

CANADIAN MINING JOURNAL

Vol. XLI.

Gardenvale, P. Q., June 16, 1920.

No. 24.

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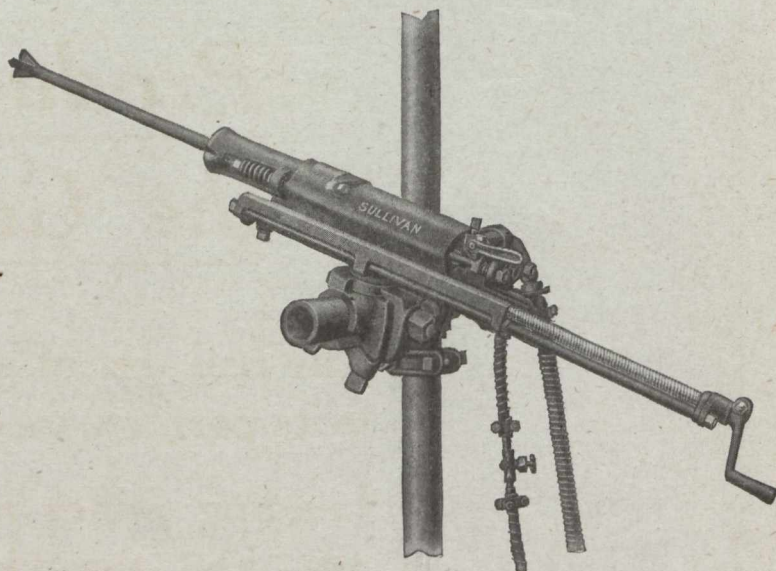
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MINING OPPORTUNITIES IN MANITOBA

Mineral Areas

Approximately three-fifths of the total area of Manitoba is Pre-Cambrian. In the Pre-Cambrian of Ontario, the well-known camps of Sudbury, Cobalt and Porcupine have been developed. In Manitoba, there was but little prospecting before 1912, when the Rice Lake Camp was opened up, and the Hudson Bay Railway gave access to the mineral areas in Northern Manitoba. Attention is being directed particularly to the Pas Mineral Belt and the Rice Lake Area, but prospecting is being carried on in the Cross and Pipestone Lake Area, the Oxford Lake, Knee Lake, God's Lake and Island Lake Area, and the West Hawk Lake, Falcon Lake, Star Lake Area.

Development

Since 1915, development has been rapid in the Pas Mineral Belt. Twenty million tons of low-grade copper ore have been explored by diamond drilling at Flin Flon Lake and are now being actively developed under option. High grade copper is exported from Schist Lake to the smelter at Trail, B.C.; over seven million pounds of copper have already been realized. Other copper prospects are under development and the building of a smelter at the Flin Flon property will lead to the establishing of a large copper industry. Gold is now produced at Wekusko (Herb) Lake, and active underground development work is being carried on at Wekusko Lake, Copper Lake and in the Rice Lake District east of Lake Winnipeg.

Transportation

Transportation is available to the Rice Lake Area by steamboat from Winnipeg to the Hole River, and thence by launch and Provincial wagon road. The Copper Belt is reached from The Pas by the Ross Navigation Co's. steamboats to Sturgeon Landing, thence by wagon road and canoe. Herb Lake is reached from Mile 82 on the Hudson Bay Railway (less than one day from The Pas.)

Mining Regulations

The mineral resources are under Federal control and the Federal mining regulations apply to Manitoba. No mining license is required. Work to the value of \$100.00 a year must be performed for a period of five years on claims filed under the quartz mining regulations. The office of the Mining Recorder for the Rice Lake district is in Winnipeg, and for the Pas Mineral Belt at the Pas.

Opportunities

The districts are comparatively new, and on the eve of substantial development. There are good opportunities at the present time for prospectors, mining companies, and particularly for development companies.

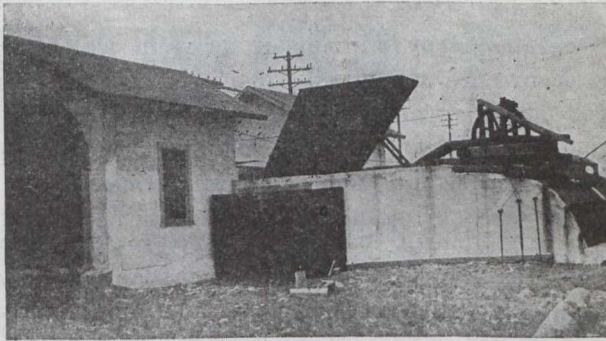
For maps, reports and general information, apply to—

THE COMMISSIONER OF NORTHERN MANITOBA
THE PAS, MANITOBA.

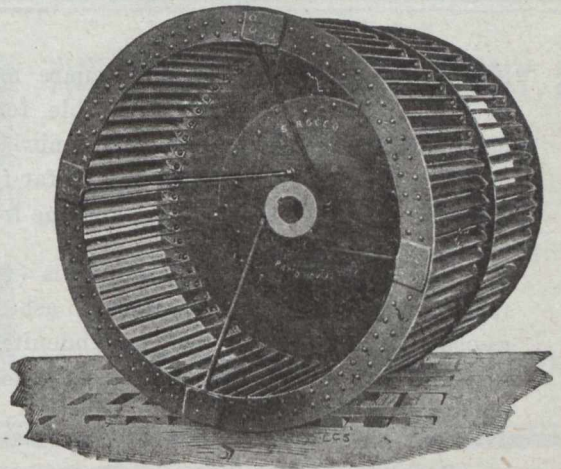
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Ontario's Mining Lands

Ontario, with its 407,262 square miles, contains many millions of acres in which the geological formations are favorable for the occurrence of minerals, 70 per cent of the area being underlain by rocks of pre-Cambrian age. The phenomenally rich silver mines of Cobalt occur in these rocks; so also do the far-famed nickel-copper deposits of Sudbury, the gold of Poreupine and Kirkland Lake, and the iron ore of Magpie and Moose Mountain Mines.

Practically all economic minerals (with the exception of coal and tin) are found in Ontario:—actinolite, apatite, arsenic, asbestos, cobalt, corundum, feldspar, fluorspar, graphite, gypsum, iron pyrites, mica, molybdenite, natural gas, palladium, petroleum, platinum, quartz, salt and tale. This Province has the largest deposits on the continent of tale, feldspar, mica and graphite.

Building materials, such as ornamental marble, limestone sandstone, granite, trap, sand and gravel, meet every demand. Lime, Portland cement, brick and tile are manufactured within the Province.

Ontario in 1918 produced 45 per cent. of the total mineral output of Canada. Returns made to the Ontario Bureau of Mines show the output of the mines and metallurgical works of the Province for the year 1918 to be worth \$80,308,972 of which the metallic production was \$66,178,059.

Dividends and bonuses paid to the end of 1918 amounted to \$13,359,210 for gold mining companies, and \$74,810,521 for silver mining companies, or a total of \$88,169,733.

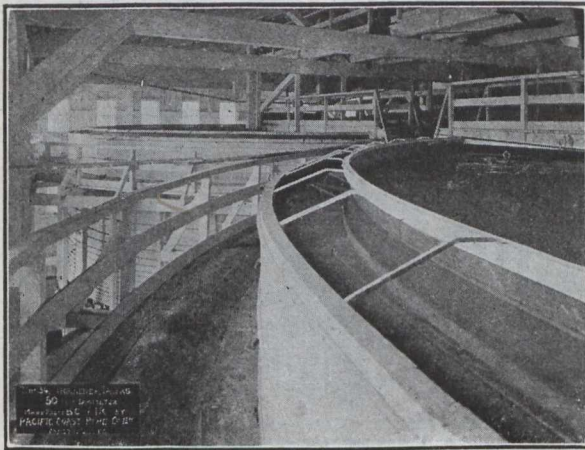
The prospector can go almost anywhere in the mineral regions in his canoe; the climate is invigorating and healthy, and there is plenty of wood and good water. Hydro-electric power is available in many parts of the Province, and many undeveloped water-powers remain to be harnessed. A miner's license costs \$5.00 per annum, and entitles the holder to stake out in any or every mining division three claims of 40 acres each. After performing 240 day's assessment work on a claim, patent may be obtained from the Crown on payment of \$2.50 or \$3.00 per acre, depending on location in surveyed or unsurveyed territory.

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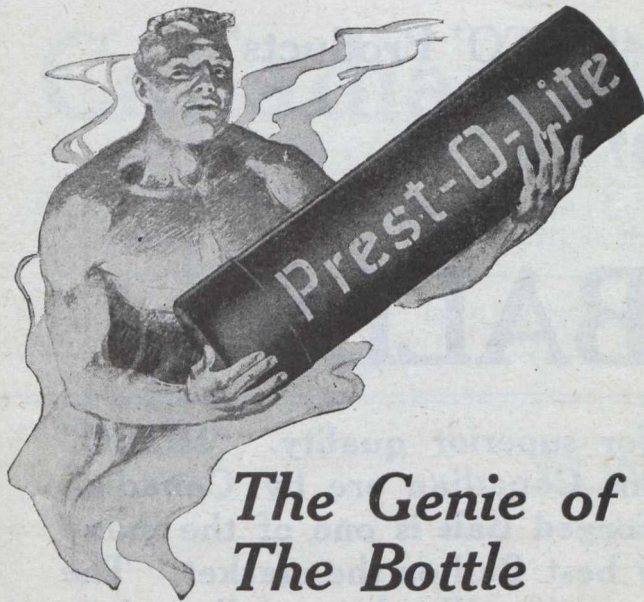
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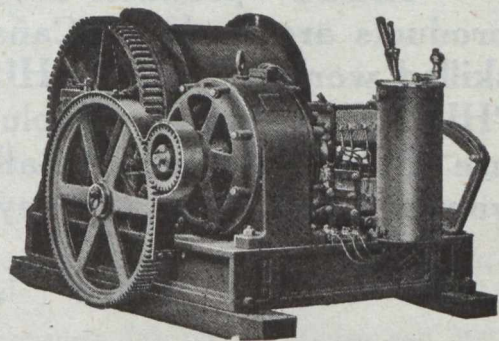
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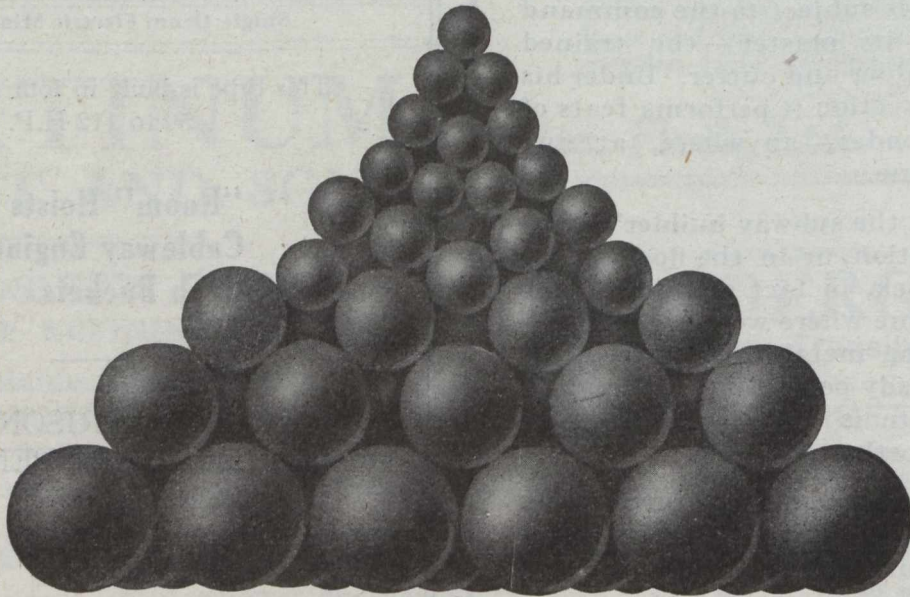
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VOL. XLI.

GARDENVALE, P.Q., June 18, 1920

No. 24

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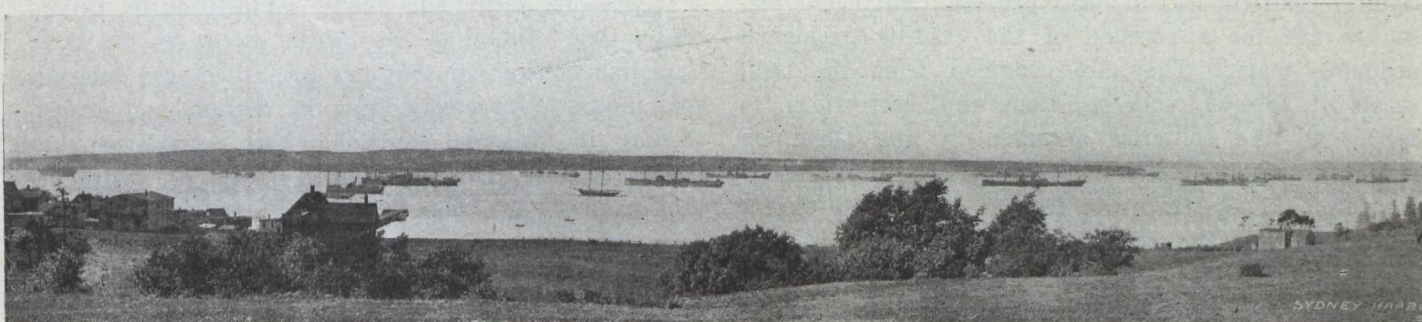
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EDITORIAL

Final Report of the Munitions Resources Commission

The Final Report of the Munitions Resources Commission is an interesting record of much hard work compressed into a short time, and performed, as is evident from the restrained wording of the record, in spite of much official apathy and with little indication of the scope of the work that it was proper for the Commission to undertake. The Mines Branch and the Geological Survey appear to have given every assistance and encouragement to the investigations of the Commission, and in particular the laboratories of the Mines Branch at Ottawa appear to have been most useful. The publication of this Final Report is to be commended, as it will not only serve to record the emergency measures of war time as a guide to the future similar emergencies that are to be anticipated, and the labours of the Commission itself, but will preserve for reference most of what is known in Canada regarding its 'war minerals,' those strategic raw materials that are earnestly desired in war time and completely forgotten in peace days.

The Commission had as Chairman Col. Thos. Cantley, and as Secretary, Mr. G. C. Mackenzie. Messrs. Robert Hobson and the Hon. W. C. Edwards were the other two members of the original Commission, to which was later added Col. Carnegie and Mr. Geo.

W. Watts. It would have been difficult to select a more representative personnel, or one more nicely combining knowledge of business and operating technical conditions with scientific attainments

The instructions given to the Commission were as wide as they were necessarily vague, but they were in effect to cruise Canada for such minerals as aluminium, chromium, fluorite, manganese, molybdenum, platinum and tungsten. How thoroughly the work was done, and what tremendous distances and physical difficulties were overcome by the investigators is revealed in the Report, which shows that the battles of the Empire were fought at home as well as abroad. Nor were the searchings of valley and mountain for scattered and elusive deposits unaccompanied by casualties.

To those who read between the lines, the Final Report of the Munition Resources Commission is a document that, despite its official wording and character, ranks in its record of labour, adventure and patriotic purpose, with despatches from the actual fighting fronts, and it is in fact the despatch of those who stayed at home and "minded the stuff" while others met and overcame the Philistine.

Geological Survey Undertakes Study of Paleobotany of the Sydney Coalfield

It is announced in the Sydney, Cape Breton, newspapers that Mr. W. A. Bell, Assistant Paeleobotanist of the Geological Survey, with two assistants will make a special study of the coal horizons in Nova Scotia during the summer, with particular reference to the evidence afforded by the plant remains as to the co-relation of the separated coal basis. The Survey is to be congratulated upon the decision to take up this long-neglected and very necessary enquiry. The recent discovery of salt at Malagash, Nova Scotia, and its possible association with potash-bearing minerals; the growing importance of oil-shales, and the necessity to elucidate the geological history of the Carboniferous of Nova Scotia so as to assist in the

search for hidden coalfields, are some of the reasons that make it urgently advisable that the geological maps of Nova Scotia, in particular those of Carboniferous areas, should be brought up to date. The recently issued topographical map of the Stellarton district is a welcome sheet, and it is hoped that it may be followed by a revised geological map. It is also suggested that maps are required of the topography and structural geology of the Sydney Coalfield, and that some attempt should be made to indicate the structural character of the submarine strata in this field, for which, when the paeleobotanical evidence is collated, there is ample information available. The inspection of the date upon the several sheets of the

Sydney coalfield will in itself provide a sufficient reason to ask for a revision of the existing geological ordnance maps. They are compiled from the field sheets of 1874-76, with additions and corrections to 1898. Of the collieries operated by the Dominion Coal Company in 1898 there are today only remaining three. These three are entirely exhausted—except for pillars—in the land area, and will shortly be superseded by new shafts sunk close to the shore so as to command as much submarine coal as possible. All the other operating collieries are new since 1898, to the extent of sixteen mines. When the old Reserve mine closes down, which will be before long, and when Dominion and Caledonia Collieries are superseded by new shafts at the shore, there will not remain in operation a single colliery that was working in 1898. In other words, the entire development of the existing collieries of the Dominion Coal Company has taken place since the last revision of the geological maps, and nothing of the knowledge gained by this development is shown on the existing sheets.

THE PRICE OF BITUMINOUS COAL.

Some interesting figures regarding the price of bituminous coal were divulged by the General Manager of the Montreal Light, Heat & Power Co. during the hearing of that company's application to increase the price of gas to the consumer, which we desire to comment upon without criticism of the policy of the company to which, we believe, no exception can be taken.

In 1914 this Montreal company was buying gas coal in the United States at figures as low as \$1.05 at the mine, with a freight to the lake front of 83 cents and a water transportation rate to Montreal of about the same, a total of \$2.71. Today, coal is costing \$9.00 at the mine, plus freight charges of \$3.86 per ton, a total of \$12.86, and it is mentioned that the coal is inferior in quality to the obtainable in 1914.

