

CANADIAN MINING JOURNAL

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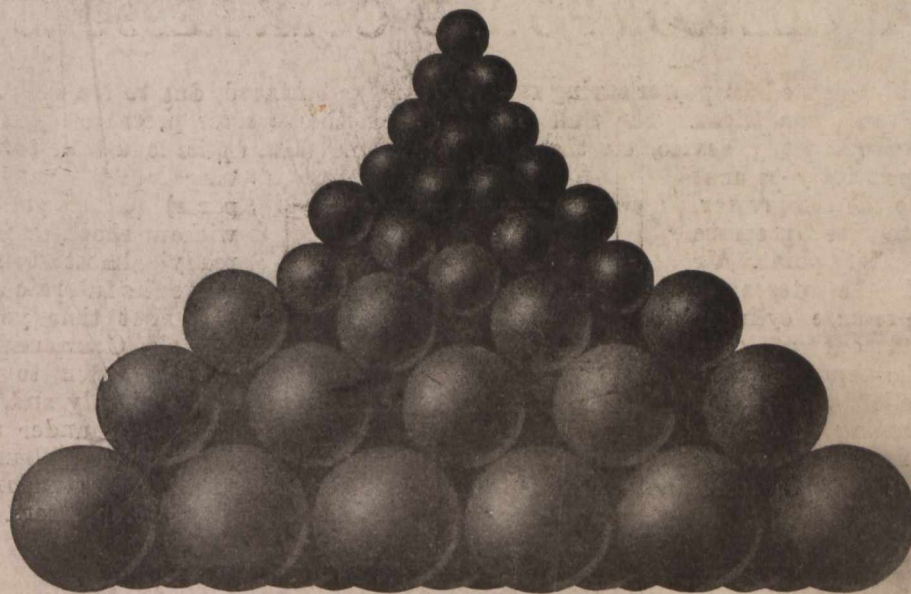
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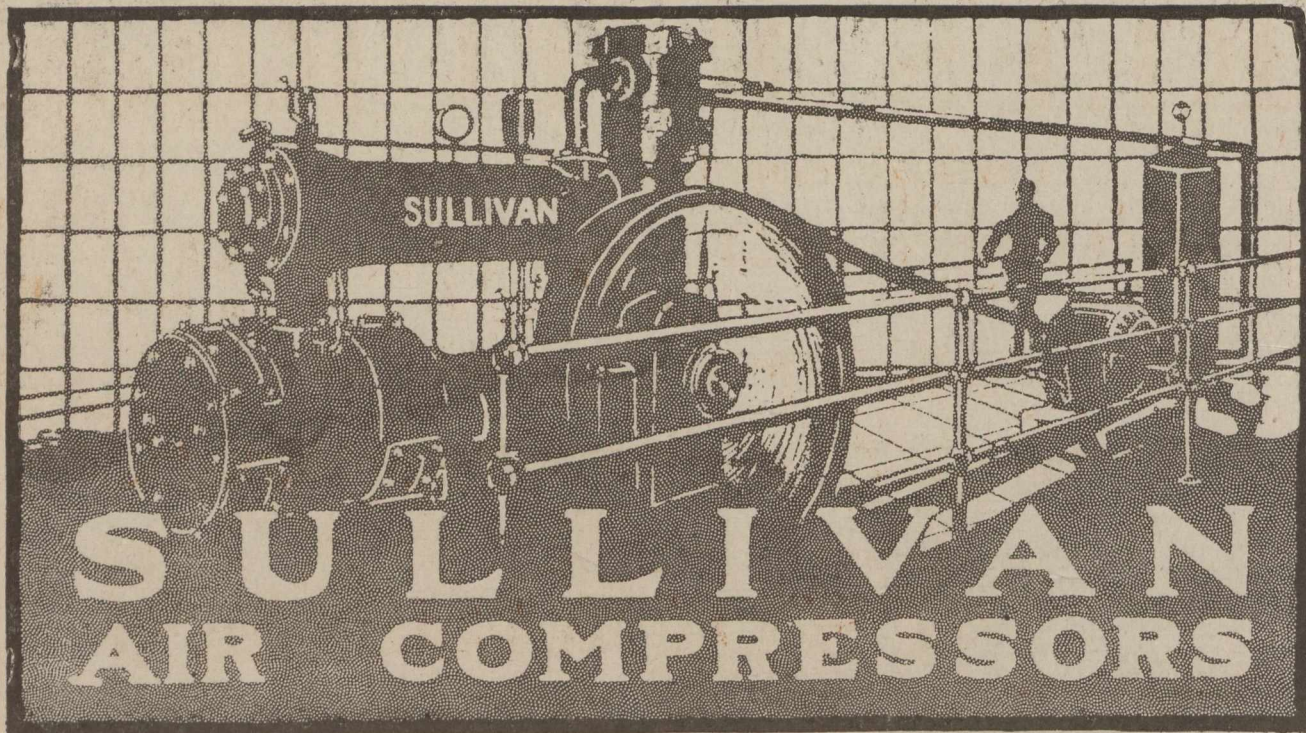
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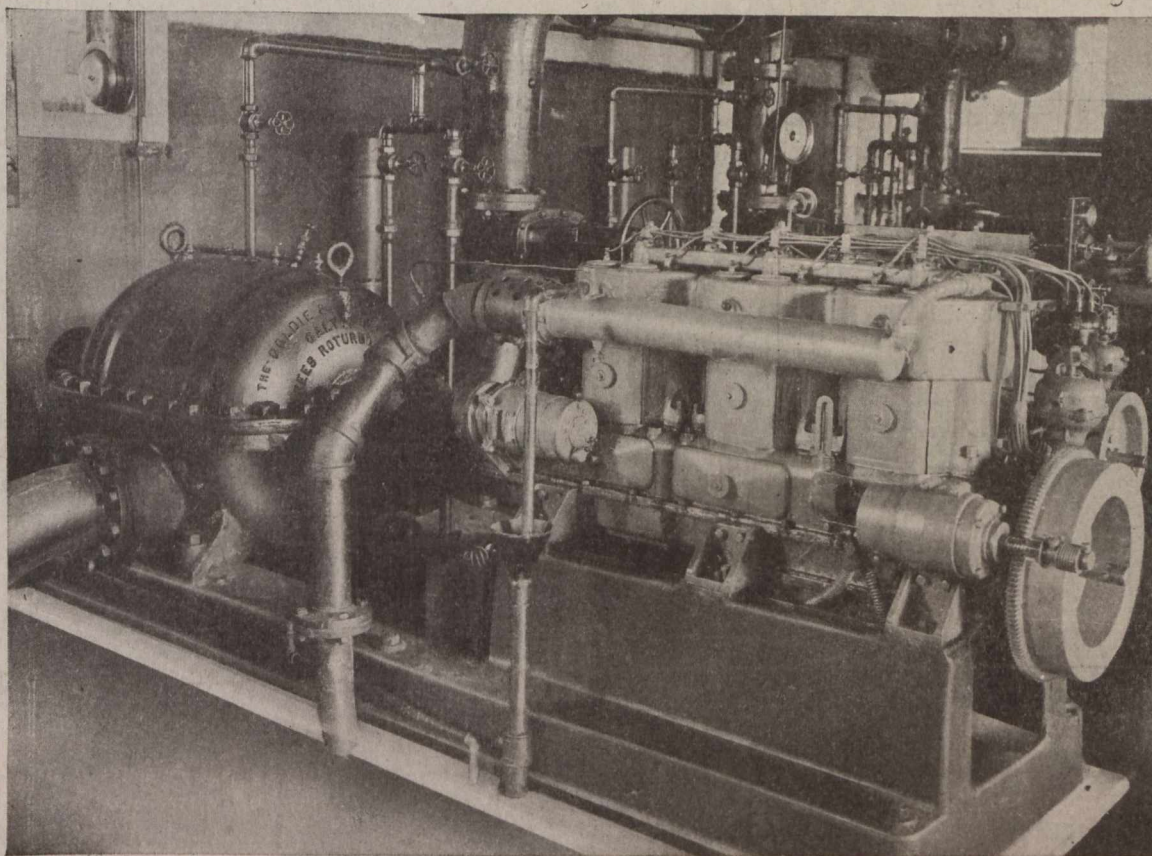


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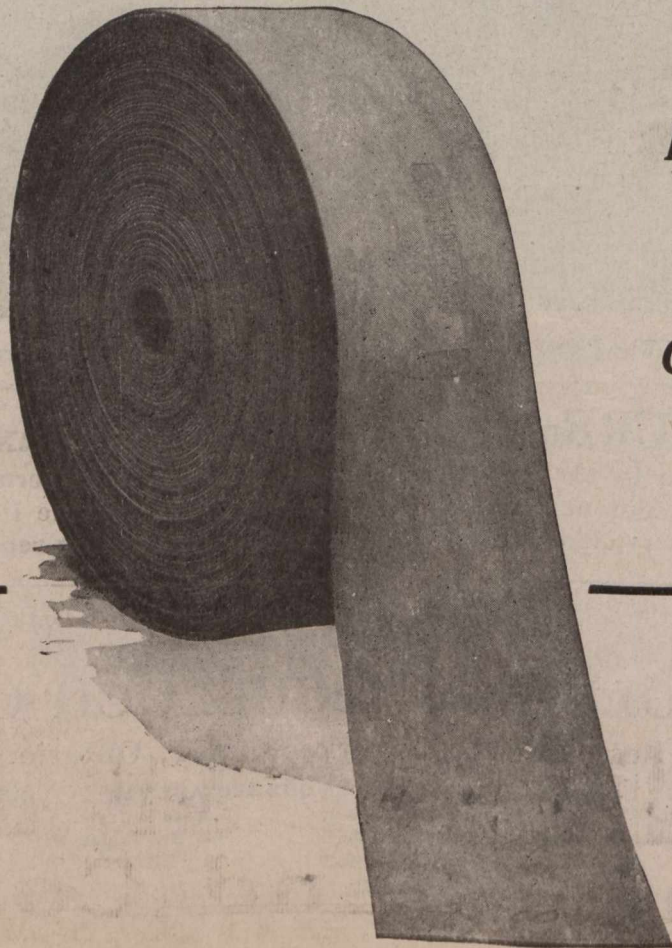
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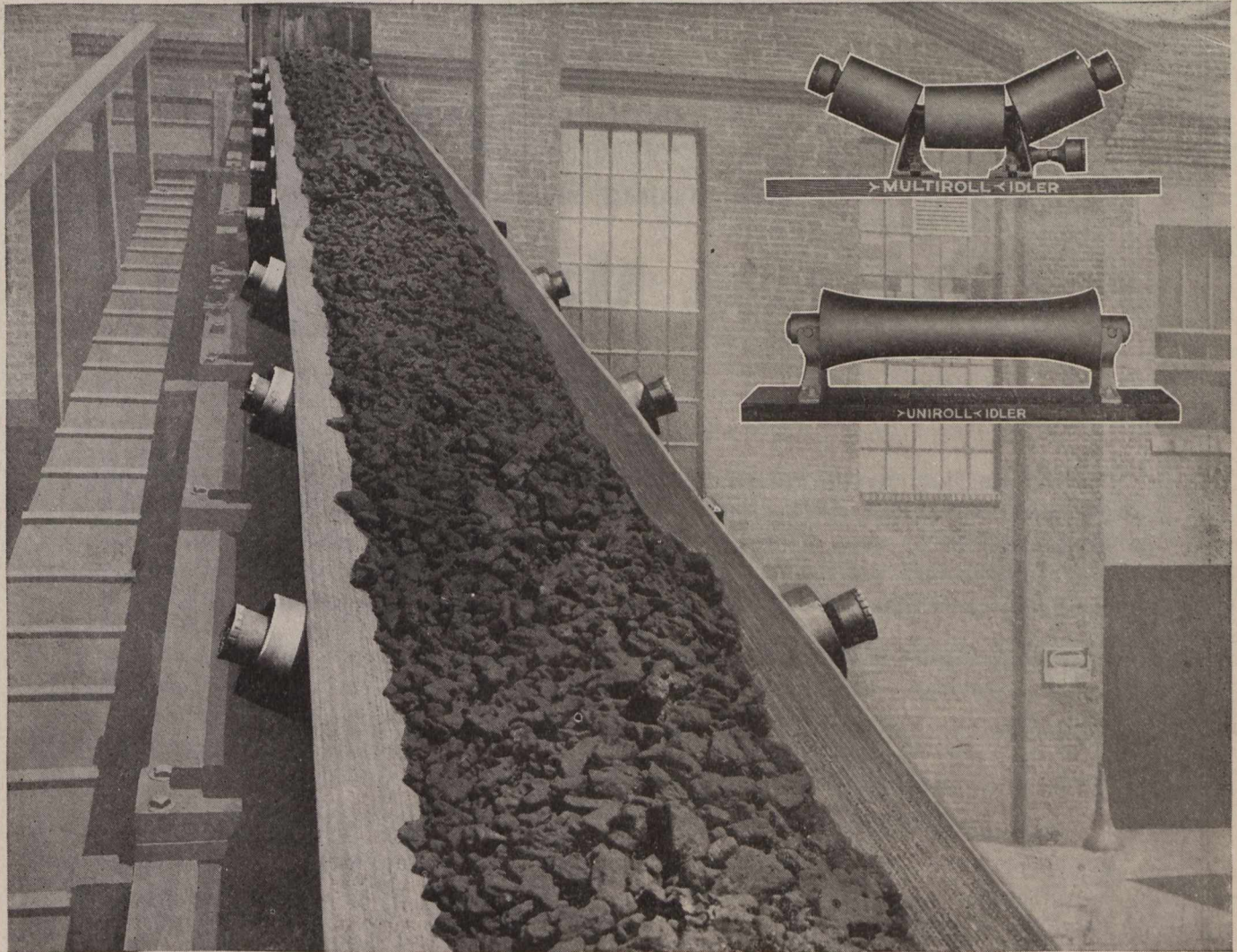
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Ontario in 1919 produced 38 per cent. of the total mineral output of Canada. Returns show the output of the mines and mineralogical works of the Province for the year 1919 to be worth \$58,583,916, of which the metallic production was \$41,590,759.

Dividends and bonuses paid to the end of 1919 amounted to \$15,545,238 for gold mining companies, and \$78,335,943 for silver mining companies, or a total of \$93,881,181.

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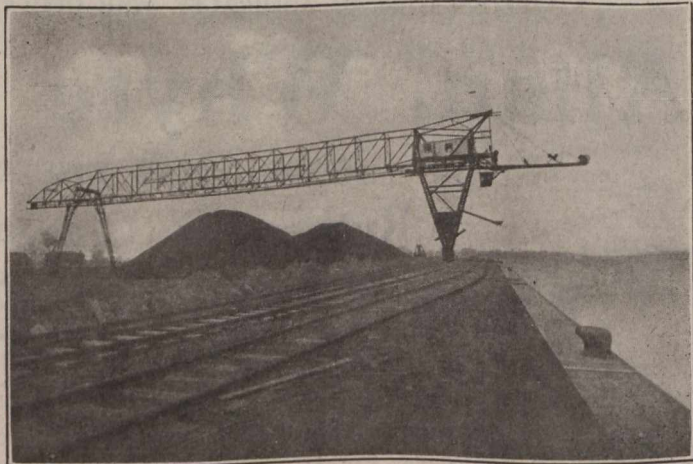
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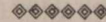
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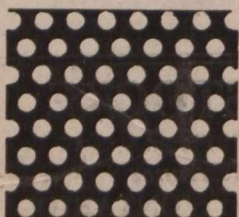
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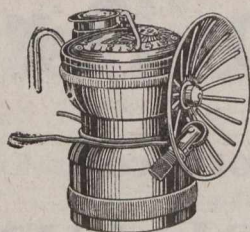
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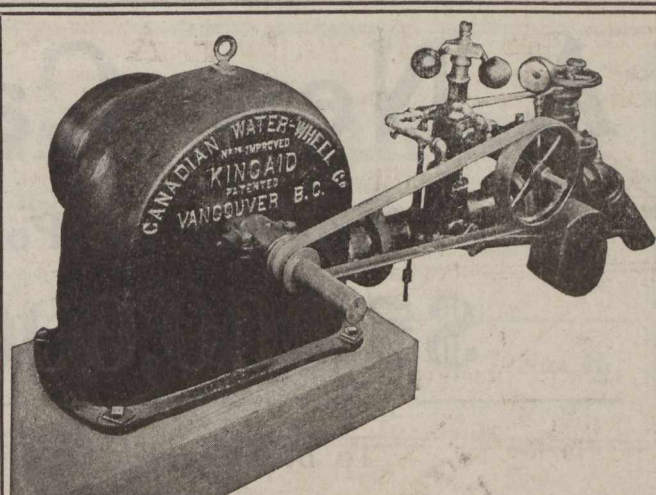
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VOL. XLI.

GARDENVALE, P.Q., November 19, 1920

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J. J. Harpell, Managing Director.

