully into the manufacture and uses of graphite crucibles, but mentions that the growing use of electric furnaces is displacing the crucible process.

The pencil industry, now firmly established in the United States to the displacement of Austrian and German goods, is a considerable user of graphite, most of which comes from the Santa Maria Mines, near La Colorado, Central Sonora, Mexico. The Report states that there are no known Canadian deposits of graphite that provide a material for pencils comparable with the Mexican product.

Both in quantity and richness of the ore, the Black Donald Mine excels all other reported Canadian deposits, and the Report states that the annual production of refined graphite of all grades from this source has greatly exceeded the combined production of all other Canadian refining plants. The deposit "is the richest

and largest body of flake graphite so far known in either the United States or Canada." The average graphitic content of the ore of 65 per cent, but zones of material ranging as high as 80 per cent occur locally. Much of the ore secured, therefore, has been pure enough in its natural state to find employment in foundry work.

Artificial Graphite.

Artificial graphite is made on a very large scale at Buffalo and Niagara Falls by the Acheson Graphite Co. in electric furnaces from anthracite. During the last three years the Acheson Co. has made an average of ten million pounds of artificial graphite annually. (See "Journal," July 16th, page 577.) This quantity represents only the manufactured graphite that comes into competition with natural graphite, and is used chiefly in the manufacture of graphite, electrodes, graphite brushes, and in the filling of dry batteries.

Summary.

The conclusions indicated by a perusal of the Report are that the domestic producers of refined graphite in the United States and Canada, if the production is not to still further decline from 1919 figures, will require tariff protection against imported materials; and that, comparing the United States and Canada only, the Canadian producer is not unfavorably situated because of the relatively higher graphitic content of the ores in Canada.

The bulk, if not almost all of the various grades of refined graphite produced in Canada, is exported to the United States, and Canada herself is required to import a not inconsiderable quantity of manufactured goods in which graphite plays an important constituent part. The extension of our graphite industry to include a modicum of domestic manufacture of such goods is plainly suggested, the graphite mining industry being in this respect analogous to asbestos mining. There are, indeed, several instances where graphite and asbestos are combined in articles imported into Canada, both materials being in all probability of Canadian origin.

PERSONAL

Hon. Robert Drummond, Editor of the Maritime Mining Record, has sailed for England, and expects to visit the mining fields of Scotland and England, to obtain first-hand knowledge of conditions. The "Journal" wishes Mr. Drummond a pleasant visit and a safe return to Nova Scotia.

METAL QUOTATIONS

Fair prices for Ingot Metals in Montreal, August 4th, 1920:

	Cents per lb.
Copper, electro	24½
Copper castings	24
Tin	55
Lead	10¼
Zinc	10½
Aluminum	9½
Antimony	9½

Northern Ontario Letter

THE SILVER MINES.

Although the price of silver has strengthened considerably, the silver hoard at the mines of Cobalt continues to increase. The leading producing companies apparently are not yet satisfied that quotations have found the high level which appears to be warranted by the law of supply and demand.

Early in the week, intimation came from New York that the antagonism of those interests which have been "bearing" the price of silver had been withdrawn, but the advice did not leave an altogether favorable impression at the mines of Northern Ontario, where it is generally conceded the antagonists are confined to Great Britain and her far-flung influence in the Far East.

In regard to the silver situation, however, mining men who claim to be in touch with the activities of British metal brokers and metal authorities are not quite sure but that a gamble in silver may yet materialize that might reasonably send quotations to a higher level than ever before reached. This, of course, is conjecture on their part, and cannot be offered as a prediction. Attracted by reports of a new silver discovery in the Harricana River district south from Amos in Northern Quebec, a large number of prospectors from the Cobalt and Haileybury district joined in a rush to the new field. Returning prospectors allege that the so-called find consisted of some leaf silver placed by artificial means in a crack in the formation. They are thoroughly convinced that the thing was "salted," and have accordingly returned without staking any claims. A number of those who joined in the rush, however, have remained in the district to prospect for gold, the formation being attractive.

Flotation equipment is being installed at the Temiskaming mine for re-treating the large pile of sand tailings which has accumulated from past operations. With the present improved methods of treating the material and with silver at the present high price, it is believed the margin of profit per ton treated will be considerable and that by late September the work will be well under way.

Quick liquid assets of the Nipissing Mining Company as of the middle of 1920 were \$5,065,211. This is the highest on record for the company. It is made up of \$3,362,214 in cash and United States and Canadian war bonds, together with \$1,702,997 in ore in transit on hand and in process as well as bullion stored at the mine. It is the plan of the company to accompany its October dividend of 5 per cent with a bonus of equal amount. The January dividend will also be accompanied with a 5 per cent bonus. This is the usual custom and will call for the disbursement of \$1,200,000 in the two distributions—October and January.

Considerable activity is taking place in the recently opened Gillies Limit. The number of mining claims recorded is not large, but quite a number have been staked and are being systematically prospected before being recorded. Those interested in the new field are quite optimistic about the outlook.

A discovery of peculiar interest has been made at a depth of 800 feet on the Crown Reserve mine. It consists of gold in quartz, occurring in quantities of as

high as \$12 to the ton. There is not much of the gold-bearing ore and the find is not regarded as of any material importance. This is the second similar freak occurrence in Cobalt, a small showing of gold having been found some years ago on the Kerr Lake mine.

It is learned this week that the Crown Reserve Company is extending its activities to the Harricana River district in northern Quebec, and has a number of men engaged in exploring a prospective gold property south from Amos station on the Transcontinental railway. The property lies on the mainland at a point close to the Siscoe property which is located on an island.

Published reports in such papers as the "Toronto World," "Mail & Empire," Toronto, and "Northern Miner," relative to a big new silver find having been made on the Miller Lake O'Brien at Gowganda are not correct, according to authoritative advice to the correspondent of the "Journal." It is stated that the company recently shipped a large specimen of silver ore to the Royal Museum, Toronto, the sample having been taken from the main vein which has been worked for a number of years. This appears to have given rise to the erroneous and misleading reports concerning a big new discovery.

Good headway continues to be made on the Keeley Silver Mines in South Lorrain, where the installation of an 80-ton mill should be completed within the next two months or so. Underground developments are satisfactory and the indications appear to be that the mine will be on a steady producing basis before the year is out.