These figures are a sufficient argument for the protective duty on coal in 1914, and they are at the same time a partial explanation of the high cost of bituminous coal today. Coal was never mined and sold at a profit in the United States at \$1.05 per ton on cars at the pit mouth. It was only possible for coal mine operators to believe they were making a profit at such a figure by borrowing from posterity, and, unfortunately, this generation happens to be that posterity. The chief contemporary reasons for the high cost of coal are fairly well known, and need not be here enumerated, but one reason that is not so well known is that we are paying today for coal that was given away in previous decades. Some indication of the competition that had to be met by Canadian coal-mine operators is given by the figures above quoted, as in domestic mines \$1.05 would not have covered the labour charges incurred in mining and placing coal on railway cars.

It was this unfair and unwise competition by United States coal, utilised to the fullest extent by the large Canadian consumers, that has prevented our domestic coal industry from expanding its outputs and strengthening its financial position. The competition was unfair because it consisted in the sale of a product in Canada at less than its cost in the United States. The unwisdom of the procedure is just beginning to dawn upon the United States. That country finds itself obliged to pay today for yesterday's dissipation. The analogy between coal supply and pulpwood supply is fairly exact in the United States, except that in the case of coal the ultimate resources are immense. It is the immediately available coal that has been rendered costly, for the reason that coal operators have not realized that coal is a wasting asset, and that mining costs are only accurate if they are calculated on the whole life of a coal mine.

We believe it may be accurately affirmed that if the large Canadian consumers had been willing, say between 1907 and 1914, to pay a reasonable price for bituminous coal to domestic coal operators, the production of coal in Canada during the war, and at the present time, would have been larger; the cost of production would have been cheaper; transportation costs throughout Canada would have been smaller; and the Canadian consumer would today be assured of an ample supply of domestic coal at much cheaper rates than it is purchasable for at this date in North America.

It is poor national policy to starve and throttle a domestic industry in the days of peace and plenty, and then to expect in the day of emergency and want to find this industry lusty and productive.

It was recently stated in the Commons that in Canada we had the coal, but had not the brains to utilize it. Perhaps it would be more accurate to state that no concentrated application of national thought has ever been given to the fuel problem in Canada. If this should ever happen, there can be little doubt but that the problem could be satisfactorily solved.

WORKING MINING CLAIMS WITH AXES AND SAWS.

The disclosures made during the investigation being carried on in reference to the disposal of timber on Crown Lands in Western Ontario should serve to emphasize the need for more frequent investigation of applications for mining claims. It cannot be expected that a mining recorder should know a great deal about each of the many hundreds of properties that are taken up by prospectors. When a claim holder presents a statement that a certain amount of development work has been done, as required under the Mining Act, that statement cannot be carefully investigated before filing is permitted. The recorder's business is to file the sworn statement, not to investigate it.

In the development of our mineral sources the forest plays an important part. Fuel and mine timber necessary for preliminary work are commonly found on Northern Ontario mineral lands. The removal of the timber suitable for other purposes is desirable, and should be encouraged; but it should not be possible for anyone to cut timber on mining claims for other than mining development purposes without permission from the Lands and Forest Department and without proper compensation to the province.

The disclosures indicate that it is now possible to secure large tracts of forest in Ontario by taking up mining claims and filing statements that development work has been done on them. It is obviously the duty of the Provincial Government to see whether the statements filed are in accordance with the facts. But whether the statements filed prove to be honest statements or not, there will remain an obligation to see that there is a change in the regulations concerning the removal of timber from mining claims. One of the ways in which the Government has been willing to help the prospector has been that of allowing him to obtain fuel and mine timber on easy terms. The misuse of this privilege by others is likely to result in a further burden on the prospector if care is not taken in changing the regulations.

GOLD PRODUCTION IN ONTARIO.

A Toronto newspaper in its financial columns states: "There are many indications of a rapidly growing interest in the gold fields of Ontario. With the near exhaustion of deposits in all other parts of the world, northern Ontario must soon come into its own." "The near exhaustion of deposits in all other parts of the world" is a statement having all the inaccuracy of sweeping generalizations, and is a fair example of the "journalese" of the mining sections of our newspapers. The gold fields of Ontario will stand and fall on their own merits, of which the price of mining stocks is the last and least indication, but the figures of production are sufficiently impressive not to require bolstering by ridiculous inaccuracies.

The quarterly report of the Ontario Bureau of Mines states that owing to Ontario's contribution, Canada was the only country able to report an increased output of gold for 1919, and that production for 1920 so far shows an increase of nearly 46 per cent over the first three months of 1919. This is a record of which the Province may well be proud, and it is the best possible testimony to the producing capacity of Ontario's gold mines when such a record is possible under conditions of high cost of production and shortage of workers. It is the quantity and availability of gold in Ontario that is causing it to take so important a rank among producers. This is the fact that should be stressed. The falling off in gold production elsewhere—with the exception of certain

fields—is not caused by exhaustion of mineral but by the increased cost of mining and the fixed price of the product.

The concentrated character of Ontario's gold production is to be seen from the Bureau of Mines Report, which gives credit to the Porcupine District for ninety-one per cent of the gold output. The remainder came from Kirkland Lake, with the exception of the contribution of the Argonaut Mine, amounting to \$11,000 for the quarter.

CONSOLIDATION OF STEEL AND COAL COMPANIES A MEASURE OF NECESSITY.

During the Budget debate, the Hon. Mr. T. A. Crerar is reported to have quoted Col. Grant Morden as stating that British Steel Corporation, if and when completed, would be able to compete with the world. "Why not then," asks Mr. Crerar, "remove the duty on coal and steel?"

We do not believe that Col. Morden ever expressed himself to this effect, and if he did, he made an inaccurate statement. What we believe Col. Morden desired to convey was that only by a consolidation of the coal and steel interests of Nova Scotia could these hope to enter the markets of the world. On a fair and square basis of competition, without regard to the desirability of possessing operating collieries and active steel works in Canada, the coal mines of Eastern Canada, and those industries which are based upon coal, namely, the manufacture of coke, the recovery of the chemical products of coal distillation, the smelting of iron, the manufacture of steel and finished steel products, and the fabrication of steel ships, none of these can hope to compete successfully against the coal industry and its offshoots in the United States; or against the coal industry of Great Britain, Belgium, Germany, Russia, and China and its offshoots, under normal peace conditions.

The acceptance of Col. Grant Morden's proposals to consolidate their interests by the directors and shareholders of the coal and steel companies in Nova Scotia will not be evidence of a desire to water the stock, but it will be evidence of a realization that these various companies cannot anticipate successful survival under independent management. As we stated in the last issue of this monthly, "the formation of British Empire Steel Corporation is above everything a measure of necessity and self-defence. Its first duty will be to consolidate its position, to conserve its resources, and these tasks, rather than dreams of aggression, will occupy all the energies of those who are chosen to manage the Corporation for many years to come."

Mr. Crerar proceeded to express his inability to support a fiscal policy that develops mergers such as British Empire Steel, "which is practically cornering all the coal and iron ore in sight in the Maritime Provinces." It would not, by the way, be a great task

to corner all the iron-ores in the Maritime Provinces. The commercial occurrences are negligible, so far as known. They are probably not all known, however. "I would suggest to the Minister of Finance," continued Mr. Crerar, "that one of the most effective ways in which he can combat this growing tendency to combine various companies into huge combinations is by using the weapon of the tariff." Apparently Mr. Crerar considers combination to be wrong, in itself. In this regard Mr. Crerar is not consistent. Combination for the grain-grower was brought about by precisely the same economic laws that have suggested the steel merger, and we see little intrinsic difference between the high fixed price of wheat and the protection given to coal and steel by the tariff. The coming together of the coal and steel companies in Nova Scotia has been occasioned by a much more potent weapon than the tariff. Independent and competitive operation of the coal trade in Nova Scotia has been tried for sixty years, and has proved to be a conclusive and dismal failure.

The cost of mining coal in Nova Scotia is relatively high, and the physical difficulties adding to the cost of mining are increasing and must continue to increase. The supply of labor is relatively scarce, and a review of the past record of the dispersal of emigrants to Canada would indicate that it is likely to continue so. Moreover, Nova Scotia has only 400,000 inhabitants, and whether it can be remedied or not, it is a fact that the newly arrived immigrant only rarely goes to Nova Scotia, and, after residence in Nova Scotia, shows a desire to go westwards. These are some of the permanent drawbacks to mining coal on a large scale at relatively cheap cost in Nova Scotia, and explain why it is considered necessary to get together for mutual self-help and protection.

The main feature of Col. Morden's proposals as they appeal to the coal and steel companies, is the undertaking to raise \$25,000,000 of new capital from outside sources. This is not a large sum in consideration of the requirements. Much more than \$25,000,000 of new capital expenditure is required to place the coal and steel production of Nova Scotia on a basis that will make it a respectable factor in the world's markets. Some sense of proportion is required in viewing these matters. The statement has been made that five billion tons of coal are at the disposal of the proposed constituent companies of a mooted merger. Such a statement does not accurately represent the facts unless it takes into account the position of the coal reserves. It would be much more accurate to state that large capital expenditures, necessitating the obtaining of outside assistance, are necessary to place the coal holdings of the companies at their own disposal.

As to the effect of the protective duty on coal, what does it amount to? There is no duty on anthracite, and a very small duty on bituminous slack coal. The duty on bituminous coal is 53 cents, and by judicious

shipments of slack and screened coal and their subsequent admixture, it can be lessened to an average of 33½ cents. Can it be contended that an impost of this amount inflicts any great hardship on Canadian consumers, or that its complete removal would lower the cost of United States coal to the consumer here? The protective value of the duty has almost disappeared in the rising cost of coal production and transportation. The duty might be taken off United States coal tomorrow, and the Canadian consumer would never know it from study of his coal bill. The chief loser would be the Canadian Treasury, and the most apparent result would be the necessity for new taxes to make up the deficit occasioned by loss of this revenue. And there are a few other reasons, which the Finance Minister could doubtless mention, why it is not desirable to encourage greater importations from the United States at this time. A thirteen per cent discount on the Canadian dollar is one of them.

The coal duty today does not represent any appreciable or adequate measure of protective tariff. It is really an excise duty for the raising of inland revenue.

The value of the coal deposits of Nova Scotia consists in large measure in their being the one Canadian source of coal east of Saskatchewan. They constitute 0.7 per cent of our national coal reserves, but they are the only source of coal supply that Canada owns within a territory that contains 80 per cent of her population. It is their position and strategic value that is remarkable, not their extent. They can only be made fully available as a source of coal supply in Canada by the expenditure of very large sums of money, and any consolidation of interests that carries with it the promise of such expenditure will benefit the country as a whole. If Mr. Crerar were Minister of Finance in Canada we can conceive that he would welcome a business consolidation that promised increase of employment, increase of internal revenue, increase of provincial coal royalties, decreased public taxation, and a decrease in imports accompanied by an increase in exports. All this, and much more, will proceed from the consolidated operations of British Steel Corporation if its organization should be consummated, and if its promoters will recognize from the first the relatively high cost of mining coal in Nova Scotia.

WORKMEN'S COMPENSATION IN NOVA SCOTIA

In this issue is published a digest of the Report of the Workmen's Compensation Board of Nova Scotia for 1919. Of especial interest is the gratifying reduction in the number of fatal accidents, and the lowering of the assessment rates in the coal-mining and iron and steel trades. In commenting in these columns on the 1918 Report we suggested that it should be possible eventually to fix the coal-mining assessment at 2.5 per cent of the payroll. The rate was fixed for 1919 at 3 per cent, but the year's opera-

tions show a surplus in this class of \$127,640. The rates for the iron and steel trades is placed at 1.5 per cent, and in this instance the surplus of approximately \$30,000 indicates that it is probably a permanent rate. We do not believe that the hazard in coal-mining is twice that in the iron and steel trades, and with the respectable disaster reserve now accumulated, a further reduction in the rate of coal-mining assessment may be anticipated. Coal mining is not so distinctly a hazardous occupation, as it is an occupation in which a large number of simultaneous deaths may occur for well-known reasons.

WORKMEN'S COMPENSATION IN NOVA SCOTIA DURING 1919.

The Report of the Workmen's Compensation Board for 1919 in Nova Scotia records a gratifying decrease in the number of fatal accidents. The figures were abnormally high in 1917 and 1918 because of the incidence of two disastrous coal-mine explosions and a lumber camp fire in those years, but after allowing for these occurrences, the record is still very encouraging, as will be seen from the comparison following:

	1917.	1918.	1919.
Fatal Accidents	146	185	47
Deduct Disasters	65	105	..
	<u>81</u>	<u>80</u>	<u>47</u>

"A further analysis," states the Report, "discloses that the greatest improvement must be credited to the coal mining industry, in which not only were disasters avoided but the ordinary fatal accidents were reduced to exactly half what they were in 1918, as shown by the following statement:—

	1917.	1918.	1919.
Total Fatal Accidents	97	126	19
Deduct Disasters.	65	88	--
	<u>32</u>	<u>38</u>	<u>19</u>

The total number of compensable accidents has varied very little, being 4,888 in 1919, comparing with 4,836 in 1917 and 4,931 in 1918.

Assessment rates were lowered from those of 1918 as follows:

	Assesment Rates 1918.	1919.
Coal Mining	4.	3.0
Steel and Iron Mfg.	1.9	1.5
Building	2.0	1.5
Stevedoring	4.0	3.0
Steam Railways	4.5	2.0
Lumbering, etc.	3.0	2.5

The lowering of rates is stated to have been justified, and to have resulted in substantial surpluses during 1919, except in the case of lumbering and saw-mill industries, which shows a deficit. The divisions of mining, iron and steel manufacture, and railways showed quite large surpluses.

The ratio of administration expenses to the total assessment has shown a steady increase, being 5.76 in

1919, compared with 3.66 in 1918 and 2.58 in 1917, the first year of operation. This understandable, as the work of the Compensation Board will be for a certain period a cumulative condition.

The investments of the Board at the end of 1919 totalled \$2,233,026, compared with \$1,579,031 at the end of 1918. The whole is invested in Nova Scotia provincial bonds and Dominion Government bonds, the last-named to the extent of \$1,990,000.

The Report mentions the formation of an Accident Prevention Association, previously noted in these columns.

The accounts of the Board has been audited by the Provincial Auditor.

A significant statement is that out of 4,504 cases of temporary disability during 1918 there developed sepsis in 104 cases. In 1917, by a coincidence the number of similar cases was also 4,504, but only 74 cases of sepsis developed.

The Report contains a number of interesting statistical tables, which, if continued under the same arrangement for a number of years, will permit of valuable deductions.

CORRESPONDENCE

"Fine Arts vs. Styracosaurus Albertensis."

Quebec, June 13th, 1920.

The Editor,
 "Canadian Mining Journal,"
 Ste. Anne de Bellevue, Que.

Dear Sir,

I read with dismay your editorial in the Journal number of June 11th, entitled **Fine Arts vs. Styracosaurus Albertensis**, and I hope that you will not let the matter rest there.

It is a disgrace on the part of the Government authorities, that they should entertain, or even think of, such a thing as boxing up the collection of Vertebrate Paleontology, to put it in the "oubliettes" of the Victoria Museum, for the sake of making room to display oil paintings and water colours by Canadian artists.

This paleontological collection was put together by the labour of love and the love of labour, representing the life-work, of many Canadian scientists. Its educational and scientific value to the nation (excepting perhaps the philistine element, which unfortunately seems to be largely represented in the powers that be) is beyond all doubt, whereas the worth of the intended substitute, as an agency and means to develop and improve Canadian taste and culture is doubtful. We have good Canadian artists, but judging from the display of pictures at present exhibited in the Victoria Museum, there are also many poor ones, and the latter are liberally represented in the Art Gallery of the Museum.

Our neighbours to the south realize the value of fossil collections such as the one the fate of which now hangs in the balance. The Smithsonian Institution, the Carnegie Museum, the American Museum of Natural History, the United States Geological Survey, have collectively, spent hundred of thousands of dollars in digging out vertebrate fossil remains from our own Cretaceous and Jurassic beds in Alberta and Saskatchewan, and they have deemed the money well spent, as they have obtained many unique specimens, which would have remained in Canada, if adequate facilities had been extended in time to our own Geological Survey.

My plea may sound feeble, but I sincerely hope that personalities, more authorized to speak than I am, will take up the matter and raise such a voice of protest and deprecation that the skeletons of the denizens of our country in past geological ages will remain on view in the Victoria Museum. Otherwise, may the shades of Cuvier, Cope, Marsh, Logan, Dawson, Whiteaves, and Lambe haunt the sleepless nights of those responsible for their removal.

Yours very truly,

THEO. C. DENIS.

INSTITUTE NOTABILITIES.

Mr. Charles Camsell.

Mr. Camsell's career is one of such variety and interesting adventure that it is impossible to even summarize it within the limits usually assigned to this purpose by the Bulletin. A volume would be better devoted to the purpose. Son of Julian Stewart Camsell, Captain in the British Army and Chief Factor of the Hudson's Bay Company, Charles Camsell was born at Fort Liard, N.W.T., in 1876. At an early age he was sent to school at Winnipeg, journeying across the plains from Edmonton by ox team.

At Winnipeg he received his primary education at St. John's College, and then in due course graduated in science at the University of Manitoba, also the alma mater of Professor J. C. Gwillim, who slightly preceded him. In college days Camsell was captain of the University football teams, both association and rugby, and seems to have been recognized as an all-round athlete.