A. S. Christie, Eastern Manager,
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'Phone Uptown 7773.

H. W. Thompson, Western Manager,
1402 C.P.R. Building, Toronto.
'Phone Adelaide 3310.

F. E. Payson, Pacific Coast Manager,
528 Winch Building, Vancouver, B.C.
'Phone Sey. 3920.

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REGINALD E. HORE, Consulting Editor,
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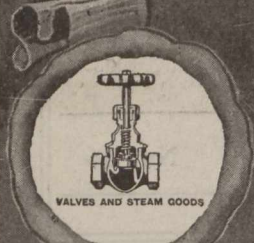
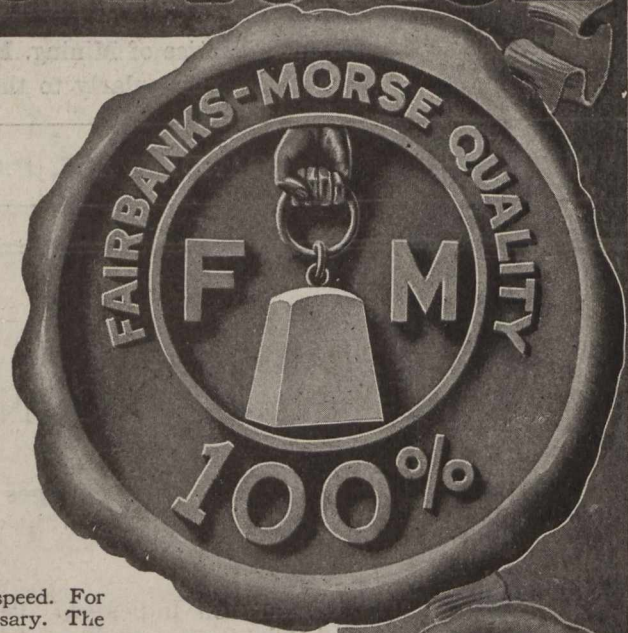
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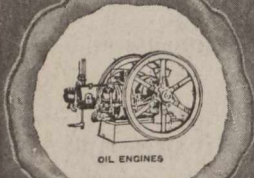
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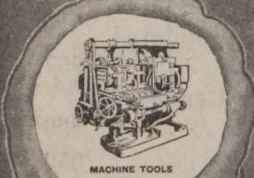
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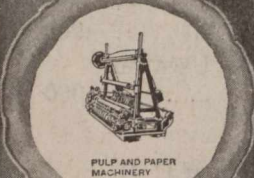
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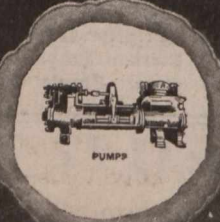
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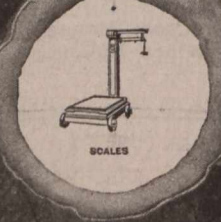
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EDITORIAL

A Permanent Tariff Commission Indicated

In this issue Mr. Alexander Gray discusses at some length the complex, unco-ordinated, in some respects contradictory, and in other respects exotic character of our mineral and metallurgical industries in Canada, which, it may as well be admitted, are disproportionate in their extension to the domestic production of the raw materials on which they subsist.

Our contributors's review pulls out the national skeleton to view, and emphasises the statements made by the retiring President of the Canadian Institute of Mining & Metallurgy at the Toronto Meeting in March last, namely, that our mineral resources are very specialized and not inexhaustible, and that our possession of certain minerals of strategic value, such as nickel, asbestos and cobalt, should be utilised to enable Canada to drive a fair bargain with those nations which possess essential raw materials with which our country is meagrely or unevenly supplied.

Our bargaining position is bad, because in some important respects it is a mendicant position, but the application of a remedy is not simple. It calls for skil-

ful and studied diagnosis. Snap judgments and emergent policies will not avail us. The policy of Protection—in its widest sense—has up to now proved the most effective medicine, but the tariff prescription requires skilful compounding. The enquiry which is now being made by a committee of the Cabinet, when completed; will be a record of symptoms, but a consultation is required for a decision regarding procedure. The tariff enquiry so far has revealed divergent and conflicting economic conditions, and the wishes of the East are not those of the West, nor are those of the Centre easily reconciled to either.

Nor is there any visible finality to the fiscal incongruities of Canada. Adjustment to environment is a first requisite to persistence of existence in a growing organism, and while the present enquiry is, in our opinion, a proper and a necessary proceeding at this juncture, it would seem that a permanently continuing process of enquiry and the indicated adjustment is required.

A permanent Tariff Commission, for advisory purposes, and not a legislative body, seems indicated.

Terms of Settlement of the British Strike

An inspection of the arrangement under which the British coal miners have gone back to work will reveal that it is not so much a settlement as a mutual agreement to work out a basis of co-operation, and it defers until the 31st of March 1921, or some previous date, the joint elaboration of a scheme for the regulation of wages in the industry "Having regard among other considerations, to the profits of the industry, and the principle upon which any surplus profits are to be dealt with." The text of the terms of settlement are quoted in extenso elsewhere in this issue.

An interesting feature of the agreement is the provision by which the coal-owners acquiesce in a variation of their profits as the wages of the miners are

reduced or increased under the application of the sliding scale.

Things have moved very rapidly in Britain, and the return of the miners to work, which is a proceeding tantamount to defeat of the extremists among the leaders, should not obscure that fact that the question which the Mining Association and the Miners' Federation have undertaken to answer is the extent to which private ownership is permissible.

An enquiry into the disposal of "surplus" profits is not in principle to be distinguished from an enquiry into the right of the individual, or a combination of individuals, to possess ownership in profits, as the word "surplus" is not one that has hitherto been regarded

a definable in law, or existent in fact, in British jurisprudence.

The whole system of coal control in Britain is an extraordinary and emergent war measure, and, presumably, will some day be abrogated.

In attempting to control essential industries in the best interests of the nation, British statesmen have brought about a practical test, under constitutional procedure and without popular excitement, of political theories that could only have been so tested without the accompaniments of revolution and bloodshed under the whole-hearted agreement of the British nation to adopt virtually anything that seemed necessary to concentrate the country's energies upon prosecution of the war. One hidden danger has been plainly disclosed, namely, that the substitution of the State for the individual, or the corporation, as employer of labor in no wise lessens the danger of industrial strife, but it increases it dangerously, inasmuch as disputes which under the private employer were matters of internal policy, in which the State intervened only as little as possible, become, under State employment, indistinguishable from political revolution. This tendency of the socialistic or communistic state has often times been pointed out by far-sighted students of forms of government, but the war has brought about an actual demonstration that cannot fail to have a deterrent effect upon those whose enthusiasm for political innovations so often exceeds their ability to forecast the outcome of untried schemes of social changes.

The disturbing feature of the situation as it now exists, is that the postponed question is still a political one, and not purely a matter of wages and hours of work.

In making the rate of wages paid to miners dependent upon the increase in the aggregate output of coal, the British Government has apparently confused two distinct issues, namely, that while a reduction of the unit cost of coal production can only be obtained by an increase in the individual rate of production, the value of the thing produced, for purposes of sale, is dependent upon the demand. Any attempt to frame a permanent basis of wages upon the fluctuation of aggregate production will fail, because it presumes an unchanging demand and an unchanging selling price, neither of which presumptions are justified.

The proposals so far put forward for satisfaction of the miners' desires and improvement of production have ignored the chief cause of the reduction in output, which is, in Britain, and elsewhere, a shortage of skilled workers at the face, and a superfluity of non-essential, non-productive employees in the auxiliary operations of handling, preparing and marketing the coal produced. A new generation of face workers must grow up, to replace those who are lost through war causes — death, disablement, and entry into other occupations — before the aggregate production of coal

can climb back to pre-war figures. The chief problem of the colliery executive, and of those governments that have usurped the functions of the colliery executive, is to restore the balance between face-workers and auxiliary employees, between coal-getters and coal-handlers. Out of the preponderance of this last named class, who necessarily include the less responsible elements of the coal-mine workers, arises much of the difficulty that miners' leaders experience in these days in advocating moderate methods and recognition of the fact that the miner is not the only gooseberry on the communal bush.

CANADA AS A PRODUCER OF PETROLEUM.

The "Petroleum Times," of London, deprecates the exaggerated accounts of Canadian oil occurrences which appear in the daily press, and particularly a statement which describes the Fort Norman strike as indicating "the largest oilfield in the world."

"So far," states this comment, "there is nothing proved which has altered our opinion that the liquid-oil riches of Canada are very limited, and though some fairly decent oil-wells may be brought in round the Mackenzie River, it must not be imagined that Canada has the slightest hopes of ever becoming a great oil-producing country; at least, not until such time as its shale wealth is commercially developed."

We think our contemporary doth protest too much. "Not proven" is still the verdict upon Canadian oil occurrences, and it is yet too soon to conclude that Canada has "not the slightest hopes" of becoming an important oil producer.

In direct contradiction of the London opinion quoted may be mentioned the conclusion of Mr. G. C. Ommanney, Investigation Engineer of the Canadian Pacific Railway, which appears in the monthly review of progress published by this railway. Mr. Ommanney points out that in September there were 24 locations at which drilling for oil was in progress throughout western Canada, not including eight in the coastal district, and he contends that Canada will, in the comparatively near future, "become an important contributor to the world's oil supply." Mr. Ommanney's observations have at least the merit of closer acquaintance with western oil possibilities than those of our London contemporary.

The officers of the Canadian Geological Survey have carefully outlined the possibilities of oil occurrence in the great plains, but their conclusions are necessarily incomplete because the surface exposures only incompletely indicate the nature of the rocks that lie below. Thorough and protracted prospecting by drilling is necessary to determine a number of stratigraphical unknowns, and this kind of prospecting is now taking place. The campaign of the Imperial Oil Company is establishing many things of "scientific value," to use Mr. Stillman's description of the Fort Norman find,

and the Company is, we understand, fully imparting this new information to the Canadian Geological Survey. It will still be some years before the potential western oil area is thoroughly tested, and, in the meantime, long-range prophecies, unaccompanied by reasoned argument, are out of order.

As to the oil-shale resources of Canada, these are very tangible assets, with no uncertainty attaching to them. Neglect of oil-shale utilisation is not confined to Canada alone. Canada had an oil-shale industry, with fair prospects, sixty years ago, but it was killed by the tapping of large petroleum flows in the United States. When petroleum ceases to become an unassailable competitor, as may well occur should a reduction in petroleum yield continue to be accompanied by an extension of the uses of petroleum, then, presumably, the distillation of oil-shales will be resumed in Canada.

DOMINION ROYALTY ON COPPER.

Mention was omitted from the report of the Winnipeg Meeting, contained in the issue of 5th November, of the text of the resolution passed regarding federal royalties on minerals, which has a particular bearing upon the operation of the Flin Flon ore-body, and is also linked up with the question of provincial ownership of natural resources that is at this time being energetically discussed in Manitoba.

The Resolution, after recital of existing regulations, read as follows:

"That this Convention strongly urges the Government of Canada to so amend said regulations as to set out specifically what are to be the royalties charged on the different minerals produced, and particularly that the time for which copper shall be exempt from royalty shall be extended for a period of ten years."

The Manitoba Government is finding itself in an impotent and embarrassing position because of its non-ownership of the natural resources over which it is charged with civil administration, and the demonstrated presence of mineral deposits in Northern Manitoba has interjected considerations that render it very desirable, from Manitoba's point of view, that the indeterminate status now existing in connection with mining lease laws, royalties, and mines regulation should be brought to an end.

Dr. W. H. COLLINS APPOINTED DIRECTOR OF THE GEOLOGICAL SURVEY.

Announcement is made by the Civil Service Commission, under date of 15 November, that Dr. W. H. Collins, who for a number of years has been a geologist of the Department of Mines, has been appointed director of the Geological Survey.

Dr. Collins has been a geologist in the Geological Survey branch of the Department of Mines for fifteen years. His work has largely been in the mineral fields of Northern Ontario and has been extremely valuable to the department. He was born near Owen Sound, Ont., and received his education at the State University of Wisconsin and the University of Toronto.

TEXT OF TERMS UPON WHICH BRITISH COAL MINERS VOTED TO END STRIKE.

The terms of settlement upon which the British coal miners took an inconclusive ballot, and on which they eventually returned to work, are as follows:—

1. Recognising that on the increased production of coal there depend not only the prosperity of all who are engaged in the coal industry, but also the welfare of the nation and the cost of life of the people, and having in view that this urgent need can only be met if the miners and mine owners throughout the country work together cordially for this common purpose; and further, having regard to the necessity of setting up machinery for regulating wages in the coal trade so as to get rid of the present anomalies and provide against future difficulties;

The Mining Association and the Miners' Federation solemnly pledge themselves to make every effort to achieve these objects.

To that end they shall:—

(a) Co-operate to the fullest extent to obtain increased output, and for this purpose will arrange to set up district committees and a National Committee.

(b) Proceed forthwith to prepare a scheme for submission to the Government at the earliest possible moment and not later than the 31st March for the regulation of wages in the industry, having regard, among other considerations, to the profits of the industry and to the principle upon which any surplus profits are to be dealt with.

2. Pending the preparation of the scheme referred to in 1 (b), wages shall be regulated on the following basis without prejudice to the ultimate scheme above mentioned:—

(a) An advance of 2s a shift to persons of 18 years of age and over, 1s to persons of 16 and 17 and 9d to persons under 16 will be paid from the date of resumption of work to the classes of colliery workers entitled to Sankey wage, and subject to the conditions under which Sankey wage is payable.

(b) For the purposes of this temporary arrangement the advance referred to shall be automatically adjusted on the basis set out below from the 3rd January, 1921, in the light of the results of the five weeks ending 18th December, 1920, and similarly from 31st January, and thereafter every four weeks on the results of the four weeks immediately following the last preceding test period, but the Christmas holiday week shall not be counted in any such period. And an adjustment will be made in those cases where the holiday period falls wholly or partly within the New Year week.

The basis on which the advance shall be adjusted is as follows:—

If the weekly averages of the proceeds of export coal during the test period are maintained at the weekly average of the proceeds of export coal during the September quarter the advance shall be 1s, 6d and 4½d respectively. If (after deduction of the cost of extra output), they exceed the September figure, an additional 6d, 3d and 2½d respectively will be paid for every complete £288,000 of the excess.

(c) For this purpose the amount of export coal in each period shall be assumed to be the excess of the tonnage produced over the rate of 219,000,000 tons annually; the proceeds shall be calculated by multiplying that excess tonnage by the average f.o.b. price as shown in the Trade and Navigation accounts for the quarter ended 30th September, 1920; and the cost of extra output shall be taken as 15s per ton for each ton produced in excess of the rate of output for the quarter ended 30th September, 1920.

(d) As part of the settlement hereby concluded, the Government undertake to make an Order under section (3) of the Mining Industry Act which shall provide for the variation of the one-tenth share of the excess profits of the industry payable to the owners under the Coal Mines (Emergency) Act by the deduction therefrom or addition thereto of one-quarter of said tenth part for each 6d by which the men's advance is reduced or increased.

(e) The certificate of the Secretary for Mines as to the amount of the proceeds and the advances payable shall be accepted as final.

Russell J. Spry, mining engineer, formerly with the Eustis Mining Co., at Eustis, Que., is now located in Salt Lake City, Utah.

Canada's Complex Economic Mineral Problems Surveyed

Natural Resources Largely Unexploited, While Foreign Fuels, Iron, Steel and Other Products, are Being Imported.

ALEXANDER GRAY, Montreal.

"The big problem of the next twenty-five years is to advance and if possible energize the development of the natural resources of this Dominion. We are now in a position to challenge the world in competition if we only pursue sane and well-tried lines of policy and do not be misled into false ones."

In his speech at Kamloops, Prime Minister Meighen cast this ambitious and optimistic horoscope.

Partisans will disagree as to the methods to be employed to bring this about, for there is no denying the complexities and disconcerting incongruities in Canada's economic affairs.

Not only does the Premier reaffirm the Parable of the Talents and give precedence to the most certain sources of great working capital; his plea for more confidence and sanity has had reawakening influence.

Out of the maze of post-War adversity and perplexity, while Elder Statesmen overseas are floundering in frenzied finance, Mr. Meighen has argued the case for Canada with refreshing candour and admirable affirmativeness.

Canada is to have stronger diversified industrialism — is to place itself upon a constructively competitive basis—instead of "taking it lying down", in the parlance of the pugilist. If opulent and impoverished nations avail themselves of advantageous exchange to undersell Canadian producers, then Mr. Meighen proffers Canadian energies and resources, and Government support of them, as assured means of prosperity and expansion. In doing this, he is not unmindful of internal and external complications. Hereafter the "equal opportunity and fair trade" advocated by Sir Auckland Geddes is to have more of our own making in it.

Putting the House in Order.

Liquidation has proceeded apace. Frozen credits are being thawed out by drastic processes. Consumers of commodities went on strike. Canada under the new leadership at Ottawa has decided to raise more steam and move faster. Ways and means whereby it will obtain a larger participation in the world's marts are being devised. Whatever of tariff revision be given effect, sentiment is becoming aggressively favorable to the promotion of the coal trade, fostering of the iron and steel industries, of assisting mineral industries throughout. Specifically, a bounty is desired for iron-ore mined in Canada; a royalty or other form of first-aid for copper producers; the levy of added duties upon coal, copper, zinc and lead and their products, as well as the restriction of the foreign steel-products free-list. In justification of the comprehensive correctives for excessive importations and the unbalanced international exchange situation, the latter facilitating the offloading of surpluses in Canadian markets—Mr. Meighen enters the plea that Canada has enough and to spare in its own resources. It is all serene to those who find it convenient to underbid, or to dominate Canadian trade, but the tide of commerce is running

too rapidly the wrong way. Were it not for the pulp and paper, asbestos exports and activity in the coal trade East and West, the protective programme would require enlargement rather than curtailment.

The American View.

There is all the more reason for altered policies because of recent utterances of a pessimistic nature. Mr. Vanderlip has proclaimed that the States are confronted by a period of unprecedented depression. Since there is no disputing that in the plenitude of counsel there is wisdom, and as international finance enters largely into Canadian matters, besides the remarks of Mr. Vanderlip no more informative précis has been presented than that issued by the Guaranty Trust Company of New York, as follows:

"During the half century preceding the war, a period representing the golden age of English industrial and trade development, a large and profitable British overseas commerce was developed. A low unit of cost in production was largely responsible for this growth. Germany, likewise producing at a comparatively low cost, developed a highly organized commercial system and made serious inroads into British commerce during the ten years just prior to the war. The United States, electing to operate upon a different standard of living, involving a higher wage cost, was unable to gain a position as a large exporter of manufactured goods, compared with Great Britain and Germany, except in those lines where our wider use of automatic machinery reduced the unit cost of production to a point that permitted competition with similar products manufactured on the lower European wage scale.

"Fortunately for the United States, the post-war period finds the condition decidedly altered. European labor costs have advanced tremendously until they now parallel, to a considerable degree, labor costs in this country. This change deprives Europe of one of her greatest foreign trade assets and improves, in like measure, the outlook for American foreign trade so far as competition in productive costs is concerned. Wages will, of course, vary, but a comparatively level situation seems assured."

Deprecating trade barriers, if international exchange is to be readjusted in order to unshackle commerce, and enable the United States to reap rewards without which its overplus production cannot find adequate markets, this trust corporation urges the broader policy, fiscal preparedness and a hundred per cent. efficiency.

While that ideal may not become universal—for obvious reasons, since overseas nations will not concede open markets,—and American industries insist upon the maintenance of protective principles, the thought uppermost in Canadian minds at the moment is: "What shall we do to be saved?"