At the Dickson Creek property, situated about seven miles from Cobalt and located along the shore of Lake Temiskaming at a point about half way between Haileybury and New Liskeard, a station is being cut at the 250-ft level preparatory to carrying out lateral operations. The vein dipped from the shaft at a depth of 200 feet, and it is estimated to lie about 25 feet from the shaft at the 300-ft. level. Work is confined to conglomerate formation, the underlying diabase being estimated to lie at a depth of about 350 feet. The operation is conducted by English interests, the address of the mine office being Haileybury, Ont.

The Mining Corporation of Canada is negotiating for the purchase of a certain part of the Right-of-Way Mines lying adjacent to the McKinley-Darragh, Princess, Silver Queen and Mining Corporation territory. It is believed the deal will reach successful consummation. It does not involve any very great amount of ore, and it is believed that the purchase price will be moderate.

At the 150-ft. level on the Oxford-Cobalt property, the cross-cut has reached the vein and drifting operations are now under way. The vein is about eight inches in width and contains smaltite together with other mineral. Silver values at the present point are low. It is planned to drift about fifty feet each way continuing the shaft another 100 feet in depth.

Ore Bullion Shipments.

During the week ended July 30, two Cobalt companies shipped an aggregate of four cars containing approximately 311,388 pounds of ore. The Nipissing alone sent out three cars containing nearly a quarter of a million pounds.

Following is a summary:

Shipper.	Cars.	Pounds.
Nipissing	3	245,388
Dominion Reduction	1	66,000
Totals	4	311,388

During the corresponding period, no bullion shipments were made, from which fact it is clearly evident that the great hoard of silver in the vaults of the local mines is steadily increasing.

The policy is one which if adopted in a general way by producers in other countries would probably quickly break the attempt of big financial interests to hold the price of silver down. The vaults at the mines of Cobalt actually contain an aggregate of around three million ounces of silver, which is equal to about 125 tons or more than four carloads of silver.

THE GOLD MINES.

The acute shortage of labor at the leading producing gold mines is being relieved only gradually, although the next few months promises to bring greater relief in this respect than any previous period since the war caused general curtailment.

As a result of the increased pay which the mining companies gave to their men last spring, the cost of mining has shown a substantial increase at the big producers where large forces are employed. The indications are that mining costs at the Hollinger Consolidated for this reason may show an increase of between 50 cents and \$1 a ton. At the same time, however, it was only because of this increase in pay that the company has been able to secure forces with which to work the mine at two-thirds capacity. Had the old wage scale been continued, it is obvious the operations would have been reduced to perhaps well under half capacity, with a corresponding decline in profits. The increase in pay is generally believed to have been wise and has assured the company of net profits adequate to cover dividend requirements at least at the rate of seven per cent annually and is tiding things along until such time as general readjustment takes place.

Official announcement is made that the Porcupine V.N.T. directors have accepted the offer made by Toronto and London interests to underwrite 600,000 shares of treasury stock. A block of 200,000 shares were immediately taken up at 15 cents each, and the recommendation has been made to resume work at once on the strength of the \$30,000 thus secured. The syndicate has an option of six months on the second block of 200,000 shares at 30 cents each, and an option on the remaining 200,000 shares for ten months at 50 cents a share.

August promises to prove a vital period for the Dome Mines as well as for the Dome Extension. With the Dome option on Dome Extension up for consideration and final decision by September, the August meeting of the directors of the Dome promises to be of much importance.

As a result of the extensive deposits of ore being opened up at depth on the McIntyre-Porcupine, the physical condition of the mine is being added to at a rapid rate. The mine is firmly established as the third largest producer in the Dominion and may even be a close contestant with the Dome Mines for second position. At a depth of 1,125 feet an ore shoot nearly

one-quarter of a mile in length has been opened up in vein No. 5. At the succeeding levels, 1,250 and 1,375 there is every reason to believe similar results will be achieved. In addition to this, recent diamond drilling operations have indicated rich ore at a depth of 1,600 feet. With one main haulage level established at a depth of 1,000 feet to which all the ore from the upper levels falls through chutes, the McIntyre management is establishing another main haulage at a depth of 1,375 feet for the purpose of handling all the ore between that depth and the 1,000-ft. level. By this method of mining, the ore falls through chutes, is drawn off into cars, conveyed by miniature electric railway to the main shaft and hoisted to surface from where it passes over an aerial tramway to the mill with a minimum of manual labor, plus that required to operate the mechanical equipment.

A deputation of Kirkland Lake and Larder Lake mining men which waited upon Premier Drury recently, requested the Government to construct an extension of the Temiskaming and Northern Ontario Railway to Kirkland Lake with a view toward extending it right on to Larder Lake by way of the Argonaut mine in Gauthier township. The Premier told the deputation the Government would build the railway provided the property owners permitted a Government appointed engineer to enter the mines and report to the Government as to the resources, and to form an estimate of the amount of traffic indicated. The Kirkland Lake mining men, as well as the manager of the Argonaut Gold Mines appear to be satisfied that the offer is a good one, and are content to let the Government engineer enter the mines. Such does not appear to be the case, however, in regard to the Associated Goldfields. It is reported that Dr. McKay, of the latter company, does not desire to submit the property to an independent examination and is understood to have told the Premier that if the Government would build the railway to the Argonaut, the Associated Goldfields would itself build the line from that point to its property at Larder Lake. Just what attitude the shareholders will take in this matter is difficult to say, but it seems obvious that suspicion will be aroused in connection with the property if the President turns down a chance of having the Government build a railway, the cost of which would be at least \$40,000 a mile. Several miles separate the Goldfields from the Argonaut, and the cost might reasonably amount to close to half a million dollars. It is pointed out that if the recent annual report of the Associated Goldfields is correct, the attitude of the President is difficult to understand.

Construction work on the Wright-Hargreave mill at Kirkland Lake is progressing rapidly, the building itself being almost completed. The work of installing equipment is also well advanced, and the earlier estimates promise to be fulfilled and the mine placed on a producing basis during the last quarter of this year.

Reports are current that a consolidation may be arranged between the Orr Gold Mines and the Hutton-Kirkland. The negotiations have not advanced very far at the time of writing, but the prospects of something of the nature being done are said to be favorable.