On leaving college in 1894, he returned to the Mackenzie River country intending to spend a winter at his home. But by the trend of circumstances he actually spent the next six years in the region north of latitude 60 deg., ranging between the Coppermine river and the Pacific coast. He describes his occupation during this period as "hunter, trapper, fur trader and dog-driver." It was naturally one of incident and adventure. Amongst other experiences in this return to the 'simple-life,' he set out on snow-shoes, in 1897 to go to the Klondike, then in its early 'hey-day,' by way of the Liard and Pelly rivers. This seems to have been one of the few cases in which Camsell ever failed to reach his objective. Game and supplies failing on the head waters of the Pelly, he fell on evil days and barely subsisted for three months on rabbits, squirrels, fish-hawk and wolf. Reaching the Cassiar country in the fall of 1898, 'dead broke,' he, for a time, worked as boatman and cook on a freight scow plying on the Dease river. It is interesting to note that of the three other members of the crew, two were graduates of Cambridge University and the third, of Trinity College, Dublin. The captain was an Indian, and the mate, as became his intermediate position, was a halfbreed.

Disregarding the social symmetry of these surroundings, with the coming on of winter Mr. Camsell engaged as mail carrier on the Stikine river between Wrangell and Telegraph Creek, driving a dog team throughout the winter of 1898-99. In the summer of 1899 he again crossed the mountains to the Mackenzie river, this time by canoe, and met experiences in traversing the Grand Cannon of the Liard from which few others would have emerged to tell the tale.

After spending the following winter in trapping furs at Fort Wrigley, he joined a Geological Survey

party under Dr. J. M. Bell in the spring. This party explored Great Bear lake and later in the season made a dash to the Coppermine river. On the return journey to Great Bear lake they barely escaped starvation and exhaustion and later being frozen in at Fort Chipewyan covered the remaining 600 miles to Edmonton on snow-shoes.

Turning from the 'wild and woolly,' Mr. Camsell then proceeded to Kingston, Ontario, and spent the remainder of the winter at Queen's University, studying geology and mineralogy under Dr. W. G. Miller and Professor Wm. Nicol. The summer of 1901 he spent exploring for the Algoma Central Railway in the Moose River basin and on James bay. On the way out from this trip, he sampled parts of the present Hollinger mine, but obtaining an assay of only \$5.20 per ton, no ground was staked.

After spending the summer of 1902 in exploring the wood buffalo country between Peace river and Great Slave lake, for the Geological Survey, Mr. Camsell devoted the following winter to post-graduate study in geology at Harvard University under the instruction of Professors Wolff, Davis and others. Obtaining appointment as geologist to the Canadian Northern Railway Company he was engaged in explorations in northwestern Ontario and eastern Manitoba, until June 1904, when he was appointed to the



Mr. CAMSELL, who is appointed Deputy Minister of Mines at Ottawa.

permanent staff of the Geological Survey on which he has since accomplished much valuable and well-known work. In 1904 he traversed parts of Patricia and in 1905 from Dawson Y.T., explored the Stewart and Peel rivers and reached the mouth of the Mackenzie.

From 1906 to 1913 he was occupied largely with problems of economic geology in southwestern British Columbia. His reports on Hedley, Tulameen and other mining districts made during this time are well-known standards. During 1908, he also pursued post-graduate study at the Massachusetts Institute of Technology, under Professor Daly, Lindgren and their associates.

In 1914, Mr. Camsell was placed in charge of the exploratory work of the Geological Survey and besides directing several parties in the field also made an exploration of the country between Athabaska and Great Slave Lakes, which amongst other results made known the Taltson river for the first time.

When it was decided to establish an office of the Geological Survey in British Columbia, Mr. Camsell was selected to open and take charge of the division of the Survey with headquarters at Vancouver, where he has since resided.

Mr. Camsell is a Fellow of the Geological Society of America, of the Royal Geographical Society and of the Royal Society of Canada, and is also a charter member of the Harvard Travellers Club. He joined the Canadian Mining Institute in 1906, became Secretary of the British Columbia Division in 1919 and a Councillor for British Columbia in 1920.—From C.M.I. "Bulletin."

C. CAMSELL APPOINTED DEPUTY MINISTER OF MINES

It is announced from Ottawa that Charles Camsell has been appointed Deputy Minister of Mines, succeeding Mr. R. G. McConnell, who is superannuated at his own request. Mr. Camsell has for some time been in charge of the British Columbia office of the Geological Survey, where his capabilities for direction of affairs have been recognized and appreciated.

THE PRODUCTION OF NICKEL OXIDE

The recently issued report of the Ontario Bureau of Mines shows the Province to be now a large producer of nickel oxide. This metal has been made here in small quantities for some years; but only recently has the amount been notable. The report shows that during the first three months of the present year there was produced 1,788,183 lbs. nickel oxide valued at \$413,944. This doubtless came largely from the Port Colborne refinery of the International Nickel Company of Canada. This company sends a large quantity of the oxide to England. Other producers include the refineries at Deloro and Thorold where nickel oxide are recovered in treating silver ores from the Cobalt district. It was not until refining of nickel-copper mattes was started at Port Colborne that the production of nickel and nickel oxide in Ontario assumed its present proportions.—R.E.H.

RESIGNATION OF MR. R. F. M. SYLVESTER.

(From the Victoria "Colonist.")

All those who know how Mr. R. F. M. Sylvester has been instrumental in developing the mining industry of British Columbia will regret to learn that he has resigned as managing director of the Granby Consolidated Mining and Smelting Company. That organization owes a great deal to his progressive business capacity and the vision which he brought to bear on its operations in this Province. He was aggressive and keenly alive to the possibilities of the acquisition and the development of new prospects. Vancouver Island owes to him the opening of the coal mining area at Cassidy's Landing, where there is now in existence the most model coal mining town in the world and where the industry gives employment to between 400 and 500 men. Taking his administration of the affairs of the company in this Province from every standpoint, he was responsible for an era of progress which is seen today both on this Island and at Anyox, and we believe he was determined to bring about such further development as would have redounded to the advantage of both the company and British Columbia. The Granby Consolidated loses an asset by Mr. Sylvester's resignation. It is of interest to learn that he intends to make his home in Vancouver. No doubt before long he will be heard from as instrumental in mining ventures on a large scale.



Mr. R. F. M. SYLVESTER, who has resigned as Managing Director of the Granby Consolidated Mining and Smelting Company.

The Dominion Government proposes continuing the office of Director of Coal Operations in the Province of Alberta. A Bill authorizing this was before the Canadian Senate recently and Senator Robertson, Minister of Labour, answering a question, stated that the Department of Justice had ruled that the legislation was constitutional.

IV. The Graphite Industry

By CHAS. SPEARMAN*

Foreign crucible graphite vs. domestic (Canadian and American): A Comparison.

Of all the foreign graphite placed on the market that from Ceylon is probably the most important and commands the most attention on account of its reputation based upon chemical purity and physical properties. The next foreign producer of importance is probably Madagascar, which, as far as quantity is concerned, is probably equal in output to, if not greater than that of Ceylon, but the quality is said to be inferior.

Of course it is to be expected that the grades of graphite from the various producing deposits of Ceylon and Madagascar vary in quality for the different commercial standards. Uniformity in this respect could hardly be expected, but, generally speaking, although there may be just as good graphite in Madagascar as in Ceylon yet the average of the output from Ceylon appears to be of a better grade for the market requirements than that of Madagascar. In this regard there are, chemically speaking, many grades of each commercial standard on the market from both countries classed according to size of product, etc., such as the lump, chip and dust of Ceylon, which vary considerably in carbon content for products of like physical classification; and the quotation varies as the carbon content, for instance, Ceylon lump may vary in price from 5 cents to 16 cents per pound at the present time according to its graphite-carbon content, and to some extent its physical properties.

Ceylon graphite found its way into the markets of the world at an early date. The nature of the deposits* offered unparalleled opportunities to place a relatively high-grade stock on the market at a low cost as compared with the disseminated deposits of Canada and the United States.

Generally speaking, Ceylon graphite is gathered from the deposits and sorted, averages between 80—85 per cent carbon. It is for this reason put on the market for crucible trade. Domestic deposits range from 2½ per cent. to 10 per cent. carbon only. It was very difficult to recover graphite from the grade of domestic deposit and at the same time show a margin of profit in the operation. Thus foreign stock became established in most countries and was regarded as unequalled for practically all commercial purposes. Then again the output from Ceylon and other foreign producers was so large that capital hesitated to venture into the development of the relatively low-grade disseminated domestic deposits on account of the higher costs and the primitive state of the milling art, which was purely experimental and too often led to grievous financial losses; more especially where the deposits contained such impurities as mica, fibrous silicates, etc. All this experimental work and consequent losses served in a great measure to promote the interests of

the foreign producers at the expense of the interests that attempted to foster the domestic industry.*

Ceylon graphite had the advantage of being sufficiently pure, commercially speaking, to market with but little sorting after being extracted from the deposits and not only this but in every instance where the domestic graphite was of equal or even greater carbon content the physical properties of the flake were such that it was vastly inferior, due to the method of milling. This feature permitted foreign graphite to meet all domestic opposition and further discouraged the local industry.

The local industry meeting with but little encouragement thus far, due primarily to the lack of efficient processes for the recovery of the graphite, and to the decided natural and local facilities of the foreign producers, contributed but a small tonnage to the world's requirements. Spasmodically the industry would make attempt to recover by taking advantage of some unusually favorable local condition and thus contribute a small tonnage for the time being, then because of excessive costs and foreign competition would cease operation, and add another chapter to the history of failures.

With improved milling methods gradually introduced within the past few years which make it possible to produce flake graphite from domestic disseminated graphite ores, comparable to, and even better, physically and chemically than the so-called high-grade foreign massive stocks, the establishment of the domestic graphite industry on a permanent basis may be expected in a comparatively short time.

The demand has now a tendency to call for a relatively high-grade graphite of better than 90 per cent. graphite-carbon content. The foreign deposits capable of marketing such a product, without first milling and refining, are indeed but few in number and wholly inadequate to supply the consumption. Foreign stock 90 per cent. graphite carbon is quoted at about 16 cents per pound today, which, if added to the expense of milling and refining, would bring the price per pound somewhere around 19 and 25 cents. This would be a disadvantage to the foreign producer and would probably eliminate foreign stock to a great extent from active competition with domestic flake, which could be sold at a much lower figure and still maintain a good margin of profit.

Much has been said regarding the relative merits of Ceylon graphite as compared with domestic flake for use in the crucibles industry. By way of comparing the properties of each it would be well to mention a few points in a general way. For example, suppose at one end of a series a graphite crucible be carved

*Geo. D. Dub, War Investigation Series No. 3 U. S.

*Fred. W. Moses War Investigation Series No. 8 U. S. Bureau of Mines 1918.

*F. G. Downs, E. and M. Journal, No. 6, Vol. 105, Feb. 9, 1918, P. 282.

*C. Spearman, Can. Mining Journal, Jan, 16th, 1920—P. 32.

°W. Lindgren—Mineral Deposits, page 703.

*Consulting engineer and metallurgist, Room 416 Power Building, Montreal, Quebec.

from a mass of pure graphite of the crystalline variety such as is used in the industry and at the other end of the series a crucible made from a very finely divided crystalline graphite. The crucible made from the pure massive graphite at the one end of the series would fail from lack of tensile strength in a direction normal to the cleavage planes, and under relatively low pressure the crucible would have a tendency to part along the cleavage planes. To overcome this weakness the graphite must be reduced to a certain mesh and the individual particles so placed in the crucible mixture so as to eliminate as far as possible the general parallelism of the cleavage planes of the mass taken as a whole. At the other end of the series where a finely powdered graphite was employed, a high percentage of clay would be required to coat or cover the particles, and thus the crucible approaches excessive impurity, lacks conductivity, is apt to brittle, and may possess drying cracks, etc. There is a degree of disintegration somewhere between the one massive piece at the one end of the series and the finely divided powder at the other end of the series, where the crucible stock will possess the maximum efficiency for its special use. Therefore, to sum up, an ideal crucible should:

(1) contain as much graphite carbon as possible without impairing its strength. It is then essential to start with a fairly high grade graphite,—the higher the grade the more suitable for the purpose,—and all impurities such as the usual non-metallic gangues, and in fact everything except graphite, constitutes an inert member to the whole. These impurities may be termed inert as they are useless in this particular art, and besides call for additional clay to coat their surfaces and thus further reduce the carbon content of the crucible. There are again other impurities which cause certain chemical reactions that are to be avoided.

(2) The flake must be of certain dimensions as to area and thickness. The size of the particles taken collectively must vary uniformly within certain limits. The area must be such that the least possible clay be used to coat the surfaces and at the same time preserve efficiency, and in this the area created must cease before the point is reached where the thickness of the flake is such that its tensile strength is endangered in a direction parallel to the cleavage planes. In practice the above points referring to dimensions are embraced in a general way by the average specifications of the consumer which are as follows:

“All particles should pass through a standard 16-mesh screen, about 50 per cent. rest on a 50-mesh standard screen, not more than 2-4 p.c. pass through an 80-mesh standard screen and all rest on a standard 90-mesh screen, and to regulate the thickness of the flake it is specified that 100 gms. loose stock shall occupy less than 110 cu.cm.”

(3) The promiscuous arrangement of the graphite in the crucible mixture is also a matter of importance. This destroys parallelism of arrangement and promotes tensile strength. It is therefore necessary to have a uniform arithmetical progression of sizes between any two limits such as the 16 and 90-mesh sizes.

With the foregoing dealing principally with physical specifications, a few comparisons between Ceylon and domestic graphite may now be made.

Some consumers believe Ceylon graphite to be the “acme of purity.” This was true up to a recent date. Statistics will show that the average graphite im-

ported for crucible manufacture ranges from 83-87 per cent. graphitic carbon while it is now possible to place domestic flake on the market ranging from 92 to 98 per cent. pure, depending upon the demand.

Some claim that the peculiar fibrous structure of Ceylon graphite acts as a stronger binding agent, and requires less clay in a crucible batch or mixture than the flake variety.* If Ceylon lump be crushed to the required size for crucible use the fibrous structure is more or less destroyed, and where it did exist the lateral axis of the fibre is so diminished as compared with its longitudinal axis that the strength of the fibre as a whole is greatly reduced. For the most part, rough angular particles predominate, which probably possesses a little more density, which in turn is more or less offset by lack of tensile strength due to the tendency to part at the cleavage planes when the density exceeds a certain degree. Then again as far as a regular balanced binding-area is concerned, the more or less disc-shaped flakes afford an interlocking medium vastly superior to the so-called fibrous stock, which range in shapes from the thin needle shaped “fibre” to the roughly shaped parallelepiped, the smaller axis of which just passes through a standard 16-mesh opening; and, when the right thickness of flake is maintained, less clay is used than with the angular variety. These shapes do not combine in a crucible mixture to give the same general efficiency as to the flake-shaped particles, and any attempt to alter the general shape of these particles so as to have them compare favorably with the flake variety, would cause abnormal losses by the creation of fines due to the more or less brittle nature of the fibrous variety as compared with the relatively tenacious domestic flake.

It has also been claimed that when flake graphite is mixed with the requisite clay for crucible making and subjected to the necessary pressure for moulding purposes, this pressure causes the flakes to orient themselves with the planes containing the longer axis normal to the direction of pressure. This argument is rather far-fetched and is not borne out in practice. In the first instance, if properly mixed so as to avoid general parallel arrangement of the flake and the more or less plastic mass then subjected to the necessary pressure, this pressure will be distributed equally in all directions upon the enclosed mass and therefore there will be no tendency to parallel arrangement of the flake. Even though all other conditions were such as to permit this law of parallel arrangement to take place, the time period, which is the important factor, is so insignificant that readjustment of the flake could be scarcely measured and from the practical standpoint could be treated as though it did not occur at all.

A point in favor of Ceylon graphite is the greater density of a unit volume of the loose crucible stock, 100 gms. occupying approximately 90 cu. cm. while the damaged thin domestic flake* resulting from the older experimental process tested from 130 to 150 cu.cm. for an equal mass. Domestic flake made by recent processes has tested lower than 100 cu.cm. and probably makes a better-balanced crucible than Ceylon graphite

*H. S. Spence—Can. Graphite Industry. Can. Bureau of Mines, Summary Report 1918.

*F. G. Downs, E. and M. J. No. 6, Vol. 105, Feb. 9, 1918, P. 282.

by combining tensile strength with high carbon content.

As to chemical purity, the domestic flake can now be placed on the market with a much higher carbon content than that of any of the foreign product now offered. This reduces any of the deleterious gangues, if present, to a quantity so small as to come well under all chemical specifications of the consumer.

As far as the combustion test is concerned the domestic flake is equal and in many cases superior to that of the foreign stock.

From the above it is difficult to see where the foreign graphite taken as a whole can compare with the domestic flake such as can be placed on the market today. Many of the buyers still claim that it would not be advantageous for them to buy domestic flake due to its impurity. This is done, in many cases, to obtain a better quotation, and is effective, generally speaking. If this domestic product is really inferior why do the consumers consider it at all?

For a time during the war it was made compulsory to use domestic flake mixed with Ceylon for crucible purposes. The mixture was approximately 75 per cent. Ceylon material supplied the higher carbon content to have made a very good mixture because the domestic flake furnished extra binding material to compensate for the weakness in the Ceylon graphite, while the Ceylon material supplies the higher carbon content to compensate for the relatively low carbon of the domestic flake then used.

Great strides have been made in the art of concentrating disseminated graphite ores in the past few years, stimulated no doubt by the demand caused by the war. These improvements have practically placed foreign graphite where in a short time the competition will be so keen as to practically eliminate it, if disseminated deposits can produce and maintain the tonnage to meet consumption requirements. The outlook for the future tonnage appears to be promising as the domestic disseminated deposits have been scarcely developed as yet, and there is the possibility of finding new deposits to replace those that become depleted.

Th old prejudices against domestic flake are gradually disappearing and when the formulae for crucible mixtures are so arranged as to admit of its use a great obstacle to the industry will be removed.

Much could be done to assist the domestic industry if consumers and producers insisted upon a strict physical and chemical standardization of the stocks to meet the requirements, establish a high standard and have the price based accordingly.