Is it possible to obliterate trade barriers, to forthwith establish industrial fellowship, synchronizing with a League of Nations, that may not become a reality?

What the States Did.

Canada has been hesitant on the point whether it should become more self-reliant, self-contained, self-supporting, more exacting in behalf of its own industries, without jeopardizing its trading privileges. So complex are its problems that the decision to be rendered when the Tariff Commission makes recommendation, will be fraught with momentous consequences. Meanwhile, there is general acknowledgment that the Government at Ottawa must step on the accelerator.

Sentiment is divergent as it was years ago, when iconoclasts in the United States, low-tariff, and no-tariff advocates, execrated "Pig Iron" Kelley as the incarnation of corporate iniquity.

To those, the Apostle of pig iron was the architrave, as it were, of Protection running riot, before Dingley, McKinley, Payne or Penrose projected themselves into the arena and saw to it that the "trade barriers" the Guaranty Trust would abolish, were buttressed.

"Pig Iron" preached Production and Protection as the complement of each other, insisted that pig iron was the basic factor if the States were to have a steel industry commensurate with their vast iron-ore and coal deposits.

That was when Schwab was trundling a barrow, Gary was receptive toward fees in petty cash, Carnegie was propagating hard luck tales about the pauper labor of Europe, and Gates was at the throttle of a locomotive.

Needless to write; the "Pig Iron" Congressman was anathema to American Cobdenites; yet he was perennially returned to Congress from his Philadelphia district, and remained in Congress as the "Father of the House" until the "Last Post."

This all may be considered irrelevant and reminiscent, but the personality and his creed are recalled by the petitions for a bounty upon Canadian iron-ore, or upon pig-iron made from Canadian ore. Moreover, it might as well be admitted that behind the "Pig Iron" Congressman was the Laird of Skibo, the canny Carnegie, whose genius created the nucleus of the greatest of steel corporations.

Carnegie, too, was pilloried, along with Frick and Phipps, but it was that triumvirate which the assistance given to pig iron made possible. They made steel, began the movement whereby the ranges of Wisconsin, Michigan and Minnesota reverberated with blasts throughout the iron country. The coal fields of Pennsylvania, Ohio, West Virginia, Illinois and Indiana shared in the movement, which was later followed by developments in Tennessee and Alabama. So stupendous has been the progress since that "Pig Iron" Congressman was berated, that the States, although protecting what long ago ceased to be "infant industries", now would lower or wipe out "trade barriers", in order to secure a still larger portion of international business. In the circumstances, therefore, Canada is concerned with the following exhibit:

Contrasts In Credits and Debits.

In the aggregate, the \$199,285,714 which the following table totalled in 1920 suggests more than surgery.

The sum of Canada's mineral output in 1919 was \$173,000,000. What it will be in 1920 cannot alter the fact that the imports of coal and coal products, and iron-ore and its products, will greatly exceed in value the grand total f.o.b. worth of Canada's mineral production.

IMPORTS OF COAL AND METAL PRODUCTS INTO CANADA.

(Figures compiled by Dominion Bureau of Statistics.)

		Six Months ending September			
		1919		1920	
		Quantity	Value	Quantity	Value
		Ton	\$	Ton	\$
Coal and its Products.					
Coal—					
From U. K.	344	2,578	.....	.....	.....
U. S.	8,829,347	31,839,153	9,093,182	48,759,066	
O. C. . . . .	.....	.....	561	5,027	
Total	8,829,691	31,841,731	9,093,743	48,764,093	
Other Coal Products—					
From U. K. . . . .	.....	4,555	.....	977	
U. S. . . . .	.....	1,061,932	.....	3,121,673	
Total . . . . .	.....	1,166,487	.....	3,122,650	
Total Coal and its Products		32,908,218		51,886,743	
Iron and its products—					
Iron Ore—					
From U. S.	802,789	2,865,859	1,087,474	4,030,906	
N'rd	244,574	263,671	245,407	333,492	
Total	1,047,363	3,129,530	1,332,881	4,364,398	
Other Iron Products—					
From U. K. . . . .	.....	3,112,511	.....	8,539,626	
U. S. . . . .	.....	84,004,446	.....	126,897,637	
O. C. . . . .	.....	210,480	.....	449,780	
Total . . . . .	.....	87,327,437	.....	135,887,043	
Total Iron and its Products		90,456,967		140,251,441	
Copper and its Products—					
From U. K. . . . .	.....	20,103	.....	134,531	
U. S. . . . .	.....	3,335,647	.....	5,214,392	
O. C. . . . .	.....	30,983	.....	57,092	
Total . . . . .	.....	3,386,733	.....	5,406,015	
Lead and its Products—					
From U. K. . . . .	.....	23,300	.....	1,003,764	
U. S. . . . .	.....	242,242	.....	248,393	
O. C. . . . .	.....	38,005	.....	215,969	
Total . . . . .	.....	303,547	.....	1,468,126	
Zinc and its Products—					
From U. K. . . . .	.....	1,532	.....	3,084	
U. S. . . . .	.....	399,262	.....	259,236	
O. C. . . . .	.....	.....	.....	11,069	
Total . . . . .	.....	400,794	.....	273,389	

"Our country must reconstruct itself" is a cure prescribed in another sense by Calvin Coolidge, Vice-President-elect of the United States. Its domestic application is imperative.

Granting every claim as to limited domestic markets and the necessity of cultivating reciprocal trade relationships, no logical deduction can be formed other than that Canada has not learned to walk by itself, as did Kipling's metaphorical cat. The hiatus made manifest in the foregoing data constitutes "an aching void". "Keeping the home fires burning"—at this price—is more ominous than optimistic. "Living on Capital" may benefit individuals but the effect is to jeopardize a greater number. The imports exhibit is convincing evidence the country "must reconstruct itself" by promoting Home Industries while cultivating overseas and over-the-border trade on a more advan-

tageous bartering basis. Nor is it adequate that our exports showed a gain. Instability is in evidence, wherever industries are dependent upon such prime factors as coal, coke, iron and steel, and the agitation for the encouragement of iron-ore production is opportune. A lonesome satisfactory item is the 1,299,424 tons of coal exported in the half year, worth \$9,103,196. Alberta is pushing its coal trade in the States. The 12,316 tons of iron ore exported valued at a paltry \$60,845, is a rather pitiful contribution. There is no denying the reasonableness of the aspiration voiced by Mr. Balmer Neilly when recently addressing the Empire Pressmen:

"We hope to develop our iron ore resources by means of beneficiation to the point where Ontario and Canada may depend upon our own resources in place of importing 95 per cent. of our iron ore and iron and steel products to the extent of some \$180,000,000 as in 1918."

Generally speaking, Canada's total trade with the United States for the twelve months ended with September, was \$1,462,213,748. This was an increase of about \$300,000,000 over the preceding corresponding period. On the other hand, imports from the United States amounted to \$919,367,989, an increase of \$200,000,000. Exports from Canada to the States were approximately \$542,845,759, an increase of not quite \$100,000,000. In the period in review, Canada increased its imports while its exports decreased. The imports were \$1,352,767,940, compared with \$888,139,956 in 1919. Exports were \$1,208,919,175, as against \$1,210,541,387, in 1919. Clearly one-half of our total trade with the world was done with the United States, about two-third of our imports were from the United States, and nearly one-half of our exports were disposed of to the United States.

IRON AND COAL.

Weakest Links in the Chain.

Pittsburg "base" prices and the "Bessemer limit" may be meaningless terms to the laity. They are branded into our economic system. Apart from the huge iron deposits of our eastern seaboard, we have yet to find another iron-ore field of first magnitude, free from impurities or which do not require beneficiation. Here and there we have hematites; magnetites rather low in grade have presented themselves; sulphur and phosphorous are too prevalent in some of these, and we have titaniferous ores awaiting economical processes and profitable uses. Exploration may supply the greater requirements. Meanwhile the "line of least resistance" has been followed, and the central provinces have no steel industry they can call their own.

In the six months ended June 30th, only 8.9 per cent. of the ores fed to Ontario furnaces were of domestic origin. Altogether 1,332,881 tons of iron-ore were imported, and we exported 12,316 tons.

Sydney and New Glasgow plants, and the iron and coal mines tributary thereto, have been handicapped by labor troubles, notwithstanding the exportations of coal in the six months ended with September, were a redeeming feature. Most of that coal went oversea, some of it across the border. Apart from Sydney and New Glasgow, all the steel mills obtained nearly all their coal from the States. The Algoma Steel Corporation was alone among its Ontario contemporaries in availing itself of what iron-ore in bulk it could muster from its own domestic mines. It used its own siderite from its Magpie Mine, where 100,000,000 tons have

been determined by diamond drilling. Latterly the Algoma corporation does not appear to have drawn so steadily upon this siderite, but the three months ended September 30, notified gratifying tonnage results, as follows:

	1920	1919
Magpie Ore	32,210	67,420
Coke	142,593	65,998
Pig Iron	116,362	50,149
Steel Ingots	92,671	55,456

Doubtless imported iron-ores entered into this production. More Magpie ore might be availed of, and probably will be, when beneficiation practice is encouraged in some way. It was explained to the Tariff Commission that this siderite has an original iron content of 35 per cent, and sulphur content of one per cent. and more. To roast this ore in brick-lined kilns, raising the iron content to 50 per cent, and reduce the sulphur content to .16 per cent., using powdered coal, is an added cost at which patriotism shies. The cost of roasting in 1918, was \$1.25 per ton; in 1919, it was \$2.64 per ton; because of the advance in the price of coal, since one ton of raw ore makes only .7 ton of finished ore. Ostensibly that is why a bounty rather than a higher duty is sought, especially by the Algoma people. On the other hand, those without iron-ore ask for tariff protection, while Canada is seeking domestic ores of Bessemer grade. On the Pacific Coast conditions are identical with those in the central provinces, with the exception that a small tonnage of iron ore and coal is going to boundary States. The British Columbia Minister of Mines in his report for 1919 was obliged to admit that "so far there has been no metallic iron produced in British Columbia, but it has been strongly advocated in many quarters that the conditions are favorable for the establishment of an iron-smelting plant somewhere on the British Columbia coast. So far nothing definite has materialized, although there is apparently a prospect of such a plant being established. As is well known, there is on the Coast, in the aggregate, an adequate supply of magnetite, quite sufficiently free from impurities as to be within the "Bessemer limit" to supply such a plant."

Undoubtedly the situation is more than embarrassing for, aside from the work at the Magpie Mine and Moose Mountain, nothing of consequence is happening in the way of iron mining, between there and the Belle Isle section on the east, whereas what is going on in British Columbia is trifling, as yet. Diamond drilling in other sections of Ontario is understood to have disclosed considerable tonnages of satisfactory ore. "Pittsburg base prices", however, for the time being, removed the incentive for further territorial exploitation by individual companies or syndicates. With assistance given to iron miners or pig-iron producers, an element of impetus might be supplied. Otherwise, Canadian steel mills and fabricating plants in general have recourse to the States, as the imports for the six months ended with September reveal. Addressing the Tariff Commission, Mr. J. A. Hussey plainly put the situation when he said: "At the present time, it is admitted by all that iron and steel are the basic industries of Canada, depending, one might say almost wholly, on ore imported from the United States and elsewhere (Newfoundland). These importations inevitably have helped to turn trade balances against us, and trade balances are a matter which affect everyone in the country."

Our Coal Account.

Accentuating this is the Coal Account, amounting in the six months dealt with in the table of imports, to \$51,886,743, for 32,908,218 tons, more than twice the quantity of coal mined altogether in Canada in any two years. Affiliated with the Maritime Provinces' iron-ores there is coal in abundance. Between there and Alberta and Saskatchewan, what coal there is has not as yet been utilized in steel and fabricating plants. This necessitates, or has necessitated, reliance upon imported coal, despite the fact that in one form or another there is about 1,200,000 million tons of coal of all kinds within the Dominion to go on with. Of this 2,000 million tons is semi-anthracitic; 283,000 million tons is bituminous, and 950,000 million tons, sub-bituminous and lignite. More of these fuels could be marketed even now, were railway freights readjusted, instead of consumers paying \$50,000,000 to \$75,000,000, plus exchange on New York, plus freight. Convenient markets—and natural markets—are available, without violating railway rights. Alberta's increasing output is demonstrating that. Concededly Ontario plants are between two stools. Coal is a commodity, dependent upon locality, quality and market. Of the coke produced in 1919 in British Columbia, about 10 per cent. was exported to the States, the remainder going to the smelters at Trail and the Boundary District. But in that year the output of coke decreased about 51 per cent. Coal production in that province fell off about 6.5 per cent. For that matter the coal and coke output there has fluctuated somewhat on a dead level since 1908, 1914 and 1915 reflecting special depression following on the outbreak of the War. Nor have the Maritime Provinces provided their quota. Labor disputes tended to increase costs, and "Pittsburg base prices" cannot be trifled with. The New Glasgow and Sydney export business cannot be dissociated from competitive factors. No doubt needed economies will be effected when the units constituting the Empire Steel Corporation are correlated, but its coal has not relieved the strain upon the popular purse, at least to an appreciable extent.

The Nickel-Copper Position.

Suggestion is made that copper production be fostered by a bounty or a royalty of some sort. An export duty has been suggested, similar to what is the vogue with the Portuguese, Mexican, or Latin-American countries. Perhaps the arrangement whereby the buyer pays the Quebec Government's exaction upon asbestos producers may be urged. Here a difficulty arises, for Quebec is the chief source of supply of asbestos, whereas copper markets hardly would be amenable to any arrangement of the sort. Outside of the Granby, Howe Sound, Weedon and nickel-copper Companies, Trail is the only important contributor of the red metal. Granby has got along without flotation methods of recovering a greater portion of the copper content of its ores. Two of the nickel companies are making copper. Otherwise, without flotation few if any of our sulphide mines would be in operation, unless their ores are of a grade high enough to defray transportation and smelting charges in addition to abnormal mining costs.

Imports of copper and its products in the six months to October, were valued at \$5,406,015, as compared with \$3,386,733 in the corresponding period of 1919. Blister and refined-copper production is increasing and Canada should not find it necessary to go far afield

for copper products. In 1917 Canada reported 109,227,332 lbs. of copper; in 1918, 118,769,332 lbs., and in 1919, 81,500,000 lbs. This is all-sufficient for domestic consumption, if refined and manufactured. Not unexpectedly, there has been a slump in the copper metal market.

Canada is equipped for larger outputting, but Granby was shut down part of the time, Trail has lacked copper ores, Howe Sound operations were curtailed, and the nickel-copper companies cannot force metals for which there is a minimum demand. Combined with liquidating markets has been the insufficiency of labor and freight cars for over-the-border service. If nickel was moving in greater volume, Canadian copper would be more in evidence, consequently discussion of a royalty on refined-copper exported might not be well-received by consumers. On the other hand, General Manager Warren of the Consolidated Mining and Smelting Company, proposes that the 1½ cents a-pound duty on copper ingots be extended to include copper wire rods, which are now admitted free, if drawn into wire in Canadian plants.

Mr. Warren is in a position to state the needs of his corporation. He comprehends the limitations of the home market. Protection for finished products is what he craves, as may be seen from his remarking:

"While the war duty of 7 1-2 per cent. was on the company began to build a wire rod mill so that it might supply the 12,000 tons of copper rods consumed by the five Canadian wire concerns in making telegraph wires, transmission wires, cables, etc. In addition to the wire rod consumption the normal Canadian consumption was only 6,000 tons in the form of ingots. The ingot demand could be filled with the company's copper refinery established during the war at the request of the British Government, with a capacity of 20 tons daily. To supply the Canadian consumer at a reasonable price it was necessary to increase the capacity of the copper plant 60 or 70 tons a day. That could be done only by building a rod mill so that the increased copper output could be made into wire rods, enabling the company to fill the whole domestic demand. This also necessitated arrangements being made to secure a supply of copper ore or concentrates sufficient to supply the enlarged plant. Contracts had been entered into with the Canada Copper Corporation under which a \$2,000,000 railway branch line had been built from Princeton to the large copper deposit it controlled nearby. The power line of the subsidiary company, The West Kootenay Power & Light Company, Ltd., had been extended 100 miles from Greenwood to the mines at a cost of \$1,250,000, and extensions had been made to the smelter costing \$750,000, including \$250,000 on the wire rod mill.

Mr. Warren's exposition of the copper situation within his jurisdiction, explains why the Trail plant has to have more copper ores, a measure of Government assistance, and support in domestic markets. They had to offer a premium of one-half cent a pound on the New York price of the metal to induce the Canada Copper Company to construct a railway in order to ship their ores to Trail. In other words the Canada Copper Company insisted upon a bonus before it would enter upon a capital expenditure not justified otherwise. The readiness of the Consolidated Company to pay more than the New York price per pound, bespeaks more than Mr. Warren in all modesty could impart to the Tariff Commission, when it is borne in mind that there was "no market for copper in the West," on either side of the border, and in shipping East, the Consolidated and Anaconda Companies have to compete with copper produced closer to the big market, or copper which can be transported by water. Toronto, Hamilton and Montreal, as Mr. Warren has explained, are the Canadian markets for cop-

per, and freights from New York to these Canadian markets are lower than they are from Anaconda and Trail. From New York, the rate is, or was, 47½ cents a cwt. to Toronto, and 46 cents to Montreal, as against the new rate of 95½ cents a cwt. from Trail to Toronto, and \$1.10 to Montreal. Besides, the cost of converting copper into rods is two cents a pound, double what it was in the pre-war period. Moreover, only fifteen per cent. of the Trail copper ores treated came from the company's own properties.

The duty sought by the Consolidated Company is designed to offset the difference in freight, the half-cent extra per pound paid to the Canada Copper Company, and leave a slight margin for protection. Such a duty would obviate royalties, or export duties, and if the plan carried out by which the Canada Copper Company got more than the market price for its copper, was extended, perhaps a greater supply of custom-ores would be forth coming in due time. No doubt, also, the Consolidated will find more ore in its own areas. At any rate, the Canadian copper industry is seeking support.

