



# CANADIAN MINING JOURNAL

Vol. XL

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No. 51

## Electric Steel & Engineering, Ltd.

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WELLAND, - ONTARIO

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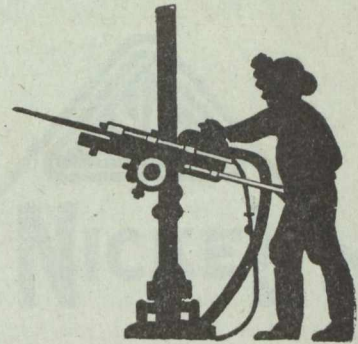
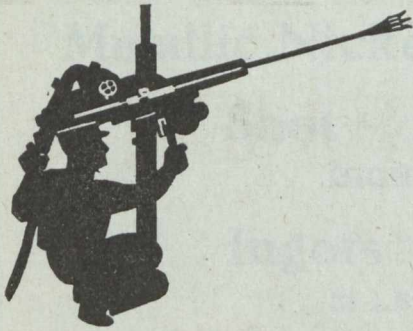
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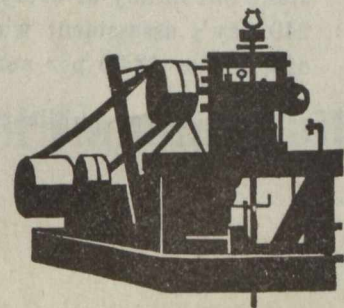
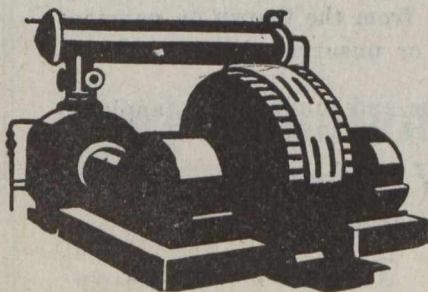


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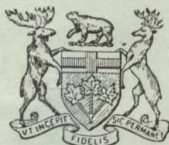
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PROVINCE OF ONTARIO



HON. H. MILLS, Minister of Mines.

# 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.

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

**Thos. W. Gibson,**

Deputy Minister of Mines,

**Toronto, Canada**

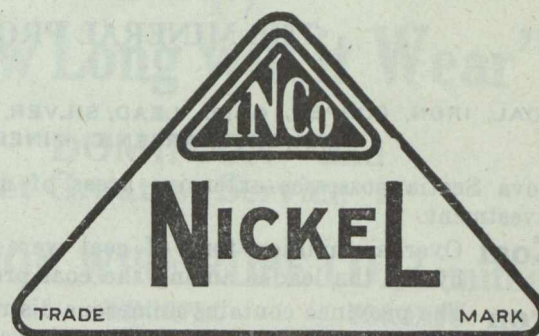


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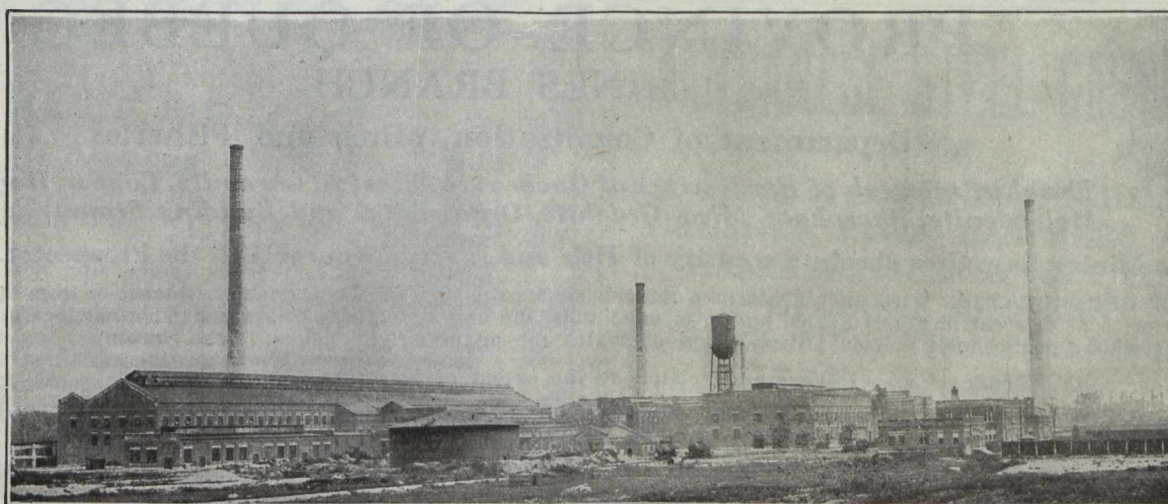
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# The Minerals of Nova Scotia

THE MINERAL PROVINCE OF EASTERN CANADA

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

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

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

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

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

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

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

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

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

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

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

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

*Commissioner of Public Works and Mines*



## PROVINCE OF QUEBEC MINES BRANCH

Department of Colonization, Mines and Fisheries

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

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

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

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

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

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

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

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

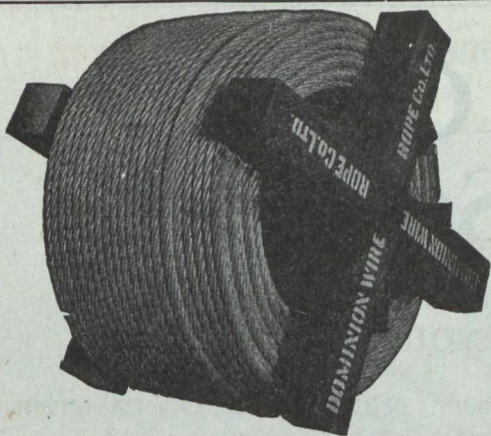
The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec, north of the height of land, where important mineralized belts are known to exist.

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

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

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MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.





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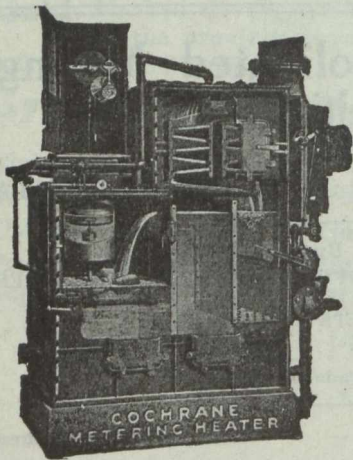
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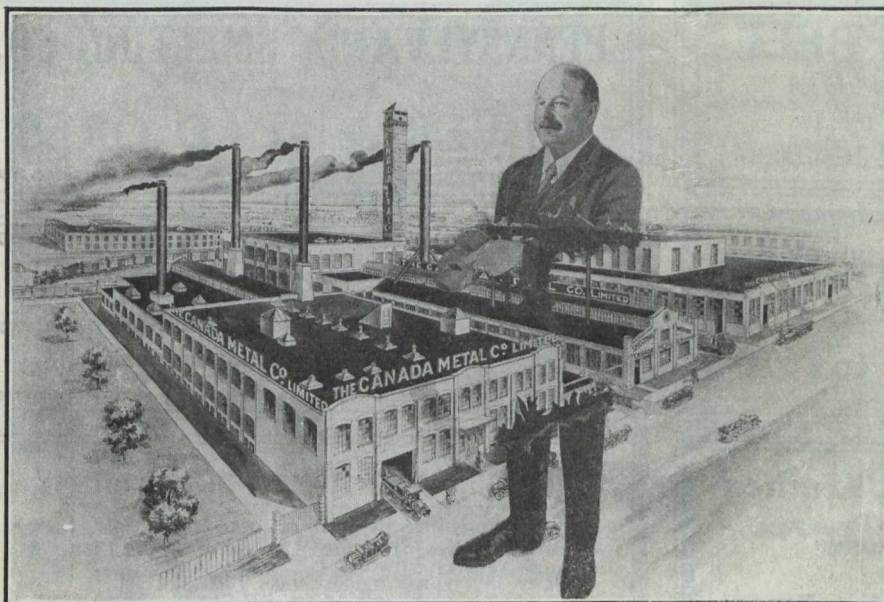
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**Aggregate Value of \$637,353,581**

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

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

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

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

Mineral locations are granted to discoverers for nominal fees.

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

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

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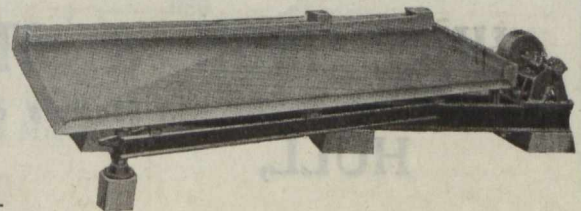
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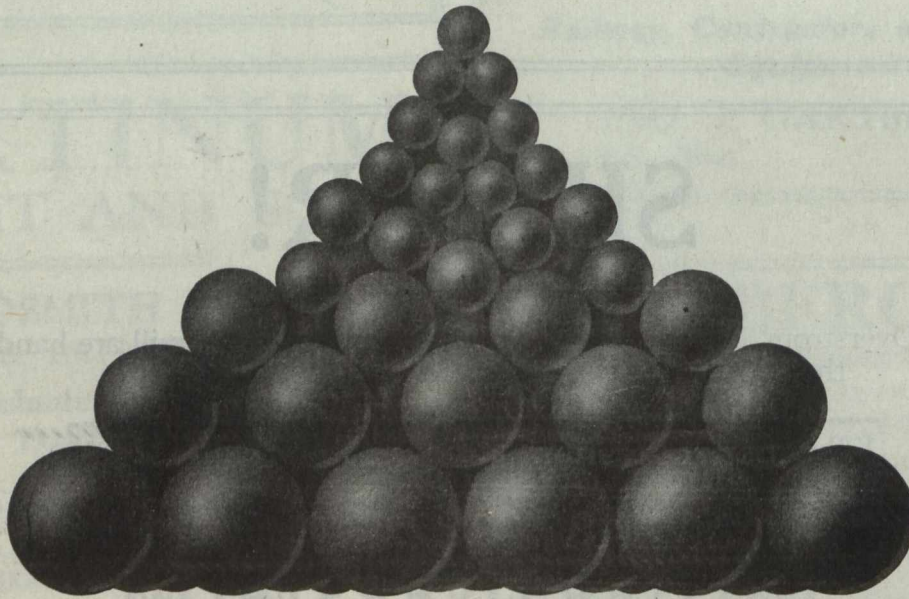


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# Canadian Mining Journal

A Weekly Journal devoted to the Science and Practice of the Mining, Metallurgical and Allied Industries, with an Up-to-date Review of existing conditions.

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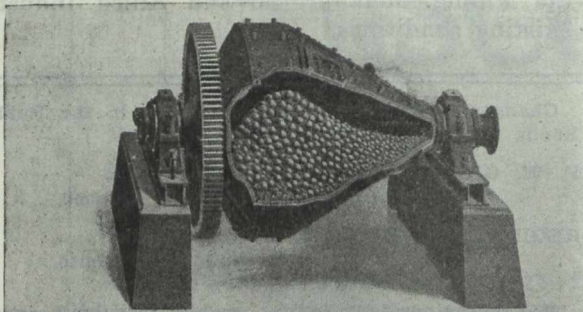
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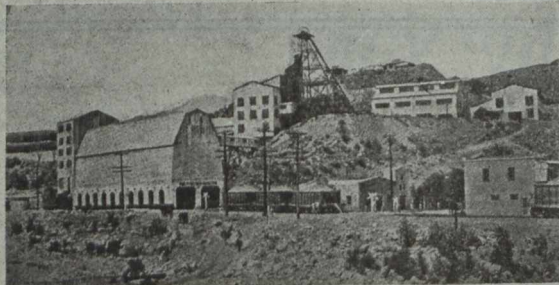


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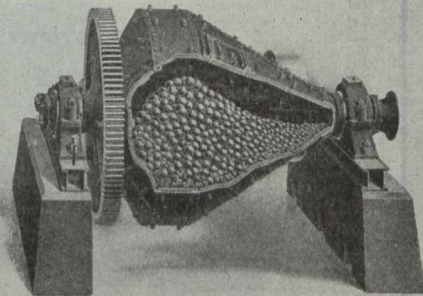
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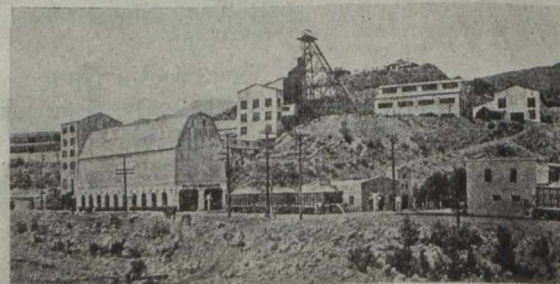
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# EDITORIAL

## INDUSTRIAL HOUSING.

A writer in the Boston "Financial Bureau" draws attention to the tremendous programme of building now in course of development in the United States, and deplores the fact that the percentages of construction of industrial plants is out of all proportion to the provision which is being made for housing the workers. He says that large industrial expansion creates an additional demand for labor which must be brought into the locality. If there are not adequate housing facilities for this imported labour, "the community is immediately in possession of a very sinister social problem—a housing problem. The higher-paid men bid the lower-paid men off their feet, the number of persons per room is increased, and sanitary and moral conditions consequently lowered; everyone is paying more than he can afford for rent, and there is a constant floating population which is unable to get accommodation, because none exists. This inevitably breeds discontent, and fertilizes the ground for the clap-trap radical orator."