During the course of continuing the main shaft of the Bidgood Gold Mines from the 200-ft. level toward the 300-ft., a large vein has come into the shaft from

the south, and is believed to be a 24-foot vein which shows on surface a short way south of the point where the shaft was commenced. Channel assays are being taken and the mineral content of the body will be ascertained within the next few days. Once a station is established at the 300-ft. level, it is proposed to carry on lateral operations along this wide vein as well as on another vein some seventy-five feet farther north and which at the 200-ft. level had a width of close to sixteen feet.

The directors of the Lightning River Gold Mines have just concluded a visit to their property and are optimistic over the outlook.

With regard to the shower of writs which farmers in the Sudbury district have issued against the International Nickel Company with a view to recovering various amounts for alleged damages from sulphur fumes, considerable discussion is heard among mining men.

One prominent mining man who has had experience in other countries, stated to the writer that without any intention on his part to venture an opinion as to the justice of any or all of the claims entered against the International Nickel Company, he nevertheless was of the opinion that the matter should be quite easily adjusted. His opinion and comment was thus:—

If the claims entered are found to be unjustified after having been thoroughly investigated, then a general dismissal of the writs will be in order. On the other hand should these claims be justified in whole or in part, the Government might indeed be well advised to turn to New Zealand for an example as to how to deal with the matter. This mining man stated that in New Zealand, the holder of land values his own property, and is taxed on his own figures. In turn, the Government has the right to redeem this land at such valuation, plus moderate addition for inconvenience caused. At times when such a dispute arises over alleged damage, the owner of the land is prevented from presenting unreasonable claims by reason of that fact that the assessed value of his land is accepted as its value.

It might not be unreasonable to suppose that the assessed value of the Sudbury farms might be averaged up for the past five years, and with a moderate addition for the increased value of land at present might be found to constitute a basis from which to calculate the measure of damage done, if any.

This method, it is thought, might go a long way to curbing any attempt on the part of owners of more or less worthless land, turning "sulphur farmers" and imposing an unjust penalty upon the nickel industry, which is of very great importance and benefit to this country.

In referring to this, the gentleman interviewed did not mean to infer that such unjust claims would be made, but events in the past have tended to show that where one individual might have reason for some complaint, others have not been adverse to attempting to profit by entering alleged similar claims for damages.

The MacLeod River Coal Mine is shipping regularly to Prince Rupert. It is located about 800 miles from the Coast on the Grand Trunk Pacific Railway. The present production is 4 carloads a week which is being marketed in Prince Rupert and Edmonton.

BRITISH COLUMBIA LETTER

The Metal Mines

The season's work has been well underway in the Portland Canal district for some weeks. With the snow gone and prospectors and miners in the hills the towns of Stewart and Hyder are almost deserted. On the various properties along the Salmon and the Bear Rivers, however, activity prevails. The only notable new discovery reported is on the Georgia River, a few miles down the river from Stewart, where a number of gold bearing claims have been recorded. Samples indicate that they are rich but their possibilities must yet be established by development. The Marmot River also is being well prospected and many promising claims have been located. For the rest development work is continuing on all the better known mines and prospects of the Portland Canal and road construction is in progress to assist in the opening up of the mineral zone. The Unicorn Group is to be drilled, a contract having been awarded to Lynch Bros., of Seattle, Wn., and F. P. Stewart, familiarly known as "Pap," has returned to the camp to supervise plans for the opening up of the Mountain Boy Group of Crown Granted Mineral Claims. "Pap" is a pioneer of the Portland Canal District, being credited with responsibility for directing the attention of Sir Donald Mann to the potentialities of the district.

Invermere, B. C.

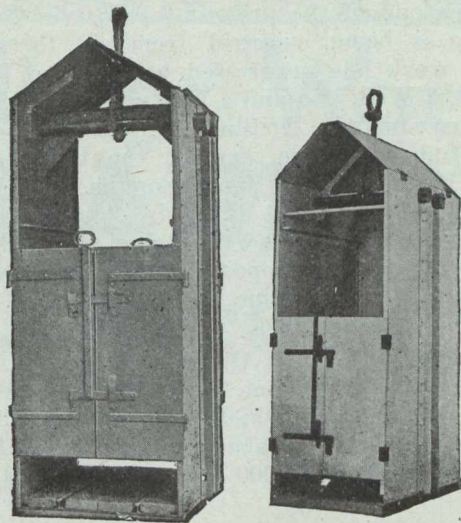
The Silver King Mining Property, operated by the Toby Greek Mining Co. Ltd., of Vancouver, B. C., and situated near the Jumbo Fork of Toby Creek, is showing up extremely well. At about 90 feet from the surface a cross-cut is being driven towards the overhanging wall of the lead to the south of the tunnel. This cut has opened up a ledge about 80 feet wide of high grade silver lead ore, which is reported to range in value up to \$100 a ton, the most important of the mineral content being silver. There is considerable shipping ore already on the dump. From what now is apparent and from the general indications it would seem to have been established that the Silver King Shortly will become one of the regular shippers of the Province. A road is under construction the completion of which will solve the question of transportation.

Trail, B. C.

Ore receipts at the Trail Smelter of the Consolidated Mining and Smelting Co. for the week from July 7th to 14th totalled 4,810 tons, making the aggregate for the year to the latter date 159,368 tons.

Kimberley, B. C.

The mineral resources of southeastern British Columbia and Alberta is the subject of an article recently published under the name of P. A. O'Farrell who declares that "in the Kootenays, the Kettle Valley, and on the Island of Vancouver there are copper mines which can easily supply all the copper which the British Empire may need for a century to come; that there is more and better coal in Southern Alberta and the Kootenays and Similkameen than in the whole of Europe, including England and Russia; and that there is more iron ore and valuable standing timber in Southern British Columbia, including the Island of Vancouver, than in all Europe." He asserts that "had the Kootenays been located in Europe, Prussia



With Two Sets of Doors

With One Set of Doors

MINE CAGES

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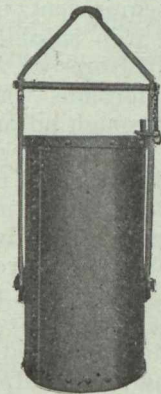
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and other pirate nations would have spent billions in treasure and rivers of blood for their possession." Dealing with the mineral resources of the Kimberley District specifically Mr. O'Farrell states that here are found deposits of lead and zinc and iron sulphides which are extensive enough to supply all the zinc and lead which Canada and the Empire will need for a century," for beneath five, six or seven square miles of land on the eastern slopes of the Selkirks a blanket of mineral lies embedded between two layers of quartzite at an angle of 22 degrees from the horizontal." He then goes on to describe operations at the Sullivan Mines. He says, in part:

"The Consolidated Mining & Smelting Company owns 2,500 acres of this mineralized territory. It is driving two long tunnels into the mountain to find how far the blanket of mineral extends. It also is boring two a half miles lower down the valley to tap it at a depth of 2,500 feet. How far this great mineral deposit extends to the east or to the north cannot be fully determined for years, but enough has been done to demonstrate that from Kimberley alone Canada and the Empire can draw all the zinc and lead they require for a generation or two. If this phenomenal continue as constant and as regular as they are and mineral deposit extends five miles down the slope and five miles to the north, and if the ore values the 500 acres already proved up, these ore deposits at Kimberley will make Canada a supreme factor in the lead and zinc markets of the world.

"I have already stated that one stope which I examined, 8,000 feet from the portal of the tunnel, would yield 30,000 tons of ore to the acre. In the other two

stopes, 2,200 feet higher up, the distance between the hanging wall and the floor was occasionally 150 feet. From each of these stopes they broke down 150,000 tons of ore, or 300,000 tons from about six acres. In other words, 60,000 tons to the acre.

"In one stope the ore ran 50 per cent lead and 10 per cent zinc, and 8 ounces of silver. In the other 30 per cent zinc and 10 per cent lead and 3 ounces of silver. The gross metal and silver values of this ore, therefore, for 800 pounds of metal and 5 ounces of silver at current prices would be \$70 to the 2,000 pounds of ore. Under each acre, therefore, were \$3,500,000 worth of metals and silver, but the general run of the ore is not so rich nor much more than the average of 20 feet between the hanging wall and the foot-wall. An average for all the ore extracted will be little over 500 pounds of zinc and lead and three or four ounces of silver to every 2,000 pounds of ore. Sixty per cent of the whole deposit so far proved will furnish ore of this average.

WANTED.—Mine Foreman for Nova Scotia mine; must be experienced in drifting, shaft sinking, shaft timbering, etc.; one who can train men to do such work or who can bring a following of experienced men with him. Single man preferred, as mine is twenty miles from railroad and no family houses available. Camp has electric light and good bunk houses. Good board is provided. Write giving references and salary desired, which will be supplemented with bonus in proportion to results achieved. Address—Canadian Mining Journal, Box 17, Gardenvale, P.Q.

"The other third of the deposit is a sulphide of iron containing smaller quantities of lead, zinc and silver which the management does not reckon as of any present value. They mine and ship the iron pyrites to make the sulphuric acid needed in the Company's metallurgy or in the western markets. No effort is made to find and work the big stopes and the rich ore. All the ore is extracted and the whole, as I have already said, will yield 500 pounds of lead or zinc out of every 2,000 pounds of ore. It has taken eleven years of constant research and metallurgical experiment to find the chemical reagents and metallurgical equipment necessary to segregate the zinc, lead and iron sulphides contained in these ores. The Broken Hill ores of Australia are of similar character and the Germans who controlled them made fair recoveries through oil and water and alkali concentration but they never succeeded in making a really pure zinc or pure lead out of the concentrates.

"But the Trail metallurgists have succeeded in making pure electrolytic zinc and electrolytic lead out of the Kimberley ores. At Tadnac (Trail) the zinc sulphide is calcined and then dissolved in dilute sulphuric acid and recovered on plates by electrolysis. If the mineral operation is not complete and particles of lead and zinc sulphides get into the sulphuric acid they remain as tailing or slimes but a way has been found to segregate the zinc in these tailings.

"I am giving these details to show that Canadian and American electro-chemical metallurgists are achieving better results in the recovery of metals than the Germans were able to effect with all their boasted knowledge of chemistry, and it is also interesting to know that at Tadnac was built the first metallurgical plant which manufactured electrolytic zinc for the world's markets."

Hedley, B. C.

There are employed at the Nickel Plate Mine, Hedley, B. C., about 150 men, two third of whom are at work underground and the remainder either at the mill, situated at Hedley, or the power plant. The Company is extracting gold bearing ore running, on average, \$9 to the ton. As it costs about \$8.50 a ton to mine, the profits are not large, in fact they are so negligible as to be scarcely worth mentioning. This was not so when the ore approximated \$12 a ton, and it is stated that considerable development is planned in expectation that a body of richer ore will be encountered. Ore is a tion of the richer ore will be encountered. Ore is being taken out of the Nickel Plate at several levels, the upper one being six hundred feet lower still. Ore cars holding two tons run on a narrow gauge electric railway for a mile out of the mine. Then the ore is dumped into a tripple at the top of a steep side hill. From the tripple the gold-bearing ore is dumped into cars operating on long steel cables and running down a side hill that seems almost perpendicular. The long slide to the mill in the town itself is made in two sections and passengers who go up or down on the ore trams sit tight and fervently hope that nothing breaks. A trip to the Nickel Plate in one of the little ore cars beats anything in the roller coaster line on any midway.

Victoria, B. C.

That oil has been discovered in commercial quantities in the Peace River Country is the effect of reports, apparently well authenticated, from Peace River Town, near where the Peace River Petroleum Ltd. is oper-

ating. Crude oil, it is said, will be delivered to customers before the end of the present season. In No. 1 Well the bore is being enlarged from six to eight inches, which work has progressed beyond the 1,000 foot level. No. 2 Well, two and a half miles below Tar Island, has been started. Drilling equipment is being installed at Hudson's Hope, and on the Upper and lower Smoky River. At the San Joaquin Well it is said that 20,000,000 cubic feet of gas is escaping daily, that it is a wet gas containing a good deal of gasoline, and that the Well will be capped and provisions made for the recovery of the gasoline and the saving of the gas.

The Department of Mines, Ottawa, claims to have discovered a process by which crude oil may be recovered from the tar sands which occur so extensively in the neighborhood of Athabaska River, near Fort McMurray. A reserve of 55,000 acres of such land has been created.

Nelson, B. C.