In this respect it differs from the nickel industry, which is full-grown and husky, requiring only more business and less taxation. The International Nickel Company has a refinery at Port Colborne that is modern in every respect. An investment of close to \$6,000,000 upon that plant does not betray any timidity about the future of the nickel industry. Moreover, the new storage-dam on the Spanish River is one of the largest of its kind. It cost \$3,000,000, or more. So that corporation — now watchfully waiting — is in an unprecedented state of preparedness, and will be all the stronger when the mill at which Monel Metal will be rolled, is completed. Supplementing these expenditures, are those of the British-American Nickel Company, amounting to a further \$14,000,000, or \$15,000,000, as near as can be calculated by an on-looker. Then there are the Mond plants, primed for larger contributions of their special products. Unlike copper, Canada has a practical monopoly of nickel, and it is an everlasting credit mark to which it is entitled, that the nickel industry did not profiteer throughout the War.

With the lower prices for copper prevailing in the current year and operating costs remaining at or near to the peak, the output cannot be increased. Few companies can produce copper at 14-15 cents. Were it not for the adoption of flotation at Trail, and other improvements at those metallurgical works, together with what came from the nickel-copper Mines, the red metal would cut a sorer figure in our score sheet. Given a chance in a better copper market, fortunately the overhanging supplies are liquidated. Granby and Howe Sound will resume their place in the output. The success of flotation at Trail and the Britannia Mine of the Howe Sound Company has established standards of excellence in recoveries of metallic contents which no longer leave Canada apologetic. Metallurgical works are enabled to get more of what they are entitled to from the sulphides. Without flotation the tale might not be worth the telling of it.

Zinc and Lead Prospects.

A vote of confidence in the zinc and lead properties of the Dominion would not be amiss, followed, as it might be, by the maintenance of a protective policy that will not suggest reprisals. Imports of zinc and lead and their products in the first half of the official year, are given as \$1,741,515. That is nearly half as much as

the total value of the zinc produced in 1919 in British Columbia. It is a third as much as the grand total of the zinc and lead produced in British Columbia in 1919. Considering that British Columbia is the chief source of those metals, Mr. Warren was upon firm ground when he urged the continuance of the duty on lead, the imposition of a limited embargo upon imports of zinc, other than from Great Britain and the States, and a duty of two cents a pound on zinc; for there have been importations upon an extensive scale of those metals and their products, and they are far from inspiring in their influence upon domestic producers, or upon those who are planning to produce in Gaspé. To have Spanish and German lead dumped here and given the "British preference" hardly is consoling, however, brotherly the affection is for the Homeland.

The Consolidated Mining & Smelting Company finally having evolved a practical and economical process whereby the complex ores of British Columbia can be treated, Mr. Warren takes the position that "as a large part of the world consumption of zinc is in the form of sheets, the company proposed to put in a zinc rolling-mill, and felt they should have a bounty on foreign business in order that it should supply the British market. Until foreign exchange rights itself, further protection also is needed. Five hundred tons of German zinc was offered in Eastern Canada in September." Besides lead, copper and zinc, the Consolidated Company is producing refined gold and silver, bluestone, fluorspar, and both sulphuric and hydro-fluoric acids. Manifestly the Consolidated management has rendered notable service and is more ambitious now the problems contained in complex ores have been solved. Trail expenditures and the magnitude of the Sullivan Mine, taken in connection with the necessity for stimulating British Columbia mineral industries, are matters of national importance. Competition with Germany, Spain, Mexico, Belgium, Australia and India—and with American producers who are prominent in metal markets—is accentuated by increased freights; so Mr. Warren has argued for a duty of \$1.50 a ton on lead, the same as the United States duty. Nor did he mince matters when he spoke of the "British Preference". The Canadian consumption of zinc is about 10,000 tons annually, whereas the Consolidated Company's capacity is 25,000 tons, superior in quality. The company's daily lead capacity is about 100 tons, about what Canada normally requires. There is now a specific duty on pig-lead of a cent a pound. Mr. Warren insists "there is no sense in the British Preference. They produce only 7,000 tons of lead in England a year; yet they send large quantities of German and Spanish lead to Canada under the preference of three-quarters of a cent a pound duty." Furthermore, it was contended by Mr. Warren that a "real difficulty in meeting this competition is that just now the English pound sterling is worth about \$3.90 in Canadian funds and the German mark had depreciated to a still greater extent." So "the exchange situation negatives the protection on a wide variety of Canadian products besides lead."

Quebec Asbestos—Gaspé Zinc-Lead.

Minister Lemieux having joined the late Premier, Sir Lomer Gouin, in favoring protection for Quebec mineral industries, which topped the score in 1919 with a production of \$20,813,670, it is to be expected that more official solicitude will be displayed. Quebec asbestos retains pre-eminence. The asbestos industry is exceptionally prosperous, though short-handed.

Equally unique, though awaiting transportation facilities, which are being provided by private enterprise, are the Gaspé zinc-lead fields, located about fifty miles from Cascapédia. While it is premature to present the Federal Zinc and Lead Mines of the Gaspé Peninsula as rivalling the New Jersey zinc property, or the Sullivan Mine, the extent of the occurrence and purity of the metals assure to Canada a supply that can compete with other producing areas. Apart from asbestos, it is becoming clearer that Quebec has something akin to the Joplin country — a commercial mining section certain to become an industrial factor — with or without protection, however scant has been official appreciation of it.

Unmindful of what happened in Missouri, where Joplin ores enriched those who foresaw their worth, the Canadian view has been that these Gaspé zinc-lead ores are irretrievably handicapped by the long haul from the mines to rail. Montreal owners, though unsupported, were undeterred, however, and there is every reason to believe Gaspé is going to market zinc and lead at a profit, unless the flood-gates of competition are opened. A noted international authority identified with one of the greatest zinc corporations advised his principals that the thickness of the formation is, perhaps, 5,000 feet, and that "the zinc occurs as a practically pure blende, clear-yellow in color, even more pure than the Arkansas blende. There is almost no iron as pyrite to be seen *** It seems to me that the way is open to a big development scheme. *** It looks like a real mining country to me, in which there may be found deposits of copper, chrome, iron, etc., as well as zinc and lead."

Yet Canada has jogged along with the Galetta Mine, in Ontario, what came from Port Neuf, and what the Consolidated Mining & Smelting Company, found precarious. Even with its present transportation difficulty, the Gaspé properties of the Federal company, owing to the exceptionally clean character of the ores, will largely supplement the Canadian output. It has involved the expenditure of a substantial sum, no doubt, to prosecute the work of exploration and development; yet the results already indicate that Gaspé has something near enough to the coast and to a railway to obtain recognition. What is going on was foreshadowed by the noted international authority already quoted, when he stated to his principals that these controlling the Federal were locating additional blocks of ground. "Block B", he wrote, "is the only one on which the timber is cleared off. This was done for fire protection to the camp and for building and mining purposes. There are fifteen vein-outcrops showing on this hill. On only one vein has work been done. *** Roughly calculating, they can be allowed a block 2,000 by 200 by 10 feet, or 2,000,000 cubic feet, or 200,000 tons from the present workings on this one vein to a depth of 200 feet. *** I might describe this as, in its infancy, one of the possible great zinc-lead mines of the world. It embraces a district. It is the district that is more important than the ground already opened up."

Singularly enough, let it be reaffirmed, Canada has been skeptical about this Gaspé country. Upon the one-body described, development has continued until its vertical extent makes conservative the estimates of the authority quoted. But why labor the point? Professor Mailhot, of the Polytechnic School, in behalf of the Quebec Government, reported among many other things, as follows:

"As the deposits are fillings of great fractures of the earth's crust, it would seem that they must go down to the base of the slaty sedimentary rocks. At the slight depth reached some veins show an increase in the volume of ore, while its character remains the same. There are outcroppings of ore distant from each other between which are differences of level of several hundred feet, and it is almost certain that the highest deposits go down in depth at least to the level of the lowest ones. Some veins (that was in 1917) have been followed for distances of 3,000 feet, and it is probable that they extend still further under the cover of superficial deposits."

The international authority heretofore quoted went further than Mr. Mailhot, and advised his principals: "Exceptionally pure concentrates of lead and zinc can be made easily. The milling of this ore would be simple. Resulting products from these ores would be of good grade."

Flattering as this testimony undoubtedly is, considering it was given to the responsible chiefs of a prosperous competitor, the average of about 8 per cent zinc and 3 per cent lead, without dwelling upon the traces of silver or the gold content, makes of these Quebec fields more than has been realized by the Government of Quebec or the industrial leaders of the country at large. Trail facilities and the accumulating features of Gaspé obviate the necessity of Canada buying abroad what it already possesses in superabundance. Obviously the last word has not been said upon this Gaspé subject. The simplicity of the ores and ascertained contents furnish conclusive reasons why domestic zinc and lead should have a reputation commending them to international buyers. For the time being a lead smelter on the spot will reduce the outgo of money for continental leads passed on by British distributors under the "preference."

PROTECTION OF MINING INVESTORS IN BRITISH COLUMBIA.

The protection of the guileless public against the designing salesman of worthless mining stock is the subject of a recent pronouncement by the British Columbia Minister of Mines. He says: "The Minister of Mines has been given wide powers (under the Mineral Survey and Development Act), as any statement in regard to any company made by him is absolutely privileged. This is a policy intended primarily, and in fact solely, for the protection of the investing public. The Resident Mining Engineers, being in the field and in close touch with actual mining operations and development, are in a position to know whether statements made by stock mining companies for the inducement of the sale of shares are accurate, or if they do not, can readily confirm such statement. British Columbia in the past has been afflicted with too many flotations designed to 'mine the public.' The Department of Mines is determined that the issuance of worthless mining stock shall cease. Hence the legislation by which the government mining engineers are charged with the responsibility of assisting the Minister in seeing that the statements made by mining companies in prospectus or any documents issued for stock selling purposes, are strictly in accordance with the facts. In the course of the last few years there has been occasion more than once to apply the terms of the Act with results of value to the public and the same policy will be continued it being the intention that all money invested in mining shall be spent in legitimate mining development."

Recent Geological Reports on Gold and Silver Areas in Northern Ontario

Ontario Department of Mines.

Part III of the 29th Annual Report of the Ontario Department of Mines recently issued contains reports on five gold and silver districts in Northern Ontario made by officers of the Provincial Department of Mines.

Ben Nevis Gold Area.—Cyril W. Knight.

Mr. Knight's examination of the Ben Nevis area occupied less than two months' time between the Summer and early Autumn of 1919, and consequently, it is noted, the geology has not been worked out in any great detail, and the map is to be considered as a reconnaissance one. The area is a part of that great belt of Keewatin rocks which stretches across north-eastern Ontario, and as it is underlain by dark-coloured lavas which are intruded by a few masses of syenite and felspar-porphry, "it is a prospective field in which gold-bearing quartz veins of economic value may be found." Part of the area, which embraces 300 square miles, is not geologically mapped, and is practically unprospected. With the exception of work done by the Nipissing Company in the southeast corner of Katrine township there has been little activity in the district. The following interesting surmise is made by Mr. Knight:

"While in all probability the locality is one in which prospectors would preferably search for gold, still it may be pointed out that there is an intrusion of serpentine at the west side of Tannahill township. A somewhat similar intrusion elsewhere in Ontario, at the Alexo Mine, has associated with it an economic deposit of nickel and copper ore; while chrome iron-ore, platinum and microscopic diamonds have also been found associated with similar rocks in Reaume township, although not in paying quantities.

The topography of the district is interestingly described, by one who, following the commendable tradition of the Canadian geologist, both sees and records the natural beauties that are seen by the officers of the Surveys, often for the first time by white men. Witness the following description of a part of Katrine Township "From the highest peak on these mountains, which have been named the Workman mountains, a remarkable view of the surrounding country to the north, west and south may be obtained, particularly on a bright clear day. The landscape looks like a vast plain, in which hills a hundred feet high scarcely make themselves discernible. Far off to the northward, a distance of twenty miles, the outlines of the stately Ghost mountains along the north boundary of Harker township may be readily seen, coloured a soft hazy blue, and wonderfully silhouetted against the sky."

The map which accompanies the Report is on a scale of one mile to the inch, and includes Elliot, Tannahill, Dokis, Clifford, Ben Nevis, Pontiac, Arnold, Katrine and Ossian Townships, the townships of Elliott and Dokis being unmapped.

West Shiningtree Gold Area.—Percy E. Hopkins.

Mr. Hopkins report covers an examination made during four weeks in September 1919, and is accompanied by a geological map on a scale of one half mile to the inch, covering Churchill, Macmurchy, Asquith and Fawcett townships.

Mr. Hopkins summarises the economic possibilities of the area as follows.

"Since the first discovery of gold in 1911, when the railway was sixty miles distant, numerous other finds have been made in parts of four townships. The railway now passes within twenty miles of West Shiningtree lake, and is connected by a wagon road with most of the properties. Frieghting in summer is still quite expensive. Not only the poor transportation facilities, but also conditions during the war period, have retarded mining development; hence very little underground exploration has been done."

"Gold occurs in numerous deposits, some of which are quite large, but in many of them the precious metal is not concentrated sufficiently to pay for working, while in others it is irregularly distributed. A few small pockets of high grade ore have been found on half a dozen properties, but this does not necessarily signify that these will make mines, since the other portions of the veins may contain little or no gold. According to the manager's reports on the Herrick, ore shoots of considerable size are indicated by surface sampling, by sinking and sampling a 50-foot shaft, and by diamond drilling. The Ribble vein, which outcrops on the Wasapika, has also been exposed on the Miller-Adair claim, and is traceable for about one-quarter of a mile on the Foisey, being in all over a mile long and of a satisfactory width. The manager, Geo. R. Rogers, reports that the outcrop of this vein on the Wasapika shows 800 feet of \$9.00 ore across four feet, while in addition a cross-cut on the 100-foot level showed 23 feet of schist and quartz, assaying \$7.20 in gold per ton. One-half mile south of the Wasapika, on the Miller-Adair, there are also indications of ore in the Ribble vein on the surface; and further south still, on the Foisey, the vein is large, and carries visible gold. Shoots of ore may occur in various places along the Ribble vein, but it will not necessarily all be ore."

"A few properties in the area have promise, but they are still in the prospect stage. Whether they will become mines or not will only be determined by further developing the veins underground and sampling the same."

"It may be said that during the geological examination of a deposit such as one of iron or copper, it is often possible to form some idea regarding its value; but in the case of gold deposits it is usually more difficult to do so, systematic sampling being required. It is not the practice of the Bureau of Mines to undertake systematic sampling of gold or other deposits, this being naturally the function of the technical or professional men employed by the property owners."

"No gold has yet been produced apart from what may have come from a few high-grade samples, some of which might be called bullion. The encouraging results obtained on a few properties will probably lead to mining being conducted on a larger scale. There seems no reason why the veins which have a satisfactory length and width should not extend to considerable depth. One would also expect to find the values underground much the same as they are within a foot or two of the surface, since any oxidized or weathered surface zone has doubtless been removed by glaciation. All the rock formations are worthy of prospecting except the granite and diabase. Gold may even be found in the granite, although this rock has not yet, generally speaking, proved very favourable for gold in northern Ontario. The intersection of veins with Iron formation or pyrite formations should be a favourable place to look for enrichment. The Iron formation or pyrite formations do not usually form gold ore bodies themselves, unless cut by numerous secondary quartz veins.

Detailed description of the various mining properties is given in the Report.

Matatchewan Gold Area.—A. G. Burrows.

The general geology of this district having been previously reported upon* this report deals chiefly

*The Matatchewan Gold Area. A. G. Burrows. Ont. Bur. Min. Vol. XXVII, 1918.

Geology of Matatchewan District. H. C. Cooke. Memoir 115, Geol. Sur. Can., 1919.

with the mining properties in the area, which include the Davidson claims, and the Otisse (now the Matachewan Gold Mines) claims, and the Nelson claims in Baden township. The mineralogy of the Otisse ore is discussed at length, and the presence of scheelite is noted.

Barite in Yarrow Township.

The presence of barite has been located near the north boundary of Yarrow township, on the west side of Mistinigon Lake. A selected sample of barite contained 98.25 per cent barium sulphate, while a channel sample taken by M. B. R. Gordon, contained 81.24 per cent. A sample of fine-grained barite taken by M. Burrows carried 94 per cent barium sulphate. As far as can be ascertained the deposit appeared to be free from sulphide minerals. "From the amount of work done, it is apparent that there is a large tonnage of high-grade barite.

Another large deposit of barite, known as the Biederman, in Cairo township, was described in the 1918 Mines Report.

Argonaut Gold Mine.—C. W. Knight

At the request of the management of the Argonaut gold mine, Mr. Knight spent ten days in 1919 in examining and making a detailed map of the property. The map in question is bound in with the Report, and is on a scale of 400 ft. to the inch.

Mr. Knight does not express any opinion on the economic possibilities of the property, but mentions that the felspar-porphry is said by Burrows and Hopkins to be similar to that at Kirkland lake.

The 15-stamp mill on the property was remodelled during 1919 by Mr. John E. Hardman, of Montreal, and is now used for testing purposes only. The intention is to construct a 300-ton mill. The following description of the milling operations is furnished to Mr. Knight by Mr. Hardman:

The mill was remodelled solely to act as a test mill, so that data might be obtainable for the construction of a large mill that would successfully extract the largest possible percentage of the total values contained in the ores. The present mill was not intended to produce bullion commercially and permanently.

The mill contains 15 stamps of the ordinary pattern, each weighing 1,250 pounds; these drop 100 times per minute and discharge through "Tyler" wire screens having an aperture of about .55 mm.

The batteries have an inside "V" plate, an outside splash plate 8 inch wide, a "quadrant" plate with a radius of 9 inches and the usual 8 feet of table plate. The mercury traps are of the usual Homestake type and all the table tails run through a 4-ft. clean-up pan before passing to the concentrating tables.

It is not probable that the new mill will use stamps to comminute the ore, as it has been proved that this can be done more cheaply by other machines that are not so expensive to erect or build.

The main items that are desired from the test mill are: (a) the average value in free gold that is amenable to amalgamation; (b) the percentage of metallic sulphides in the ore and the gold values therein contained; (c) the gold values in the non-metallic tails. The necessity for (b) arises from the fact that the Argonaut sulphides are cupriferosus, carrying from 3 to 12 per cent. of metallic copper, and putting their treatment quite outside the usual cyanide methods. A process is now being devised that promises to recover both copper and gold values at a favourable cost so that both metals will help the profits.

The results that have so far been obtained from working some 2,000 tons have been very satisfactory; the average amalgamation recovery being 68 per cent. of total assay value, and the values in the concentrates averaging but 17 to 18 per cent. of total gold values. The 15 per cent. in the final tails yields its gold to a dilute cyanide solution.