Note:

This is the fourth article on the Graphite Industry contributed to the "Journal" by Mr. Spearman. For previous articles see issues Feb. 12th, page 87, Aug. 6th, 1919, page 586, Jan. 16th, 1920, page 32. See also account of Dominion Crucible Company in last-named issue.

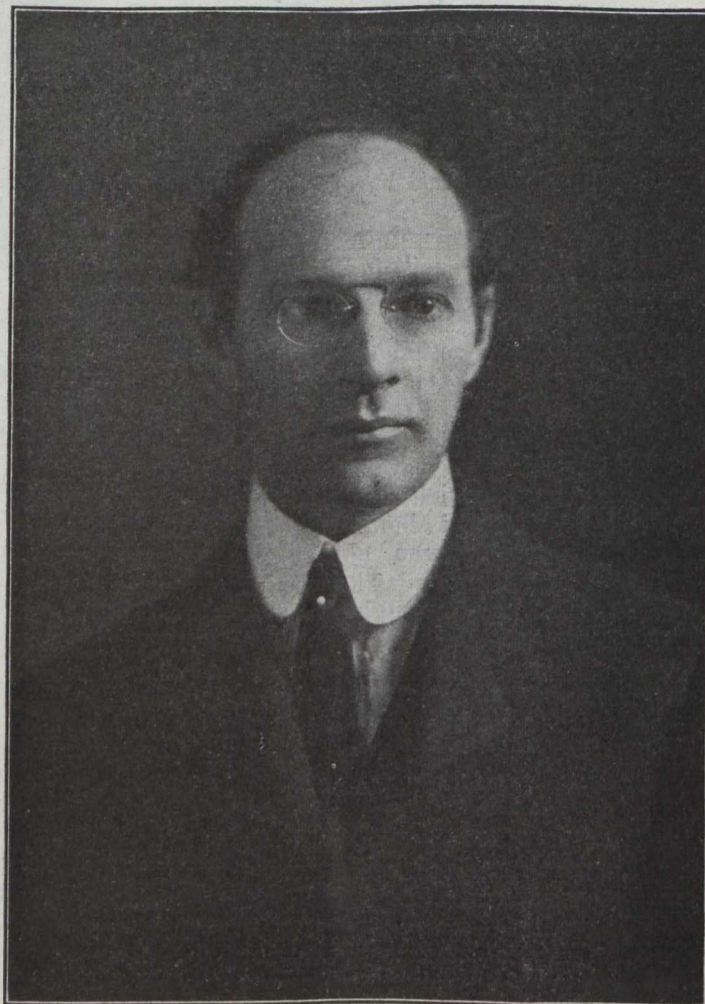
INCREASE IN SELLING PRICE OF COAL AT CALGARY

Calgary prices for coal have been raised from \$9.75 to \$10.50 per ton for lump coal, and to \$8.75 for steam sizes. This increase is necessitated by the advance in miner's wages. The miners have not yet signified their acceptance of the proffered increase, but if ratified it is retroactive to 1st April.

"THE CANADIAN INSTITUTE OF MINING AND METALLURGY."

The "Bulletin" announces change of name, and appointment of Mr. Lamb as Secretary Emeritus

With this month the Institute opens a new chapter in its history. The legal formalities which were necessary in order to give effect to the decision to change the name having now been all complied with, the Canadian Mining Institute became, on April 11, the Canadian Institute of Mining and Metallurgy. As the letter ballot proved, the change was desired by the majority of the members, and there is no doubt that those who, for sentimental or other reasons, were in favor of adhering to the original name will soon become reconciled to the change. It is probable that the majority of those who would have preferred to perpetuate the old style are charter members, or at least members of very long standing, who have watched the Institute grow from very humble beginnings, and who have helped to steer it through troubled waters on many occasions. The Institute has attained its present strong position largely as the result of their labors, and is only natural that they should be jealous of its traditions; but it is safe to say they will be no less loyal to the Canadian Institute of Mining and Metallurgy than they were to the Canadian Mining Institute. As showing the present-day tendency of mining men to give proper recognition to metallurgists, however, it



Mr. H. MORTIMER LAMB, who retires after 15 years' service as Secretary of the Canadian Mining Institute, and is appointed Secretary Emeritus.

is of interest to note that the Mining Society of Nova Scotia, with traditions extending back even further than our own institute, and with a record of which any society might well be proud, is now considering the advisability of changing its name to "The Nova Scotia Mining and Metallurgical Society."

This month also marks another break in the continuity of the Institute's history, the Council having accepted, with great regret, the resignation of Mr. H. Mortimer-Lamb as Secretary. Mr. Lamb has ably filled this position for a period of fifteen years, and has thus been very closely associated with the work of the Institute throughout the most critical stages of its growth. Fortunately, the Council has been able to retain in some degree his services and the benefit of his experience, and as Secretary Emeritus Mr. Lamb will continue for the time being at least, to devote attention to the affairs of the Institute, particularly as the editor of the Annual Transactions.

FIRST QUARTER FOR ONTARIO MINES SHOWS INCREASE.

The Ontario Department of Lands, Forests and Mines has just issued a report showing an increase in the value of the output for the first quarter of the year in metalliferous mines, smelters and refining works of Ontario, of nearly one million dollars over the corresponding period of 1919.

Owing to Ontario's contribution, Canada was the only country able to report an increased output of gold of 1919. Production for the first quarter shows an increase of nearly 46 per cent over the first three months of 1919. Of the total output of \$2,953,036, Porcupine contributed \$2,694,665. Kirkland Lake \$247,339, and the balance \$11,032 came from the Augonaut mine in Gauthier township and from refining of nickel-copper matte. The output from Porcupine came from the following mines: Hollinger Consolidated, McIntyre, Dome, Dome Lake, Porcupine Crown, and Davidson Consolidated. At Kirkland Lake the producers in order were Lake Shore, Teek-Hughes and Kirkland Lake. Production is still hampered by insufficient labor, and although the wage scale has been increased to equal that at Sudbury and Cobalt, the effect has not been appreciable. In addition, gold mines produced 24,913 ounces of silver valued at \$31,373. The total tonnage of ore milled was 360,327 tons. As regards mill equipment the producers report 5,485 tons daily milling capacity which includes 210 stamps capable of treating 3,880 tons. Ball and tube mills installed have a capacity of 1,605 tons daily.

Silver.

The quantity of silver marketed during the period shows a falling off, despite the high price of the metal, which averaged \$1.30 per fine ounce. When the price began to recede, some of the larger producers held a considerable proportion of their output in the hope that the market would recover. The course, however, continued downward, the present level being about \$1 per ounce. The average price was \$1.01 for the corresponding period in 1919. Of the total of 2,280,665 ounces, Cobalt and Gowganda contributed 2,244,709 ounces while 11,763 ounces were recovered from nickel copper refining and 24,193 from gold ores. In addition certain silver producers were paid \$7,111 for 54,518 pounds of cobalt contained in the ores and concentrates sold.

Refineries:—At Deloro, Thorold and Welland the three operating silver-cobalt refineries treated 219 tons of ore, 655 of concentrates and 626 of residues for a total recovery of 829,142 ounces of silver in addition to arsenic, cobalt and nickel in various forms. Only 5,535 lbs. of nickel oxide were marketed in this form, the major part of the output, as noted in the table, coming from the Port Colborne nickel-copper refinery. Metals Chemical, Ltd., at Welland has sold its plant to Ontario Smelters & Refiners, Ltd., which will carry on the business in future, using a different process. The new company also owns the plant at Chippawa formerly operated by the Standard Smelting and Refining Company.

Summary of Metalliferous Production—First Quarter of 1920.

	Quantity		Value \$	
	1919 Ounces	1920 Ounces	1919	1920
Gold	98,188	142,840	2,026,536	2,953,036
Silver	3,105,002	2,280,665	3,152,700	2,954,695
Platinum metals	100			7,172
	Lbs.	Lbs.		
Copper, blister	1,724,631	1,508,014	270,493	242,630
	Tons	Tons		
Copper in matte ex- ported (*)	2,674	1,976	588,280	553,280
Nickel in matte ex- ported (*)	5,610	4,571	2,692,800	2,285,500
Iron ore exported, short	4,840	44	41,118	322
Iron, pig (†)	14,170	13,428	399,963	344,241
	Lbs.	Lbs.		
Cobalt, metallic	13,594	46,479	20,889	108,430
Cobalt oxide	127,954	213,024	186,036	340,232
Nickel oxide	5,070	1,788,183	1,421	413,944
Nickel, metallic	1,830,569	2,159,316	756,062	753,169
Other Nickel Com- pounds	33,716	159,183	5,804	15,308
Other Cobalt Com- pounds	14,189	1,417	9,827	1,417
Lead, pig	567,716	509,075	34,684	48,278
Total			10,186,613	11,021,654

* Copper in matte was valued at 11 cents and nickel at 24 cents per pound in 1919. For 1920 the values have been placed at 14 and 25 cents per pound respectively. The total matte produced contained 7,038 tons of nickel and 3,631 tons of copper.

† Total output of pig iron was 152,022 tons worth \$3,897,211. Figures in the table represent proportional product from Ontario ore.

SAVING THE PRECIOUS METALS

It is now announced by the Ontario Bureau of Mines that gold, silver, platinum, palladium, rhodium, ruthenium, osium and iridium were recovered at the Port Colborne nickel refinery, where Sudbury mattes are refined. The amounts recovered were probably small and are not given separately. The announcement is an interesting one, as it is regarded as highly desirable that the production of these metals in Canada should have been undertaken long ago. The metals of the platinum group are very valuable and the sources of supply are few. The Sudbury nickel-copper ores have long been known to carry small quantities of these precious metals and their recovery is regarded as one of the advantages of the process adopted by the British America Nickel Corporation for refining ores from Sudbury properties.—R. E.H.

Conveying Systems

JOHN S. WATTS, New Glasgow.

Of late years, there has been developed, and placed on the market, such a large variety of conveying apparatus, of so many different types, that it is now possible to purchase a type of conveyor to suit almost any conceivable conveying problem, with almost as much simplicity as the purchase of such standard products as a lathe or planer.

The manufacture and design of conveying equipment has reached the stage where these machines are made practically as standard lines, with the excellence of design which naturally follows from continuous experience in their manufacture and operation.

This is a distinct step forward from the older practice, when every conveyor was considered as a special problem to be solved only by the operating companies' engineers, who would naturally have less experience than that of the engineering staff of a company regularly manufacturing conveyors.

The operating companies' engineers, however, still have, and must continue to have, the final responsibility of deciding which of the numerous types of conveyors will best fill their requirements.

To decide this question intelligently, requires a knowledge of the characteristics of all the various types of apparatus, a knowledge which is not possessed by the average engineer, and it is in the hope that it will be of some assistance to engineers in deciding on the right kind of conveyor, that this article has been written.

The conveying problems may be divided into two broad classes, namely, those in which the receiving point, and delivery point are not in any fixed position, and those cases in which the receiving and delivery points are fixed.

In describing the various designs of conveyors that are used, under the conditions specified, it will be understood that no reference is made to what may be considered as standard equipment that is universally known and used, such as overhead travelling cranes, man or horse-propelled trucks, wheel barrows and the like. Not that these do not require study, and are sometimes the right solution to a conveying problem, but that the intended function of this article is to give a comprehensive list of the available, but less well known and more modern conveyors, with the limitations of each type.

Taking up the first-named class of conveying problem, the requirements may be stated in general terms, as being the moving of material from any point anywhere within a certain area to any other point, which may be anywhere within the same or another given area.

If the material to be moved, consists of a large number of comparatively light parts, which can be conveniently placed in boxes or trays, after being operated upon, and are to be moved to another point in the same shop, over a reasonably smooth floor, the transporting elevating trucks, which can be pushed under the loaded box, and the load then raised by the truck a few inches clear of the floor, are the best type. These transveyors or elevating trucks are now sufficiently well known to need no further description.

When the parts to be moved are single heavy pieces, but the other conditions are as outlined in the last paragraph, the best solution is to use a portable crane, similar to that shown in Figure 1. This, of course, assuming that an overhead travelling crane is not available, or already has more work than it can handle.

If the floor of the shop is not smooth enough to allow the transveyor or portable crane to be hauled over it with a reasonable effort, or if the floor space is too confined, or if the material has to be conveyed some distance, as into another shop, the overhead trolley will best fill the conditions. An example of this type is shown in Figure 2.

While the receiving and delivery positions, are, with this last apparatus, confined to points under the line of the overhead beams, by fitting switches and junc-

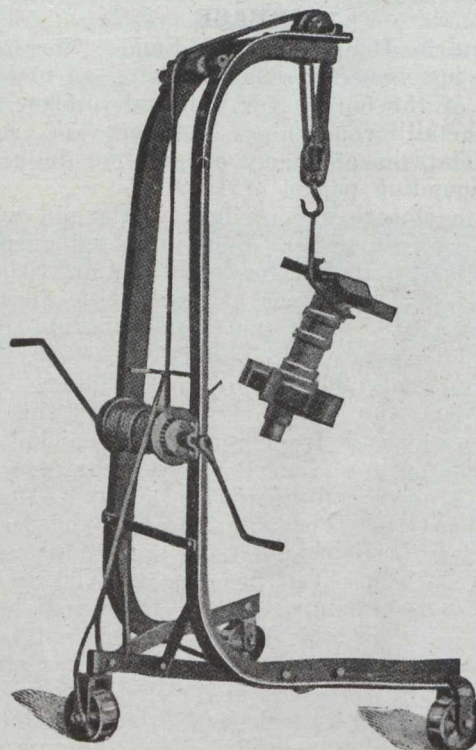


Fig. 1.

tions, in a manner similar to those used on a railway track, this system can be made to serve a large area at a reasonably low expense.

Outside of the older methods of handling material, such as trucks or cars, hauled by men or horses, electric or gasoline tractors, the above mentioned systems of conveying, represent the choice of apparatus we have, and knowing the conditions, there need be no trouble in deciding upon the right one.

The second class, where the delivery and receiving points are fixed, introduce a much greater range and variety of conditions, of material to be handled, and of equipment that may be used.

This class can be further sub-divided, in accordance with the general direction in which the material is to be conveyed, namely:

1. Vertically upward.
2. On an incline upward.
3. Horizontally.
4. On an incline downward.
5. A combination of any or all of the above directions.

Taking these sub-divisions in their numerical order, we have:—

1—Conveying Vertically Upward.

The available methods are:

The lift or elevator, operated by air, hydraulic, steam or electric power. These are used, when the material is in large heavy pieces, or varies in bulk and shape. The power to be used will be necessarily decided by what power is available.

The chain elevator fitted with buckets, arms or other attachments, suitable for the material. For light material, a belt is sometimes substituted for the chain, the buckets being fastened to the belt.

The choice of equipment for cases under this subdivision is practically decided by the class of material to be handled, and the problem should present little difficulty to the engineer.

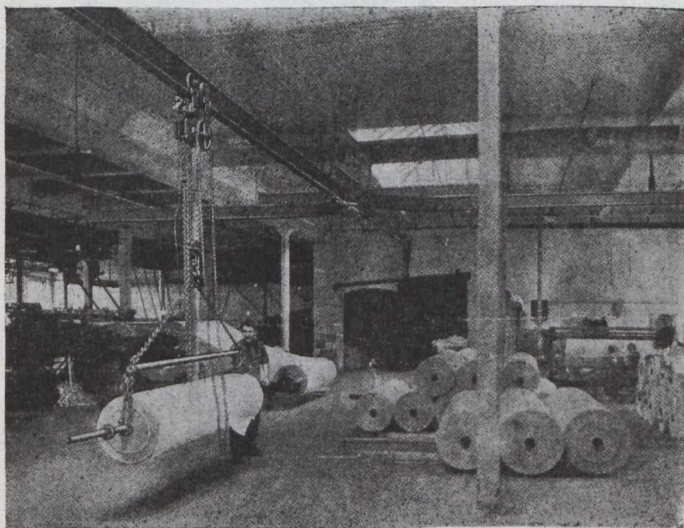


Fig. 2.

The next subdivision presents a more varied combination of conditions, and is:

2—Conveying on an Incline Upwards.

This may be subdivided further into—

2a—Conveying up an incline of 20° or more, from the horizontal;

2b—Conveying up an incline of less than 20° from the horizontal.

2a—Inclines of 20° or More.

We are compelled to use either a bucket or chain elevator, similar to those described under sub-section 1. If the grade is not too steep, the chains may be fitted with flights or scraper plates, which drag the material along a trough of steel or wood but these can only be used for comparatively fine and light material.

If the material be very light, such as sawdust, tan bark, etc. and the distance not too great a very simple type of conveyor can be used made of a wire rope with circular discs of cast iron, clamped on it at intervals, and working in a semi-circular trough.

For very long distances, a cableway must be used with a carriage travelling on the cable, and hauled up by a hoisting engine at one end.

For slopes of 20° or over those conveyors having a flat conveying surface, such as steel plate or belt conveyors, cannot be used, because the material would slide backward.

The type of conveyor to be used must be decided to suit the material to be handled. Heavy material in lumps will be best conveyed by the bucket elevator. For barrels or packages use a chain elevator fitted with the proper attachments for carrying that shape of package that is to be elevated. Light material in small pieces can be elevated by the chain with scraper flights in a trough. Heavy materials to be transported a long distance, require a cable conveyor.

2b—Inclines of Less than 20°.

Under these conditions, we have the choice of all of the types described under section 2a, and in addition we have the following:

For moderately light material, we can use the rubber belt conveyor, but the material must be such that it can be delivered onto the belt without cutting or abrading it, and the weight must be low enough, not to sag the belt too much between the roller supports. Hard material must be delivered onto the belt at about the same speed, and in the same direction, as that in which the belt is travelling.

For heavy or hot material which would damage a rubber belt, we must use a steel plate or pan conveyor.

3—Horizontal Conveyors.

For horizontal conveying, we can use any of the types outlined in the previous sections, the choice depending on the class of material to be handled, and the quantity to be conveyed in a given time.