The Blue Bell Mine, Riondel, B. C., is the largest property to come under the interdiction of the One Big Union. This organization has demanded for the workers in that mine a scale of wages which, it is said, to amount to an increase of 40 cents per day over what was being paid. The Blue Bell is the oldest mine in the Kootenay, dating back to 1865, and is operated by the New Canadian Metal Company, the manager of which is S. S. Fowler, one of the most highly respected metal mine operators of the Province.

TORONTO NOTES

Mr. Frank C. Loring, Sun Life Building, Toronto, has just returned to the city after an extended stay in London, Eng. in the interests of Northern Ontario mining properties. Mr. Loring states that he has sufficient faith in the standing and reputation of Canadian mining amongst British investors and promoters to return to England and open an office in London, which he proposes to do shortly. Mr. Loring pointed out that South African production was falling off and that Canada seemed to be the only country left in the way of a gold producer. Canada is becoming increasingly popular amongst the financiers in the Old Land, as is evidenced by the space being devoted to Canadian mining and other industrial affairs in the British journals and he predicts that Canadian mining investments are destined to occupy a large place in the British financial world. Mr. Loring will remain in Toronto till October and will then return to London where he will open an office as consulting engineer. He will, of course, retain his office in Toronto, which will be looked after by his son.

At a special meeting of the shareholders and directors of the Porcupine V. N. T. Mines, held in Toronto on Tuesday of this week the offer by Hamilton B. Wills, on behalf of a syndicate he has formed, for the purchase of 600,000 shares of treasury stock of the company at an average price of 31 $\frac{3}{4}$ cents a share, was accepted. The scheme has been adopted as a substitute for the mortgaging of the property to the Associated Gold Mines of Western Australia to the extent of \$50,000, which had originally been proposed. English interests agreed to the proposition so that fresh funds for development purposes will come both from Canada and overseas. It is expected that actual mining operations will be under way by Oct 1st.

They Work Intelligently

HARDINGE Conical Mills

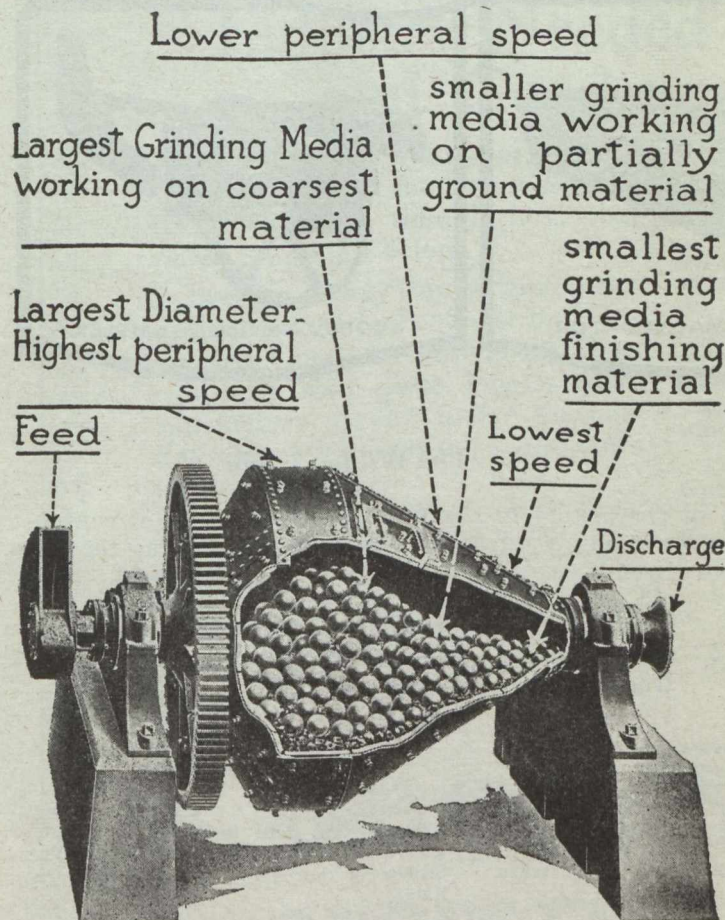
Large Balls Work Only on Coarse Material, Small Balls Grind to Finish

Notice the shape of the Hardinge Mill—conical, big at the feed end, tapering towards the discharge.

By the natural action of the mill the largest, heaviest balls concentrate at the point of largest diameter where they have the maximum drop; the smaller ones collect towards the discharge. The coarse material entering first meets the big balls and, as it is reduced and passed through the mill, is ground by the smaller balls.

That is common sense and true efficiency. No working hit-or-miss, banging away with big balls at small stuff or tapping at coarse material with small balls but, exercising almost human intelligence, automatically adjusting the grinding media to the material. That is the secret of Hardinge Mills and the reason they have so rapidly become the standard crushing and grinding for all modern plants.

We will be glad to give definite facts and figures as to what Hardinge Mills can do on your work if you will mail us a sample of your ore and let us know quantities to be handled, sizes of primary crushers, finished product desired, etc. Write for "Grinding Data" and our general catalog.