Argonaut Gold, Limited, will not decide on either the process or the equipment of the new mill until a sufficient number of tests have been made on the red porphyry ore that underlies the Keewatin basalts. A cross-cut, No. 203, is now driving to

cut this porphyry ore, but is not expected to reach it before midsummer; it is possible that a different mineralization may demand additional niceties or equipment in the mill.

Gowganda Silver Area.—A. G. Burrows.

This is a report on a two weeks examination of recent developments in Gowganda, particularly in the vicinity of Miller Lake. Since the discovery of silver in the vicinity of Miller Lake in 1908 there has been produced 5,430,152 ozs. of silver to the end of 1919, most of it from the Miller Lake O'Brien Mine. With the exception of an ore-shoot in conglomerate in the Millerett Mine, which produced about 500,000 ozs. of silver, all the ore has come from the diabase sill.

A series of ideal sections through Miller Lake are given together with a sketch map showing the relation of the diabase sill to the older rocks. Mr. G. M. Colvocoresses is quoted from the "Canadian Mining Journal" of April 15th, 1912, as pointing out that the westerly side of the diabase sill exposed to the west of Miller Lake is the footwall. Mr. Colvocoresses, who was at one time manager of the Millerett Mine, stated:

"The Huronian rocks underlying the particular sill on which the O'Brien and Millerett are located are very clearly exposed less than a mile west of these properties, and prospecting there has so far had no good results. It would seem, nevertheless, that the claims thus located would merit particularly thorough development if Professor Miller's theory as deduced at Cobalt is in any measure applicable to the Gowganda district. Professor Miller states that at Cobalt 85 to 90 per cent. of the production has come from the veins found in the foot wall of the diabase sill; and it is strange that up to the present time absolutely nothing has been found in the foot walls of the several diabase intrusions which carry silver in the Gowganda district."

Mr. Burrows emphasises the fact that silver production in the Gowganda district has so far been from veins in the diabase, whereas at Cobalt it has come from below the diabase. "No silver ore has yet been produced, as at Cobalt, from the formations that were once below the diabase sill and are now exposed by erosion. Under favorable conditions one would expect that silver ore would occur in some parts of this area, where the footwall is exposed in proximity to the diabase."

This series of Reports is annotated with references, and indexed and shows signs of very careful editing and proof-reading, as is usual with publications of the Ontario Bureau of Mines.

It is announced that the Haileybury Frontier Mine, about fifteen miles south of Cobalt in South Lorraine, has been sold by Joseph Newburger of Memphis, Tenn. the owner, to New York interests represented by H. F. Strong, under a leasing option to purchase at a price said to be \$135,000. It is understood that operations under the new ownership will commence immediately.

Certain shareholders of Wasapika Gold Mines, Limited, have applied for an injunction restraining the company from issuing stock to the Wasapika Consolidated Mines, Limited in the manner as set out in their circular of November 1st. It will be recalled that the exchange proposed was on a basis of three shares of the new stock for one share of the old and that on November 11th the opportunity for shareholders to avail themselves of this offer would lapse it being intimated that after the date mentioned, the original certificates would have no value. The injunction proceedings were called at Osgoode Hall this week when George R. Rogers, the president, was unprepared to proceed with the argument and an adjournment was granted.

Northern Ontario Letter

THE SILVER MINES

The Cobalt Area.

By eliminating all non-essential work it is believed the power situation at the mines of Cobalt will not become any more unsatisfactory than as at present. It has been found that the consumption of energy may be conserved very considerably by dispensing with certain branches of work. The curtailment of operations in connection with the re-treatment of tailings by oil flotation will be one of the big factors toward relieving the situation. This policy is usually followed out during winter months even under normal conditions. Another factor is that after the close of navigation on the Montreal River, the power company will be permitted to draw more heavily upon the reserve supply of water, and it is felt this will carry work through until the spring freshets set in. In the meantime, should soft weather still set in before real winter commences, the entire situation would become quickly adjusted.

For the month of October, according to the managers' regular monthly report, to the president and directors, the Nipissing mine produced \$184,578, and shipped bullion and residue from Nipissing and customs ore of an estimated net value of \$316,475. The report states that owing to "power interruptions", the amount of development work done during the period was considerably below normal. The report states that no new veins were discovered during the month, but that developments on old ones were generally satisfactory. The output for the month shows a decline from \$225,100 during the preceding period. This decline was partly due to the decrease in the price of silver, the October estimate being based upon silver at 82 cents an ounce as compared with 91 cents during September.

An average of close to thirty tons of ore are being shipped from the Peterson Lake mine, to be treated in the mill of the Dominion Reduction Company. In addition to this, underground work is proceeding as rapidly as the power supply will permit. The management is optimistic over the outlook and confident of a comprehensive scheme of development work resulting in success. The area still undeveloped is quite extensive.

The Crown Reserve Mining Company is stated to have secured an option on the old Farah property, more recently known as the Nipissing Extension. The Crown Reserve is also continuing its deep drilling scheme in which it is planned to explore the formation to a depth of about 2,000 feet. The drill is already down between 700 and 800 feet, working on an incline from the 500-ft level. The crosscut is also proceeding on its way toward the zone in which it is hoped to open up the continuation of the three high-grade veins opened up not long ago on the Kerr Lake, at a point within ninety feet of the Crown Reserve boundary, and running directly toward the Crown Reserve.

Operations have been temporarily suspended on the Beaver Consolidated. The reason for this is that the supply of power has been adequate only to operate at reduced capacity and in addition to this a break occurred in the crushing equipment which has also interfered with milling. These causes provide the reason for deciding to remain closed until repairs can be completed and pending the return to a more satisfactory power supply.

The Elk Lake Field.

Announcement is made that the National Mining Corporation has taken an interest in the White Reserve mine, in the Maple Mountain section of the Elk Lake district. This important corporation has its head office in London England, and was incorporated less than two years ago, having a paid up capital of £2,500,000 for investment in connection with mining within the British Empire. Mr. J. B. Tyrrell, Toronto, is the company's consulting engineer for Canada. The plans of the company are to conduct a diamond-drilling campaign on the White Reserve, where silver showings are highly encouraging.

During the last 25 days of October, the Chambers-Ferland extended a cross-cut 140 feet from the 385-ft level of a shaft on the Right of Way Mine. This drive will ultimately be about 500 feet in length and will connect up with the main workings of the Chambers-Ferland. It is passing through highly promising prospective territory.

Silver mine operators are inclined to the belief that the January silver market will be marked by a substantial increase in price. This belief is based on the fact that Far Eastern demand usually attains its high point about that season. As an instance of such an influence was the sensational rise in January 1920, when the price of silver rose to the record price of \$1.37 an ounce.

New interest centers around the Mining Corporation, due to this important silver producer being interested in the exploration of the Flin-Flon mine in Northern Manitoba. Added interest attaches to the new venture owing to a statement issued by Charles F. Ayer, New York, in which it is pointed out the option holds good until March, and that up to the present time, the results have been quite as favorable as expected.

Mr. Ayer points out two questions which will have vital bearing on the final decision. First is as to whether the good results continue underground, and second is the question of a change in the Dominion mining law in which it is provided that refining must be done in Canada and that the Dominion Government has the option of imposing whatever royalty it desires.

The operators of the Flin-Flon recognize that they are confronted with a big problem in getting the enterprise under way. Enormous expenditure will be incurred. For that reason they believe the enterprise should be exempted from the royalty clause for a period of from 15 to 20 years and that after such time a definite maximum be decided upon so as to estimate its bearing on the economic operation of the property. In mining circles the request appears to be entirely reasonable. As regards release from the provision that refining must be done in Canada, it is felt that this might also be done for a limited period at least, say 10 years. This would enable the operators to proceed quickly with production and be able to realize income pending the determination of the extent of the deposit and the size of the refinery required on or near the mine itself.

Request Is Reasonable.

In view of the great importance of the Flin-Flon enterprise to the economic development of that part of Northern Manitoba, mining men express the opinion that nothing should be permitted to impede progress, and the Canadian Government should be willing to make the temporary concessions requested, knowing that in the end the country will be in a position to

benefit in a maximum degree from the success met with in the meantime.

In regard to development work to date on the Flin-Flon, Mr. Ayer has this to say:—"We can say that the results obtained from development to date are fully up to our expectation. This fact, and the statement of our engineers that the diamond-drilling, on which the original ore-estimate was made, has been very carefully done, lead us to the belief that the grade and tonnage of ore on the property will be as high as anticipated."

Ore British Shipments.

During the week ended November 12th, four Cobalt companies shipped an aggregate of five cars containing approximately 382,011 pounds of ore. The Coniagas was the heaviest shipper with two cars.

Following is a summary:—

Shipper	Cars	Pds.
Coniagas	2	168,977
McKinley-Darragh	1	85,696
Nipissing	1	67,338
Beaver	5	60,000
Total	5	382,011

During the corresponding period, the Nipissing mine was the only bullion shipper, sending out one of the largest individual consignments in recent months, made up of 183 bars and containing 250,065.68 fine ounces.

THE GOLD MINES.

The Porcupine Area.

At the beginning of this week, the mines of the Porcupine district took adequate steps to meet the power situation, and the plan adopted conveys re-assurance of steady operation. It has been arranged to reduce the power consumption about twenty-five per cent., and thus establish a rate which may be maintained throughout the winter. To offset this reduction, the leading mines are ordering a large amount of coal and will employ their auxiliary plants. As in the case of the Hollinger Consolidated, the company is stated to have arranged to order some 8,000 tons of coal and to have a part of it delivered by special train. In this way it is hoped to maintain operations at the present rate. The Dome and the McIntyre are also making arrangements to use all the auxiliary power possible.

These arrangements are calculated to assure steady operation throughout the winter, pending the freshets in the spring. At the same time, the peculiar nature of the present Autumn is not without promise of still bringing rain, in which case with the auxiliary power being provided, the mines would be enabled to speed up work to full capacity, and attain records in excess of anything so far in their history. The ore in sight, together with the milling equipment ready to operate, and the steady influx of men go to make up the reasons why a sufficient power supply would lead to great expansion in operations throughout this field.

Cross-cut work at a depth of 250 feet on the Porcupine-Keora has advanced about 200 feet, and with a little less than 180 feet remaining between the present face and the point where it is expected to encounter the first of two veins indicated by former diamond drilling. Circular information from the company brokers is optimistic, it being shown that the diamond-drill core indicated two wide veins in which gold values were high. Until such time as the veins are reached, however, it will be impossible to estimate the accuracy of the information so far available. The pro-

perty is equipped with a small steam-driven mining plant.

The labor problem at the Dome Mines has been solved to a large extent by the arrival of 109 Cornish miners, imported direct from the Old Country. These men arrived a few days ago and are already at work. They will work out a four months' contract at the Dome, and with the Canadian labor supply having undergone a favorable change, the question of procuring adequate working forces is lessened very considerably.

A report on the strength of which the deal in England for the sale of the Davidson Consolidated is being negotiated has just come to hand. It was prepared by R. C. Fielding, A.R.S.M. and is couched in most optimistic terms. It is addressed to the General Mines Investment (1920) Ltd., of London. Mr. Fielding estimates "probable ore" at 350,000 tons, with \$11 per ton in extractable gold content. He estimates costs at \$4 a ton, and thus indicates a profit of \$2,450,000.

The Kirkland Lake Area.

In common with Cobalt, from which district the Kirkland Lake field receives its electric power, the shortage of energy is felt more or less seriously. Arrangements have been made to reduce the current about 25 per cent. until the water in the Montreal River rises. With the close of navigation it will be permissible for the power company to draw more heavily upon the reserve supply, and even though no more rain falls it will be possible to continue operations as now arranged for. Should a thaw set in, normal rate may then be resumed.

A statement issued to the shareholders of the Kirkland Lake Gold Mining Company, under date of 9th November, states that the No. 2 shaft has been deepened from 700 ft. to 900 ft., at which depth a cross-cut encountered the ore zone 35 ft. wide.

"Drifting on this ore zone", states the Report, "we encountered assay values in sulphides from \$18 to \$42, and recently, in drifting on the foot-wall side, we encountered free gold and tellurides, special assays of which give values of \$34.70 and \$122.75, and channel assays across the face of the drift—five feet—average \$52.10." The presence of the ore-body at the 900 ft. level is believed to establish a proven body of ore of 700 ft. in depth. The mill is treating 110 tons of ore daily, but has a capacity of 150 tons daily. It is decided to deepen the main working shaft to 900 ft. from its present depth of 520 ft. Operations have been restricted by labor shortage, and also by shortage of hydraulic power caused by dry weather.

As a result of the completion of a large program of surface exploration on the property of the King-Kirkland Gold Mines, in the eastern part of the Kirkland Lake district, careful assays taken show comparatively high values, and the company is now in a position to select the most suitable at which to commence underground operations.

On December 3rd the Bourke's Gold Mines will be sold in Haileybury at public auction, subject to a reserve bid. The property is situated at Bourke's Siding, some twelve miles north-west from Kirkland Lake. It is equipped with a small steam-driven mining plant and has generally been regarded as a promising mining prospect. Development work has been carried to a depth of 200 feet and one or two short ore-shoots opened up. The grade of the ore is quite high, although the deposit is narrow. In an endeavor to induce the stockholders to protect their interests, the Company

issued an appeal some months ago asking each shareholder to pay a certain amount per share to cover the debts owing, at the same time guaranteeing not to get into debt again. In view of the present announcement by the Sheriff of the district of Temiskaming it is believed the appeal did not meet with the desired response.

An injunction has been secured by minority interests in the Orr Gold Mines restraining Hamilton B. Wills of Toronto, as well as the majority interests in the Orr from transferring some 800,000 treasury shares of that company. The trial of the case will come up in due course. It has to do with an apparent endeavor of the Wills' interests to recoup expenditure incurred previously through the Kirkland-Prophyry Company which for a time held an option on the Orr and which subsequently went into voluntary liquidation.

An injunction has also been granted in connection with plans of the Wasapika Gold Mines of West Shining Tree to liquidate and exchange its shares for stock in the Wasapika Consolidated. The point objected to was the setting of a certain date, November 12th, as the final date on which recorded owners of shares would receive credit and specifying the intention of the Wasapika Consolidated to issue its shares to those holders of Wasapika who appear on record. It is said that large blocks of this stock is held by individuals who have never placed themselves on record.

British Columbia Letter

Stewart, B.C.

George Clothier, Government Mining Engineer, has returned after making a final tour of the Salmon River Section, Portland Canal, Mining Division. He expresses satisfaction with the progress made this season in the prospecting of this mineral zone, and in the development, both of new claims and other mining properties. He now is engaged in the preparation of his Annual Report.

The first winter's shipment of ore from the Premier Mine, Salmon Arm, took place a few weeks ago. Last winter's shipments totalled approximately 1,500 tons, and this year it is expected to double the output.

Gratifying reports are received regarding the development of the Silver Tip Group of mineral claims. It is said that thirty-seven open-cuts were made on the veins during the summer, and three tunnels driven an aggregate of sixty-eight feet. As a result important ore showings have been developed. The values include lead, zinc, and iron sulphides, carrying native ruby and brittle silver. The silver values in places are very high.

W. A. Meloche, managing engineer of the Algonian Development Co., states that ore will be shipped this winter from the Spider Mine, Salmon River, and that if the development planned shows up an ore tonnage equal to three times what is in sight, a mill will be working on the property by next July. With further reference to his Company's operations in the Portland Canal District, Mr. Meloche says:—

"We will carry on development at the Spider all winter and hope to make a mine there. Operation of the George copper group, Bear River, will be undertaken next year but to what extent will depend upon results.

"While we have obtained some satisfactory results here we have also obtained some unsatisfactory ones. But this is true of any camp. On the whole I am very satisfied with what

has been done.

"I want to commend the Department of Mines and Department of Lands, and Hon. Mr. Sloan and Hon. Mr. Pattullo, for the way they went ahead and what they accomplished in this district with small appropriations. It was difficult work under difficult conditions. The transportation facilities provided put a country in a position to develop more than anything else.

"I am genuinely sorry to leave Stewart for I have received every courtesy and co-operation from the people."

The headquarters of the Algonian Development Co., have been transferred from Brussels, Belgium, to San Francisco, Cal.

Anyox, B.C.

That the Hidden Creek Mine of the Granby Consolidated Mining & Smelting Co., has 11,000,000 tons of ore designated as No. 1, and containing 2.4 per cent copper, and 14,000,000 tons designated as number two ore containing about 1.25 per cent copper, is the effect of a report recently published. Smelting is said to be limited mainly to the No. 1 ore, but the No. 2 will become available after concentration.

Prince Rupert, B.C.

H. A. Guess, President of the American Smelting & Refining Co., and now head of the Premier Gold Mining Co., arrived from New York recently to visit the latter property. He was accompanied on his trip north, by H. MacDonald, mine foreman.

Nelson, B.C.

The Ottawa Mine, Springer Creek, is rapidly being put in shape for active operation and shipment of ore. The machinery for the tube mill is on the ground, and the cable for the tram is at the upper terminal, which has been finished. The latter will be about 2,000 in length. L. H. Biggar, the mine manager, is gratified by the progress made and is looking forward to the Ottawa becoming a regular producer in the near future.

Trail, B.C.

Ore receipts at the Trail Smelter of the Consolidated Mining & Smelting Co., for the week ending Oct. 21st., totalled 9,239 tons, bringing a total for the year up to that date to 284,497 tons.

Merritt, B.C.

A large clay deposit located near Merritt, has received special attention from Officials of the Department of Mines, Ottawa. It appears that it is a high class bentonite, and as far as known the only such body in Canada. There are deposits in the State of Wyoming occurring in connection with coal deposits similar to those of the Nicola Valley, B.C.

A sample of the clay has been taken to Ottawa for analysis, and the owners of the property are hopeful that the outcome will be the establishment of an important industry.

Vancouver, B.C.

At a recent meeting of the Mining Committee of the Vancouver Board of Trade there was some discussion with reference to the falling off in British Columbia of the production of gold, the upshot of which is the unanimous endorsement of the following resolution which explains itself.