Where a large output of heavy material is to be conveyed a distance of not over about five hundred feet the bucket type of conveyor is the best. The buckets can be made of large capacity, holding a ton or more if necessary, and deliveries of one thousand tons per hour are being handled by this type with excellent results in low cost. This type can be run outdoors exposed to severe climatic conditions without detriment.

For smaller outputs of any kind of material that is not sticky and for any reasonable distance, the vibrating conveyor is most suitable, being simple and rugged in construction. This type consists, in general, of a steel trough mounted on wooden legs set at a slight angle. The trough is given a vibrating, or to and fro, motion by a crank shaft. The general idea can be seen from Figure 3.

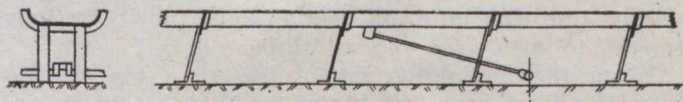


FIGURE 3

Some makers use rollers to carry the trough and cause the material to travel along the trough, by giving the trough a quick forward and slow return movement, by means of a link motion actuated by the crank shaft.

This type of conveyor is not as well known on this continent as it deserve to be, but is much used in Europe, and for rough hard work is a machine that will

give little or no trouble. It will elevate material up a slight grade about 2 per cent being the maximum, but depending upon the difference between the coefficient of friction of the material, at rest and in motion.

This difference between the friction at rest, and in motion, is the basis upon which the machine depends to perform its function. The trough itself only vibrates backward and forward a few inches, while the material travels along the trough at a practically uniform speed.

When the material requires to be examined, and rock or other debris picked out, the bucket conveyor is eliminated from consideration, and a vibrating or a flat plate conveyor of either steel or rubber must be used.

For fine material of a gritty nature, to be conveyed a short distance, a screw conveyor such as that shown in Figure 4, makes an easily arranged system.

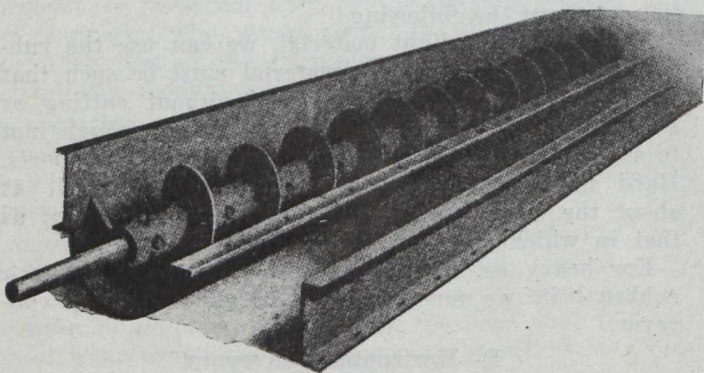


Fig. 4.

4.—Conveying Downwards

When the material is to be transported on a downward inclination, we have the choice of all of the types already described, and also some others, descriptions of which follow.

Where the downward grade is at an angle of not less than about 35 degrees from the horizontal, depending upon the co-efficient of friction of the material, all that is needed is a chute to guide the material. The force of gravity will cause the material to slide down the chute to its destination. The chute can be made straight, curved or spiral, or any shape required to join the delivery point to the receiving point, so long as the grade is not less than that needed to cause the material to slide.

If it is impossible to get an inclination of 35 degrees, the material will not slide, but one of the types of gravity conveyors can be used. These are made with sides, like a chute, but the bottom is made of rollers, which can be made of any shape or size to suit the material to be handled. The material must be nearly uniform in cross section, and must be long enough to span over at least three rollers.

When the inclination is not less than ten degrees from the horizontal, and the material such that it cannot be handled by a roller gravity conveyor, a shaking chute will deliver the material.

This is simply an ordinary chute, suspended by eyebolts, and given a shaking movement, backward and forward in the same direction as the flow of the material, of some four or five inches, by eccentrics driven by a revolving shaft running at fifty to ninety revolutions per minute, depending upon the inclination of the chute, and the friction of the material on the chute bottom.

If the material will float in water, or is fine enough to be carried in suspension by a current of water, the hydraulic flume may be a simple solution. This is merely a stream of water carried in a wooden trough, and where ample water is available provides a cheap method for the disposal of ashes.

A Unique System of Ash Disposal.

A very economical method of ash disposal is in vogue at the Wabana Iron Mine at Bell Island, Newfoundland. This island is situated in Conception Bay, and the bay is frozen over every winter.

The power house is situated on a wharf at the water's edge, and the wharf is equipped with a coal handling tower, which has a crane on it, handling a grab bucket, by means of which the coal is unloaded from steamers in the summer season.

In the Winter, the ashes are allowed to accumulate on the wharf until the ice commences to break up and drift out to sea. When this occurs there is a continuous procession of large ice cakes passing the wharf for some days, and as each cake passes the wharf, the grab bucket picks up a load of ashes and deposits it on an ice cake, which the ice carries out to deep water before it melts.

In any of the above types, the loading point can be placed anywhere on the line of the conveyor. The delivery point on the large bucket conveyor, is of necessity at the end of the conveyor.

The smaller bucket conveyors can be arranged to deliver at any point, in a horizontal part of the conveyor, by having a moveable tripper, which will upset the bucket at any desired point.

The rubber belt conveyors can also deliver at any point in their length, by the use of a moveable tripper, which is, however, a rather expensive and complicated piece of mechanism.

The flat plate steel conveyors, can only deliver at the end of the conveyor.

The chain conveyors, and vibrating conveyors, can deliver at any point in their line, by having gates fitted in the bottom of the trough at the desired delivery points.

The vibrating conveyor has the further advantage that by using perforated plates in the trough, it can deliver various sized products at various points.

5—Conveying in both vertical and horizontal directions or any combination of indications.

This division requires further subdivision, as follows:—

5a—Where the centre line of the conveyor is always in the same plane.

5—Where the direction of the flow may be changed sideways, as well as changing in inclination.

5a.

This constitutes the cases where the material has to be conveyed at varied inclinations, but in plain view the centre line of the conveyor will be a straight line.

With limitations depending upon the inclination, all of the conveyors described in the previous sections can be used, if the conditions specified in the other sections are not violated.

The steel plate type of conveyor would require a separate conveyor for each change of direction. That is, we could arrange a conveyor running up one incline, and delivering its material to another conveyor running on a different incline. The other types can change their direction without difficulty in one plane.

5b.

As in section 5a, all the types will fulfil this condition more or less easily, but require as a general thing, a complete conveyor for each change of direction that is not in the plane passing through the centre line of the conveyor.

However, there are a few types which can accomplish the conveying of materials in a tortuous direction, more simply if the conditions are favorable.

For heavy material, over long distances, the cableway is the most flexible apparatus.

For light material, such as shavings, sawdust, etc., a blower, will blow this material through piping in the most contorted construction, given pressure and capacity sufficient but is limited somewhat as to distance.

For conveying small parcels, in any direction, a lead pipe is used, of about 3 inches diameter, with a circular carrier made to fit it, and having a felt disc to make it airtight. This carrier is forced through the pipe by air pressure of about ten pounds, or sometimes a vacuum is used of the same amount. The carrier will convey anything that can be placed in it, and will travel around a radius of as small as twelve feet.

RECENT PUBLICATIONS OF THE GEOLOGICAL SURVEY.

The Survey has recently distributed an unusually numerous and useful series of maps and bulletins. In addition to the Stellarton, Nova Scotia, sheet and the Sandon sheet, previously noted, the following have been received by the "Journal":

Blairmore, Alberta:—A contoured topographical map, geologically colored of the district around Blairmore, including the colliery towns of Bellevue, Hillcrest, Blairmore, Coleman, Carbondale and Lille, and showing the mines of the following companies, namely, McGillivray Creek Coal and Coke Co., International Coal and Coke Co., West Canadian Collieries, Franco-Canadian Collieries, Hillcrest Collieries, Maple Leaf Coal Co., Leitch Collieries, and Burmis Coal Co. Seventeen sections are shown of the geological structure across the three parallel mountain ridges which are the features of this district. The map is a very interesting one. Geological work was done by W. W. Leach in 1911-12 and B. Rose in 1915. Topography by W. H. Boyd and B. R. MacKay. Scale is one mile to the inch. Publication No. 1584.

Buckingham, Hull and Labelle Counties, Quebec:—A map coloured geologically showing the vicinity of Buckingham, Que. An explanatory note states that the various rock types in this district are so intimately intermingled that uninterrupted areas of the same rock, even a few hundred square feet in extent, are uncommon. The colour scheme of the map is most involved, and it is a most creditable production. Geological work was done by M. E. Wilson in 1913-1915, and the geographical details are compiled by J. O. Fortin from various official sources. Publication No. 1691. Scale one mile to the inch.

Geology of Matachewan District, Northern Ontario:—By H. C. Cooke, Publication No 178, Memoir No. 115. Accompanied by geological map. Scale one mile to the inch. Although this Report is devoted to the geology of the Matachewan District, following the traditional and laudable custom of the Canadian Geological Survey, it is prefaced by historical information, and by a description of the fauna and flora and the general phisographical character of the district. Some

of the most far-sighted and discriminating remarks in Canadian literature are to be found in the records of the Survey, and it is pleasing to observe that the admirable tradition of the founders of the Survey is maintained.

The geological description is too extensive and detailed to admit of condensed review, but Mr. Cooke's summarized conclusions as to the origin of the ore-bodies are as follows:—

"The internal structure of the ore-bodies, consisting of a pegmatite vein at the centre, a middle zone of mineralized and altered rock, on each side, and an outer zone of altered rock without mineralization, which grades into unaltered country rock with irregular and embayed contacts, is clear evidence that the deposits in schist have been formed by the alteration and mineralization of the country rock by solutions coming up along the central vein. The partial calcitization of the feldspar of the pegmatite indicates a change in the character of the solutions during the formation of the ore-bodies.

The serial composition of the various veins of pegmatite, varying from veins of pure quartz up through pegmatites of increasing feldspar content, to dykes of pure porphyry, indicates an igneous origin for all.

The satellitic arrangement of the veins, in that with few exceptions they are grouped within an area bounded by a line drawn about 1,000 feet from the edge of the porphyry mass, with the major number within 500 feet, points conclusively to their genetic connection with the porphyry intrusive.

Veins or dykes approaching the poprhry in composition deposited little or no gold, but did in places deposit pyrite. They had no strong alterative action on the wall rocks. Pegmatites deposited auriferous pyrite; and had a powerful alterative action on the wall rocks. Quartz veins had little action on the wall rocks, and deposited little or no pyrite. Other things being equal a rough proportion exists between the size of the vein and the size of the altered zone around it.

It is concluded, therefore, that the schist ores of Matachewan district were deposited by juvenile solutions originating as the last products of the differentiation of masses of intrusive granite porphyry. The solutions were at first rich in silica, soda, and alumina, which crystallized out first to form the material of pegmatite veins. The separation of these constituents left the solutions relatively enriched in lime, carbon dioxide, iron, sulphur, potash, and gold, and their reactions with the wall rocks caused the formation of replacement deposits whose principal minerals are calcite and auriferous pyrite.

There is little direct evidence to connect the gold of the Davidson property with the porphyry, except the fact that the veins are confined within the intrusive mass. However, the proof that the neighbouring stock, which is petrographically identical with the Davidson porphyry, carried gold, renders the conclusion inevitable that the gold of the Davidson property was also a magmatic constituent. The differentiation has here continued uninterruptedly to the stage in which the mineral constituents of the magmatic solutions are silica and gold, and these are deposited as quartz with native gold."

The Report notes the occurrence of asbestos at Rahn Lake in the western part of Bannockburn Township. Specimens were submitted to Mr. Harvie of the Survey, who pronounced them of first quality, but not so good as the best Black Lake asbestos. The Report

states that should development prove a sufficient supply at Rahn Lake to make mining profitable, only improved facilities of transportation will be necessary to make this field economically valuable.

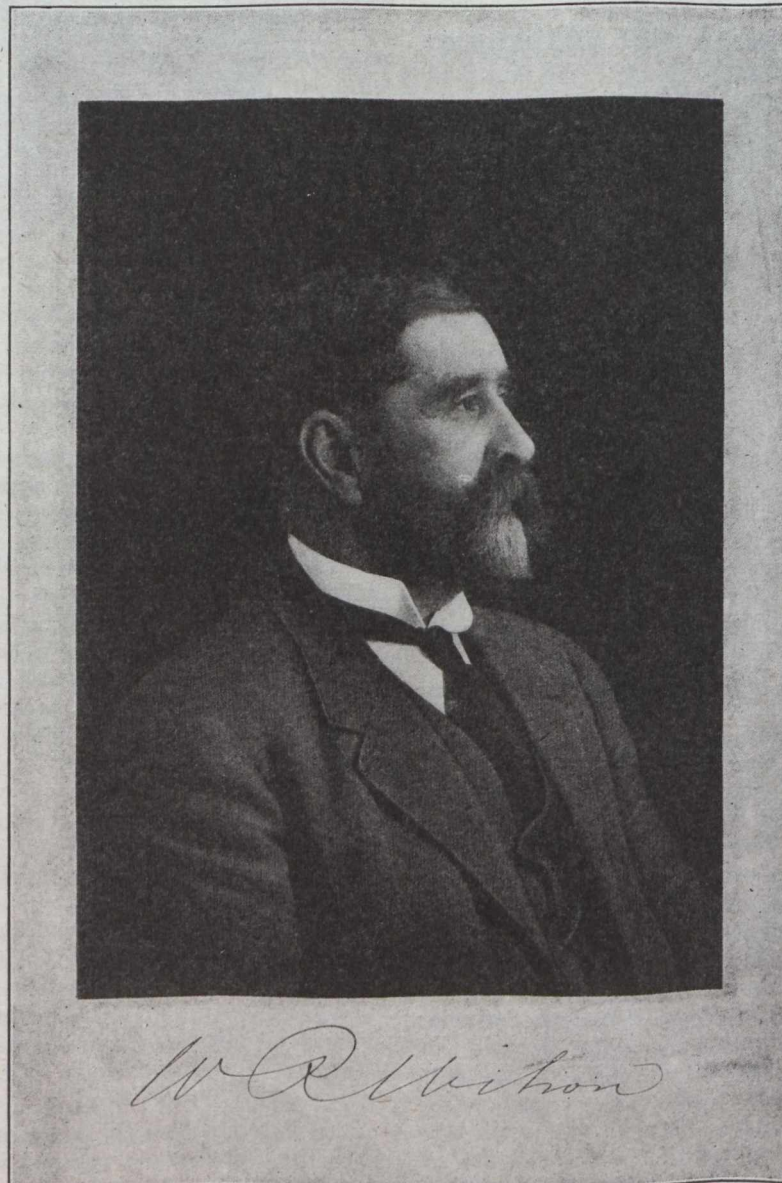
Small deposits of fluorspar, barite and hematite are referred to, which were not seen by Mr. Cooke, who copies the references made to these occurrences in the report by A. G. Burrows.

Geology and Ore Deposits of Ainsworth Mining Camp, British Columbia. By S. J. Schofield. No. 1773. Memoir 117. Accompanied by twelve coloured maps in pocket, which include topographical and geological maps of Ainsworth District, diagram of mineral claims in districts, and a number of diagrams showing the geology of selected mining operations.

The deposits of economic importance in this camp are entirely silver-lead ores. Previous to 1914 the zinc which was associated with the silver and lead in the primary deposits was worthless or detrimental to the ores, but owing to the increase in the value of zinc

and the erection of a smelter at Trail for its recovery, its presence now adds to the value of the deposits at Ainsworth.

Prospects for the continuance of mining in the Ainsworth district are considered to be good. The success of the Highland in proving that the ore bodies extend at least to 700 ft. below the outcrop in the case of veins of the true fissure type, and the occurrence of the replacement deposits in limestone 350 ft. vertically below the outcrop in the Florence mine, augur well for deeper mining, especially as, so far as can be determined, the tenor of the ore does not appreciably decrease at depth. A study of the various mines has been shown that the ore-bodies so far discovered have three well-defined modes of occurrence and in the future economic development of these deposits it is recommended that this fact should be kept in mind, and should govern the methods of exploration of the veins. The Report deals fully with these differing modes of occurrence.



Mr. W. R. WILSON, recently appointed President of the Crow's Nest Pass Coal Co., Fernie.

REPORT OF DOMINION STEEL CORPORATION FOR 1919.

The Report of the Dominion Steel Corporation shows production during the fiscal years 1918 and 1919 as follows:

	1918. Tons.	1919. Tons.
Pig iron	307,863	184,229
Steel ingots	341,603	219,943
Blooms and billets	47,890	26,165
Standard rails	164,972	28,976
Light rails . . . . .	.....	3,319
Wire rods	26,746	44,436
Bars	1,459	1,245
Wire (includes used in making rails)	6,043	15,542
Nails	5,508	12,386
Plates . . . . .	.....	3,252
Coal	3,622,644	3,502,069

The Report states with reference to production:

"Although every possible effort was made by your directors and the officers of the Dominion Coal Company to maintain the output of the collieries, it was somewhat less than that of last year. The total production from all collieries for the past five years was as follows:

Year ending 31st March, 1920, 3,502,069 tons; March 1919 3,622,644 tons; March 1918, 3,781,615 tons; March 1917, 4,279,772 tons; March 1916, 5,261,198 tons.

"On account of trade conditions operation of the steel company's works was greatly restricted during the months of August, Septemebr, October and November, and in consequence the year's output of steel was correspondingly reduced. During the last quarter of the fiscal year operations were gradually increased and are now upon a more satisfactory basis.

"It will be noted that a new item has been added to the list of materials produced and that steel plates are now being made in quantity."

The net addition to value of properties during the year amounted to \$4,329,043, principally represented by the erection of the plate mill, additional electric power equipment at Sydney plant and at the Wabana mines, and improvements to the collieries and power systems of the collieries in Cape Breton and at Springhill.