Night and Day they grind away

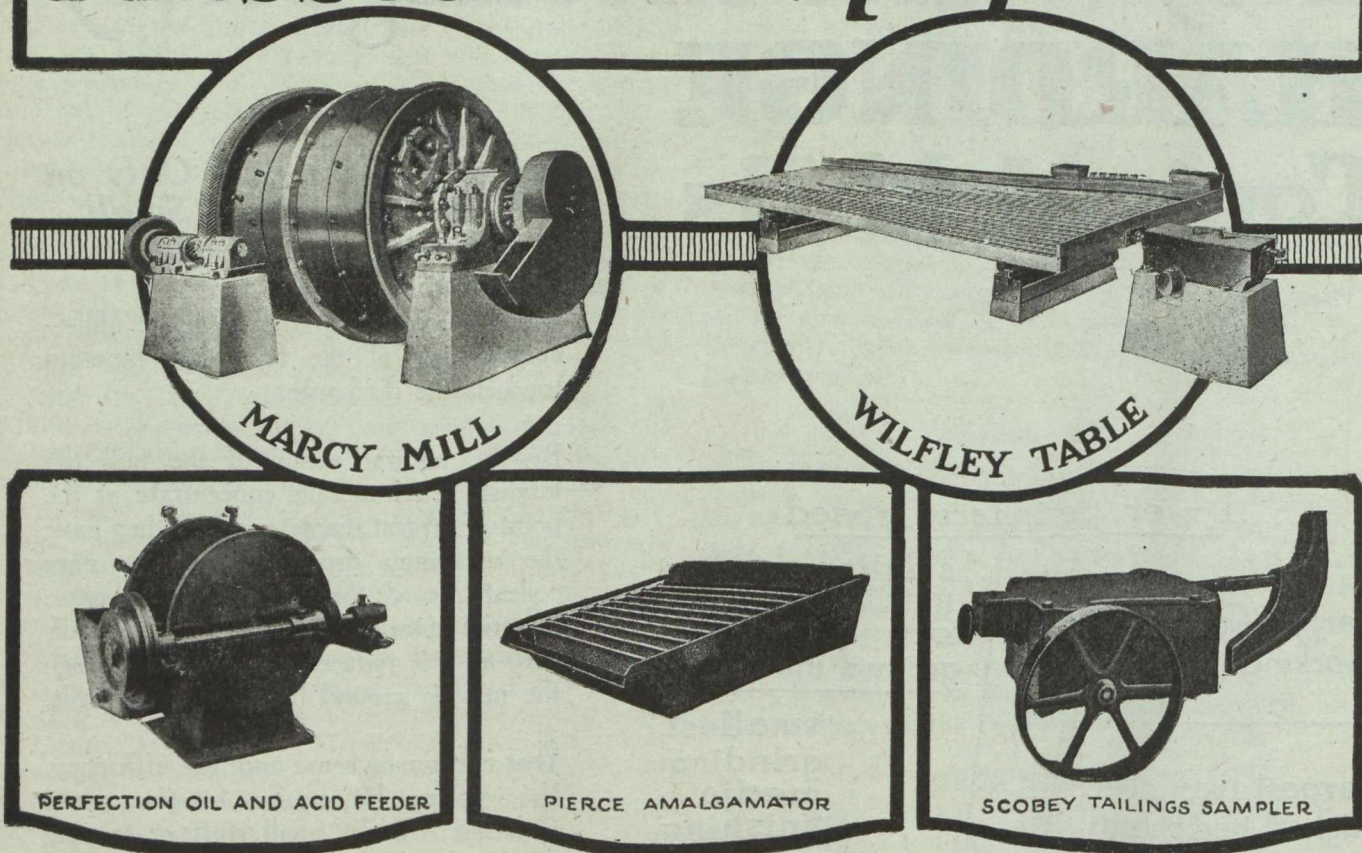
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Crushing in one **easy step** means lowest cost per ton output. The reason lies in the Marcy grate and the low pulp-line carried. Marcy balls are always crushing ore, their impact being unretarded by any superfluous cushion of water. Marcy grate openings run with the movement of the mill, enabling the rapid discharge of fine material.

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The history of the Wilfley is the history of concentration. Over 22,000 have been sold during the last twenty years for use in all parts of the world. Simple, substantial construction, trouble-proof moving parts, have kept the Wilfley to the fore-front of all concentrators. Manufactured in Canada by Wabi Iron Works, New Liskeard, Ont.

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Reduces a full day's run of pulp at any part of your mill to a 10 lb. sample, accurately and without attention. The Scobey is thoroughly practical and reliable.

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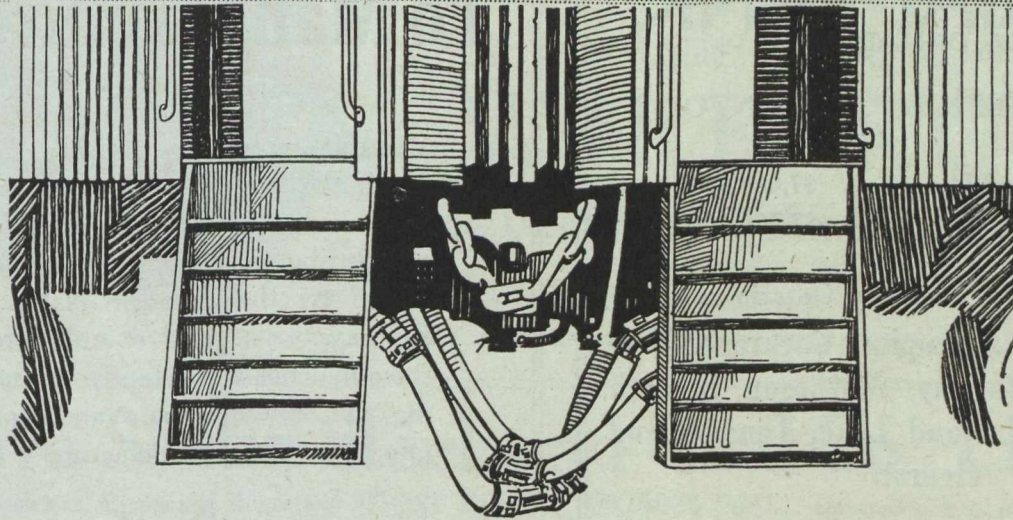
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Breaking away from accepted but antiquated methods of hose building created Goodyear Industrial Hose—a hose that gives longer, more satisfactory service under present-day industrial conditions, and costs less in the end.

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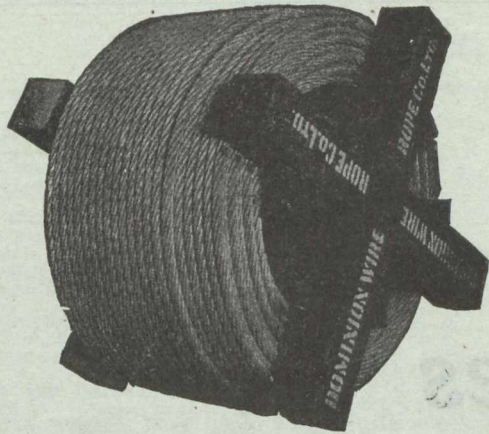
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The Minerals of Nova Scotia

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

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

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

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

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

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

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

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

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

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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, \$75,436,103; Lode Gold, \$97,121,786; Silver, \$46,839,631; Lead, \$42,294,251; Copper, \$145,741,069; Other Metals (Zinc, Iron, etc.), \$13,278,058; Coal and Coke, \$187,147,652; Building Stone, Brick, Cement, etc., \$28,843,272; Miscellaneous Minerals, \$651,759; making its mineral production to the end of 1918 show an

Aggregate Value of \$637,353,581

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.