One of the most noticeable features of the financial pages of Canadian newspapers in recent months has been the large number of new incorporations, the tremendous projection of United States interests into the Canadian field, and the great number of new factories mooted for Canadian industrial centres. It is equally certain that nothing like the same proportionate activity marks the erection of moderately priced houses, and, as everybody knows, the housing problem in Canadian towns and cities is sufficiently grave already.

The duty of providing houses for workmen should go side by side, and should be accepted by employers of labour as part of the necessary expenditure for industrial extensions. If this duty is not undertaken, the employer suffers in many ways. As the writer previously quoted says:

"A floating labour class inevitably increases the labour turnover of a factory. Nothing will run up factory costs quicker than a constantly changing personnel, no one offers the I. W. W. agitator a more inviting field than the roving workman, who lives in a barrack or a boarding-house, and has not a penny-worth of permanent investment, because it is not portable."

It is becoming more and more realized that the I. W. W. trouble in the Western States of the Union is the outcome of the formation of a class of "landless men" brought about by the seasonal work

periods of the harvest fields, lumbering and other industries that do not offer men a permanent home or steady employment. There is much reason to believe that Bolshevism, with all its hideous consequences, was born in the I. W. W. circles of the United States, and the policy of United States employers of labour, possibly unconsciously, is not blameless in the creation of this class of roving, landless, homeless men, who naturally follow the age-long path of the Ishmaelite.

One shining example of the opposite tendency is the policy pursued in housing by the Granby Consolidated Co. at Cassidy Mines, already described in this journal. Such faith and vision cannot fail of its just reward.

Canada is not a country for "landless men". The climate discourage aimless migration, and our per capita wealth and great natural resources allow no legitimate excuse for the growth of such a class. But there is a grave danger of the growth of slums in Canadian cities. Indeed, they already exist, as bad and as vile as can be found anywhere.

It should not be forgotten that anarchy, civil discord, and mob rule in its most pitiless and hideous aspect, lurks and awaits its opportunity in every slum. We do not want in our Canadian cities areas from which—should for any reason the civil rule of ordered justice be paralysed, as we have seen it so happen not long ago—there will emerge the original anarchy, with no stake or joy in life, to wreak destruction on peaceful homes of more fortunate people. Such areas are, however, in process of making, although there is neither necessity nor excuse for their existence.

The Editor of "Mining & Scientific Press" commenting on the confessions of the German criminals who caused the war, writes: "These German confessions exhibit an entire absence of sorrow for the sufferings brought on humanity by the war; instead, there are repeated expressions of chagrin that the great piratic scheme failed, and a regretful rumination over the factors that made its success impracticable, with the suggestion that next time there must be no such blunders. The German leaders are entirely unrepentant of their crime, the details of which they themselves have exposed. They justify the judgments formed in the early months of the war, on the basis of the information then available, and they show, how, under an autocratic regime, a few men can play fast and loose with the fortunes of humanity."

Mr. Rickard, in his last sentence, concisely sums up



the initial cause of the war. Three great adjacent empires were ruled by three men, one a fool, one a weakling, and the other an old man in dotage. The inevitable happened, and it was to prevent such a thing happening again that the League of Nations was conceived.

Why the conception should have failed of realization may be understood by the citizens of the United States, but is causing much bewilderment among other peoples. However, a good cause must eventually succeed, and we have great faith in the ideals of the people of the United States, because they are largely those of our own nation.

Mr. Balfour has exquisitely phrased the general feeling of the British peoples in this matter. He said: "The part of the United States in the war was noble and disinterested, with no thought of national ambition. I had dreams that a work so nobly begun would be effectively carried through." So had we all. And after all our hopes were only dreams.

#### MINSTERS OF MINES.

The Cobalt "Mining Review" remarks that the recent visit of the new Premier of Ontario, accompanied by the new Minister of Mines, "did not serve to allay the fears that the new appointment may not prove to be beneficial."

There can be no two opinions about the wisdom of the creation of a new portfolio concerned with mining and with nothing else. This action of the new Ontario government is one that should be followed by a similar concentration of ministerial duties in the federal cabinet.

As to the choice of a minister of mines we advance the opinion, with which, on principle, we do not see how the United Farmers of Ontario can quarrel, that the proper person for such office is a man who, firstly, should be a properly qualified mining engineer, and, secondly, should never have been in "politics" as that elastic term is commonly understood amongst us. Possibly this opinion will be regarded as too advanced—or shall we say—too elementarily correct, even for the U. F. O. We have never been able to understand why the responsible ministers of state should be chosen from amongst those who have been prominent in electoral activities, and are also inclined to believe that a minister of agriculture should be a farmer, a minister of finance, a financier, a minister of education, an educationalist, or, in short, that those who direct technical department of state should know something about the things they are going to direct.

Of course, we know that it will be said that we are ignorant of the first principles of popular control of government through electoral channels, or, less elaborately phrased, that we do not know the first thing about politics. The statement would be quite correct, but, admitting it, what does a minister of mines

need to know about politics? If he knows something about the nature and operation of mines is not that the main desideratum?

#### BURSARIES FOR MINING & METALLURGY STUDENTS.

Elsewhere in this issue will be found an account taken from the "Industrial Australian and Mining Standard" of the generous assistance that has been given by mining companies and individuals interested in mining to the foundation of bursaries for students of mining and metallurgy. While a commendable commencement has been made in this direction in Canada, thanks to the bounty of the International Nickel Company and the Granby Consolidated Company, we do not recollect hearing of such an organized movement in Canada for the assistance of students as appears to have gathered way in Australia.

Here is an excellent opportunity for the many Canadian who have become wealthy through the yield of Canadian mines, an opportunity not only to show a spirit of gratitude for the good fortune which has befallen themselves personally, but to ensure greater monetary rewards for the future, for themselves may be, and certainly to Canada at large, because—and this is a point that cannot be too strongly urged—Canada is so little prospected, and her mineral values are so little understood, that the reward of the future will always be in exact proportion to the effort expended in scientific research upon our mineral occurrences. Science cannot progress without students, and scientific investigations cannot be carried to final success without monetary assistance.

#### UNIVERSITY BURSARIES FOR MINING AND METALLURGY.

Towards the end of 1915, following the suggestion of Mr. W. S. Robinson, a movement was initiated with the object of providing a fund whereby bursaries and scholarships might be offered to mining and metallurgical students in Australian Universities. In 1916-17 a sum of £5,400 was subscribed for the purpose by the following companies:—Amalgamated Zinc (De Bavay's); Broken Hill Proprietary Block 14; Broken Hill South; Electrolytic Refining and Smelting; Adelong Gold Estates; Cock's Pioneer G. and T. Mines; North Broken Hill; Mount Morgan G. M. Co.; Mount Lyell M. and R. Co.; Zinc Corporation; Hampden-Cloncurry Copper Mines; Broken Hill Proprietary Block 10; Sulphide Corporation; and the British Broken Hill Proprietary Co. This sum provided an income sufficient to allow of two bursaries of £60 each being offered to the University of Melbourne in 1917, and of a further two bursaries of like amount to the University of Adelaide in 1918. These bursaries are awarded and paid to successful students in two instalments of £30 each, at the beginning of the 3rd and 4th year of their courses, and carry a scholarship on any one of the companies' mines for one year following the completion of the University course, and a salary of £150 is paid to the successful students for that period. Provided the student responds to his work, the companies agree to obtain a suitable posi-



tion for him at an initial salary of not less than £250 per annum.

Notwithstanding that the movement was started during the war period, when so many of the most promising students had enlisted and were serving their country abroad, it proved so successful as to warrant further sums being subscribed to allow of similar bursaries and scholarships being offered to the Universities in the other States of the Commonwealth. An appeal was made to the boards of the various companies, to which a most gratifying response was made, the result being that the fund was nearly doubled. Included in this response was a donation of £500 from Howard, Smith, Ltd, on behalf of the Caledonian collieries, thus bringing this coal proprietary within the benefits to be derived from the scheme. The provision of these additional funds will permit the Board of Trustees to extend their efforts, and bursaries and scholarships on similar conditions are now being offered to the Universities of Sydney, Brisbane and Hobart. This will almost absorb the income from the invested funds. Already a number of the students who interrupted their studies at their country's call have returned, or are returning, and the inquiries show how much the scheme is appreciated. Of returned soldiers, one has been awarded a bursary, and three have been placed in positions almost equal to the scholarship. The bursaries and scholarships are awarded on the recommendation of a selection committee in each State, consisting of two professors of the University of the State, two nominees of the Trustees and a nominee of the Australasian Institute of Mining and Metallurgy.

It is felt that this bursary and scholarship fund is still incommensurate with the importance of the mining, and metallurgical industries of the Commonwealth, and it is hoped that further contributions will be received so that the scheme may be extended, not only to the Universities, but also to the various Schools of Mines and Technical Colleges outside the sphere of the Universities. The companies which, so far, have not contributed to the fund may yet do so, as the advantage of having highly-qualified young men available for special technical and research work must sooner or later be realised. As showing the changing attitude to technical education abroad, it may be stated that, quite recently, four British oil companies operating in the East subscribed £200,000 to endow a Chemical School at the Cambridge University—a munificent donation, which sum was increased by £10,000 by a generous donor, who wished to convert the pounds into guineas. The hon. secretary of the movement is Mr. F. G. T. Nicholas, of 56 Queen-street, Melbourne, who will gladly answer any inquiries.—*Industrial Australian and Mining Standard*.

#### *Mining Personals*

Alfred R. Whitman, mining geologist, is spending a week in Cobalt in connection with a geological survey at the Genesee property.

Geo. J. Miller of the Miller Independence Mine is in Dayton on business.

L. C. Campbell, of the Lumsden Mine, has returned to Montreal after paying a visit to the property.

W. L. Penick, until recently connected with the Salt Lake City office of the Hardinge Conical Mill Company, has been advanced to the position of Northwest Sales Manager, and has gone to Spokane, Washington, to open a new branch office for the Hardinge Conical Mill Company.

#### BOOK REVIEW

**ELECTRIC MINING MACHINERY:** by Sydney F. Walker, author of "Electricity in Mining. Isaac Pitman & Sons, Ltd., London and New York. Cloth, 8 by 5½ ins., 374 pp. with index. Illustrated. 12/6 net.

Mr. Walker's work on "Electricity in Mining" was one of the pioneer works on the application of electricity to mining operations, and a comparison between the new work now issued by Pitman & Sons and the earlier book will show what great strides have been made. Mr. Walker, in the preface, writes, with correctness, that electric science advances day by day, and that it is impossible to be quite sure that everything which is on the market has been included in his book. Mr. Walker also urges the importance of employing competent electrical engineers in mine plants where large use is made of electric machines, and pleads for a recognition of the necessity to pay adequate salaries if employers are to obtain the services of really competent electricians. As all mining engineers know, to their sorrow, there are electricians and electricians. Modern electrical machinery is above all efficient. If electrical engineering applied to mining has a fault, it is in the tendency of manufacturers to take undue advantage of the nice calculations which are possible in electric machine design, and not to make sufficient allowance for the special conditions under which mining machinery must operate. This tendency makes the employment of competent electricians all the more necessary.

The book discusses the merits of various prime movers, favoring the steam turbine in general, but going fully into the use of gas producers and gas engines where the presence of suitable materials, or waste gases, indicate economy in the use of this form of primary power.

The lay-out of an electric generating station for a group of mines is explained, as also a suitable lay-out for a single mine.

The principles and design of modern electric generators and machines is made the subject of a number of chapters, and much attention is paid to the problems of transmission, the regulating of pressures and the use of measuring instruments, which Mr. Walker intimates, mine operators have shown some backwardness in installing.

Especial attention is devoted to the insulation and support of mine cables, a matter of very great importance under the conditions of strain and damp surroundings that transmission cables in mines are often subjected to. Mr. Walker mentions that aluminum is coming into favour as a conductor metal as the quantity manufactured is increased, because of its lightness. The question of weight in mine cables is important, where these have to be led down vertical openings, and require strong support.

The subsidiary uses of electricity are gone into in individual chapters. The chapter on portable electric mining lamps does not include any references to the cap type of lamp with Edison battery that is now so largely used on this side, and mentions that the hand lamp of the Ceag type is regarded as the standard in British practice. Electric winding, or what is known as electric hoisting in North America, is described, as are also the forms of electric haulage used underground. Significantly no mention is made by Mr. Walker of the trolley-haulages that are so



much used in the United States, and their adoption in English mines is unlikely. In coal mines, of course, their use is forbidden, although some of the original types of trolley locomotives have been used in British mines where gas was absent. The adaptability of electricity to secondary or auxiliary haulages is pointed out.