The profit and loss account for the fiscal years ending March 31st compare as follows:

	1919	1918.	1917.
Op. income.	\$5,532,529	\$8,768,054	\$11,030,112
Depreciation, etc..	1,266,856	1,304,323	1,384,242
Balance	\$4,265,673	\$7,463,731	\$9,645,870
Interest	1,004,060	1,013,263	1,064,209
Net income	\$3,261,613	\$6,450,468	\$8,581,661
Pref. dividends . .	420,000	420,000	420,000
Do. other Co.'s . . .	560,000	560,000	560,000
Net profits	\$2,281,613	\$5,470,468	\$7,601,661
Com. dividends . .	2,029,629	1,765,373	1,444,397
Surplus	\$ 251,984	\$3,705,095	\$6,157,264
Prev. surplus . . .	7,959,252	13,754,157	7,596,893

T'l surplus	\$8,211,230	\$17,459,252	\$13,754,151
Reserves . . . . .	.....	9,500,000	.....
P. & L. balance..	\$8,211,236	\$7,959,252	\$13,754,157

The common stock shows an increase from \$32,097,700 in 1918 to \$37,100,000 in 1919, and the balance available for common stock dividends amounted to 7.1 per cent on the old capitalization, and 6.15 per cent on the increased common stock liability, the six per cent dividend being earned by a narrow margin.

Reference is made to the sale of 50,000 shares of common stock to British interests, as follows:—"During the year an offer was made by a syndicate of British capitalists to purchase on favorable terms 50,000 ordinary shares of the capital stock of the corporation which had been allotted to the Dominion Iron and Steel Company, Limited, which the directors of that company considered advisable to accept. The proceeds of this sale will furnish a part of the funds required to cover expenditures on its property undertaken and in prospect. The instalments payable under the agreement providing for this new capital have been received; the balance is included in accounts receivable under the heading of current and working assets. The discount on these shares has been written off general reserve, reducing the balance in this account to \$10,000,000."

In connection with the mooted entrance of Dominion Steel Corporation into a holding company incorporated in Nova Scotia as "British Empire Steel Corporation," the President, Mr. Roy M. Wolvin, states: "Your directors are carefully considering the proposals, and if they are approved, will submit them for your consideration at a special meeting to be called for the purpose."

The Balance Sheet for 1918 and 1919 compares as follows:

	1919.	1918.
<i>Assets:</i>		
Properties	\$79,861,902	\$75,509,711
Trustees account	145,752	142,432
<i>Current:</i>		
Inventories	9,490,369	9,314,602
Accounts receivable	6,737,807	5,039,479
Cash	1,674,668	3,603,542
Prepayments . . . . .	.....	585,812
Interest, etc. . . . .	.....	1,715,034
Sale of common stock	1,732,530	.....
Employes' Balances	196,155	.....
Investments	2,222,037	.....
Total current	\$22,053,566	\$20,258,469
Total assets	\$102,645,205	\$95,910,612
<i>Liabilities:</i>		
Funded Debt	\$20,450,683	\$20,830,097
Reserves	2,074,449	2,656,742
Pref. Stock	7,000,000	7,000,000
Do. other companies	8,000,000	8,000,000
Common stock	37,100,000	32,097,700
Special reserves . . . . .	.....	11,500,000
Common stock	37,100,000	32,097,700
Deferred payments	208,000	234,000
Surplus	8,211,237	7,959,252
*Gen. Reserve	10,000,000	.....

<i>Current:</i>		
Accounts payable	3,881,634	4,827,930
Accruals	230,378	235,925
Bank loans, etc.	4,844,860	.....
Dividends payable	643,966	568,966
<hr/>		
Total current	\$9,600,837	\$5,632,821
<hr/>		
Total liabilities	\$102,645,205	\$95,910,612

* After deducting difference between par and proceeds of 50,000 shares of corporation common stock.

ALBERTA MINERS OBTAIN LARGE WAGE INCREASE

An agreement has been arrived at between the coal operators of Alberta and the representatives of the United Mine Workers of America, whereby a 27 per cent increase will be given to all day men over October scale, to be retroactive to April 1. This increase includes a preliminary 14 per cent increase given last January. The contract men will get 24 cents a ton increase on the war bonus of 92 cents. This is seven per cent more than has been awarded in the United States central competitive field.

The agreement is to be submitted to a vote of the miners.

Our Northern Ontario Letter

THE SILVER MINES.

Great interest has centered during the past week about the trend of quotations for silver, the recent decline in price having apparently been quite contrary to the generally accepted opinion. In view of the calculations of many careful observers having proved to be quite unsound as shown during the past week, there is now a tendency to become reticent over the situation and to abide strictly by the verdict of events and time. Seemingly, however, when quotations during the second week in June declined to 81 cents an ounce and then fluctuated upward above 90 cents, the recession in price may have gone its full course, and steadier quotations may now rule.

Taking into account the amount of cobalt metallics and cobalt oxide produced by the silver mines of Cobalt during the first quarter of 1920, the silver mines of Ontario produced \$3,404,774 for the period as compared with \$3,369,452 during the corresponding period of 1919, thus showing an increase of \$35,322. The quarterly statement just issued by the Ontario Bureau of Mines shows a decline of \$198,005 in silver production for the quarter as compared with a year ago, and in that way leaves the impression that the value of the output from the silver mines decline that amount. An analysis of the report, however, brings out the fact of the increase.

It is learned in reliable quarters that the Ontario Bureau will conduct a resurvey of the geology of the Cobalt silver area, and that Cyril W. Knight, Assistant Provincial Geologist, will commence the important work at an early date. The decision appears to be the direct result of representation made by the Temiskaming Mine Managers' Association to Premier Drury, and to the Minister of Mines, Hon. Harry Mills, on the occasion of their visit to Cobalt last fall. This resurvey has long since been regarded as advisable, owing to the large amount of underground work done since the previous report was made, now making it possible to study the geology with greater accuracy and to present a report that will prove of value to the mines.

In order to combat the lower quotations for silver provided they should continue downward, the mines of Cobalt will reduce the amount of low grade ore being treated, and in that way by increasing the number of ounces in the ore handled will produce an equal value per ton as though silver had remained high. This will mean of course, a reduction in tonnage and lessened production at the lower-grade mines. Contrary to the pessimistic views expressed in certain newspapers,

the moderate producers will not be placed in peril, while the chief producers are still able to produce at a cost not far under fifty per cent of the gross yield. The standing of the camp is exceptionally strong, even in the light of present low prices for the metal.

Announcement is made that the Mining Corporation of Canada has become interested in the exploration and development of the Flin-Flon property in Northern Manitoba. At the annual meeting of the Mining Corporation, the following directors were elected:— 1st Vice-President; W. R. P. Parker, 2nd Vice-President; G. M. Clark, J. W. Watson, Thomas Plunkett and D'Arcy Weatherbe, directors.

Arrangements are being made to operate the old Colonial Mine, situated in the mineralized silver area of Cobalt, but which has been idle for some years. The Colonial adjoins the O'Brien Mine as well as the Violet property of the La Rose Consolidated. The rock formation consists of keewatin overlying diabase and with numerous veins opened up. Underground work formerly carried on resulted in considerable medium-grade ore being placed in sight. Some high-grade shoots more or less limited in extent were also encountered. A peculiar fact in connection with the property is that repeated bids have been made for it, but have all been refused, and that despite the property lying in idleness it has been regarded as a potential mine and one that may reasonably develop into a steady and important shipper. Tenders are being called for several hundred feet of underground work.

For the first five months of this year, the Nipissing mine has produced \$1,837,118, according to regular statements. The report for May, just issued by Hugh Park, manager, to the president and directors shows an output of \$335,597 for the 30-day period.

In summarizing the work during May, Mr. Park states:—

"During the month of May the company mined ore of an estimated value of \$335,597, allowing 99¼ cents per ounce of silver. Shipments of bullion and residue from Nipissing and custom ores are estimated to have a net value of \$405,746.

"Favorable developments were met with at the first and second levels of 63 shaft. Several new veins are being developed and results to date have been satisfactory. In all cases the veins are small but of good assay. The mill rock is of good grade. The distance between levels is 95 feet.

"Stopping operations and general development work at all shafts continue to be favorable during the month.

The usual amount of development is proceeding."

"Burrowite," a new explosive, is being tried out at some of the Cobalt mines, and is stated to have stood up well under careful tests. It is stated that provided sufficient encouragement is offered, arrangements will be made to manufacture Burrowite in the Cobalt district. Not only is the new explosive said to be non-freezing, but to produce less gas than some of the brands now in use.

Encouraging results are reported from the Bonsall property in the Gowganda district where a small mining plant is in operation and where work is being carried on between a depth of 100 and 150 feet. The Bonsall is controlled by Senator M. J. O'Brien, Sir Clifford Sifton and Mr. Glendenning.

Announcement is made to the "Journal" that work has just been resumed on the White Reserve mine in the Maple Mountain section of the Elk Lake district. It is stated that work will be concentrated on the new rich vein opened up at surface last Autumn, just prior to being compelled to close through labor shortage.

In various parts of the Elk Lake and Gowganda districts, numerous bush fires are reported and at the time of writing rain is badly needed to prevent an enormous loss of timber, as well as restriction of prospecting activity in some parts of these districts.

Ore and Bullion Shipments

During the week ended June 11th, four Cobalt companies shipped an aggregate of seven cars containing half a million pounds of ore. The Nipissing with four cars was the heaviest shipper as shown in the following summary:—

Shippers	Cars	Pds.
Nipissing	4	348,612
La Rose	1	65,992
Mining Corporation	1	65,070
Dominion Reduction	1	60,000
Totals	7	539,581

Bullion shipments during the week consisted of one quite large consignment from the Mining Corporation, 99 bars containing 100,333 fine ounces being sent out on June 10th.

THE GOLD MINES.

Gold mining in Ontario promises to attain a point actually in excess of silver mining by the end of the current year. The production of gold for the first quarter of 1920 showed an increase of 46 per cent over the corresponding period of 1919, and at a rate of close to a million dollars a month. This exceeds any previous record in the history of mining in the province and seems to offer conclusive proof of the strong physical condition of the mines.

Producing gold mines report a total capacity of 5,485 tons daily. Running at full capacity and recovering an average of \$9 a ton, the output would amount to more than \$18,000,000 annually. The present rate amounts to about two-thirds capacity, the only barrier to maximum output being the acute shortage of labor. The situation is one of great promise.

On June 16th the Hollinger will disburse a dividend of one per cent. the amount to be distributed being \$246,000. This is the third dividend of like amount to be paid this year.

At a depth of 140 feet on the Porcupine-Keora a vein measuring some ten feet in width has been encountered and, although average assays have not yet been announced, it is understood the vein matter shows

quite heavy mineralization. The development is regarded as the future of that part of the Porcupine districts hinges to an important degree on the measure of success achieved at the Keora. Former exploration work with diamond drills indicated the presence of ore at depth, and the present development program has for its object the confirmation of the earlier results.

The Davidson Consolidated is called for tenders to sink a central shaft to a depth of 1,000 feet, which is taken as an indication that the finances required have been subscribed. It is understood the result if work at depth has been more satisfactory than in the levels lying closer to surface.

The annual report of the Dome Mines is favorable. Although the mill did not resume operations until last May, after the shutdown of the previous year, and, therefore, earnings are really only for ten and two months, the recovery amounted to \$1,773,374, maintenance expenses of \$930,762, leaving net operating earnings of \$842,612, to which is added revenues from other sources, chiefly discount and exchange, amounting in all to \$109,372, making a total net profit of \$951,984. Deductions amounting to \$600,170 were made chiefly for depletion of mining claims and properties, \$325,190, and plant depreciation and replacement, etc., \$234,373, leaving a net surplus for the year of \$351,814. The mines improved financial position is seen in the fact that current assets exceed current liabilities by \$1,253,025 compared with \$488,895 a year ago. Total assets have increased to \$5,909,318, compared with \$5,002,625.

President J. S. Basche, whose comments are of the briefest character, says, "The company had a satisfactory year, in spite of starting it under the handicap of non-productive operation during the first forty days, and having to start the plant on a small tonnage, and increase gradually. As indicated in the report of the operating management, the mine and plant are in first-class condition to enable operations to be continued at a satisfactory profit, but the success of future operations must, to a great extent, depend upon the amount and efficiency of labor obtainable.

In the Kirkland Lake district, wages are being offered to the scale at Porcupine, Sudbury and Cobalt, the object being to induce men to remain at their jobs as well as to encourage others to enter the camp.

During the first quarter of 1920 the mines of Kirkland Lake produced close on a quarter of a million dollars. These mills were in operation, the Lake Shore, Teek-Hughes and Kirkland Lake. A similar performance is expected for the second quarter, while an increase for the third and fourth quarters may be expected. The reason for this is the fact that it is planned to operate the Tough Oakes mill during the third quarter, while, for the fourth quarter, the new mill of the Wright-Hargreaves is expected to be completed and in operation.

From the West Shiningtree district, conservative mining reports, notably by George R. Rogers of the Wasapika tend to expose various blatant reports which formerly circulated. Mr. Rogers presents an excellent report in which he expresses the belief that he can mine the Wasapika, adopting selective mining methods, at a profit, but makes it clear that the recent reports of sensational finds are misleading. The announcement is receiving favorable comment in mining circles in other parts of Northern Ontario.

WASAPIKA GOLD MINE.

The following statement concerning developments at Wasapika mine has been given out by the president of Wasapika Consolidated Mines, Limited.

"The results obtained in the development of the Wasapika ore deposit by the new company which took over the property a few months ago, has given rise to some stories of sensational nature. It has been reported that ore carrying \$200 in gold per ton has been encountered at the second level. The company wishes to advise its shareholders and the public that the results obtained, do not indicate the presence of any considerable body of ore of such high grade.

"The preliminary sampling underground, as at the surface, indicates that the ore deposit carries enough gold to permit profitable mining, but the venture is still in the early speculative stage, which does not permit positive statements concerning its success.

"In order that the significance of the results obtained recently may be understood, it should be stated here that the underground work has indicated that the Wasapika ore deposit is a much bigger one than it appears to be on the surface. There only the footwall portion is exposed. The work at the 100 ft. level showed an additional hanging wall portion which at surface is hidden under a low wet depression. The footwall quartz at the 100 ft. level showed in the cross-cut ore carrying about \$12 gold per ton. The hanging wall quartz samples showed \$3 to \$11. The intervening schist carries only \$1 or \$2 gold per ton.

"The systematic surface sampling of the footwall quartz had indicated the presence of an orebody carrying \$8 or \$9 per ton. The work at the 100 ft. cross-cut gave the hoped for results with regard to the footwall quartz and also disclosed more quartz that may prove an important source of ore. It may prove profitable to mine the whole deposit, including quartz and schist, for a width of 20 ft.; but the present indications are that the low values in the schist will make selective mining preferable.

"The deposit has recently been cut twice at depths between 160 and 204 ft., and ore of similar character exposed. Here again the deposit shows much quartz in addition to the main footwall portion. The preliminary sampling indicates that the values are holding well with depth.

"The management proposes first to open up the footwall portion of the deposit and to begin mining and milling this ore before attempting to explore thoroughly the hanging wall portion. The alternative method of mining the whole deposit at once would give lower costs per ton, but there would be much dilution by the inclusion of lowgrade schist. When development is further advanced and milling tests are possible, the possibilities of this method can also be investigated."

—R.E.H.

MINING CORPORATION'S AFFAIRS

According to the annual report submitted at the annual meeting of the Mining Corporation of Canada held in Toronto on Saturday, June 5th, the profits on the years operations were \$908,000 for what was really only ten months, owing to the strike, compared with \$925,000 in the previous year. The Mining Corporation is an outgrowth of the old Townsite Mine, to which was subsequently added the Cobalt Lake, City of Cobalt, Cobalt Station Ground, Little Nipissing and Buffalo. It was announced that the Corporation is as-

sociated with W. B. Thompson & Co., of New York, on the option of the Flin Flon Mine in northwestern Manitoba. This great copper property is now being explored by the sinking of shafts and doing a number of drifts on the vein, with a view to confirming the diamond drill results which indicated twenty to thirty million tons of copper ore in sight. The option runs until next March, but the development work may justify decisive action before that time. It is estimated that a total capital outlay in connection with the project of \$8,000,000 to \$10,000,000 would be necessary to bring it to a completed stage. The Mining Corporation since its formation has paid dividends amounting to \$5,083,862, exclusive of the current dividend of almost \$250,000 soon to be paid. The former Board of Directors and officer were elected as follows: Sir Henry M. Pellatt, C.V.O., President; J. P. Watson, First Vice-President; W. R. P. Parker, Second Vice-President; G. M. Clark, J. G. Watson, Thomas Plunkett, and D'Arcy Weatherbe.

THE SILVER MARKET

By R. E. HORE

The continued weakness of the market for silver is disturbing shareholders of silver mining companies. The metal still commands a high price as compared with that of a few years ago, but the higher cost of production and scarcity of high grade ore necessitates a fairly high price for silver. For some weeks, however, the price has been steadily downward and the recent sharp break has directed much attention to the changed position of the silver producers.

There are doubtless good reasons for the weakness of the silver market; but since the chief consumers are in far away countries, and are dealt with through metal brokers, there are few persons here who can give a very satisfactory statement concerning the recent drop or the probable future trend of prices. Metal brokers in London and New York could doubtless make some interesting comments on the situation, for they are in closer touch with the consumers than are many silver producers. Some of our silver producers are nevertheless in close touch with the markets and give to the selling of their product such attention that shareholders may have confidence that good judgement, based on experience in other periods of changing prices, will be exercised in selling Canadian silver.

Aside from the fact that high prices for silver mean large profits for the shareholders and permit high wages for the miners, there is under such conditions an opportunity to market ore that in periods of low prices would be useless. Since most of our silver is exported, higher prices for silver mean greater gain for this country generally and it is in the general interest that there should be no return to the pre war prices.