Production During last ten years, \$313,976,022

Lode-mining has only been in progress for about twenty years, and not 20 per cent. of the Province has been even prospected; 800,000 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.
- 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 Wabi 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.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co.
The Wabi 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.
The Electric Steel & Metals Co.
The Wabi 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 Wabi Iron Works
R. T. Gilman & Co.
The Dorr Company
- Clutches:**
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.
- Coal:**
Dominion 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.
- 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:**
Coniagas 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 Wabi 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 Wabi 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
Osborn, Sam'l (Canada) Limited.
- Crude Oil Engines:**
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.
Lymans, Ltd.
Mussens, Limited

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Smelters and Refiners of Cobalt Ores

Manufacturers of

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Bar Silver—Electrically Refined

Arsenic—White and Metallic

Cobalt Oxide and Metal

Nickel, Oxide and Metal

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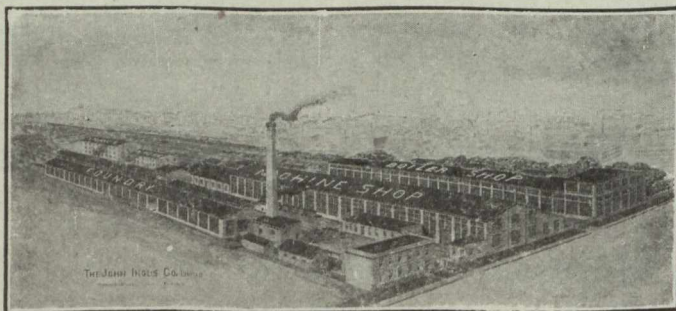
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J. W. ANDERSON, 7 Bank Street Chambers

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., Rockaway
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., Montreal, Que.
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—Stationary:**
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 & Glasco
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—Miners:**
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.
- 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.
Northern Canada Supply Co.
Jones & Glasco
- 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.
Coniagas Reduction Co.
Consolidated Mining & Smelting Co. of Canada
Canada Metal Co.
C. L. Constant Co.
Everitt & Co
- Metallurgical Engineers:**
General Engineering Co., New York
The Durr Co.
- Metallurgical Machinery:**
General Engineering Co., New York
The Durr 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.

Pipe—Wood Stave:
Pacific Coast Pipe Co.
Mine & Smelter Supply Co.

Piston Rock Drills:
Mussens, Limited
Mine & Smelter Supply Co.

Plate Works:
John Inglis Co., Ltd.
Hendrick Mfg. Co.
The Wabi Iron Works
MacKinnon Steel Co., Ltd.

Platinum Refiners:
Goldsmith Bros.

Pneumatic Tools:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.

Powder:
Giant Powder Company of Canada, Ltd.

Prospecting Mills and Machinery:
The Electric Steel & Metals Co.
E. J. Longyear Company
Standard Diamond Drill Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, L.
The Wabi Iron Works

Pumps—Pneumatic:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Sullivan Machinery Co.

Pumps—Steam:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Limited
Northern Canada Supply Co.
Smart-Turner Machine Co.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Turbine:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Vacuum:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
The Wabi Iron Works

Pumps—Valves:
Canadian Fairbanks-Morse Co., Ltd.

Pulleys, Shaftings and Hangings:
Northern Canada Supply Co.
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:
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
Mine & Smelter Supply Co.

Pumps—Centrifugal:
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
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:
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Electric Steel & Metals Co.
The Wabi Iron Works
Smart-Turner Machine Co.

Quarrying Machinery:
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
Hadfields, Limited
Mussens, Limited
R. T. Gilman Co.

Rails:
Hadfields, Limited
John J. Gartshore
R. T. Gilman & Co.
Mussens, Limited

Railway Supplies:
Canadian Fairbanks-Morse Co., Ltd.

Refiners:
Goldsmith Bros.

Riddles:
Hendrick Mfg. Co.

Roller Chain:
Hans Renold of Canada, Limited, Montreal, Que.
Canadian Link-Belt Co., Ltd.

Roofing:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Rope—Manilla:
Osborn, Sam'l (Canada) Limited.
Mussens, Limited

Rope—Manilla and Jute:
Jones & Glassco
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
Allan, Whyte & Co.

Canadian Miners' Buying Directory.—(Continued)

Rope—Wire:

Allan, Whyte & Co.
Canada Wire & Cable Co.
Dominion Wire Rope Co., Ltd.
Greening, B. Wire Co.
Northern Canada Supply Co.
Mussens, Limited

Rolls—Crushing

Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
The Electric Steel & Metals Co.
Mussens, Limited
The Wabi Iron Works

Samplers:

Fraser & Chalmers of Canada, Ltd.
C. L. Constant Co.
Ledoux & Co.
Milton Hersey Co.
Thos. Heyes & Son
Mine & Smelter Supply Co.
Mussens, Limited

Scales—(all kinds):

Canadian Fairbanks-Morse Co., Ltd.

Screens:

Greening, B. Wire Co.
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—Revolving:

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

Scheelite:

Everitt & Co.

Separators:

Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Mine & Smelter Supply Co.

Shaft Contractors:

Hendrick Mfg. Co.

Sheet Metal Work:

Hendrick Mfg. Co.

Sheets—Genuine Manganese Bronze:

Hendrick Mfg. Co.

Shoes and Dies:

Canadian Foundries and Forgings, Ltd.
H. A. Drury Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Shovels—Steam:

Canadian Foundries and Forgings, Ltd.
Canadian Mead-Morrison Co., Limited.
Osborn, Sam'l (Canada) Limited.
R. T. Gilman & Co.

Ship Bunkering Equipment:

Canadian Mead-Morrison Co., Limited.

Silent Chain:

Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.

Silent and Steel Roller:

Canadian Link-Belt Co., Ltd.
Jones & Glassco (Regd.)

Silline:

Coniagas Reduction Co.

Saline Refiners:

Goldsmith Bros.

Smelters:

Goldsmith Bros.

Sledges:

Canada Foundries & Forgings, Ltd.

Smoke Stacks:

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

Special Machinery:

John Inglis Co., Ltd.

Spelter:

The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.

Sprockets:

Hans Renold of Canada, Limited, Montreal, Que.
Canadian Link-Belt Co., Ltd.
Jones & Glassco (Regd.)