Electrically driven mine pumps, or ram and centrifugal type are described. Mr. Walker prefers the ram type of pump where small quantities of water have to be delivered against high lifts. The use of centrifugal pumps, electrically driven, is well adapted for emergencies.

In connection with the electric drive of air-compressors, Mr. Walker writes:

"Electricity has not completely superseded compressed air, principally because of the dangers of sparking and the ignition of gas, which mine managers fear very much. With the steady increase in the use of electric drive in mines, the question of the driving of air-compressors has naturally come up, particularly as for some time past now the practice has been introduced of driving air compressors underground, as near to the apparatus that is to use it as is safe, the compressed air being taken from there to the working face, or wherever it may be required."

This reference has an interesting bearing on the working of undersea coal areas remote from the point of entrance of motive power, and electricity appears to be the only suitable motive power in these circumstances.

The operation of ventilating fans by electricity is mentioned, and a full chapter is devoted to electrical coal-cutting machinery. Electric signals are discussed at length, and the final chapter is on shot-firing in mines. "In the earlier days of electric lighting," says Mr. Walker, "shots were fired from the lighting service, and according to reports from America, this is still done the practice in some districts. The practice cannot be too strongly condemned, quite apart from the Coal Mines Regulation Act."

Mr. Walker's book does not discuss the objections to the use of electricity underground in coal-mines, and it would have added much interest to the book if the author had found it advisable to detail at length the objections of mine managers to the use of electricity underground, and as far as possible to reassure them. In coal mines, at any rate, the more extended use of electricity is hindered by some uncertainty and probably a good deal of misconception as to the perfection to which more electric machinery has been brought. If makers of electric machinery can provide devices that can be safely used in the presence of gas and air there is no reasonable limit to the use of electricity underground, even to the supersession of all other forms of motive power now known.

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ASBESTOS, and the Asbestos Industry, by Leonard Summers, 5 by 7 ins. Cloth, 107 pp. with Index. Illustrated. Price 2s. 6d. Sir Isaac Pitman & Sons, London and New York.

This little volume is the latest addition to Messrs. Pitman's series of treatises on "Common Commodities and Industries" which now includes about twenty-five volumes.

The writer mentions in the preface the paucity of popular literature dealing with asbestos, and in this connection we may mention that this "Journal" has recently had its attention called to the scarcity of Fritz Cirkel's monograph on Asbestos published by the Mines Branch at Ottawa. In view of the great development that the asbestos industry has undergone in the war period, and the additional uses which are every day being found for asbestos, we would suggest that either the Mines Department of Quebec, or the Mines Branch at Ottawa should consider the publication of a monograph on asbestos, dealing not only with its occurrences in Canada, but with the tremendous variety of uses to which this interesting mineral is now put, similar to the monograph on "Cobalt and its Uses" recently issued by the Ontario Mines Department.

Mr. Summer's volume places Italian asbestos before Canadian in point of quality, but mentions that 80 per cent of the asbestos put to commercial uses in the world to-day comes from Canada. The statistics of asbestos production in the world are not complete, and only bring Canadian production up to 1908, mentioning that probably the Canadian output is now double what it was in 1908. The actual figures, as given in the preliminary figures for 1918, show that in this year Canada produced 141,463 tons of asbestos and 16,734 tons of asbestic.

An interesting resumé of the history of asbestos is given, in which it is mentioned that to-day the Amalgamated Asbestos Corporation of Canada operates mills with a capacity of 5,000 tons daily, employing 12,000 to 14,000 persons.

It is mentioned that fine quality asbestos can be spun in strands to weigh less than an ounce to the 100 yard length, and that fine cloth can be made from the fibres weighing only a few ounces to the square yard.

The uses of asbestos mentioned in the volume include steam packings and pipe-jointings, boiler insulating materials, fire-proof paints, theatre curtains, building materials, roof coverings, portable houses, lamp wicks, safety lamp gaskets, cord and twine, fire-ladders and ropes; protective clothing, such as leggings, spats, aprons, gloves, etc., used in processes where the workmen are subjected to great heat; various forms of electric insulation, fireproof asbestos papers, and a variety of things, which like the auctioneer's announcement are "too numerous to mention."

It is mentioned that the ex-Kaiser possessed a portable asbestos cottage, which indicates some prescience on his part.

Although this little volume is confessedly elementary and is largely devoted to mentioning the trade uses of asbestos, upon reading it, one realises that the future of asbestos is only beginning, that the variety of its possible uses is immense, and that Canada, occupying such a dominating position in the asbestos market, may very well look forward not only to a greater production of the raw material, but to multiplication of the industries concerned with the manufacture and marketing of asbestos in finished form.

To those who work in the asbestos industry, or are financially interested therein, this little handbook will bring much interesting and suggestive information.



# The Use of Portable Rock Crushing Equipment at Mines

By F. A. McLEAN.

There are few things to be regretted more than the poor condition of mine roads in many parts of the country, which, due to improper drainage, or the use of too soft or porous metalling material, become a pasty and sticky mass soon after a heavy rain, requiring the expenditure of a great deal of time and money to keep them in decent order. There are not many places where a good solid sandstone or limestone ballast would not help matters to a large extent and prevent considerable trouble and loss of time, which often occurs through having to wait for a wagon heavily laden with much needed supplies to be extracted from the mire; requiring the use of horses and men who could be employed to much better advantage elsewhere about the mine.

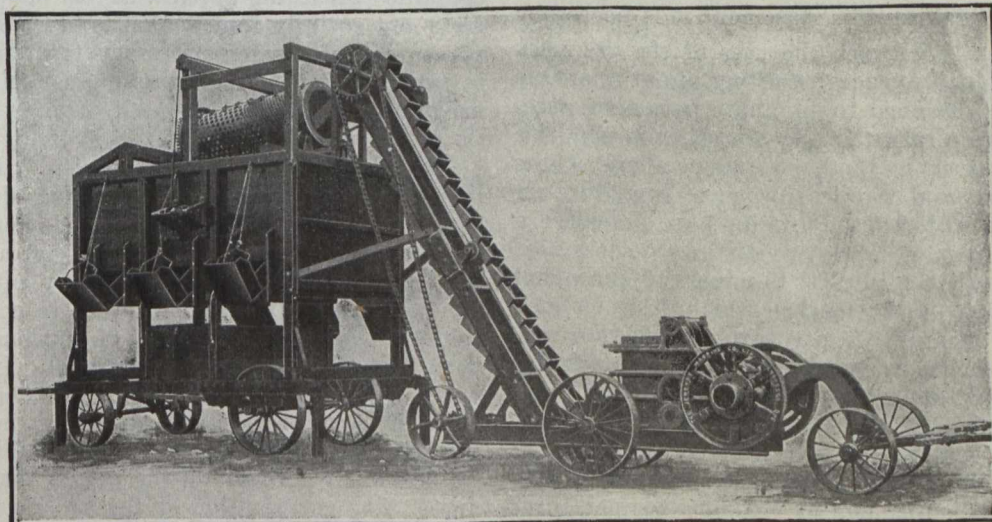
While in many places the rock removed from the workings is well suited to the construction of good roads, and may often be the nearest source of good road-metal available to the municipalities in the surrounding country, unfortunately there are some mines in which the rock taken out is entirely unfitted for this purpose. It is sometimes possible where this condition exists, to quarry a good grade of stone from the hills adjacent to the mine and where this is not feasible, rock of the required quality can often be secured from the surface of neighboring farms. The presence of large quantities of stone on these farms reduces their productive capacity to a large extent, and the farmers—after decorating their land with numerous rock piles and large stone fences—are glad to haul some of this stone to the mine for a very small sum, sometimes less than their time is actually worth rather than have an otherwise idle team of horses on their hands, and in order to clear part of their land which they wish to bring under cultivation.

Stone of this kind is particularly valuable for the construction of permanent roads as, due to the years of exposure, all soft clayey or shaley substances have long since been washed away, leaving the remaining rock durable and well suited for the purpose; and being of moderate size, it usually requires a minimum amount of crushing to render it fit for use either on roads, or in the form of an aggregate for concrete

work. Whether the rock is obtained locally or brought in from a distance, it is likely to require some crushing before it can be used either for road ballasting or for concreting around the mine, and can often be run through the regular mine crushing plant, although it will generally be found far more convenient to the use for this one of the small portable rock crushing outfits now on the market, for this purpose.

While the latter type is usually associated in the minds of most people with municipal paving, and contracting jobs—on which it has made a name for itself—its possible field of utility around the mine may at first glance seem too limited to warrant its purchase by any but the largest mines, but when one considers how much more conveniently it can be moved from one place to another wherever crushed stone for roads, mine tramways, or concreting is required it is readily apparent that, in many cases the savings in time which result from its use will soon offset the cost of installing the necessary equipment. That this is true under the high cost of labor prevailing to-day, will be borne out by anyone who has ever had occasion to watch a gang of men engaged in breaking up rock by hand on a hot summer's day.

A type of portable crushing equipment which is particularly adapted to stand up under the hard knocks likely to be met with on this class of service, and which is at the same time as compact in construction and as light in weight as is consistent with the required strength and reliability, is shown in the accompanying illustration. This crusher is of an improved type the weight of which has been materially reduced by the use of steel castings wherever possible without any decrease in strength. The crusher is mounted on a steel truck, equipped with wide-tread wrought-iron wheels, and the truck frame is hung from the rear axle and connected to the front axle by side plates curved in such a way as to keep the centre of gravity low and make it easy to block up the wheels when the crusher is in operation. An extension of the frame is arranged to carry the elevator and its drive. The frame of the latter is made of wood and is equipped with a winch with which to adjust the elevator



*Canadian Ingersoll-Rand Portable Crushing Outfit.*



to the discharge opening of the crusher, after which the foot of the frame may be easily blocked up. A steel-bucket, chain-type elevator, fitted with adjustable take-up boxes is used and is driven by a belt from one of the crusher flywheels.

A four-compartment, 20 ton, inverted V bottom-bin, with adjustable self-closing chutes, on both sides, and weighing about 5500 pounds is generally supplied with these outfits. These bins are lined with steel plate, and the frame rests on a steel truck, carried on four iron wheels. Bolted posts are fitted to each corner of this steel truck-frame so that it may be blocked-up to relieve the wheels and axles of all strain when the bin is full. A box mounted on the truck frame provides a convenient place for the storage of tools, jacks, etc. Screens used with this equipment are generally of the rotary type, with three sizes of perforations, and are driven by a sprocket and chain connected to the elevator head-shaft.

These portable crushing-outfits are built in two sizes, the smallest of which has a capacity of 7½ to 15 tons, depending on the size of crushed rock desired, requires 15 H.P. and weighs complete with folding elevator, 10800 pounds, while the larger size weighs 12500 pounds, has a capacity of 8½ to 20 tons, and requires 20 H.P. An electric motor, a gasoline engine, or a plain slide-valve engine, mounted on a wheeled locomotive-type boiler, are suitable sources of power for the operation of these outfits, and although the latter is perhaps more reliable and is far more commonly used for the purpose, a gasoline engine has the advantage of decreasing the bulk and weight of the complete equipment and increases the portability to some extent. Where electric power is available, the location of the plant can be frequently changed with little or no trouble.

### THE BURREL MASK FOR CARBON MONOXIDE.

It was generally understood that during the war the scientific investigators of the allies tried in vain to perfect a gas-mask which would eliminate carbon-monoxide from the atmosphere. Materials were found which would satisfactorily protect men against the presence of such gases as bromine, chlorine and phosgene in the surrounding atmosphere, but carbon-monoxide is a gas that it was found not only difficult to provide protection against, but even to detect in time to prevent fatal results. In making this statement it is necessary to distinguish clearly between the uses of the gas-mask and the self-contained oxygen breathing apparatus. One is merely a filter, designed to eliminate poisonous gases from the air of respiration, while the other is a device by which the wearer is rendered independent of the outer atmosphere, and carries his own breathing-air with him. Some unfortunate results have followed a confusion of the uses of these two distinct devices.

It is therefore of much interest to miners to know that a gas-mask is now on the market which it is claimed will protect the wearer against carbon-monoxide gas. This device is known as the "Burrell Gas Mask for Carbon-Monoxide," and is supplied by the Mines Safety Appliance Company of Pittsburg, Pa.

The absorbent material has been given the name of "Hopealite," being, it is stated, a combination of substances which it is stated will at ordinary temperatures act catalytically and convert carbon-monoxide into carbon dioxide. The mask consists of a face-piece, exhalation

valve, connecting tube, canister, harness and case, weighing in all three and a half pounds.

The Mines Safety Appliance Co. also offer a carbon-monoxide indicator, likewise stated to be a war-time development. The indicating fluid is contained in a glass tube, the contents of which assume a lighter or a deeper green tint according to the concentration of carbon-monoxide present, and by means of a colour scale, the approximate percentage of carbon-monoxide can be ascertained. We do not remember to have heard previously either of a mask that would give protection against monoxide, or of a workable indicator of the presence of this insidious and deadly gas, and if the two devices now being offered for sale by the Mines Safety Appliances Co. will do what is claimed for them, then a notable advance has been made in the fight against the dangers of the mine.