"Whereas the maintenance of the gold production is essential to the financial stability of the Dominion;

"Whereas this bureau therefore views with alarm the falling off in the national gold reserve at Ottawa and in the gold production of the Dominion;

"Whereas the latter condition is due to the abnormal cost of production under existing conditions;

"Whereas these conditions are intensified by the incidence of taxation;

"Therefore, the Vancouver Board of Trade urges on the Dominion and Provincial governments the necessity of action to encourage the gold production to the utmost, and offers the following suggestions:

(a) Removal of all taxation of gold mines and a customs duties on machinery and supplies not produced here and imported for use in the industry, until such time as cost conditions return to normal:

(b) Return to Canada of all gold produced from exported ore, the purchase thereof by the mint at Ottawa and the Dominion assay office at Vancouver. For all gold sold by these institutions for industrial purposes the selling price shall be such as shall cover the normal cost of production, such surplus revenue to be distributed among the gold mining companies in proportion to production."

In the hearing of the trial of Grant vs. Alexander estate, in which the plaintiff seeks to establish his right to a share in the Alexander Mine Property, Atlin District, some rather startling evidence has been submitted. A New York handwriting expert has declared that Captain James Alexander's signature to the declaration of trust, giving W. Pollard Grant a one-fifth interest in the property, is a carefully made tracing of the Captain's signature. It was positively stated that the signature on the trust agreements was copied from that on a check which had also been put in evidence.

Something has been learned of the terms of the settlement of the recent trouble in the eastern British Columbia coal fields and the mining centres of the Province of British Columbia.

It is understood that the day wage men have received an additional \$1.15 per ton which is along the lines of their demand. This no doubt will mean an increase in the price of coal in these fields. In fact information has come from authoritative quarters to the effect that both bituminous and lignite coal will advance 60c a ton at the Collieries affected.

Under amendments to the Coal Mines Regulation Act passed in 1919, the Minister of Mines of British Columbia is authorized to arrange for the appointment of a Minimum Wage Board. The powers given this Board include the definition of coal mining districts, within which it may carry on investigations as to the wage scale paid to coal miners.

It also may carry inquiry to the point of ascertaining, by means of evidence taken openly, general working and living conditions among the miners. Although this provision was made by the Legislature of 1919 it did not become operative until July of this year. Since then the Minister of Mines has been engaged in the work of organizing the Board. The Coal Mine Operators of the Province have selected George Wilkinson, Supt. of the Pacific Coast Coal Mines, Ltd., as their representative, and the coal miners now are busy choosing, by means of the ballot, their representative. It is understood that the Minister looks forward to having the Board well launched and able to commence its activities in the course of a few weeks.

The shortage of fuel oil is causing some concern to western transportation officials. The Canadian Pacific Railway is reported to be seriously considering reverting to coal for its locomotives. The Union Oil Company has a contract to supply the C. P. R. with oil until the end of the year, and is of the opinion that it can still

still continue to keep the Company after that. In view of the uncertainty, however, the C. P. R. men are making such arrangements that in the event of a definite shortage of fuel-oil they will be able to carry on without inconvenience. The Pacific Great Eastern has four locomotives that can be readily converted to coal burners. In the meantime this Company is fortunate in having secured a large reserve of fuel oil.

THE NOVA SCOTIA COLLIERIES.

After protracted conference between representatives of the Nova Scotia District of the U. M. W., representatives from international headquarters, officers of the Department of Labor, and officials of the Dominion Coal Company, Nova Scotia Steel & Coal Co., and the Acadia Coal Co., a basis of agreement was reached which the miners' representatives have laid before the men for ratification, or otherwise, accompanied by strongly worded advice to accept.

The text of the proposed agreement is as follows:

After canvassing the situation from every angle, recognizing the importance of industrial peace in the coal fields at this time and with a full knowledge of both sides that the agreement of January 1920 was still in effect, it was deemed expedient in the interests of peace and harmony that something should be done to improve the existing labor situation. The representatives of the Dominion Coal Company, Ltd., Nova Scotia Steel and Coal Company, Ltd., each submitted the following, as its final offer:

Tonnage rates to be increased 10 cents per ton over present schedules. All datal hands to be advanced 55 cents per day above present schedule rates.

All local contract rates to be advanced 12½ per cent. over those in existence at the present time.

This agreement when approved by the members of District No. 26, United Mine Workers of America to become effective from the first of November, 1920, to November 30th, 1921, both sides to agree to meet at Halifax, twenty days before the expiration of this agreement for the purpose of arranging a new understanding.

The following provisions were also agreed to by the representatives of the companies and the men for inclusion in the new agreement which is to supercede the existing agreements, namely:

Management of Mines.

The right to hire and discharge the management of the mine and the direction of the working forces are vested exclusively in the company, and the United Mine Workers of America shall not abridge this right. However, the Company agrees not to discharge employees or refuse work to applicants on account of, or because, of their affiliation with the United Mine Workers of America. Employees shall perform such work as the management may direct.

Hours of Work.

Hours of labor to be in accordance with the provisions of the agreement of February 21st, 1919, in this respect as follows:

The collieries will commence to hoist coal at 7 a.m., at which time all the men must be in the mine.

The days work will cease at 3 o'clock when all arrangements will be available for conveying the men to the surface.

The surface men around the bankhead and screens associated with the handling of coal are to be on duty between the hours of 7 a.m. and 3 p.m. and for a short time after, if necessary for the purpose of attending to such duties as will facilitate their own work, such time not to exceed a half hour.

The standard of other surface labor around the collieries to be from 7 a.m. to 4 p.m. with half an hour for dinner.

There continuous attendance is required the shifts will be eight hours instead of twelve both surface and underground.

No Stoppage of Work.

No stoppage of work shall take place owing to any dispute arising at any mine under the jurisdiction of District No. 26, except for refusal of employers to pay wages on the regular pay day without satisfactory explanation, or danger to life or limb.

It is distinctly understood that no other grievance shall be considered where men suspend work to enforce adjustment and employees striking in violation of contract shall not be sustained in such cause.

The international organization and District No. 26 officials guarantee the fulfillment of this agreement and pledge co-operation and support in every legitimate way to maintain and encourage increased output.

Duties and Limitations of Mine Committee.

The duties of the mine committee shall be confined to the adjustment of disputes between the mine officials and any of the members of the United Mine Workers of America working in and around the mines arising out of this agreement or any local agreement made in connection therewith where the mine officials and said miner or mine laborer have failed to agree. Thereafter, the matter in dispute shall be referred to the district executive of the U. M. W. of America and the district superintendent of the company and the higher officials.

In the event of their failure to settle the matter it shall be referred to arbitration and the majority decision shall be final and binding upon all concerned.

If within ten days the representatives of the operators and miners fail to agree upon an arbitration when the selection of an arbitrator shall be made by the prime minister of Nova Scotia who shall make such selection on within ten days and such selection shall be final, miners to continue to work from the inception until the final adjustment.

Funerals.

It is recommended that the operators and miners executive draft a suitable rule to govern the operation of the mines in the event of fatal accidents and funerals.

Housing.

Housing and rental are not part of this contract. However, we recognize the necessity of improving the housing conditions in the mining centres but would respectfully refer the subject back to the management and those who may be affected and recommend that in looking toward betterments in improved housing conditions that where substantial improvements and extensive repairs are requested by the occupants and the same are made that such rental charges covering such substantial improvements and extensive repairs be mutually agreed to between the officials of the company and the parties affected.

Price of Miners Coal.

It is recognized that the price charged miners for house coal has not been in keeping with the cost of production and it is felt that in future the price to the miner for his own use must be considerably advanced and for this reason the price where it is less fixed at \$2.25 per ton at the mine or coal yards.

Where it is necessary to transport the coal from the mining centres over a railway in order to make delivery, the cost of said transportation shall be added to the above price.

Comparison between the terms of this agreement, and the working conditions demanded before the Royal Commission, can be made by reference to the "Journal" of 30th July, page 621.

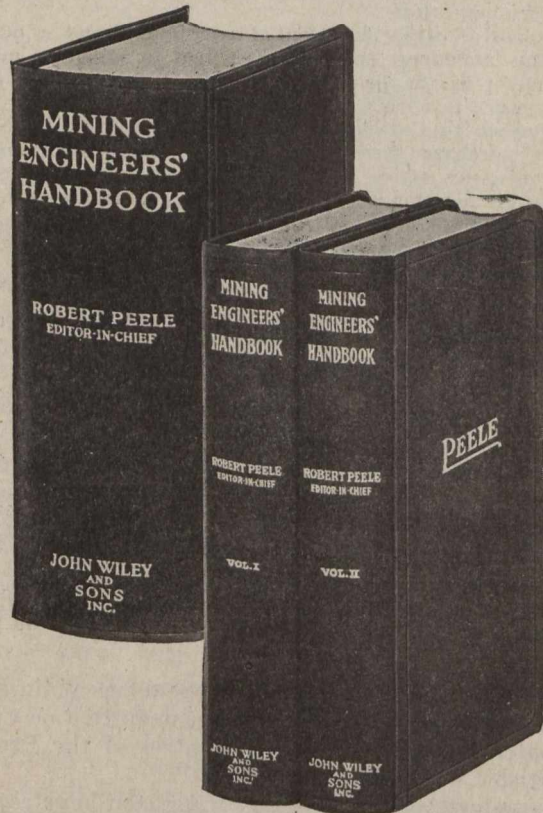
In commending this agreement to the acceptance of the workmen, the President and Secretary of the Nova Scotia District, after detailing the declining trend of business, the difficulties under which the U. M. W. is laboring in the United States, and the reduction in coal selling prices at United States mines, state that the miners in Nova Scotia have the choice of two courses, namely:

"(1) A strike under the adverse circumstances outlined, which would in our opinion jeopardize the life of our organization, and all the gains made during recent years, or

"(2) Accept as a settlement the proposed contract, which we have been, with the assistance of the international union, able to negotiate, after conferences held both in Montreal and Indianapolis, and thus preserve all we have gained."

The terms of settlement have been under discussion by the Wage Scale Committee of the District, and the question of acceptance or rejection is to be decided at a conference of delegates from the locals to be held on the 16th November.

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PHYSICAL CONDITION OF THE HOLLINGER CONSOLIDATED GOLD MINES.

By J. A. McRAE.

Now that the general economic conditions are improving, and steadily moving toward at least a gradual solution of part of the problems which have made gold mining difficult in recent years, the time seems opportune to review the status of the Hollinger Consolidated Gold Mines in its physical aspects.

The Hollinger has produced a little over \$37,000,000 to date. In doing this, not far under 4,000,000 of ore has been treated.

As against these figures, the ore reserve as of the beginning of this year amounted to 4,388,940 tons containing \$39,894,770.

These total figures show that the amount taken out and that placed in sight aggregate at least 8,250,000 tons containing a total of something like \$77,000,000.

Such figures in themselves are exceedingly impressive, but are made doubly so when the general physical condition of the mine in all its aspects are taken into consideration. For instance, these figures deal only with a total of 38 veins which have been developed underground, and only contain estimates of ore to a depth of just 100 feet on 39 other known veins which have been opened up to a limited extent at surface. In reality, the big achievements on the Hollinger are the result of work on approximately one-half of its known veins.

The importance of the 39 veins awaiting develop-

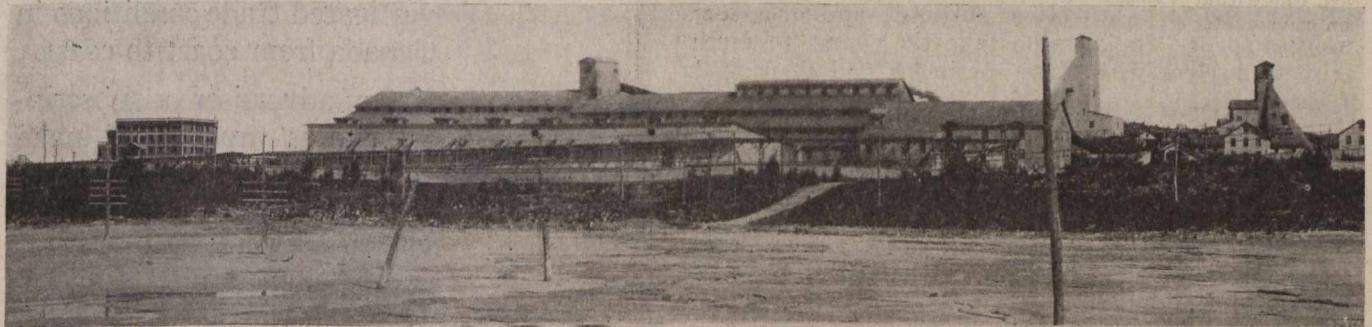
ment is apparent from the fact that they are officially declared to range in width from 4 ft. to 25 ft., and the average gold content is estimated at \$9.88 to the ton. One of these veins is over 11 ft. wide and carrying average gold values of \$23.50 to the ton. Another is 16½ ft. wide and carries an average of \$20.30 to the ton. As a matter of fact, the average value in these 39 undeveloped veins as shown at \$9.88 to the ton is actually higher than that found in the 38 veins being developed which average \$9.09 to the ton.

believed to be the continuation of vein No. 4 on the Hollinger, has been encountered and contains high-grade ore over great width. This vein where it occurs on the Hollinger was estimated at the beginning of this year to have \$5,786,590 in ore reserves, above the 800-ft. level. Below this point very little work has so far been undertaken, but from the results on the adjoining McIntyre, the prospects below the 800-ft. level on the Hollinger warrant optimism.

Of the total estimate of 4,388,940 tons on the Hollinger, containing \$39,894,770 in ore reserves, the entire amount (with the exception of 306,920 tons containing \$2,433,480) lies above the 800-ft. level. These facts show that the \$77,000,000 so far mined or placed in sight is contained in only one-half of the known veins, and these developed to no great extent below a depth of 800 feet.

Geological conditions, as found by diamond-drill tests, are said to undergo no change as so far tested to a depth of over 2,000 feet. Actual developments on the McIntyre-Porcupine show high-grade values over extensive areas at a depth of around 1,600 feet. Therefore, as a consequence of all this, it seems certain the Hollinger Consolidated is only in its early stages of development.

Adverse economic conditions have retarded progress on the Hollinger. Since the completion of its mill, adequate to treat from 3,000 to 3,500 tons of ore daily, at no time has it been possible to procure a full supply of workmen. Nevertheless, development work has been



A Recent View of the Hollinger Mine.

maintained, ore reserves have not been depleted and the conditions of the mine is such as will make it possible to take full advantage of favorable conditions whenever they materialize.

This period seems to now be in sight. Warnings in certain of the leading cities for men to seek employment elsewhere, and the expression of fear over the possibilities of a "bread-line" in such centres, indicate a more plentiful supply of workers for the gold mines, and resulting increase in production.

The recent achievements on the Hollinger are the result of working at not much more than half capacity. Results of capacity operating should be most satisfactory.

NEW MAP OF THE FLIN FLON LAKE MINING DISTRICT.

We have received from the Surveyor General of the Topographical Surveys Branch at Ottawa copy of a new map of the Flin Flon Lake Mining District — which lies partly in Manitoba and partly in Saskatchewan. The map shows all the surveys of this district, and is issued to meet a general public demand. It is sold by the Department at a nominal price of five cents per copy. Scale is one mile to one inch.

PLAN INSTRUCTION CLASSES FOR ONTARIO PROSPECTORS.

Ontario Department of Mines Takes steps to Aid Prospecting.

What is regarded in Northern Ontario as a commendable scheme to establish "Prospectors' Classes" at strategic points in the North, is announced by Thos. W. Gibson, Ontario Deputy Minister of Mines.

It is planned to commence these classes as soon as possible after the New Year, Dr. W. L. Goodwin of Queens University being in charge. In view of mining Schools being already established at Haileybury and Sudbury, it is believed these two points will offer ideal conditions under which to commence such Prospectors' Classes.

The Mining Recorders, Secretaries of the High School Boards and Instructors in the Mining Schools mentioned, are being advised in connection with the scheme, also the Prospectors' Association and Miners' Unions of the various mining camps throughout the Province.

The statement announces that the Minister of Mines, Hon. H. Mills, is desirous of carrying on instruction classes for prospectors at the various mining centres where sufficient interest is shown to justify the undertaking. It is the intention to place at each of these centres an instructor competent to give an outline course in geology, particular reference being given to the principal rock formations with which economic minerals are associated. A collection of minerals will be used for illustration purposes, and an opportunity afforded for all who take the course to familiarize themselves with these specimens and their mode of occurrence.

Evening classes cannot be started advantageously until March, in order that mineral-spotting may proceed in daylight. Day classes are preferable if it is possible to arrange for same. The course will be of two weeks' duration, or longer if conditions warrant. In centres where High Schools or Collegiate Institutes are located and laboratories are available, blow-piping instructions will be included. A minimum attendance of ten persons will be necessary in order to justify the holding of a class.

The foregoing briefly outlines the official information coming from the Deputy Minister of Mines, and mining men recognize in the plan a movement calculated to greatly benefit prospectors in the mining areas. The addition of even a little technical knowledge to the information gathered by practical experience is expected to be very beneficial. Not only this, but men desirous of engaging for the first time in prospecting may in this way educate themselves in respect to the rock formations most favorable for the occurrence of economic deposits.

Apropos the course of lectures to be given by government mining engineers of British Columbia this winter under the auspices of the Department of Mines it is announced that the subjects to be dealt with include Chemistry, Mineralogy, Lithology and Geology. Elementary discussion of these subjects, for the special benefit of prospectors and those wishing to become prospectors, will be followed by a lecture on the general process of the formation of the earth; another on igneous rocks and their origin, and a third on ore deposits.

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Realizing the Development which is bound to take place in trade between Canada and the [United Kingdom, the **Industrial & Educational Publishing Co., Limited** will open its own office in England early in January.

Mr. C. H. Armstrong, Jr., who will be in charge, has investigated trade conditions in Canada from coast to coast.

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ONTARIO MINING TAX ACT.

Decision of the Mining Commissioner "in re" Appeal of Canadian Copper Company Against Assessment and Tax Levied Under the Act.

The Canadian Copper Company, a subsidiary of the International Nickel Company, appealed against the assessment of profits and the amount of taxes levied by the Mine Assessor for the year 1918 and subsequent periods.