Spring Coil and Clips Electric:

Canadian Steel Foundries, Ltd.

Steel Barrels:

Smart-Turner Machine Co.
Fraser & Chalmers of Canada, Ltd.

Stamp Forgings:

Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.

Steel Castings:

Canadian Brakeshoe Co., Ltd.
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
The Wabi Iron Works

Steel Drills:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
The Electric Steel & Metals Co.
Osborn, Sam'l (Canada) Limited.
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.

Steel Drums:

Smart-Turner Machine Co.

Steel—Tool:

Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
N. S. Steel & Coal Co.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
Swedish Steel & Importing Co., Ltd.

Structural Steel Work (Light):

Hendrick Mfg. Co.

Stone Breakers:

Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Sulphate of Copper:

The Mond Nickel Co., Ltd.
Coniagas Reduction Co.

Sulphate of Nickel:

The Mond Nickel Co., Ltd.

Surveying Instruments:

C. L. Berger

Switches and Switch Stand:

Canadian Steel Foundries, Ltd.
Mussens, Limited.

Switches and Turntables:

John J. Gartshore

Tables—Concentrating:

Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.

Tanks:

R. T. Gilman & Co.

Tanks—Acid:

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

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.:

Hendrick Mfg. Co.
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.

Tanks (water) and Steel Towers:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Chicago Bridge & Iron Works
Gould, Shapley & Muir Co., Ltd.
MacKinnon Steel Co.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tires—Auto, Truck and Bicycle:

Gutta Percha & Rubber, Ltd.

Canadian Miners' Buying Directory.—(Continued)

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Hadfields, Limited
- Transits:**
C. L. Berger & Sons
- Transformers:**
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
Northern Electric Co., Ltd.
- Transmission Apparatus:**
Jones & Glassco (Regd.)
- Transmission Machinery:**
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.
Jones & Glassco (Regd.)
- Troughs (Conveyor):**
Hendrick Manufacturing Co.
- Trucks—Electric:**
Canadian Fairbanks-Morse Co., Ltd.
- Trucks—Hand:**
Canadian Fairbanks-Morse Co., Ltd.
- Trucks:**
Canadian Fairbanks-Morse Co., Ltd.
- Tubs:**
Hadfields, Limited
- Tube Mills:**
The Electric Steel & Metals Co.
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.
- Tube Mill Balls:**
Canada Foundries & Forgings, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Tube Mill Liners:**
Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Turbines—Water Wheel:**
MacGovern & Co.
- Turbines—Steam:**
Fraser & Chalmers of Canada, Ltd.
MacGovern & Co.
- Twincones:**
Canada Foundries & Forgings, Ltd.
- Uranium:**
Everitt & Co.
- Weighing Larries:**
Canadian Mead-Morrison Co., Limited.
- Welding—Rod and Flux:**
Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.
- Welding and Cutting—Oxy-Acetylene:**
Prest-O-Lite Co. of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Imperial Brass Mfg. Co.
- Wheels and Axles:**
Canadian Steel Foundries, Ltd.
Hadfields, Limited
The Electric Steel & Metals Co.
The Wabi Iron Works
- Winches—Power Driven:**
Canadian Mead-Morrison Co., Limited.
- Winding Engines—Steam and Electric:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works
- Wire:**
Canada Wire & Cable Co., Ltd.
Greening, B. Wire Co.
- Wire—Bare and Insulated:**
Canada Wire & Cable Co.
- Wire Rope:**
R. T. Gilman & Co.
Canada Wire and Iron Goods Company.
Canada Wire & Cable Co.
Dominion Wire Rope Co., Ltd.
- Wire Rope Fittings:**
Canada Wire and Iron Goods Company.
Canada Wire & Cable Co.
- Wire Cloth:**
Northern Canada Supply Co.
Greening, B. Wire Co.
Canada Wire & Iron Goods Company
- Wire (Bars and Insulated):**
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.
- Wolfram Ore:**
Everitt & Co.
- Woodworking Machinery:**
Canadian Fairbanks-Morse Co., Ltd.
- Zirconium:**
Everitt & Co.
- Zinc:**
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Consolidated Mining & Smelting Co.
- Zinc Spelter:**
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Foyt Metal Co., Ltd.

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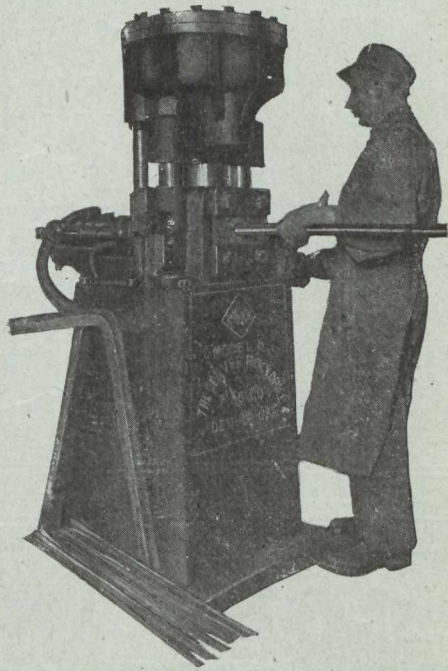
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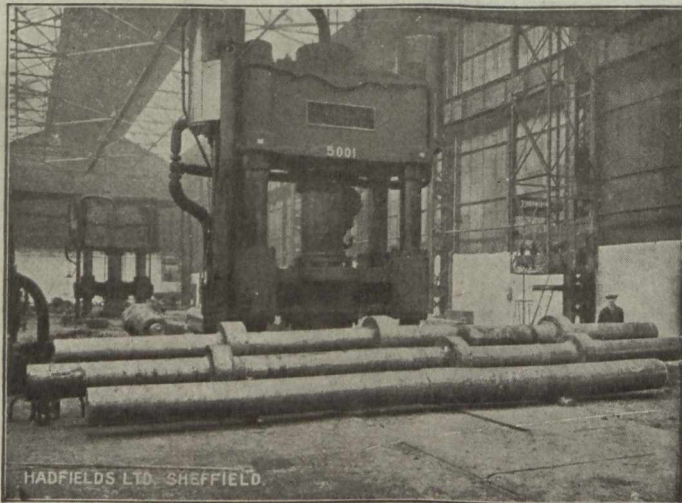
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