It is well known that the greater percentage of those who are the victims of coal mine explosions die, not from the blast itself, but from the carbon-monoxide which speedily pervades the mine air following the blast, arising from the effect of intense heat and the burning of carbonaceous materials in a supply of oxygen insufficient to complete the process of combustion to the point of forming carbon-dioxide.

In one instance, taken from the writer's own experience, the percentage of carbon-monoxide victims was not less than seventy-five of the total of those killed in a mine explosion, and there was indubitable proof that those who had died from monoxide had been exposed to its effects for not more than twenty minutes or half an hour, and were also at all times within a few minutes' distance of fresh air. In this particular explosion, when the dead men were reached, their lamps were still burning, as monoxide does not affect a flame except to slightly increase its brilliance. Had these men possessed some means of passing through the monoxide zone, only a short one, and also only a temporary one, they could have reached safety. The problem of mine rescue work following an explosion has usually presented itself to those on the surface as to how to get into the workings, so as to reach the men in the mine, but to these men the problem is, how can we get out? Often they are quite uninjured, and quite capable of helping themselves if only they can escape the carbon-monoxide.

There is also another phase which a satisfactory carbon-monoxide mask develops, namely, the use of self-contained breathing apparatus. In many cases the mine air is not entirely fouled, that is to the extinction of the percentage of oxygen necessary to support life; but it is rather poisoned, and under such circumstances the use of a carbon-monoxide mask suggests itself, and opens up many possibilities.

The idea of the "Pneumatogen," the only really lightweight self-contained breathing device that was ever put on the market, proceeded more than a desire to invent a self-rescue apparatus, that a man could take in the mine with him and keep by him for the emergency; than it did from a desire to compass the functions of the standard type of oxygen breathing-apparatus as they are now understood. It was always the writer's opinion that in the "Pneumatogen" lay the germ of the mine-rescue apparatus of the future, and the fact that the "Pneumatogen" was a German device has no bearing whatever on the points that are of importance. The combination of the known capabilities of the self-contained oxygen breathing-apparatus with the novel possibilities held out by a carbon-monoxide mask



and detector, contain much promise for the future, which there is no doubt the large body of men who are now thoroughly acquainted with the work of mine rescue and the fighting of underground fires can be trusted to develop to the great future advantage of the mining industry.—F. W. G.

### MOLYBDENUM STEEL.

A cable report from England tells of the reported perfection of a molybdenum high-speed steel by Prof. John Oliver Arnold, who has for many years been at the head of the Department of Metallurgy in the University of Sheffield, and has recently retired from that position. The cabled report is taken from the "Daily Mail," not an entirely reliable organ, particularly where any regulation of the British Government is concerned, which intimates that Britain is likely to lose the benefit of Prof. Arnold's formula because under the Defense of the Realm Act it is not permitted to him to utilize the formula commercially in Britain. The cable states that Prof. Arnold will be allowed to proceed with the taking out of an American patent, "on condition that he publishes nothing concerning it." How a patent can be taken out under these conditions is not explained, and altogether the cabled account is—to put it mildly—inecoherent.

The interest to Canada is supposed to consist in the large new field for molybdenum that will be opened up. The following extract from the Report of the Department of Mines of Quebec for 1918 sums up most of what is at present known regarding the uses of molybdenum:

"The chief use of molybdenite is in the manufacture of ferro-molybdenum, which enters into the composition of high-speed tool steels, molybdenum tool steel possessing the same qualities as tungsten steel. The main objection to substituting molybdenum for tungsten in the manufacture of self-hardening tool steel is that to give satisfactory results, great care and skill are required in observing the proper proportions and in the annealing process. It requires about three times less molybdenum than tungsten to obtain the same effects in the tool steel, but molybdenum steel is much more liable to crack, or otherwise deteriorate in careless quenching.

Molybdenite is also used in the manufacture of chemicals, ammonium molybdate, sodium molybdate, and molybdic acid.

Apart from these uses the technology of molybdenum is more or less obscure. A short time before the declaration of war, prices for molybdenite rose steadily until in 1914 it attained \$3.00 and \$4.00 a lb. It is surmised that this rise was due to German buyers securing stocks as a substitute for tungsten. Other uses to which molybdenum and molybdenum compounds are said to have been put to a great extent, but most of which have been alternately denied and reiterated, are manufacture of smokeless powder, stabilizers for high explosives, to prevent their decomposition and spontaneous explosion; special steels for gun linings and for rifle barrels; armour plates and manufacture of plate-piercing projectiles. Enquiries made by the United States Geological Survey from the military authorities of the Allies brought forth the fact that none of the war material manufacturers of the United States, France or England were using molybdenum in armour plates or large

guns, and that numerous analysis of captured German guns showed that it was not being used by the Germans.

The French, however, used molybdenum in the manufacture of the breech blocks of some of their field guns. The alloy "stellite" may also contain a small proportion of molybdenum. The original "stellite" is an alloy of cobalt 50 to 60 per cent, chromium 30 to 40 per cent, tungsten 8 to 20 per cent. Sometimes part of the tungsten is replaced by molybdenum. A small proportion of molybdenum, less than one per cent, has also been used in the steel of some of the crank shafts and connecting rods of the "Liberty" motors for aircrafts, built for the United States War Department."

So far as can be gathered from the very little that has been published regarding molybdenum steels, the quantity of this alloy material used has hitherto been very small. Molybdenum ore is quoted nominally in New York at 75 cents per pound at the present time. Molybdenum steels are being advertised rather extensively in trade papers in the United States at the present time. It is open to anyone to experiment in alloy steels, and it is difficult to see how a formula can be patented unless it includes something new in metallurgical science. No doubt Professor Arnold will announce the results of his research work in due time, as so many important discoveries have been previously announced from the Department of Metallurgy at Sheffield University, or, as old students remember it better, the Technical School in St. George's Square. Andrews, Sorby, Hadfield, Arnold, are names that are associated with radical advances in metallurgy, and with the study of that science in Sheffield schools, and the traditions of these schools do not tend to incline one to the belief that there can be any tendency to withhold from national benefit anything that is really important. Really some of the news that is cabled from London for Canadian consumption is almost infantile. Three examples within a week include the reported transmutation of metals by Prof. Rutherford, the "scrapping" of the new plant of the Dominion Steel Corporation, and lastly, this wierd yarn about molybdenum steel.—F.W.G.

### NEW METHOD OF UTILIZING LIGNITE.

A new method of utilizing the vast deposits of low grade lignite coal, commonly known as Souris coal, which underlie great tracts of the southwestern and south-central portions of the province of Manitoba, has been successfully demonstrated by the provincial government in the power plant of the town of Souris. This plant, formerly operated on American anthracite, was remodeled by the gas engineer of the Public Utilities Commission in 1916, the new arrangement being the first of its kind on the continent. It has operated four years without hitch, showing a reduction of 40 per cent, in fuel cost, a considerable increase in efficiency, and the requirement of less labor and attention. The experiment was financed by the provincial government, but the whole cost has been absorbed by the town after demonstration that the plant was a permanent success. Coupled with the successful experiments of the Lignite Utilization Board in the briquetting of lignite coal, this gives bright promise that the enormous deposits of lignite coal, both in Manitoba and Saskatchewan, can be used to advantage, in the direction of replacement, as compared with the price of imported American coal.—C. P. R. Monthly Bull.



# The Dominion Iron and Steel Company's Koppers By-Product Coke Plant at Sydney, N.S.

By C. E. Wallin, Superintendent of Coke Oven Dept.

During 1916 it became evident that the coke plant of the Dominion Iron & Steel Co. at Sydney, would be taxed to its utmost to provide sufficient coke for the Blast Furnaces then in operation, and furthermore the small size of the ovens on the plant first erected and the method of handling the coke after quenching would always militate against the production of coke at a cost which would compare favorably with coke made in more modern plants.

The importance and necessity from an economic standpoint of recovering the greatest possible percentage of by-products has been so often emphasised, notably in recent articles in this journal by Messrs. Marquard and Lucas, that there is no occasion to touch further on this phase of the subject.

To obtain a plant embodying the latest improvements in by-product operation and labour saving machinery, a contract was placed with H. Kopper's Co. of Pittsburg for the erection of two batteries of 60 ovens each, and work was commenced on the site by the By-Product Coke Company of Canada Ltd, in the spring of 1917. Construction was delayed owing to difficulty in obtaining delivery of materials but, even so, the first battery was put in operation on Oct. 12th, 1918 and the second on March 27th of the present year.

The Coal carbonized is 100% high volatile slack coal from the Dominion Coal Coy's mines and has in the raw state the following average analysis.

	Per Cent.
Volatile Matter. . . . .	33.50
Fixed Carbon. . . . .	57.50
Ash. . . . .	9.00
Sulphur. . . . .	2.50

Before being delivered to the ovens the coal is first crushed in a Jeffries roll crusher and then passed through a British Baum Washer, of 150 long tons per hour capacity, to lower the ash and sulphur contents. On its passage to the crusher the coal is screened to eliminate the fines which by-pass the crusher and mix with the crushed coal at the foot of the elevator.

The coal leaving the washer has a moisture content of approximately 11% and the following analysis calculated on a dry basis:

	Per Cent.
Volatile Matter . . . . .	34.50
Fixed Carbon. . . . .	60.50
Ash. . . . .	5.00
Sulphur. . . . .	1.60

The washed coal is delivered on to a 36" belt conveyor and delivered to the oven bin which has a capacity of 2200 net tons of coal and is situated above and midway between both batteries.

The ovens are of the standard Koppers regenerative type and of the following dimensions.

Length between door brick. . . . .	37' 6"
Width on pusher side. . . . .	15¾"
Width on Coke side. . . . .	18¼"
Height from floor to top of coal. . . . .	8' 7"

and have a capacity of 11.3 tons of coal weighing 49

lbs. to the cubic foot, but the density of the coal varies somewhat owing to varying moisture content of the washed coal and percentage of fines in the slack supplied.

The batteries consist of sixty ovens each, Fig 1. each oven having independent regenerators, thus constituting a separate unit. Heating is effected by the combustion of a part of the gas generated during carbonisation, the gas being supplied alternately to the pusher and coke sides of the ovens. The gas is supplied to the 16 vertical flues on the pusher side and 14 on the coke side by means of a hollow gun brick running the entire length of the oven and having outlets on top. These outlets are fitted with nozzle brick with an elliptical orifice at which point combustion of the gas takes place. The size of this orifice varies with the position of the nozzle brick along the gun brick, the size increasing from the second nozzle on either side to the division wall of the battery to make allowance for the drop in pressure and increase in temperature of the gas during its passage through the gun brick. The largest nozzle is in the outside flue on each side on account of the large amount of heat lost through radiation at the doors. The volume of gas supplied to each battery for heating purposes is measured by 16" x 8" indicating and recording Venturi meters.

The necessary air for combustion is drawn, by the stack draft, through the regenerator on the side on which the gas is burning; and in doing so becomes heated to approximately 1800°F. From the regenerator it passes into the vertical flues alongside the gas nozzles. The amount of air admitted to each individual regenerator is regulated by dampers on the air box, the damper for the oven furthest away from the stack having naturally the widest opening. This makes it possible to equalise the draft conditions on each oven. A further adjustment can be obtained by altering the size of the opening, where the vertical flue joins the horizontal flue, by means of a sliding brick.

Each vertical flue can be inspected from the top of the battery by the removal of a cast iron cap and it is possible in this way to take the temperatures of the flues, examine the state of the nozzle brick and change the same if necessary, make adjustment of the sliding brick settings and generally keep a close check on the conditions under which the combustion of the gas is taking place.

The advantages to be gained from this system of oven heating are the close adjustments of gas and air with the result that the oven walls are evenly heated by the minimum amount of fuel gas. The gas is reversed every half hour, or twenty minutes in cases where extremely high flue temperatures are carried.

All the operations of reversal are carried out by means of a master control which shuts off the gas on one side, reverses the stack dampers and air openings and finally open the gas cocks on the opposite side. This control is put into operation by means of a self-winding clock which makes certain electrical connections every half hour or twenty minutes as the case may be.



The products of combustion are carried away by side flues running the length of the battery to a stack 7' 6" in diameter and 200 feet high.

The coal is charged into the ovens from a larry equipped with four hoppers and a sufficient quantity of coal is drawn from the oven bin into these hoppers to fill the oven to the proper level. This level is regulated so as to allow contact of the gas with the heated brickwork for as short a time as possible.

After the coal is discharged from the larry into the oven, it is levelled off, the charging covers placed in position and luted down and the oven connected to the collecting main by opening a butterfly valve. Under these conditions a charge of coal can be carbonised in 18 hours, with an average flue temperature of 2470°F. The ovens are designed for a coking period of 15½-16½ hours but with a washed coal containing 11% moisture it is not deemed advisable to raise the flue temperature to the height necessary to accomplish this.

At the end of the coking period the oven is cut off the main, the doors removed by door machines on either side of the battery, and the charge of coke is pushed out into a wide dumping car of steel and cast iron construction. The car is then brought by an electric locomotive to the quenching station where the coke is subjected to a spray of water for 35-40 seconds. After draining in the car for five minutes it is discharged on to the coke wharf, the power for elevating the dump-

ing doors being provided by an air compressor on the electric locomotive. The coke contains on an average 1.5% moisture. Figs 2, 3 and 4.