It may be true that Cobalt has seen its best days and is now showing by its declining production that a large part of the higher grade ore has been mined. Nevertheless, if high prices can be obtained for silver, Cobalt will be a producing district for many years. It is well to realize that mining is a liquidating process and that long years of operation are not desirable from the operator's standpoint; but limitations as to mining and milling facilities will make even the mining of the relatively small ore deposits at Cobalt a matter of several years yet.

British Columbia Letter

THE METAL MINES.

Stewart, B. C.

The Patricia, Magee, and Montana groups of Mineral Claims, situated on the Marmot River, are to be actively developed during the summer. On the Patricia a 4-foot lead of good ore has been opened, samples from which have given returns from \$15 to \$35 in gold and as high as \$62 in silver.

General R. G. Edwards Leckie, who was prominently identified with the Canadian Expeditionary force, having been on foreign service throughout the war, has resumed practice in British Columbia as a mining engineer. In 1910 General Leckie became interested in the Hercules group of mineral claims, Salmon River district. Some development was done and the Crown grant was obtained to the property. No progress was made in opening the claims during the war. General Leckie, however, has now taken up the task of developing, proving, and if warranted putting the property on a producing basis.

J. D. Craig, an engineer in the employ of the Dominion Government, has left for Portland Canal to take charge of the Canadian party, whose duty it will be to co-operate with United States surveyors in the establishment of a clearer definition of the Canadian Alaskan boundary. Stone cairns on the mountains, bronze monuments and a 20-ft. lane through the forest will mark the boundary by the time the party have finished their season's work. Commenting on his task Mr. Craig said: "The wisdom of marking the boundary some sixteen years ago—a marking which has since become more or less obliterated—is now apparent. As it happens about 90 per cent. of the silver recently discovered has been on the Canadian side. If the survey had been delayed it might have made the settlement of the line more difficult to agree upon." A neutral strip of 60 feet on either side of the boundary is to be preserved, as is the custom on the whole 5,000 miles of Alaskan and U. S. boundary, except where titles to the strip had previously passed out of the Government. Mr. Craig does not think this will mean that the strip will be withheld from mineral development, but that in the case of location of mineral special leases will have to be obtained from Ottawa or Washington.

The Prospectors Association of Stewart, recognizing the value of publicity, have arranged for the assemblage and display of an exhibit of the minerals of the district. It is to be quite comprehensive including specimens from all the well known properties of the Portland Canal region, and should be both interesting through the town.

Alice Arm, B. C.

The snow is rapidly disappearing in this district and the mining industry is becoming quite active. The Dolly Varden mine again is in full operation and ore shipments are being received at tide water. The La Rose property is to be developed further and a force of men has been put to work. The Moose prospect also is to be opened up and the McLennan Silver Mines Ltd., already have started work on the Royal Group adjoining the Dolly Varden. In the course of the last few weeks a great many miners and prospectors have

arrived and as the snow recedes prospectors and miners will make their way up both the Kitsault and the Illiance Rivers.

Kamloops, B. C.

It begins to look as though the Stump Lake Mine of the Donohoe Mines Corporation is to be made productive within a short time. Machinery has been ordered for a modern concentrating plant, the foundations of which are now being constructed. The plant it is hoped will be ready for operation in three or four months at the outside. It will have a capacity of 50 tons a day. The ore of the Donohoe mine is principally silver bearing but carries besides gold, lead and copper, the metal content varying from \$20 to \$600. The property recently was inspected by William J. Shedwick, Jr. of the Kennecott Copper Corporation and Lewis A. Levensaler and Francis N. Myers, all of whom are mining engineers.

Nelson, B. C.

The Nelson Mining and Development Company, which is interested in a number of properties, in the Lardeau and Sandon districts, is preparing for considerable development work. The Whitewater and Comstock groups on Cascade Creek, Lardeau, are to be opened up and, to facilitate this, the construction of a nine-mile wagon road is planned. On the Comstock leases there is a good mill site and the erection of a mill is being considered. Some good silver lead showings have been uncovered on the Zincton property near Sandon and, in addition to high grade ore, a considerable quantity of good milling ore has been exposed. Clarence A. Marsh, Secretary of the Company, headquarters Nelson, B. C. also is interested in the Gold Cure mine, situated on the South Fork of Kaslo, and it is his intention to start development here immediately. Ore carrying high silver and lead values already is in evidence and, if the results of further work are satisfactory, the idea is to install a concentration and flotation plant having a capacity of 50 tons a day.

Development work carried on at the Mountain Chief Copper mine, Renata, Arrow Lakes, has demonstrated that the ore body has a depth of 68 feet below the original shaft. There is practically no change in the character of the ore, bornite and Chalcopyrite. It is the intention to explore further along whichever section of the vein appears most attractive.

Trail, B. C.

Receipts at the Trail Smelter of the Consolidated Mining and Smelter Company of Canada for the week ending May 31st were 6,832 tons, of which 67 were concentrates. One of the noteworthy independent shippers was the Bluebell of Riondell, which contributed 180 tons, this indicating that this mine, for a time inactive because of lack of water required for the operation of the mine plant, has resumed operation. Other shippers apart from the Company's properties were Electric Point, Boundary, Washington, 196 tons; Florence, Princess Creek, 67 tons; Josie, Rossland, 170 tons; North Star, Kimberley 181 tons; No. 1 Mine, Ainsworth 127 tons; and the Tom O' Shanter, Riondell 56 tons. The Sullivan Mine, Kimberley, evidently is getting back into its normal gait, having shipped 5,367 tons of zinc ore and 296 tons of lead ore during the week. The total amount of ore to be received at the Smelter up to the present this year is 110,928 tons.

Ymir, B. C.

The Texas-Yankee-Girl mine at Ymir, recently taken over by the Mining Corporation of Canada, is being systematically explored and developed in accordance with plans laid down by A. W. Newbury, one of the Company's engineers. A force of about forty men is engaged and it is expected it will take six months of this work to obtain the information necessary to determine the Company's future plans.

While dealing with this phase of the operations of the Mining Corporation of Canada in British Columbia, it is interesting to note that that concern has previously tried out a number of Provincial mining properties. One of the first of these was the Lode Gold proposition of Prosperine Mountain near Barkerville, upon which a considerable sum of money was spent without obtaining results considered sufficiently satisfactory to warrant the installation of the necessary plant for the handling and treatment of the quartz. In the Bridge River section options were taken on several small gold mines but as far as can be gathered these too after the investment of some money and development were allowed to drop.

Vancouver, B. C.

The retirement of F. M. Sylvester, for years managing director in British Columbia of the Granby Mining and Smelting Co., and the appointment as his successor with the title of General Manager of H. S. Munroe, of New York, has caused somewhat of a stir in provincial mining circles and has given rise to speculation as to whether the changes presage material revision of the Company's operation policy in western Canada. About all that is known regarding Mr. Munroe's intentions is that he proposes making his headquarters at Anyox, which means that the Company's business in this Province will be curtailed there rather than at Vancouver as in the past. Regret is expressed by the press and in many quarters that Mr. Sylvester should be severing his business relations with the Company, it being pointed out that he has been at the helm during a period marked by much notable achievement and expansion. It was under his direction that the Company took up, developed, and installed an exceptionally modern colliery on coal lands of Vancouver Island. He also saw the installation at Anyox of the first by-product cooking ovens of the Canadian West. In this connection it is said that the Island coal has not proved the success in coking that was expected, the ash content being, in the case of some shipments at least, rather embarrassing. In confirmation of this it is known that coal now is being received at the Anyox plant from eastern British Columbia properties and, as far as experiments with it have been able thus far to determine, promises to give satisfaction.

Victoria, B. C.

According to well authenticated reports Alder Island, one of the smaller members of the Queen Charlotte Group, consists of one large deposit of metallic arsenic. The two or three claims staked over the entire island and samples taken indiscriminately gives returns running from 18 per cent. to 24 per cent. arsenic while the locator states that it is possible to obtain specimens of almost pure mineral. This is interesting be-

cause it appears to be the first such deposit of which there is record in British Columbia although for years arsenic has been produced as a by-product from the arsenic-pyrite ores of the Hedley Gold Mining Company.

Grand Forks.

It is announced that the diamond drilling to be undertaken by the Provincial Government in the Frankline Mining Camp will be initiated on the Gloucester group of mineral claims. Drilling equipment has been installed and the work will commence in a few days. These operations are to be carried on under the supervision of T. B. Freeland, Government mining engineer. It is likely that other properties in this locality will receive similar attention.

At a recent meeting of the Mining Bureau of the Vancouver Board of Trade a number of important resolutions were passed. One recommends that the administration of coal and petroleum lands should be transferred from the Lands to the Department of Mines. Another deprecated the action of the Provincial Legislature in placing a reserve on coal lands in the Province. A third proposes the discouragement of the export of certain classes of mineral in order that their refinement within British Columbia might be brought about.

Cowichan, B. C.

The development of the Manganese Deposits of Hill 60, Vancouver Island, is proceeding apace. As work progresses it becomes apparent that a large tonnage is available. Operations have started almost at the summit of the hill and exploration indicates that the ore body extends down for a considerable distance. The aerial tramway, which has been in course of construction for some weeks, is now practically ready for service.

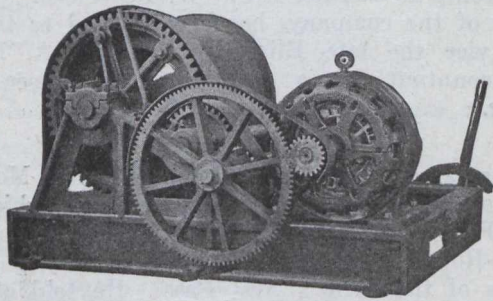
THE COLLIERIES.

Almost coincident with the announcement of the retirement of F. M. Sylvester as Managing Director in British Columbia of the Granby Mining & Smelting Co., and the appointment as General Manager of H. S. Munroe, of New York, comes word from Prince Rupert that shipments of coking coal are being received by the company at Anyox from eastern British Columbia. This coal is being tried in the company's by-product ovens, and it is said to be giving satisfaction. It is reported that some of the coal shipped from the Cassidy Collieries, Vancouver Island, has not been the success expected for coking purposes, and that it is proposed trying some from other fields.

An analysis of the latest figures available relative to the coal production of British Columbia shows that, while the output of the mines of the Crow's Nest Pass Field is increasing, that of Vancouver Island Collieries is declining slightly, although not sufficiently for serious comment. This is taken to prove that, notwithstanding general predictions that the shortage of fuel oil would increase the demand for coal, there has been no such result evident up to the present. However, the collieries of Vancouver Island anticipate that the present difficulty in securing adequate supplies of oil will affect their bunker trade. The reports of freight, and passenger vessels being re-converted into coal burners, and of many of those under construc-

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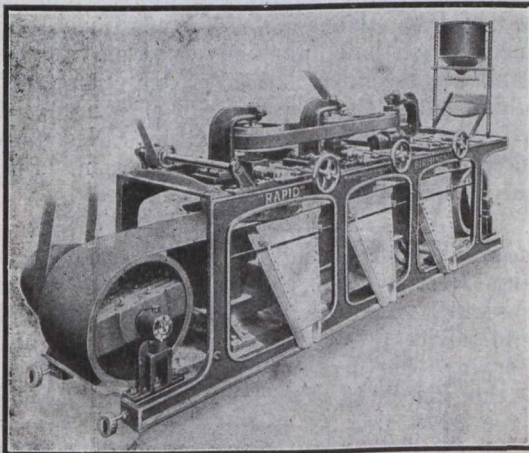
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tion being designed for the use of the latter fuel, are known to be authentic and it is felt that there will be, consequently, an increase in business shortly. Meanwhile the domestic demands have fallen off somewhat and production, as far as the coast mines are concerned, is about stationary. Production in the Crow's Nest Field, on the other hand, is climbing, a good market being found in supplying the Great Northern Ry. Co., by which concern it is used in pulverized form in the operation of the railroad. The greater proportion of the Corbin coal is shipped to Spokane, Wash., a comparative small quantity being taken by the C.P.R. A recent development, the results of which may be of importance, is the shipping of four cars of coal to Winnipeg, Manitoba, by the Crow's Nest Pass Coal Co. This is explained as an emergency shipment arranged for to meet the shortage caused by the lack of coal usually obtained from the United States. It is an indication, however, that Eastern British Columbia and the Province of Alberta may be called on to meet the requirements of the Canadian Middle West to a greater extent in the future than in the past. Coke production in the Crow's Nest still is far below what it once was, the ovens at Fernie being idle and only some of those of Michel in use, the product of which is absorbed by the Canadian Consolidated Mining & Smelting Co., for the Trail Smelter. The coal output for the month of April in the Crow's Nest and Nicola Fields follows:

Crow's Nest Pass.

	Tons.
Crow's Nest Pass Coal Co., Coal Creek	37,931
Do., Michel	21,529
Corbin Coal & Coke Co., Corbin	17,713
Total	77,173

Nicola-Princeton.

Middlesboro Collieries	6,220
Fleming Coal Co.	2,352
Princeton Coal & Coke Co.	1,267
Total	9,839

The production of Vancouver Island Collieries for the month of May follows:

Vancouver Island.

	Tons.
Canadian Western Fuel Co.	52,193
Canadian Collieries (D) Ltd., Comox	29,169
Do., South Wellington	6,889
Do., Extension	14,175
Pacific Coast Coal Co.	7,793
Nanoose-Wellington Coal Co.	2,251
Granby Mining & Smelting Co., Cassidy	15,107
Total	127,577

It is possible that the explanation of the action of the Crow's Nest Pass Coal Co.'s shipment to Winnipeg lies in the recent issuance in eastern Canada of a warning circular for the guidance of manufacturers which pointed out that the coal year, starting April 1st, started out with practically no coal reserves, a condition without parallel in the history of the con-

tinental, and advising those users within the area of distribution of the coal fields of the maritime provinces and of Alberta and British Columbia to obtain their supplies locally, thus avoiding the overloading of transportation.

The head office of the Crow's Nest Pass Coal Co., as well as that of two subsidiary companies, the Crow's Nest Pass Electric Light & Power Co., Ltd., and the Morrissey Fernie and Michel Ry., has been transferred from Toronto to Fernie, B.C. W. R. Wilson, General Manager of the company, has been elected to the presidency vice the late Elias Rogers, and A. Klauer, chief accountant for a long term, has been made treasurer.

At the annual meeting of the Rocky Mountain Branch of the Canadian Mining Institute, which was held at Fernie on May 27th, an instructive paper was read by Robert Strachan, Inspector of Mines, on the coalfields of the Crow's Nest Pass. He told of operations from the year 1873 to the present, dwelt on the abnormalities of the formation, and explained some of the methods most useful in overcoming the difficulties and the dangers of extracting coal. W. P. Williams, president of this Branch of the Institute, presided, and Dr. McDonald, Inspector of Mines, Calgary, acted as secretary. There was an address of welcome by Mayor Henderson, of Fernie, B.C., and a speech was delivered by A. I. Fisher, member of the Legislative Assembly, who expressed the opinion that because of the precautionary measures introduced by the Department of Mines, the experiences of the past, always involving interruption of work and loss of production and sometimes causing loss of life, had not been repeated of late. However, the government officials welcomed suggestions, particularly from a practical man, and he recommended that Mr. Strachan's paper be submitted to the Department of Mines. W. R. Wilson, General Manager of the Crow's Nest Pass Coal Co., entertained the delegates at luncheon. Subsequently the mines were inspected.

The Canadian Western Fuel Co.'s (Nanaimo) First Aid and Mine Rescue Assn., held their third annual competition recently for the company's shield. This is confined to novice or first year men and the high grade of the work performed was gratifying both to judges and the discriminating spectators. The winning team for 1920 was as follows: David Simpson (Captain) and Chas. Nicholls, William Thorpe, Robt. Humphries, and Jack Carnelly.

Announcement was made in Vancouver, B.C., of another increase in the retail price of coal. This advance took effect on the 1st of June. It amounts to 50c a ton, which means that lump coal now is selling for \$14 a ton. The Vancouver Coal Dealers' Association assert that the cause of the rise is the increased cost of doing business.