The Tax Act was amended in 1917 in regard to the method to be used in arriving at the taxable profits of nickel and nickel-copper mines, and it was the contention of the Canadian Copper Company that not only were certain specified mining costs to be deducted, but that a further allowance should be made "of the actual cost of marketing the metal, or other product, and of each process by which the metal or other product is refined and treated." It was further contended that the taxes assessed in the United States, where the product of the appellant is refined, forms part of the marketing costs and is properly deductible from profits for purposes of tax assessment in Ontario.

The Mining Commissioner, Mr. T. E. Godson, K.C., finds against the appellants, expressing in his judgment the opinion that the Tax Act specifically details all the allowable deductions, and that the deduction of United States taxation is neither allowed nor contemplated by the Act.

Mr. Godson states "The sole issue before me is can a profit tax levied by the Government of the United States against the appellant Company, or the International Nickel Company, be considered 'a cost of marketing the metal'."

"It will be observed the words used are 'actual cost', not 'expenses', 'payments' or 'allowances'. The words 'actual cost', are used, however, in the statutory deduction clauses such as actual cost of transportation, working expenses, cost of supplying power and light, hiring horses, the actual cost of explosives, insurance upon the mining plant and work done on the mine. In each case it is the cost of the particular work done, the specific article purchased, cost of proper insurance, or as the case may be, as in clauses A to J contained. There is no room for speculation as to what shall be allowed as a statutory deduction as they are definitely and specifically named in clauses A to J and sub-section 3 of Section 5 further ties the hands of the Mine Assessor by stating, 'No other expenses, payments, allowances or deductions shall be deducted and made' except as provided in the case of nickel mines by the provision of clause 3 a. From the above I gather the import of the words 'actual cost of marketing'. The language of the sub-section must be taken to mean exactly what the words imply in the light of the intent running through the clauses of the Act under consideration and that is the actual cost have been provided for and allowed; even a profit tax has been provided for by clause 'J' but it is only deductible when taken by the Parliaments of Great Britain and Ireland or the Dominion of Canada.

"While clauses B and C of sub-section 3 (a) are separate and distinct in their several methods of arriving at the profit tax they are properly read together as part of a definite scheme of fixing the basis of the tax with reference to nickel mines and so read elucidate the meaning and construction of the words 'cost of marketing'."

"I find no insuperable difficulty in determining the meaning of the words at issue because all allowable deductions have been provided for by the Act up to the stage where the metal is ready for sale. The assessor is only concerned with the cost of marketing. He has allowed statutory deductions with reference to mining, roasting, smelting, converting and refining. Clause 'J' negatives the right of allowance of a tax levied within the United States. It breaks new ground when allowing the deduction of a tax payable on profits taken by the Parliaments of Great Britain and Ireland or the Dominion

of Canada. 'J' and S.S. 3 (D) seem therefore to refute and work against the argument of the appellant company.

"In my opinion the tax is not a cost of marketing any more than it could be said to be a cost of each process by which the metal is refined.

"I can vision a foreign state taking all the profits and there would be if the tax as contended for is deductible no provision under the Act as now framed to preserve to the Province a share of the profits. Such a contingency is however provided for in S. S. 3 (D) in the case of the imposition of a War Tax in Great Britain and Ireland by fixing a minimum tax of not less than 3 p.c. This sub-section again expounds when and where a tax imposed outside this Province may be allowed as a deduction.

"In Mr. Osler's very thorough and earnest argument he referred to the fact that if this tax was not deducted as 'a cost of marketing' it would not be a tax upon the profits but upon the gross receipts of the Company.

"The answer to this contention is found I think in clause (C) of S. S. 3 A 'and the balance' after making the said deductions and allowances, shall be deemed and taken to the annual profits of the mine.' Whatever the tax is in effect it is deemed to be a profit."

"This appears to be a case that might properly be taken to the Minister under Section 22 of the Mining Tax Act. It in part says 'where owing to special circumstances it is deemed inequitable to demand payment of the whole amount imposed under this Act the Minister may compromise the matter by the acceptance of such amount as he may deem proper'. The tax levied by the United States undoubtedly absorbed a part of the profits of the Company but whether it is inequitable to disallow it as a deduction is a matter now for the Minister."

Following the dismissal of its appeal, the International Nickel Company has paid to the Province of Ontario the sum of \$504,000, being taxes due in 1920 and arrears for the years 1918 and 1919, amounting to over \$300,000.

BOOK REVIEW.

MINE BOOKKEEPING. A comprehensive system of records and accounts for mining operations of moderate dimensions. Robert McGarraugh. Cloth boards. 9 by 6 ins.; 118 pp., with index. McGraw Hill Co., New York.

This work is evidently compiled by one who has a good grasp of both operating and accounting details in metal-mining enterprises, and it is designed to cover the bookkeeping of mining operations of modest size. The writer agrees with Gillette and other competent writers on unit costs that "the segregation and distribution of cost data is essentially an engineering undertaking," and states that mine costs, if left entirely to clerks, will develop into a cut-and-dried thing of no value. That the writer has been behind the scenes is evident when he pleads for a simple set of accounts, with accurate classifications, which he states "is of incomparably greater value for the analysis of costs than an elaborate subdivision, the details of which have been largely approximated or guessed at." The importance of daily records are insisted on, monthly statements being properly classed as "past history." In many cases they are worse than that.

Correct opinions are expressed regarding amortization, depreciation and the distinction between capital and operating expenses. There are rules applying to these things, although mine executives and presidents delight to make hash of them.

We note that the scheme of classification of operating expenses is based on operations, such as "tramping," "timbering" and "breaking ground," to which we take exception, believing that a simpler and more effective classification is into classes of labor,

as "trammers," "timbermen," etc., but this is an expression of personal preference, and is not accepted practice.

The book may be taken as a correctly written manual of mine accounting for mines of moderate size, and it is fully illustrated by specimen forms which can be adapted to suit the varying necessities of differently conditioned operations.

F. W. G.

USEFUL MINERALS AND RARE ORES. Practical Instructions in the Search for and Determination of the Useful Minerals, including the Rare Ores. Alexander McLeod. Second Edition. John Wiley & Sons, New York, 6½ by 4 ins., limp leatherette backs. 254 pages with Index.

This little book, first compiled in 1913 and re-issued in 1917, is from the pen of a Cape Breton prospector with much practical experience in the field. The book is intended to be a field guide to persons without extensive technical knowledge, although it is not an elementary treatise except in the simplicity of the wording and the tests for minerals that are recommended. It is the aim of the book, states the author, "to furnish severely simple, but fully dependable, means by which anyone can determine the useful minerals." Himself a practical prospector, the author has written an understandable volume that contains much meat and little non-essential trimmings, and the simple tests suggested should be of such value to the prospector "remote from more refined methods in the fastness of the everlasting hills." The author states that he has drawn freely from acknowledged authorities in compiling his volume, but this fact in no wise detracts from its usefulness, which lies in lucidity of wording and arrangement, and in its application to the requirements of the average prospector. The book would form a handy textbook for prospectors' classes such as are being held under the auspices of the provincial departments of mines in several provinces.

METAL QUOTATIONS.

Fair prices for Ingot Metals in Montreal Nov. 17th, 1920. (In less than carload lots).

	Cents per lb.
Copper, electro	19¼
Copper casting	19
Tin	46½
Lead	8
Zinc	8¾
Aluminum	34
Antimony	8

COAL PRICES.

St. John, N.B.—The Dominion Coal Company on November 10th advanced its price here for bituminous coal from \$12.25 to \$13.25 per ton delivered. Anthracite sells at \$20.50 delivered.

Fredericton, N.B.—Anthracite is quoted at \$20.00 per ton delivered. Recent prices for anthracite have ruled as high as \$25.00 per ton.

Toronto, Nov. 16.—Navigation has practically closed down and so far there has been no apparent change in the situation, with receipts very meagre and business correspondingly dull. The price of hard coal remains unchanged. Bituminous mine run is quoted at from \$10.00 to \$11.00 with bituminous slack slightly easier. Smokeless is still selling at from \$10.50 to \$11.50. Bituminous lump coal is scarce. Hard coal is quoted at from \$8 to \$16.00 at the mines.

TORONTO MINING STOCKS

Following are the average quotations for active gold, silver and oil stocks, on the Standard Mining Exchange, for week ending 13th November, 1920:

	High	Low	Last
SILVER			
Bailey	4½	4	4½
Beaver Consolidated	39	34¾	34¾
Chambers-Ferland	5½	4½	5½
Coniagas	2.25	2.20	2.20
Crown Reserve	22	20	20
Gifford	1¼	1¼	1¼
Hargraves	17/8	17/8	17/8
McKin.-Dar.-Savage	48	46	48
Mining Corp. of Can.	1.68	1.65	1.65
Nipissing	9.75	9.75	9.75
Ophir	17/8	17/8	17/8
Peterson Lake	11½	11½	11½
Temiskaming	30½	30	30
Trethewey	26¾	24¾	24¾
GOLD			
Atlas	10	10	10
Davidson Gold Mines	50	45	45
Dome Extension	45½	46	46
Dome Lake	4	3	3
Dome Mines	14.00	13.25	13.25
Gold Reef	3½	3½	3½
Hollinger Cons.	5.60	5.50	5.51
Hunter Kirk'd G.M.	10	10	10
Keora	16	15	16
Kirkland Lake	44	43	43
Lake Shore M. Ltd.	1.08	1.04	1.04
McIntyre	1.94	1.91	1.91
Moneta	9	8¾	8¾
Newray Mines, Ltd.	5	5	5
Porcupine Crown	22½	22	22
Porcupine V.N.T.	23¼	22¼	22¼
Preston East Dome	2½	2½	2½
Schumacher	19¾	19¾	19¾
Teck-Hughes	7	6½	6½
Thompson Krist	6¾	6	6
West Dome	5¾	5¼	5¼
West Tree Mines Ltd.	5	5	5
Wasapika Gold Mine Ltd.	10½	9	10
OILS			
Vacuum G.	27	25½	26

BRITISH APPLICATION OF ASBESTOS.—USES IN INDUSTRY AND WAR.

(Communicated by Turner Bros. Asbestos Co., Rochdale, England).

Beyond the fact that the word Asbestos suggests something of a fireproof nature, the general conception of this marvellous production of inorganic nature is of a very hazy character. As a matter of fact, it is extremely doubtful whether even the user of Asbestos, in one or other of its multitudinous forms of manufacture, has any idea of the extent to which the industry has grown.

To enumerate only the "Group" headings, into the composition of which Asbestos enters, results in a formidable list, including fibre, yarn, cloth, webbing, listing, tubing, braiding, sheeting, jointing, compressed Asbestos fibre rings and joints, millboard, paper, tubes, packings of all kinds for high pressure, superheat, for medium and low steam pressures, for hydraulic and feed pumps, for ammonia and acid pumps, packings with and without rubber, some metallic and some non-metallic. In fact, the variety appears to be

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almost endless. Then, it is used in the manufacture of such goods as catalyser nets for oleum, gloves, suits, leggings, aprons, iron-holders, rings for arc lamps, lamp shades, Asbestos-faced beltings and other articles of a special character, mainly of interest to scientists, the laboratory, etc.

In the second category, under the heading of "Pipe and Boiler Insulation," appear sectional blocks, locomotive lagging, sectional pipe coverings, bulkhead linings, Asbestos mattresses for locomotives and marine boilers, etc., Asbestos fibre rope, Asbestos composition, flange and valve covers, etc.

Under the third heading is found an infinite variety of goods made of Asbestos-cement, including building materials such as sheets, slates, tiles, partitions, shutters, doors, etc. These materials are rapidly gaining favour as proof of their weather-resisting properties become more apparent to the building industry generally. Asbestos-cement materials are suitable alike for factory, hospital, barracks, villa, garage, or cottage construction. The architect, moreover, has at his disposal a large variety of tiles, also ridging, etc. of a more or less decorative character.

The part played by Asbestos in the great war was an amazing one. As Asbestos shields on warships, mattresses made of Asbestos saved many lives from the dangers of flying fragments from the guns of small craft, including submarines firing under the cover of smoke clouds and fog. All exposed positions, whether around the guns, the bulwarks, gangways, or other parts of a warship, which have to be continually traversed by the men during action, are well protected by Asbestos mattress shields.

In the stokehold of the battle-ships also Asbestos is found in the shape of jointing rings or gaskets, insignificant rings the use of which can only be appreciated by those who have a more or less intimate knowledge of the working of the engine rooms and stokeholds. Upon the accuracy of these jointing rings depends the high degree of efficiency in steaming. Thousands of these little rings are used in the boiler equipment of a single battle-ship. Any leakage from tubes due to defective rings means enormously increased work, to the point of exhaustion, on the part of the stokers, and what is of still more serious consequence, decreases the speed of the battle-ship. Until these rings were discovered, the naval water-tube boiler never attained its 100 per cent. efficiency, which is now established as the rule.

In the form of packing, Asbestos is comparatively well known. It prevents the escape of the driving force, whether as steam or any other pressure, from stuffing boxes, piston rods, and valve spindles, etc., while allowing easy movement without undue friction. The properties which make Asbestos so valuable in this case are that, whilst it is flexible and of a fibrous nature, it is indestructible by heat conditions. Its coefficient of friction is low, consequently a minimum amount of wear and loss of power takes place. As packing, Asbestos has been used more extensively than in any other way up to the present time.

Asbestos in the form of compressed Asbestos fibre jointing is also used on the principal joints of the auxiliary propelling turbines and plant, and the hydraulic machinery which operates the huge guns; also in regard to the torpedo tubes, and all deck gear, its importance may be realized when it is stated that upon its reliability depends the immediate operation of all the machinery for a sea battle.

In the form of fibre and fibre rope, commonly called Asbestos fibre-filled rope, it is used for covering pipes in battle-ships, the object being to maintain the steaming efficiency of the plant by the prevention of condensation and the dissipation of heat, and also to reduce the consumption of coal.

Asbestos, combined with cement in conjunction with Asbestos corrugated paper, is used for bulkhead linings, *i.e.*, the inside partitions, gangways, cabins, etc., are covered with this material for its insulating properties, with a view to maintaining an even temperature under varying conditions, and also for the prevention and spread of fire. This material is largely replacing wood for the purposes named in all modern battle-ships.

In the form of a metallic cloth, Asbestos was used to make gun "grips" to protect soldiers' hands from the heat of the rifle barrels. Many hundreds of thousands of such "grips" were provided for service during the Great War.

At home also Asbestos in the form of woven nets is used in the manufacture of chemicals for high explosives, the nets being put through a special chemical process necessary for the production of oleum, or fuming sulphuric acid.

For some years prior to August, 1914, the quantity of Asbestos products of British manufacture sold in the home markets was much in excess of the total imports from all other sources, and afterwards the imports formed a very small proportion of this country's requirements. At the same time, British manufacturers were exporting very considerable quantities to the Colonies and foreign countries, including those highly protected, in open competition with the products of Germany and Austria.

There are only a very few bona-fide British manufacturers of Asbestos goods. It is quite a mistake, however, to assume that British firms—though few—have been either insignificant or backward from the scientific standpoint. In the latter connection, particularly, credit is due to one of the pioneer British concerns, in that tests of the goods manufactured by the firm have proved British products to be of superior value to those of German manufacture for many years past.

Following these tests, and before the war, *i.e.*, in 1910, the British Admiralty made their own tests of British products, and approved them for use throughout the Navy in preference to those of foreign manufacture, the use of the latter being then discontinued.

B. C. MINERAL EXHIBIT FOR OVERSEAS.

It has been decided to assemble a representative exhibit of the minerals of British Columbia for display in England and on the Continent. This exhibition now is being prepared. It will be the best that ever has been got together for the purpose of illustrating the mineral resources of the Province. A considerable part of it already is in shape for shipping and the whole exhibit, it is hoped, will go forward very shortly. International Exhibitions of importance are being held in England and different centres on the Continent and it is considered imperative that there should be a representative display of the mineral resources of British Columbia available for use on such occasions.

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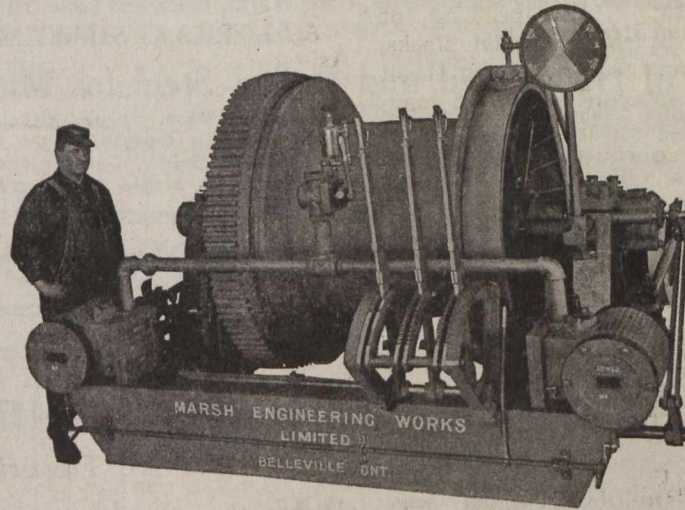
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15	Westinghouse	1675	55	Allis Chalmers	550
15	Crocker Wheeler	300	60	Crocker Wheeler	625
15	General Electric	625	75	Westinghouse	800
20	Crocker Wheeler	775	75	Westinghouse	475
20	General Electric	975	80	General Electric	750
20	Westinghouse	975	90	Western Elec.	525
20	Sprague	1250	100	General Electric	720
20	Ft. Wayne	660	100	Westinghouse	700
25	Westinghouse	825	120	General Electric	450
25	General Electric	560	125	Crocker Wheeler	650
25	Crocker Wheeler	775	150	Sprague	1050
25	Bullock	600	160	Goodman Elec. Co.	420
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30	General Electric	975	200	Westinghouse	560
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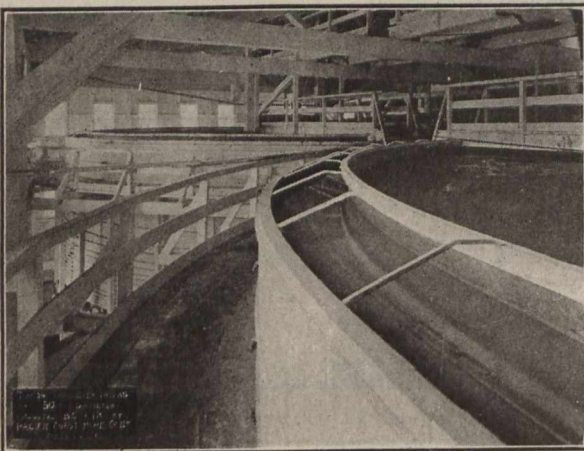
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Pit Rails, T Rails, Edge Rails, Fish Plates, Bevelled Steel Screen Bars, Forged Steel Stamper Shoes and Dies. Blued Machinery Steel 3-8" to 1-4" Diameter, Steel Tub. Axles Cut to Length, Crow Bar Steel. Wedge Steel, Hammer Steel, Pick Steel, Draw Bar Steel, Forging of all kinds, Bright Compressed Shafting 5-8" to 5" true to 2/1000 part of an inch. A full stock of Mild Flat, Rivet Round and Angle Steels always on hand.