From the wharf the coke is fed into a belt conveyor which delivers it on to a ¾" bar grizzly screen, the furnace coke and breeze being delivered direct into cars down their respective chutes. Fig 5.

The collecting main on the ovens is connected by two crossover mains to the suction main from the batteries. It is important to carry as constant a pressure as possible on the collecting main and to ensure this each crossover is fitted with a governing device known as a North Western governor. A float controlled by the gas pressure in the collecting main is set to give in the neutral position the desired pressure and any variation in the position of the float caused by a rise or fall in pressure actuates a lever making electrical contact in the power circuit of a small reversing motor. The motor in turn opens or closes a butterfly valve allowing more or less gas to pass from the collecting main until the lever attains the neutral position and breaks the contact. Only one governor on each battery is in operation, the other acting as a spare.

The suction mains from both batteries unite in a common downcomer outside the by-product building.

In order to keep all mains clear of pitch which, if not removed, would eventually block the mains, a flush of hot tar and gas liquor is kept in circulation by

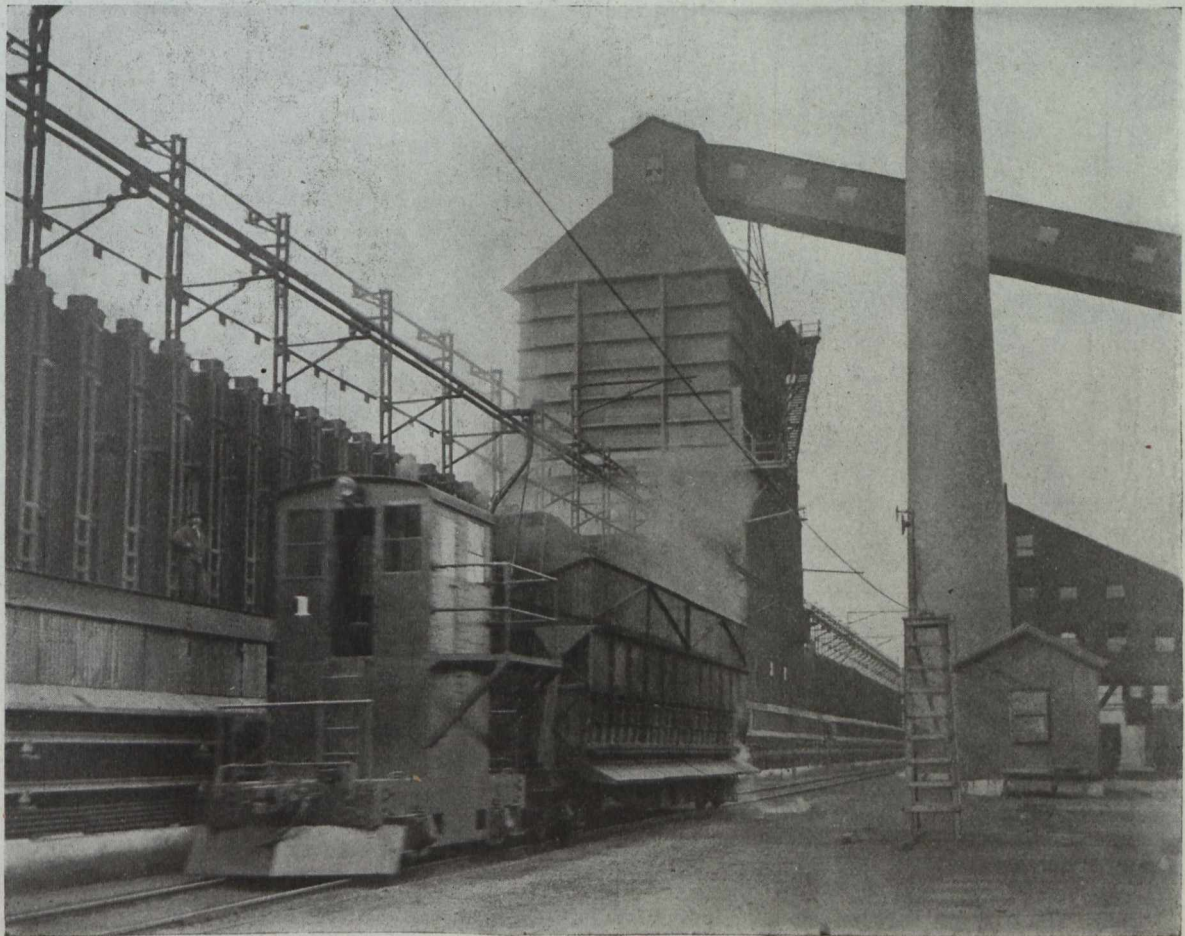
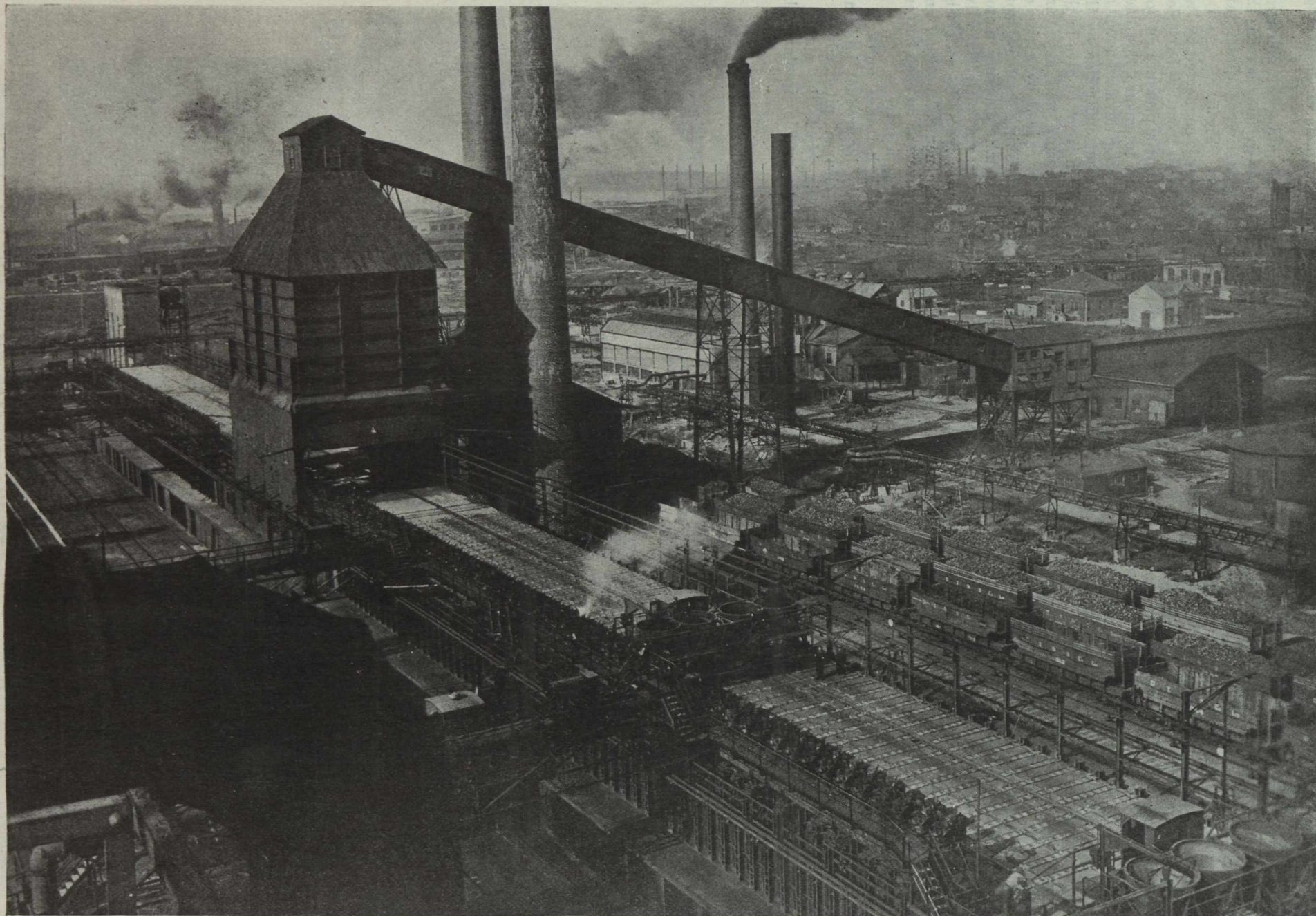


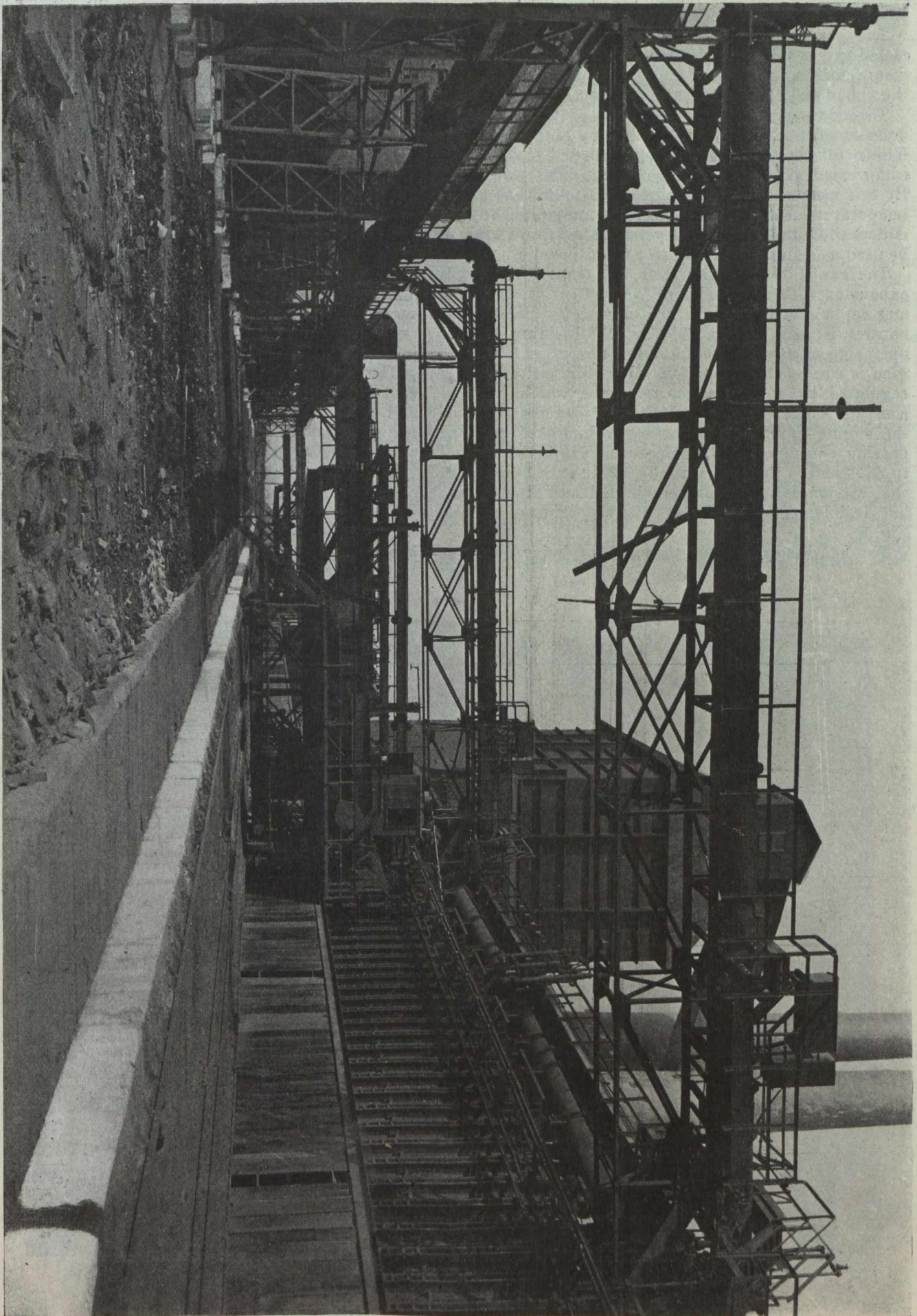
Fig. 3—Locomotive and Coke Quenching Car, showing a charge of coke being pushed out of the oven-chamber.





*Fig. 1—General View of the Coke Ovens of the Dominion Iron & Steel Company at Sydney, Nova Scotia, showing in foreground the Koppers Ovens, Coal Pocket, Larry and Coke Sidings; and, in the distance, Sydney Harbor.*





*Fig. 2—Pusher Side of Owens, showing Pusher and Pusher Track, and the Cross-over and Suction Pipe Mains.*



means of a centrifugal pump, the solid matter being filtered off by suitable screens.

The gas entering the by-product building is first cooled by passing through a multitubular cooler, gas and water entering at opposite ends; the gas passing around the tubes and the water through them.