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The Wabi Iron Works
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Mussens, Ltd.
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The Canada Metal Co., Ltd.
- Castings (Iron and Steel)**
Burnett & Crampton
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works
- Cement and Concrete Waterproofing:**
Spielman Agencies, Regd.
- Cement Machinery:**
Northern Canada Supply Co.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
Fraser & Chalmers of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Burnett & Crampton
- Chains:**
Jones & Glassco
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
Link-Belt Co.
Greening, B., Wire Co., Ltd.
- Chain Drives:**
Jones & Glassco (Regd.)
- Chain Drives—Silent and Steel Roller:**
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:**
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
- 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
Link-Belt Co.
- Coal Pockets:**
Canadian Mead-Morrison Co., Limited
- Coal Pick Machines:**
Sullivan Machinery Co.
- Coal Screening Plants:**
Canadian Mead-Morrison Co., Limited.
- Cobalt Oxide:**
Coniagas Reduction Co.
Everitt & Co.
- Compressors—Air:**
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
Musser, 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:**
The Mine & Smelter Supply Co.
Jones & Glassco (Regd.)
- Conveyor Flights:**
Hendrick Mfg. Co., Ltd.
- Conveyor—Trough—Belt:**
Canadian Fairbanks-Morse Co., Ltd.
Link-Belt Co.
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.
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.
- Crude Oil Engines:**
Swedish Steel & Importing Co., Ltd.
- Crushers:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Hardinge Conical Mill Co.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co., Ltd.
R. T. Gilman & Co.
Lymans, Ltd.
Mussens, Limited
The Mine & Smelter Supply Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

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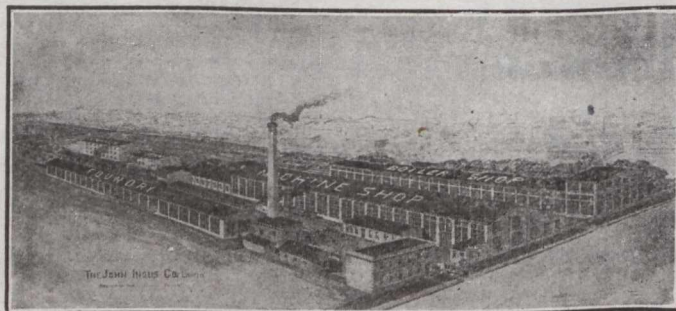
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Canadian Miners' Buying Directory.—(Continued)

- Cut Gears:**
Hans Renold of Canada, Limited, Montreal, Que.
- Cyanide:**
American Cyanamid Company.
- Cyanide Plant Equipment:**
The Dorr Co.
The Mine & Smelter Supply Co.
- D. C. Units:**
MacGovern Co.
- Derricks:**
Smart-Turner Machine Co.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Mussens, Limited
- Diamond Drill Contractors:**
Diamond Drill Contracting Co.
E. J. Longyear Company
Smith & Travers
Sullivan Machinery Co.
- Diamond Tools:**
Diamond Drill Carbon Co.
- Diamond Importers:**
Diamond Drill Carbon Co.
- Digesters:**
Canadian Chicago Bridge and Iron Works
- Dies:**
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Dredger Pins:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
- Dredging Machinery:**
Canadian Steel Foundries, Ltd.
Canadian Mead-Morrison Co., Limited.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
R. T. Gilman & Co.
- Dredging Ropes:**
Allan, Whyte & Co.
Greening, B., Wire Co., Ltd.
R. T. Gilman & Co.
- Drills, Air and Hammer:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
The Mine & Smelter Supply Co.
Mussens, Limited
- Drills—Core:**
Canadian Ingersoll-Rand Co., Ltd.
E. J. Longyear Company
Standard Diamond Drill Co.
Sullivan Machinery Co.
- Drills—Diamond:**
Sullivan Machinery Co.
Northern Canada Supply Co.
E. J. Longyear Company
- Drill Steel—Mining:**
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rockaway
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.
- Drill Steel Sharpeners:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Northern Canada Supply Co.
Sullivan Machinery Co.
Osborn, Sam'l (Canada) Limited.
The Wabi Iron Works
- Drills—Electric:**
Canadian Fairbanks-Morse Co., Ltd.
Sullivan Machinery Co.
Northern Electric Co., Ltd.
- Drills—High Speed and Carbon:**
Canadian Fairbanks-Morse Co., Ltd.
Osborn, Sam'l (Canada) Limited.
H. A. Drury Co., Ltd.
Hadfields, Limited
- Dynamite:**
Canadian Explosives
Giant Powder Company of Canada, Ltd.
Northern Canada Supply Co.
- Dynamos:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Company
- Ejectors:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
- Elevators:**
Canadian Mead-Morrison Co., Limited.
Sullivan Machinery Co.
Northern Canada Supply Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
Jones & Glassco (Regd.)
Mussens, Limited
The Wabi Iron Works
- Engineering Instruments:**
C. L. Berger & Sons
- Engines—Automatic:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
Fraser & Chalmers of Canada, Ltd.
- Engines—Gas and Gasoline:**
Canadian Fairbanks-Morse Co., Ltd.
Alex. Fleck
Fraser & Chalmers of Canada, Ltd.
Osborn, Sam'l (Canada) Limited.
Sullivan Machinery Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.
The Mine & Smelter Supply Co.
- Engines—Haulage:**
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
- Engines—Marine:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Co., Inc.
Swedish Steel & Importing Co., Ltd.
- Engines—Steam:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
R. T. Gilman & Co.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.
- Engines—Stationery:**
Swedish Steel & Importing Co., Ltd.
- Engineers:**
General Engineering Co., New York
The Dorr Co.
- Ferro-Alloys (all Classes):**
Everitt & Co.
- Feed Water Heaters:**
MacGovern & Co.
- Fire Fighting Supplies:**
Gutta Percha & Rubber, Ltd.
- Flashlights—Electric:**
Spielman Agencies, Regd.
- Flood Lamps:**
Northern Electric Co., Ltd.
- Flourspar:**
The Consolidated Mining & Smelting Co.
Everitt & Co.
- Forges:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
- Forging:**
Canadian Mead-Morrison Co., Limited.
Canadian Foundries and Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
- Frogs:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore
- Frequency Changers:**
MacGovern & Co., Inc.
- Furnaces—Assay:**
Canadian Fairbanks-Morse Co., Ltd.
Lymans, Limited
Mine & Smelter Supply Co.
- Fuse:**
Canadian Explosives
Giant Powder Company of Canada, Ltd.
Northern Canada Supply Co.
- Gaskets:**
Gutta Percha & Rubber, Ltd.
- Gears:**
Hans Renold of Canada, Limited, Montreal, Que.
Jones & Glassco (Regd.)
- Gears (Cast):**
Hull Iron & Steel Foundries, Ltd.
The Link-Belt Co.
- 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 Wabi Iron Works
R. T. Gilman & Co.
Mussens, Limited
Link-Belt Co.
- 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.
- Hydraulic Machinery:**
Canadian Fairbanks-Morse Co., Ltd.
Hadfields, Limited
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Industrial Chemists:**
Hersey, M. & Co., Ltd.
- Ingot Copper:**
Canada Metal Co., Ltd.
Hoyt Metal Co.
- Insulating Compounds:**
Standard Underground Cable Co. of Canada, Ltd.
- Inspection and Testing:**
Dominion Engineering & Inspection Co.
- Inspectors:**
Hersey, M. & Co., Ltd.
- Jacks:**
Canadian Fairbanks-Morse Co., Ltd.
Can. Brakeshoe Co., Ltd.
Northern Canada Supply Co.
R. T. Gilman & Co.
Mussens, Limited
- Jack Screws:**
Canadian Foundries and Forgings, Ltd.
- Laboratory Machinery:**
Mine & Smelter Supply Co.
- Lamps—Acetylene:**
Dewar Manufacturing Co., Inc.
- Lamps—Carbide:**
Dewar Manufacturing Co., Inc.
- Lamps—Miners:**
Canada Carbide Company, Limited
Canadian Fairbanks-Morse Co., Ltd.
Dewar Manufacturing Co., Inc.
Northern Electric Co., Ltd.
Mussens, Limited
- Lamps:**
Dewar Manufacturing Co., Inc.
- Lanterns—Electric:**
Spielman Agencies, Regd.
- Lead (Fig):**
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.
- 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.
Northern Canada Supply Co.
Jones & Glassco
- Machinists:**
Burnett & Crampton
- Machinery—Repair Shop:**
Canadian Fairbanks-Morse Co., Ltd.
- Machine Shop Supplies:**
Canadian Fairbanks-Morse Co., Ltd.
- Magnesium Metal:**
Everitt & Co.
Hull Iron & Steel Foundries, Ltd.
- Manganese Steel:**
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Metal Marking Machinery:**
Canadian Fairbanks-Morse Co., Ltd.
- Metal Merchants:**
Henry Bath & Son
Geo. G. Blackwell, Sons & Co.
Coniagas Reduction Co.
Consolidated Mining & Smelting Co. of Canada
Canada Metal Co.
C. L. Constant Co.
Everitt & Co.
- Metallurgical Engineers:**
General Engineering Co., New York
The 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
- Mining Requisites:**
Canadian Steel Foundries, Ltd.
Dominion Wire Rope Co., Ltd.
Hadfields, Limited
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
- Mining Ropes:**
Dominion Wire Rope Co., Ltd.
- Mine Surveying Instruments:**
C. L. Berger & Sons
- Molybdenite:**
Everitt & Co.
- Monel Metal (Wire, Rod, Sheet and Foundry Metal):**
International Nickel Co.
- Motors:**
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
MacGovern & Co.
The Mine & Smelter Supply Co.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

- Motor Generator Sets—A.C. and D.C.**
MacGovern & Co.
- Nails:**
Canada Metal Co.
- Nickel:**
International Nickel Co.
Coniagas Reduction Co.
The Mond Nickel Co., Ltd.
- Nickel Anodes:**
The Mond Nickel Co., Ltd.
- Nickel Salts:**
The Mond Nickel Co., Ltd.
- Nickel Sheets:**
The International Nickel Co. of Canada
The Mond Nickel Co., Ltd.
- Nickel Wire:**
The Mond Nickel Co., Ltd.
The International Nickel Co. of Canada
- Oil Analysts:**
Constant, C. L. Co.
- Ore Handling Equipment:**
Canadian Mead-Morrison Co., Limited.
- 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.
- Roofing:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
- Rope—Manilla:**
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
- Rope—Manilla and Jute:**
Jones & Glassco
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited
Allan, Whyte & Co.

Canadian Miners' Buying Directory.—(Continued)

- Rope—Wire:**
Allan, Whyte & Co.
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.
Link-Belt Co.
- Screens—Cross Patent Flanged Lip:**
Hendrick Mfg. Co.
- Screens—Perforated Metal:**
Hendrick Mfg. Co.
- Screens—Shaking:**
Hendrick Mfg. Co.
- Screens—Revolving:**
Hendrick Mfg. Co.
- Scheelite:**
Everitt & Co.
- Separators:**
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Mine & Smelter Supply Co.
- Shaft Contractors:**
Hendrick Mfg. Co.
- Sheet Metal Work:**
Hendrick Mfg. Co.
- Sheets—Genuine Manganese Bronze:**
Hendrick Mfg. Co.
- Shoes and Dies:**
Canadian Foundries and Forgings, Ltd.
H. A. Drury Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
- Shovels—Steam:**
Canadian Foundries and Forgings, Ltd.
Canadian Mead-Morrison Co., Limited.
Osborn, Sam'l (Canada) Limited.
R. T. Gilman & Co.
- Ship Bunkering Equipment:**
Canadian Mead-Morrison Co., Limited.
- Silent Chain:**
Hans Renold of Canada, Limited, Montreal, Que.
- Silent and Steel Roller:**
Jones & Glassco (Regd.)
- Siline:**
Coniagas Reduction Co.
- Saline Refiners:**
Goldsmith Bros.
- Smelters:**
Goldsmith Bros.
- Sledges:**
Canada Foundries & Forgings, Ltd.
- Smoke Stacks:**
Hendrick Mfg. Co.
MacKinnon Steel Co., Ltd.
Marsh Engineering Works
The Wabi Iron Works
- Special Machinery:**
John Inglis Co., Ltd.
- Spelter:**
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.
- Sprockets:**
Hans Renold of Canada, Limited, Montreal, Que.
Link-Belt Co.
Jones & Glassco (Regd.)
- Spring Coil and Clips Electric:**
Canadian Steel Foundries, Ltd.
- Steel Barrels:**
Smart-Turner Machine Co.
Fraser & Chalmers of Canada, Ltd.
- Stamp Forgings:**
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Steel Castings:**
Canadian Brakeshoe Co., Ltd.
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
The Wabi Iron Works
- Steel Drills:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
The Electric Steel & Metals Co.
Osborn, Sam'l (Canada) Limited.
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.
- Steel Drums:**
Smart-Turner Machine Co.
- Steel—Tool:**
Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
N. S. Steel & Coal Co.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
Swedish Steel & Importing Co., Ltd.
- Structural Steel Work (Light):**
Hendrick Mfg. Co.
- Stone Breakers:**
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works
- Sulphate of Copper:**
The Mond Nickel Co., Ltd.
Coniagas Reduction Co.
- Sulphate of Nickel:**
The Mond Nickel Co., Ltd.
- Surveying Instruments:**
C. L. Berger
- Switches and Switch Stand:**
Canadian Steel Foundries, Ltd.
Mussens, Limited.
- Switches and Turntables:**
John J. Gartshore
- Tables—Concentrating:**
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
- Tanks:**
R. T. Gilman & Co.
- Tanks—Acid:**
Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.
- Tanks (Wooden):**
Canadian Fairbanks-Morse Co., Ltd.
Gould, Shapley & Muir Co., Ltd.
Pacific Coast Pipe Co., Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works
- Tanks—Cyanide, Etc.:**
Hendrick Mfg. Co.
Pacific Coast Pipe Co.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works
- Tanks—Steel:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Chicago Bridge & Iron Works
Marsh Engineering Works
Osborn, Sam'l (Canada) Limited.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Hendrick Mfg. Co.
The Wabi Iron Works
- Tanks—Oil Storage:**
Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.
- Tanks (water) and Steel Towers:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Chicago Bridge & Iron Works
Gould, Shapley & Muir Co., Ltd.
MacKinnon Steel Co.
Mine & Smelter Supply Co.
The Wabi Iron Works
- Tires—Auto, Truck and Bicycle:**
Gutta Percha & Rubber, Ltd.

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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 Apparatus:
Jones & Glassco (Regd.)

Transmission Machinery:
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.

TTrucks:
Canadian Fairbanks-Morse Co., Ltd.

Tubs:
Hadfields, Limited

Tube Mills:
The Electric Steel & Metals Co.
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.

Tube Mill Balls:
Canada Foundries & Forgings, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Tube Mill Liners:
Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Turbines—Water Wheel:
MacGovern & Co.

Turbines—Steam:
Fraser & Chalmers of Canada, Ltd.
MacGovern & Co.

Twincones:
Canada Foundries & Forgings, Ltd.

Uranium:
Everitt & Co.

Weighing Larries:
Canadian Mead-Morrison Co., Limited

Welding—Rod and Flux:
Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.

Welding and Cutting—Oxy-Acetylene:
Prest-O-Lite Co. of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Imperial Brass Mfg. Co.

Wheels and Axles:
Canadian Steel Foundries, Ltd.
Hadfields, Limited
The Electric Steel & Metals Co.
The Wabi Iron Works

Winches—Power Driven:
Canadian Mead-Morrison Co., Limited

Winding Engines—Steam and Electric:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Wire:
Canada Wire & Cable Co., Ltd.
Greening, B. Wire Co.

Wire Rope:
R. T. Gilman & Co.
Canada Wire and Iron Goods Company.
Dominion Wire Rope Co., Ltd.

Wire Rope Fittings:
Canada Wire and Iron Goods Company.

Wire Cloth:
Northern Canada Supply Co.
Greening, B. Wire Co.
Canada Wire & Iron Goods Company

Wire (Bars and Insulated):
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Wolfram Ore:
Everitt & Co.

Woodworking Machinery:
Canadian Fairbanks-Morse Co., Ltd.

Zirconium:
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Zinc:
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Zinc Spelter:
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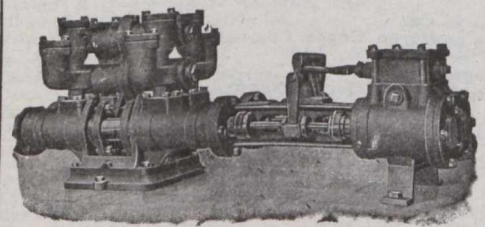
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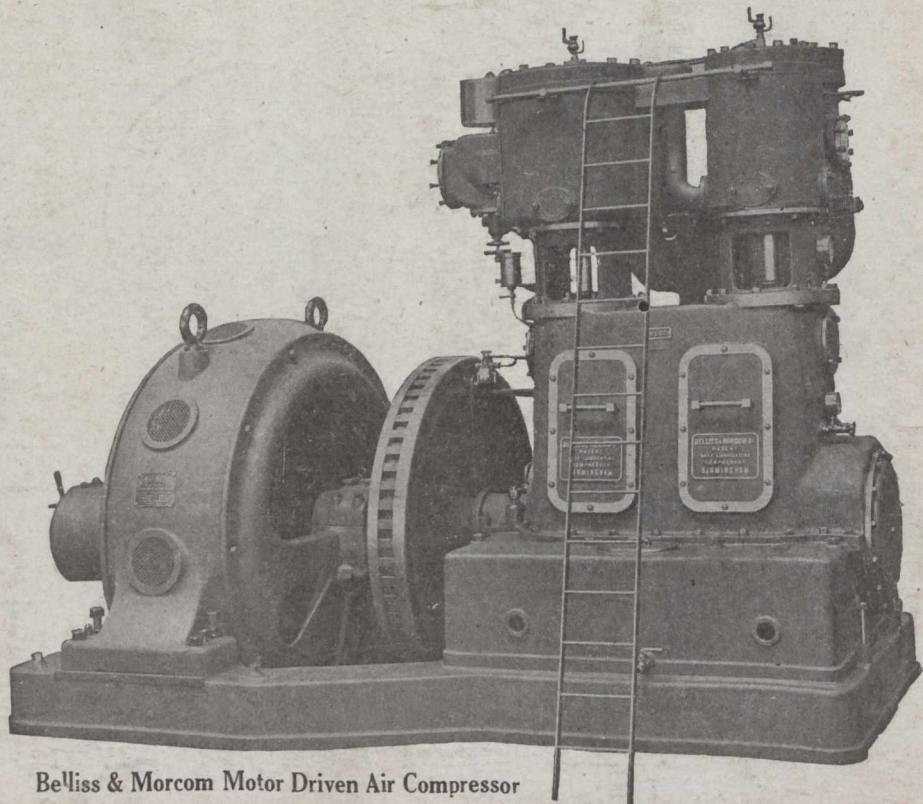
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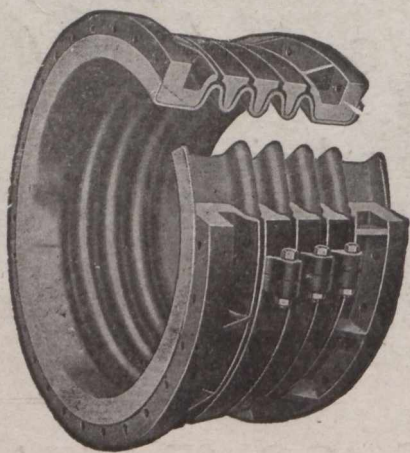
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