SPECIAL ATTENTION PAID TO MINERS' REQUIREMENTS. CORRESPONDENCE SOLICITED.

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Wood Mining Tanks

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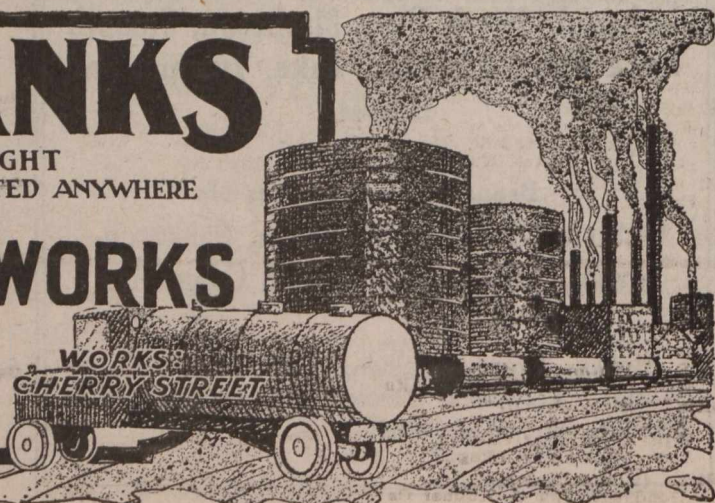
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HEAVY & LIGHT
STEEL PLATE CONSTRUCTION ERECTED ANYWHERE

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TORONTO



The Canadian Miners' Buying Directory.

- Acetylene Gas:**
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.
- A.C. Units:**
MacGovern & Co.
- Agitators:**
The Dorr Co.
- Air Hoists:**
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.
- Alloy and Carbon Tool Steel:**
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, N.J.
Peacock Brothers Limited.
- Alternators:**
MacGovern & Co.
Spielman Agencies, Regd.
- Aluminium:**
- Amalgamators:**
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.
- Antimony:**
Canada Metal Co.
- Antimonial Lead:**
Pennsylvania Smelting Co.
- Arrester, Locomotive Spark:**
Hendrick Manufacturing Co.
- Arsenic White Lead:**
Coniagas Reduction Co.
- Assayers' and Chemists' Supplies:**
Dominion Engineering & Inspection Co.
Lyman, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.
- Ash Conveyors:**
Canadian Link-Belt Company
- Ashes Handling Machinery:**
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.
- Assayers and Chemists:**
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.
- Asbestos:**
Everitt & Co.
- Balls:**
Canadian Foundries and Forgings, Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Peacock Brothers Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
- Ball Mills:**
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works.
- Balances—Hessner:**
Canadian Fairbanks-Morse Co., Ltd.
Mine and Smelter Supply Co.
- Babbit Metals:**
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd.
Hoyt Metal Co.
- Ball Mill Feeders:**
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
- Ball Mill Linings:**
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
- Belting—Leather, Rubber and Cotton:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.
- Belting:**
R. T. Gilman & Co.
Gutta Percha & Rubber, Ltd.
- Belting—Silent Chain:**
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.
Jones & Glasco (Regd.)
- Belting (Transmission):**
Goodyear Tire & Rubber Co.
- Belting (Elevator):**
Goodyear Tire & Rubber Co.
- Belting (Conveyor):**
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.
- Blasting Batteries and Supplies:**
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
- Bluestone:**
The Consolidated Mining & Smelting Co.
- Blowers:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
- Boilers:**
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.
- Blue Vitriol (Caniagas Bed):**
Canadian Fairbanks-Morse Co., Ltd.
- Bortz and Carbons:**
Diamond Drill Carbon Co.
- Boxes, Cable Junction:**
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.
- Brazilian Rough Diamonds:**
Diamond Drill Carbon Co.
- Brazilian Mica:**
Diamond Drill Carbon Co.
- Buggies, Mine Car (Steel)**
Hendrick Manufacturing Co.
- Brazilian Ballas:**
Diamond Drill Carbon Co.
- Brazilian Rock Crystal:**
Diamond Drill Carbon Co.
- Brazilian Tourmalines:**
Diamond Drill Carbon Co.
- Brazilian Aquamarines:**
Diamond Drill Carbon Co.
- Bridges—Man Trolley and Rope Operated—Material Handling:**
Canadian Mead-Morrison Co., Limited
- Bronz., Manganese, Perforated and Plain:**
Hendrick Manufacturing Co.
- Buckets:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Buckets, Elevator:**
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.
- Cable—Aerial and Underground:**
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
- Cableways:**
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.
- Cages:**
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

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SISCO Drill and Tool Steel

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Co. Limited**

COBALT, HAILEBURY, SOUTH
PORCUPINE, TIMMINS

Dominion Coal Company

Limited
Glace Bay Nova Scotia

19 Collieries

Output—5,000,000 tons annually

“Dominion” Coal

Screened, run of mine and slack

“Springhill” Coal

Screened, run of mine and slack

Collieries at Glace Bay, C.B., and Springhill,
N.S.

Shipping Ports—Sydney and Louisburg, C.B.,
and Parrsboro, N.S.

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Hull, Blyth & Co, 1 Lloyds Ave., London, E.C.
Rarvey & Co., St. John's, Nfld.

The Minerals of Nova Scotia

THE MINERAL PROVINCE OF EASTERN CANADA

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

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

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

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

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

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

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

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

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

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

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

HON. E. H. ARMSTRONG, HALIFAX, N.S.

Commissioner of Public Works and Mines

Canadian Miners' Buying Directory.—(Continued)

- Cables—Wire:**
Standard Underground Cable Co of Canada, Ltd.
Canada Wire & Cable Co.
Fraser & Chalmers of Canada, Ltd.
Northern Electric Co., Ltd.
Osborn, Sam'l (Canada) Limited.
R. T. Gilman & Co.
- Cable Railway Systems:**
Canada Wire & Cable Co.
Canadian Mead-Morrison Co., Limited.
- Cam Shafts:**
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
- Car Dumps:**
Sullivan Machinery Co.
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
- Carbide of Calcium:**
Canada Carbide Company, Ltd.
- Cars:**
Canadian Foundries and Forgings, Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
John J. Gartshore
MacKinnon Steel Co., Ltd.
The Electric Steel & Metals Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
Marsh Engineering Works
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
R. T. Gilman & Co.
The 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.
Peacock Brothers Limited.
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.
Peacock Brothers 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.
Peacock Brothers Limited.
- Coal Mining Explosives:**
Canadian Explosives, Ltd.
Giant Powder Company of Canada, Ltd.
- Coal Mining Machinery:**
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Osborn, Sam'l (Canada) Limited.
Canadian Ingersoll-Rand Co., Ltd.
Sullivan Machinery Co.
Marsh Engineering Works
Hadfields, Ltd.
Hendrick Mfg. Co.
Fraser & Chalmers of Canada, Limited
Mussens, Limited
R. T. Gilman & Co.
- Coal and Coke Handling Machinery**
Canadian Mead-Morrison Co., Limited.
Canadian Link-Belt Co., Ltd.
- Coal Pockets:**
Canadian Mead-Morrison Co., Limited.
- Coal Pick Machines:**
Sullivan Machinery Co.
- Coal Screening Plants:**
Canadian Link-Belt Co., Ltd.
Canadian Mead-Morrison Co., Limited.
- Cobalt Oxide:**
Conlagas Reduction Co.
Everitt & Co.
- Compressors—Air:**
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
The Mine & Smelter Supply Co.
- Concrete Mixers:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.
Mussens, Limited
R. T. Gilman & Co.
- Condensers:**
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Northern Canada Supply Co.
MacGovern & Co., Inc.
- Concentrating Tables:**
The Mine & Smelter Supply Co.
Deister Concentrator Co.
The 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, Hull, Que.
Osborn, Sam'l (Canada) Limited.
Swedish Steel & Importing Co., Ltd.
- Brushers:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Hardinge Conical Mill Co.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co., Ltd.
R. T. Gilman & Co.
Lyman, Ltd.
Mussens, Limited

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Manufacturers of

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Arsenic—White and Metallic

Cobalt Oxide and Metal

Nickel, Oxide and Metal

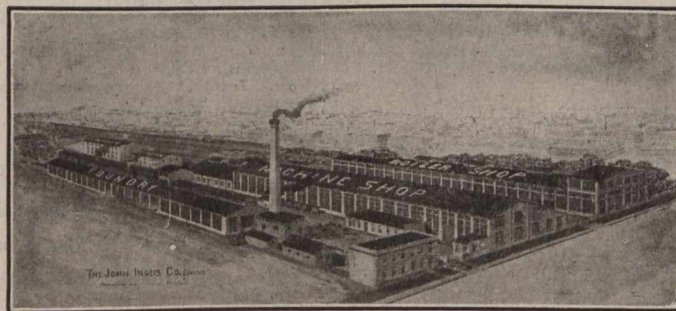
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Canadian Miners' Buying Directory.—(Continued)

- The Mine & Smelter Supply Co.**
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Cut Gears:**
Hans Renold of Canada, Limited, Montreal, Que.
- Cyanide:**
American Cyanamid Company.
- Cyanide Plant Equipment:**
The Dorr Co.
The Mine & Smelter Supply Co.
- D. C. Units:**
MacGovern Co.
- Derricks:**
Smart-Turner Machine Co.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Mussens, Limited
- Diamond Drill Contractors:**
Diamond Drill Contracting Co.
E. J. Longyear Company
Smith & Travers
Sullivan Machinery Co.
- Diamond Tools:**
Diamond Drill Carbon Co.
- Diamond Importers:**
Diamond Drill Carbon Co.
- Digesters:**
Canadian Chicago Bridge and Iron Works
- Dies:**
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Dredger Pins:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
- Dredging Machinery:**
Canadian Steel Foundries, Ltd.
Canadian Mead-Morrison Co., Limited
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
R. T. Gilman & Co.
- Dredging Ropes:**
Allan, Whyte & Co.
Greening, B., Wire Co., Ltd.
R. T. Gilman & Co.
- Drills, Air and Hammer:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
The Mine & Smelter Supply Co.
Mussens, Limited
- Drills—Core:**
Canadian Ingersoll-Rand Co., Ltd.
E. J. Longyear Company
Standard Diamond Drill Co.
Sullivan Machinery Co.
- Drills—Diamond:**
Sullivan Machinery Co.
Northern Canada Supply Co.
E. J. Longyear Company
- Drill Steel—Mining:**
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rochester, N. Y.
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
Glant 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.
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
Glant 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, Ltd.
- High Speed Steel:**
Canadian Fairbanks-Morse Co. Ltd.
H. A. Drury Co., Ltd.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
International High Speed Steel Co., Rockaway.
- High Speed Steel Twist Drills:**
Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
- Hoists—Air, Electric and Steam:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Jones & Glassco
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
Northern Canada Supply Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabli 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 Wabli 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 Borews:**
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.
Hoyt Metal Company.
- Levels:**
C. L. Berger & Sons
- Locomotives (Steam, Compressed Air and Storage Steam):**
Canadian Fairbanks-Morse Co., Ltd.
H. K. Porter Company
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
- Link Belt**
Canadian Fairbanks-Morse Co. Ltd.
Canadian Link-Belt Co., Ltd.
Northern Canada Supply Co.
Jones & Glassco
- Machinists:**
Burnett & Crampton
- Machinery—Repair Shop:**
Canadian Fairbanks-Morse Co., Ltd.
- Machine Shop Supplies:**
Canadian Fairbanks-Morse Co., Ltd.
- Magnesium Metal:**
Everitt & Co.
Hull Iron & Steel Foundries, Ltd.
- Manganese Steel:**
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabli 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.
Hoyt Metal Company.
- Metallurgical Engineers:**
General Engineering Co., New York
The Dorr Co.
- Metallurgical Machinery:**
General Engineering Co., New York
The Dorr Co.
The Mine & Smelter Supply Co.
- Metal Work, Heavy Plates:**
Canada Chicago Bridge & Iron Works
- Mica:**
Everitt & Co.
Diamond Drill Carbon Co.
- Mining Engineers:**
Hersey, M. Co., Ltd.
- Mining Drill Steel:**
H. A. Drury Co., Ltd.
Osborn, Sam'l (Canada) Limited
International High Speed Steel Co., Rockaway, N.
- Mining Requisites:**
Canadian Steel Foundries, Ltd.
Dominion Wire Rope Co., Ltd.
Hadfields, Limited
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabli 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 Wabli Iron Works

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- Motor Generator Sets—A.C. and D.C.**
MacGovern & Co.
- Nails:**
Canada Metal Co.
- Nickel:**
International Nickel Co
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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.

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Rope—Wire:

Allan, Whyte & Co., Ltd.
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.
Peacock Brothers Limited.
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.)

Silver:

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

Solder—Bar and Wire:

Hoyt Metal Company

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.
Peacock Brothers 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)

Tramway Points and Crossings:Canadian Steel Foundries, Ltd.
Hadfields, Limited**Transits:**

C. L. Berger & Sons

Transformers:Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
Northern Electric Co., Ltd.**Transmission Apparances:**

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.
Peacock Brothers Limited.**Tube Mill Liners:**Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.**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:Allan, Whyte & Co., Ltd.
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

Zincenium:

Everitt & Co.

Zinc:The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co**Zinc Spelter:**Canada Metal Co., Ltd
Foyt Metal Co., Ltd.

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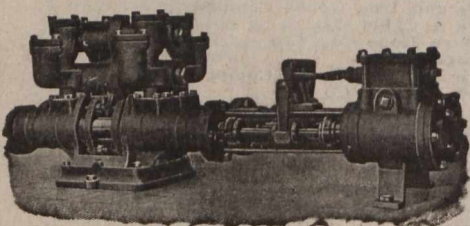
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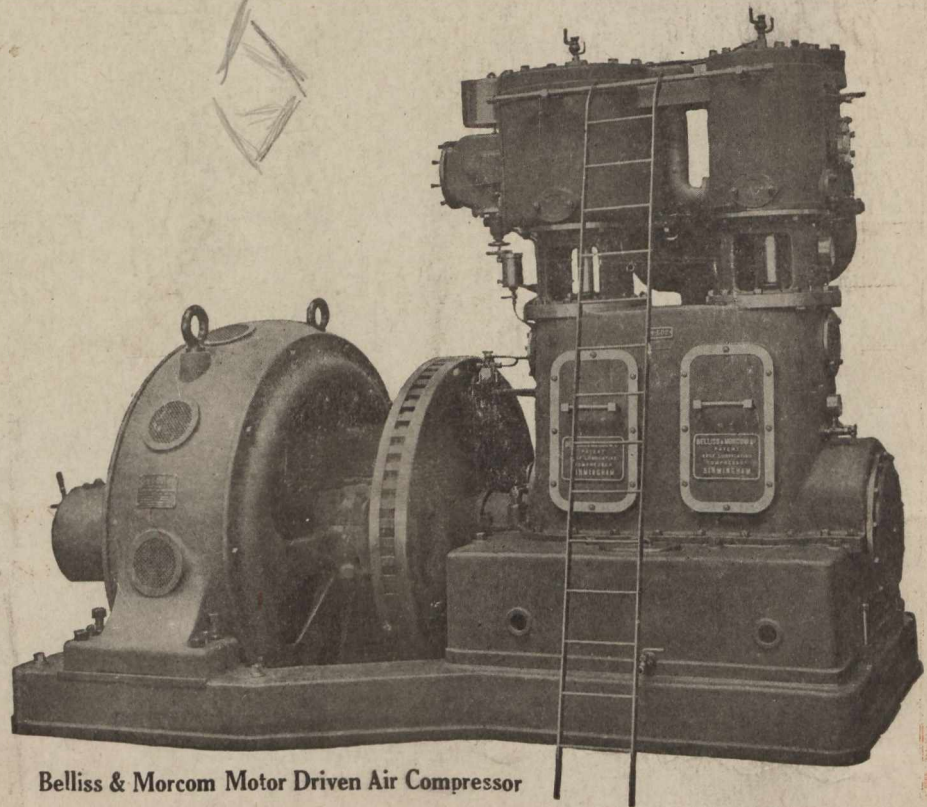
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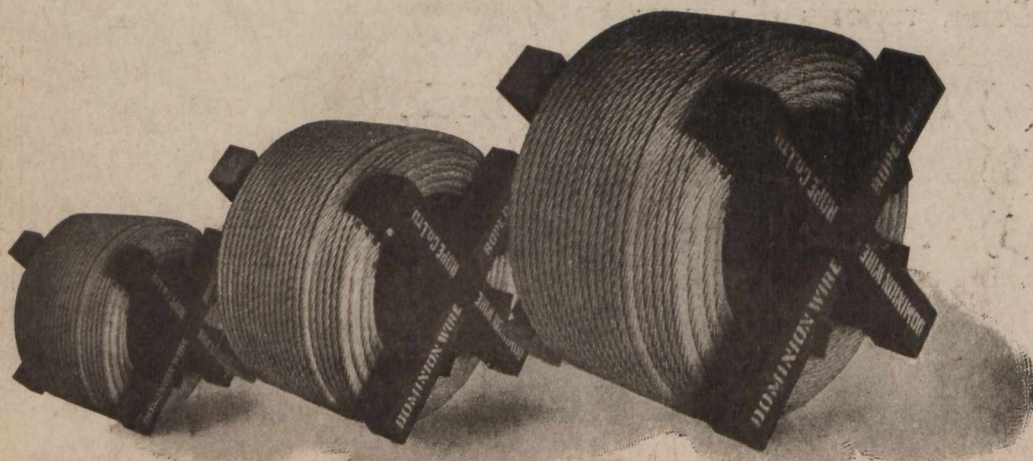
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