The gas temperature at the exit of the coolers is determined and kept constant by the automatic Tagliabue temperature control operating, by means of compressed air, a motor valve on the inlet water line. By this means the gas is cooled down to 28°C at which temperature most of the lighter tar and water vapour is deposited and carried away to the hot drain tank to be used as a flush in the mains as mentioned above.

The gas is drawn away from the ovens by a Root's exhauster with a capacity of 700,000 cu. ft. per hour and capable of exerting a pressure of 3½ lbs., the exhauster is driven by a 20½" x 24" Fleming Engine operating at a pressure of 100 lbs. per sq. in. The engine is equipped with piston valves, the cut off being regulated by a Root's gas governor which keeps a constant suction on the main by varying the speed of the engine to deal with varying volumes of gas. In passing through the exhauster the gas is heated up to 35°C and is then led through a Tar extractor where the last traces of tar are eliminated and flow to the hot drain tank with the tar from the primary coolers. Fig. 6

The gas is next passed through a tubular reheater.

and its temperature raised to 60°C by the exhaust steam from the engines, and then to the Saturator which is a cylindrical cast iron vessel lined with lead. The hot gas is carried down a vertical lead pipe inside the saturator, into a horizontal cracker pipe also of lead. The cracker pipe is of inverted U section and is slotted with vertical semi-elliptical holes through which the gas passes.

The Saturator contains a solution of Ammonia Sulphate with 7% free Sulphuric Acid and the ammonia in the gas, in passing through this bath, combines with the Sulphuric Acid forming Ammonia Sulphate, which crystallises out and is continually ejected by a compressed air syphon on to the drain table, the mother liquor flowing back again to the saturator. A continuous addition of Sulphuric Acid is made to the saturator, the amount being run in being determined by the operator who tests the free acid content of the bath at intervals of half an hour. Fig. 7.

The sulphate from the drain table is flushed in to a centrifugal dryer where it is washed with hot water and finally whizzed for ten minutes at 600 revolutions per minute. The finished sulphate averages .2% free acid and 1.5—2.0% moisture and is a good white colour.

The By-Product house is equipped with three complete interchangeable sets of engines and exhausters, tar extractors, reheaters and saturators, each being capable of dealing with gas from 60 ovens, so that there is always one spare set available in case of breakdown.



Fig. 4—Quenching a charge of coke. Coke-wharf on the right.



The ammonia condensed from the gas as gas liquor, contains 50 per cent of the total ammonia and after running in to the hot drain tank with the tar, is pumped into a settling tank where the liquor settles on the top of the tar and liquor and tar are then run off into separate storage tanks. The tar thus obtained contains 2 per cent moisture.

The gas liquor is fed into a 6' 0" ammonia still having free and fixed stills on separate foundations, the lime necessary to decompose the ammonia salts is introduced into the bottom section of the free still, and steam for the operation is furnished by the exhaust steam from the engines at 15 pounds pressure. The flow of liquor is measured by means of a Venturi meter, 3,000 gallons per hour has been successfully treated with a loss of .015 grams per litre of ammonia in the waste liquor.

The gas liquor contains 8.2 grams per litre of total ammonia of which 75 per cent is in the fixed state.

The ammonia vapour generated is led through a covered pipe which is connected to the main gas line between reheater and saturator.

The top temperature of the still is kept constant at 99° except for 1 hour at the end of each shift when it is raised to 103°C, and at the same time the acid content of the saturator is increased. This prevents the cracker pipe and saturator becoming salted up and blocking the passage of the gas.

After leaving the saturator the gas passes through

an acid separator where the traces of acid mother liquor carried by the gas are deposited, and thence to the final cooler. The cooler consists of a steel tower 60' 0" high and 12' 0" in diameter containing sets of wooden grids. The gas in its upward passage meets a descending spray of water, the cooling being accompanied by a partial deposition of naphthalene. The temperature of the gas is here reduced from 60°C to approximately 20°C, the latter temperature depending on the temperature of the cooling water, but no difficulty has been experienced in cooling the gas, if necessary, to within three degrees of the temperature of the water as shown at the inlet to the cooler.

After being cooled the gas passes through two towers of similar design to the final cooler, but 100' 0" high and 15' 0" in diameter. Here it is washed with a high boiling point petroleum oil which absorbs the Benzol vapours from the gas, 95 per cent of the total Benzol being absorbed with suitable conditions of gas and oil temperatures and oil flow.

The debenzolized gas is then passed to a holder of 40,000 cu. ft. capacity. From the holder it is delivered to the fuel mains at the batteries and the surplus gas is measured by an indicating and recording it is sent under pressure to the steel plant. The surplus gas is measured by an indicating and recording Venturi meter. Should it be necessary, at any time, to cut off the supply of surplus gas at the steel plant, the holder, when full, automatically opens a valve on

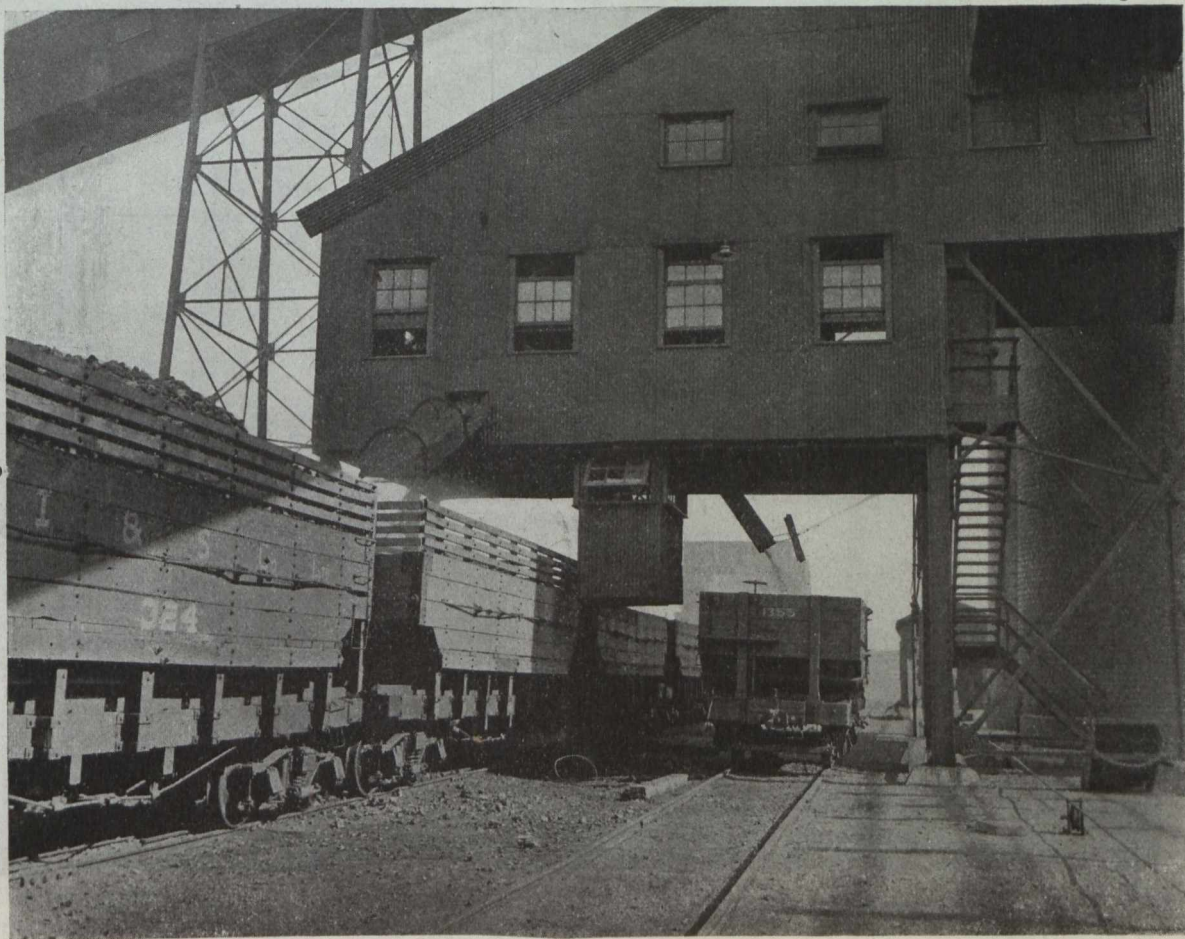


Fig. 5—Loading Coke and Breeze Simultaneously.



the bleeder line and discharges the surplus gas into the atmosphere.

The gas has the following average analysis:—

	Per cent.
Carbon dioxide . . . . .	2.0
Illuminants . . . . .	3.5
Oxygen . . . . .	.5
Carbon Monoxide . . . . .	7.0
Methane . . . . .	31.5
Hydrogen . . . . .	48.5
Nitrogen . . . . .	7.0

The Benzolised oil is pumped to the Benzol Plant and there stripped of the Benzol and its homologues and the cooled debenzolized oil returned to be again circulated through the towers.

No description of the Benzol Plant is given as it does not form part of the Kopper's installation, but it may be stated that Benzol, Toloul, Xylol, and Solvent Naphtha of the highest degree of purity have been produced in large quantities, notably during the period of the war.

Below are given some operating statistics which may be of some interest.

Suction after primary coolers . . . . .	m.m. water	175
" before " . . . . .		85
Pressure on collecting mains . . . . .		3.5
Stack draft . . . . .		21.0
Gas Consumed—	cu. ft.	
On ovens per hr. Pusher side . . . . .		180,000
On ovens per hr. Coke side . . . . .		170,000
Percentage of total gas . . . . .		40%

**Production (Short tons.)**

	Per ton dry coal	Per 24 hrs.
Furnace Coke (lbs.) . . . . .	1360	1180*
Surplus Gas (cu. ft.) . . . . .	6300	10,987,000
Tar (Imp. Gal.) . . . . .	11.0	19,000
Ammonium Sulphate (lbs.) . . . . .	28.0	24.4*
Ammonium Sulphate loss in		
Saturators and Stills (lbs.) . . . . .	.086	150
Light oil (Imp. Gal.) . . . . .	2.9	4800
Coal charged per oven . . . . .		11.0*

\* Tons.

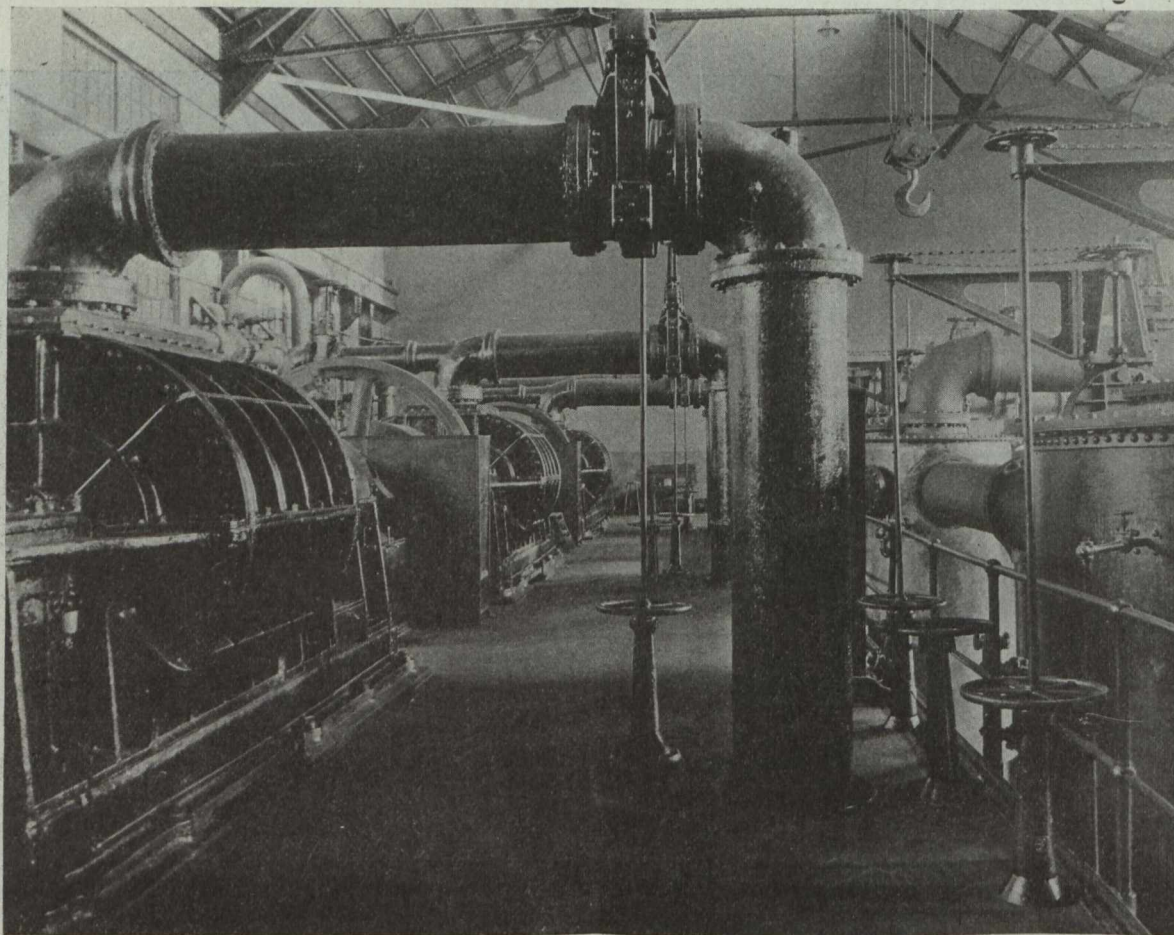


Fig. 6—Interior of By-Product House, showing Engines and Gas Exhausters.



# Our Northern Ontario Letter

During the past week the quotations for silver having sagged to around \$1.30, rose sharply again to \$1.34 an ounce at the time of writing. This is New York quotation, and is equal to around \$1.45 in Canada, at prevailing high rate of exchange. Some of the leading silver producers of Cobalt can now look back to 1915, at which time they sold silver at around 46 and 47 cents an ounce, or just \$1 under present quotations. At this rate the average net profit amounts to approximately 90 cents an ounce and constitutes a volume of net revenue equal to any previous period in the camp's history.

Recent rich finds at the Crown Reserve, Beaver Consolidated, Temiskaming, as well as the rich vein opened up some months ago on the Nipissing promises to offset the natural decline in output from other sources to the end that the 1920 production may reasonably exceed that of the current year.

At the 150-ft. level of the Crown Reserve a substantial quantity of high grade ore has already been opened up as a result of the development of the new vein which was reported in these columns. Picked samples contain upwards of fifty per cent silver and a considerable amount has been bagged which runs several thousand ounces to the ton. It is learned that the company will establish a record output for December as compared with any previous month in recent years. Although not sufficient work has been done to determine the lasting importance of the new find, yet it has every appearance of being likely to continue for some distance.

The McKinley-Darragh continues to operate its flotation plant, which together with the operations underground is resulting in an average output about on a par with that of 1918. The 1918 output amounted to 904,543 ounces, and the fact that the 1919 output will about equal the preceding year in spite of the 46-day labor strike this year speaks volumes for the physical condition of the McKinley. Total production from this mine since 1906 amounts to a little over 19,000,000 ounces.

The Temiskaming Mining Company's declaration of a dividend of 4 per cent payable in January is an indication of the prosperity of that old property. The favorable developments, which date from April last, are believed to be the direct cause of the dividend being paid. The disbursement, however, is believed to be an interim one in that it is somewhat higher than the former rate and is considered too high to become a regular rate of dividend.

Producing at around \$12,000 daily, and with a surplus of \$4,300,000 the Nipissing Mining Company has declared a dividend of 5 per cent plus a bonus of 5 per cent, the disbursement amounting to \$600,000. Although officials are reticent regarding ore reserves, yet it is reported in usually well informed circles that the ore reserves at the end of 1919 promise to have a value around \$10,000,000, made up of something like 7,000,000 ounces of silver.

In a report covering the period from July 15th to December 2nd the directors of the Peterson Lake announce that the company has a surplus of current assets over liabilities of \$13,094.76, as compared with almost nil one year ago. It is stated that a recent shipment of ore netted the company \$13,727. It is stated that 385,000 shares of treasury stock were sold at 15 cents a share, the stock to be paid for in monthly install-

ments. With this money, profits expected from the ore on hand and with \$24,000 in the bank, the company expects that upwards of \$90,000 will be available for development work. This does not include the potential value of the tailings pile which the courts recently decided belong to the Peterson Lake Company.

The tailings dump on the Chambers-Ferland property has been optioned to H. Cecil and his associates for an ultimate price of between \$50,000 and \$100,000. Plans are being made to sample the material.

At the Adanae property one diamond drill machine continues to operate from a cross-cut at the 310-ft. level. No developments of particular interest have so far occurred.

Alfred R. Whitman, mining geologist, has been engaged to make a geological survey of the Genesee property, and commenced work late last week. The Genesee has been opened up to a depth of 500 feet, at which level considerable faulting occurred, and close to which faults, low but encouraging silver values were encountered.

The Cobalt 53 Silver Mining Company has been incorporated for the purpose of developing that piece of ground in Gillies Limit known as block 53 and on which some encouraging veins occur at surface.

The litigation in connection with the Bailey-Cobalt and the question of merging with the Northern Customs Company is still unsettled, the case having recently been heard before Justice Sutherland at Osgoode Hall, Toronto, the previous order of the assistant Master in Ordinary being refused. An appeal has been made to Mr. Justice Lennox for permission to take the case into the Divisional Court. Decision on this matter is reserved.

Regarding the recently reported negotiations between the Northern Customs Company and the La Rose, Mr. Young, President of the former company, states that no recent offer has been made.

Following is a statement of ore shipments over the T. & N. O. Ry. for the month ending November 30th, 1919. (In tons of 2,000 lbs.):

<i>Silver Ore</i>	
Cobalt Proper	Tons
Buffalo .....	302.30
Coniagas .....	96.08
Dominion Reduction .....	3.00
Hudson Bay .....	31.60
La Rose .....	41.74
McKinley-Darragh .....	94.97
Mining Corporation .....	143.54
O'Brien .....	64.93
Trethewey .....	62.98
	869.14

The above shipments were made to the following Companies:

Canada	
Deloro Smelting & Refining Co. ....Marmora	281.21
Coniagas Reduction Co. ....Thorold	126.08
United States	
American Smelting & Refining Co ....Pueblo	311.88
American Smelting & Refining Co. ....Perth Amboy	55.00
Pennsylvania Smelting Co. ....Carnegie	94.97
	869.14



*The Gold Mines*

The opinion is being freely expressed in Northern Ontario that the Dominion Government should make a special effort to induce mine operators in this country to produce more gold. It is significant to note that without any governmental assistance and confronted with an economic situation which is causing a rapid decline in output in such countries as the United States, the mine operators of this province during the last quarter of 1919 succeeded in establishing the highest record in Ontario's history. With such aggressiveness on the part of the operators, and with the physical condition of the mines commanding unbounded optimism, the situation presents a genuine opportunity for the Government to take steps to make gold mining more attractive. Stereotyped phrases such as "something should be done" are meaningless. The fact is that the gold deposits are here and gold is concentrated in values which enable operators to realize a fair profit, but that the desired number of men are not available to work the mines at capacity, and the Government does not appear to have considered it worth while to devise some scheme whereby the men could be procured.

On December 31st the Hollinger Consolidated will disburse \$246,000 in dividends. On January 15th the Dome Mines will make a \$100,000 disbursement. Concerning both of the two mines mentioned, the year 1920 appears to offer reasons for believing that new high records in point of gross production as well as net profit will be realized.

Tonnage being treated at the McIntyre is somewhat above the average for the past fiscal year, and net earnings for the current year are expected to amount to at least 20 per cent. Developments at depths continue favorable.

The mill at the Dome Lake is to be tried out this week, and the management entertains hope of being able to establish a fairly uniform rate of production. In connection with transportation to the outlying mining camps, the suggestion is being made this week by a prominent mining engineer that a "loopline" (meter gage) could be built to great advantage, commencing at Boston Creek Station, passing through the Boston Creek area eastward through Catherine Township, through the northwest part of Skead and running north to Larder Lake. Thence turning west so as to pass through McVittie Township by way of the Argonaut mine (formerly La Mine Dor Huronia) and westward through Gauthier and Lebel to Kirkland Lake to terminate at Swastika. Such a line would be about fifty miles in length. It is suggested that the holders of mining property along the way might become bondholders in the enterprise because it would be to their mutual benefit as an accommodation and a means of more rapid development, besides assuring a saving of enormous transportation expenses.

Reports brought out from Skead township, as well as the Township of Hearst, are encouraging and indicate considerable activity. This week a new find was made in Hearst Township, close to the north boundary of Skead.

Kirkland Lake and Boston Creek districts continue active with reasonable promise of added activity with the passing of winter.

## Special Correspondence

## BRITISH COLUMBIA

## The Collieries

John Newton, for many years District Mines Inspector with headquarters at Nanaimo, B.C., died on the 6th of December. Although ill for months he continued his official duties up to within a few days of the end, having been on a trip of inspection of the Britannia Mines, Howe Sound, when overcome. His death occurred shortly after he returned to his home city. Mr. Newton's work was almost entirely among the coal mines of Nanaimo District and he was well-known to officials and men of the Canadian Western Fuel Company and the Canadian Collieries (D) Ltd., and highly respected by all.

The position thus vacant will be filled by Henry Devlin, a long service member of the Mines' Inspection Staff, who for years has shared with the late Mr. Newton the responsibilities of the Nanaimo Inspectorate. He has had jurisdiction over the Comox and Extension Coal Mines.

Pending another appointment, Mr. Devlin's place is being taken by James Dixon, a member of the Board of Examiners, and who, under the terms of a recent amendment to the Coal Mines Regulation Act, also is an Acting Inspector.

The Editor desires to add a word of personal regret upon hearing of the death of Mr. Newton. He had the pleasure of travelling with Mr. Newton from Nanaimo on the 1st of December, on the return of the party of Canadian Mining Institute members which had visited the Island collieries over the week-end, and learnt from Mr. Newton a great deal of the early history and development of the Nanaimo coalfield. Mr. Newton was quite apparently suffering from a heavy cold, and was really not fit to undertake the journey to Britannia. Mr. Newton was born near Whitehaven, Cumberland County, England, and was one of a number of men from that district who made a home in Vancouver Island, and achieved positions of responsibility through hard work and personal merit. In the course of a first and brief acquaintance, Mr. Newton impressed one as being a man of much worth, and his death, practically in harness, confirms an opinion formed upon short acquaintance, which, unfortunately, it will not now be possible to renew.

It is reported from London, England, that a re-organization of the Canadian Collieries (D) Ltd., operating collieries on Vancouver Island, British Columbia, has been decided upon and that as a result, the property will be handed over to the bondholders; or, rather, that the changes contemplated virtually will have such an effect. On January 19th a meeting will be held to authorize the plan.

In this connection the London Times observes:

"To what extent the Company will be able to pay interest on debentures will depend upon the ability to sell the coal it can produce. The Company has coal, but the difficulty is to sell it in sufficient quantities, but trade on the Pacific no doubt will expand."

No statement has been given out by the Company's local management, whose headquarters are in Victoria.

The Canadian Collieries (D) Ltd., has extensive holdings on Vancouver Island. It has producing mines at



Comox, Extension, and South Wellington and coal rights throughout a large section of what is known as the Esquimalt and Nanaimo Railway Belt.

Officials of the One Big Union are beginning to show signs of activity again among the coal miners of the Fernie (Crow's Nest Pass) District. On December 9th a mass meeting was held at which H. Beard, president of the O.B.U., spoke. The result, according to report, is that a vote was taken as to whether the miners would stand by the O.B.U. or continue in their allegiance to the United Mine Workers of America. No official announcement of the way the vote went is obtainable. If it favored going back to the O.B.U., as seems to be the impression, it is hard to predict the outcome as the men withdrew from that organization and decided to stay with the U.M.W. of A. when the strike of the early part of this year ended. That strike lasted three months and was caused by the determination of the management of the Crow's Nest Pass Coal Company not to negotiate with the One Big Union.

Coal and its by-products was the subject of a paper by Alexander Sharp, C.E., read recently at one of a series of winter lectures being held under the auspices of the British Columbia Chamber of Mines. After speaking of the waste involved in the use of coal direct from the mine he observed that the principles of carbonizing coal should be adopted to supply cheap fuel for manufacturing and domestic purposes, then the Provincial iron ores could be melted with a coke sold at \$5 a ton.

The coal returns for the month of October indicate that operators of collieries are responding to the increased demand for fuel for domestic purposes and to meet the market in the adjoining sections of the United States, which has been strengthened through the recent strike in the bituminous mines of America. In the Crow's Nest Field the Crow's Nest Pass Coal Company is back to normal in respect of its production for the first time since the month of August when the three month strike was settled. In the month of August it produced 5,344 tons of coal while in October the output had mounted to 41,284 tons. The latter figures refer only to the Coal Creek Mines. If the Michel Mines are included the October production aggregated 63,431 tons. On Vancouver Island the same condition is shown, although the increase is not so marked for the reason that there have been no labor troubles in this section. Notwithstanding, the increased demand has brought the output of the Canadian Western Fuel Co. from 49,000 odd tons in September to 59,000 odd in October. The Granby Consolidated Mining & Smelting Co.'s Mines at Cassidy, Vancouver Island, have about doubled their production, the October returns showing 11,591 tons.

The complete returns for the month of October follow:

*Crow's Nest Pass Field.*

	Tons.
Coal Creek, Crow's Nest Pass Coal Co. ....	41,294
Michel, Crow's Nest Pass Coal Co. ....	22,147
Corbin, Corbin Coal & Coke Co. ....	12,359

*Nicola-Princeton Field.*

Middlesboro Colliery . . . . .	9,809
Fleming Colliery . . . . .	3,181
Coalmont Coal & Coke Co. . . . .	401
Princeton Coal & Land Co. . . . .	2,371

*Vancouver Island Field.*

Canadian Western Fuel Co. ....	59,404
Canadian Collieries (D), Ltd., Comox . . . . .	49,354
Do., Extension . . . . .	18,811
Do., South Wellington . . . . .	7,709
Pacific Coast Coal Mines, South Wellington . .	4,862
B.C. Coal Mining Co. (Jingle Pot) . . . . .	3,399
Nanose Collieries . . . . .	3,909
Granby Cons. Mining & Smelting Co., Cassidy.	11,591

**BRITISH COLUMBIA'S OLDEST MINER,  
ROBERT STEVENSON**

In attendance at all the functions of the Canadian Mining Institute meeting at Vancouver recently, and enjoying the uproarious fun of the smoker as heartily as the youngest man present, was Mr. Robert Stevenson, who received many congratulations.

The Vancouver "Daily Province" published the following account of Mr. Stevenson's pioneering work in B. C. mining, which is of such general interest as to merit a wider circulation:

"Attending the mining convention is the oldest in point of mining experience and in years, and still actively engaged in this industry.

Pioneer of the Cariboo, Robert Stevenson, hale and active, is 81 years of age. He is well posted on mining topics of to-day, and is heavily interested in quartz propositions in the Simikameen. He makes his headquarters at Princeton every season. In fact his activity in looking after his properties in that promising mining district, and pushing the development to the producing stage would give an object lesson to much younger men in many other walks of life.

Mr. Stevenson's experiences of the Cariboo, date back to the spring of 1860, when he left Osoyoos, on the international boundary and made his way over the Cariboo trail. He had been collector of customs at Osoyoos from shortly after his arrival in British Columbia in 1859, until the lure of the rich placers of Antler, Quesnel and Barkerville, threw their spell over his imagination and he joined the north-bound caravans. Sixteen years of life in the Cariboo country saw the decline of Canada's first great placer camps. The gravel of the original creeks was all sluiced and the last dust panned.

Then Robert Stevenson removed to Chilliwack and married. He soon became interested in the Simikameen district, where he has since been active in mining. He makes his home in Chilliwack, coming there "to visit his family" as he himself puts it.

"I can ride a horse as well to-day as ever I could and as I find tramping in the hills is harder on me than it used to be. I usually make my trips on horseback," said Mr. Stevenson to a representative of The Province. "It is an advantage, for I can take a horse anywhere in the district, and get over more ground than if on foot. It takes me much less time that way, and while I do not belong to any union, I am in favor of shorter hours as I grow older."

With Col. Donald MacGregor, Mr. Stevenson is one of the very last of the originals who worked in the old Cariboo diggings. A year older than Col. MacGregor, who only admits four-score, Mr. Stevenson, who is a powerfully-built, heavy-set man, under average weight, forms a sharp contrast to the tall spare form of his old Cariboo friend. His brother, John Stevenson, who died a few months ago after a service of twenty-two years as sheriff of Cariboo, and the old partners, May and McLean, who died in the Cariboo,



shortly after, were among the last of the old guard to remain.

Many an interesting tale of the old diggings and camps is recalled by Mr. Stevenson, as he chats of the early years of his romantic career. Conspicuously among these experiences stands out the well-known account of the "lost diggings" in the far interior, which out-Cariboo the richest claims of Cariboo's best days, and Mr. Stevenson is now the only living man who knows the location. The many causes contributing to these wonderful diggings being left untouched in all the years since the death of John Rose, who located them, form an absorbing chapter of history.

"I can find them even yet," said Mr. Stevenson, in talking of the rich find which in the end cost the life of Rose and his partner, Johnston. "I was the last man with Rose and Johnston when they set off in the spring of 1862, to return to their new diggings, which they had prospected and worked the previous year. They left from the old Antler camp—not a trace of which now remains, but where I am told much mining activity has been going on the past season.

"Rose and Johnston outfitted and took nearly twice the ordinary season's supplies on a double-decked raft or barge they built. I recall as if it were yesterday, walking down to the side of the creek, where they had their raft moored. We each carried a few last supplies. Rose turned to me, and pointing to a young man, a stranger to the camp, said, "I have invited this young man to come along. He tells me he has no money, no outfit, no blankets, not even a coat. But he looks a likely fellow, and will be a great help.

"From that moment Rose and Johnston were never again seen nor heard of. Twenty-five years later a friend of mine met a man in Portland who was, he said, on his way to the Cariboo to re-locate the old Rose diggings. He told my friend he had been the third man in Rose's ill-fated party of the spring of 1862, and had been living in the States since that year, but had never been able to return. He invited my friend to follow and join him in the quest. But my friend could not leave Victoria. No trace of the stranger was ever again found. To this day my firm belief is that he was the young man Rose picked up the spring morning I bade him good-bye.

"But Rose had confided in me the exact location of the wonderfully rich diggings he had found, and which he said would carry a camp of several thousand men. I have never yet been able to go," ended Mr. Stevenson wistfully, "but can still locate the place."

Strong in his faith in the value of the undiscovered placer field, and in his own ability to locate it, Mr. Stevenson still cherishes the hope to be able to make the trip some day, and he is equally confident that he is as fit as many a younger prospector for the arduous season's campaign it would mean. But he will not reveal the secret of Rose's diggings.

#### Map of the Anyox District, B. C.

We have received a contoured map of the vicinity of Anyox, British Columbia, situated on Observatory Inlet. The map, on a scale of 1,000 feet to the inch, shows the layout of the Anyox Smelter, and the adjoining community, together with the railway, compressed air line and the buildings around the Hidden Creek Mine of the Granby Consolidated Smelting Co. Copies can be obtained from the Mines Branch at Ottawa. Publication No. is 1706.

## Nova Scotia Notes

### Loch Lomond Coalfield, Cape Breton

Reports in the Sydney newspapers refer to the Loch Lomond and Glengarry coalfield, and intimate that some of the larger coal companies in Cape Breton are interesting themselves in the area—a report which was later denied.

This report evidently refers to the small synclinal basin, an outlier of the main Sydney field, which lies not far from the eastern shore of the East Bay of the Bras d'Or Lake, back of Big Pond. A description and map of this small coal occurrence will be found on page 8 of Mr. J. F. K. Brown's memoir on the "Mining of Thin Coal Seams as applied to the Eastern Coalfields of Canada."\* Mr. Brown calculates a possible coal content of 28,000,000 tons in the area. It is, however, one of those coal areas remote from transportation, containing thin and not easily mined seams, which form part of the natural coal reserves of a country, and which, in due time, will appreciate in value, but is not of great importance while large and undeveloped coal areas exist within easy reach of present colliery equipment.

The most interesting part of this coal occurrence is connected with the existence of a thin strip of carboniferous measures bordering the shores of the East Bay, which suggests the possibility that some day coal seams may be found underlying the waters of the Bras d'Or Lake.

\*Note.—Bulletin No. 14, Mines Branch, Ottawa.

### Labour Matters

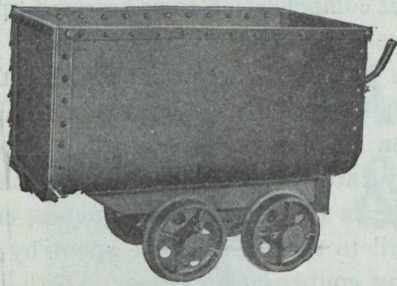
The negotiations between the coal operators and the U. M. W. are reported to be proceeding satisfactorily, with the promise of amicable settlement before the end of the year.

### G. B. Burchell to Operate the Fenwick Mine

It is understood that Mr. George B. Burchell, General Manager of the Bras d'Or Coal Co., has taken over the operation of the Fenwick Colliery, in the Cumberland Field, in which the Provincial Government became financially interested during the urgent coal shortage of two winters ago. Mr. Burchell has been very successful in operating small collieries, and previous to taking over management of the Bras d'Or Mine he was for a number of years in charge of operations in the Joggins Field.

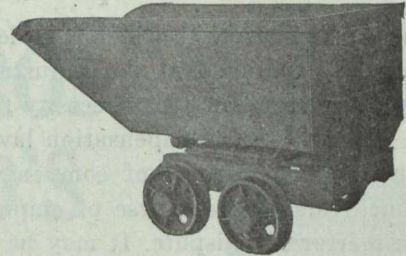
The small companies, including the Indian Cove Mine at North Sydney, the Bras d'Or Coal Company, also at North Sydney; the operations of Mr. Malcolm Beaton and partners at Port Hood, and of the Greenwood and Milford Companies in the Pictou Field have latterly been quite busy, and production during the last quarter of the year will be appreciably helped by the output of these minor operators. It is also understood that the New Campbellton Mine, in which Mr. John C. Douglas, M. P., is interested, has recently increased its production and is making satisfactory progress.





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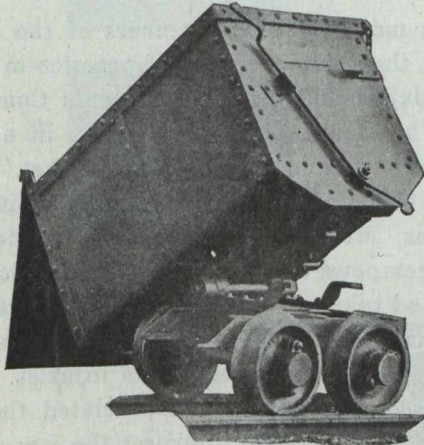
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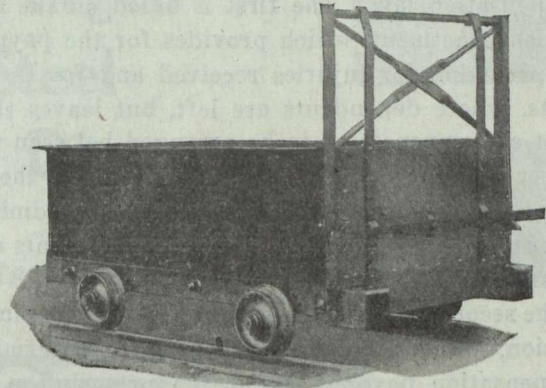
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## Workmen's Compensation Laws

One of the matters in which complete concurrence of opinion was obtained at the Industrial Conference in Ottawa was regarding the necessity for the standardization of workmen's compensation laws in Canada.

The essential fairness of compensation for injuries sustained during the course of employment is not today a matter for dispute. It may be regarded as generally accepted.

There are two main divisions of administration of a compensation law. The first is based on the original British enactment, which provides for the payment of compensation for injuries received and for fatal accidents, where dependents are left, but leaves the payment of compensation to be arranged between the employer and the employee, with recourse to the courts in case of disagreement. This method of administration usually carries with it lump sum payments of compensation.

The second mode of administration is vested in a commission, which has absolute power to determine the compensation payable, under the prescription of the act, and permits no recourse to the courts. Administration by a state commission usually includes collective assessment of industries by groups, the rate being at the discretion of the Commission, and monthly payments and pensions in lieu of lump sum payment.

Administration by a state board has the following features to recommend it. It entirely eliminates recourse to the courts and avoids the necessity for the employment of lawyers. No direct contact between the employer and the employee is required, and no questions requiring agreement or disagreement between them are raised. Medical diagnosis of injuries rests with the medical officers of the state board, and in this regard a fruitful field of non-agreement is avoided. Monthly payments of compensation for injury correspond approximately with the periodical receipt of earnings, and avoids all the abuses and disasters that accompany lump payments of compensation. The payment of comparatively large sums of money to persons unable to expend it wisely has nothing to recommend it, and much to condemn it.

The administration of a compensation law by a state board is a logical evolution from the acceptance of the principle that compensation for occupational injury is a charge against the industry as a whole. The evils of bureaucratic control are admitted and well-known, but if we accept the foregoing postulate, there is no other way by which industry, as a whole, can be fairly and equitably assessed for compensation for injuries received in industry.

From the employers' side, we believe there is much to be said for the manner in which workmen's compensation is assessed and disbursed in Ontario, Nova Scotia and British Columbia. The method of group and

collective assessment, after some years of experience, enables the cost of compensation to be assessed upon the payrolls with precision, and within a limited range, and in this way, employers are relieved from the uncertainty of judicial decisions, and the necessity for legal consultation and payments. In the objections which accompany the working of a compensation law such as is in force in the Province of Quebec, employers should not fail to reckon the time spent by executives in contesting compensation cases.

The Report of the Ontario Compensation Board for 1918 contains the following:

"Complaint is made by some members of the legal profession that they are ruled out of practice in connection with claims under the Workmen's Compensation Act. The Board feels that this is in accordance with the spirit and intention of the Act."

In the Quebec Court of Appeal, during the sitting of the 28th October, Mr. Justice Martin, in rendering judgment in a compensation case, called attention to the fact that it had taken nine judges, nine doctors and four lawyers nearly four years to determine the nature and extent of the respondent workmen's injuries. His Lordship remarked that he quite appreciated that it was the function of a judge to interpret the law as he found it, and perhaps he ought not to suggest any changes or reforms in the law as made. "But, in the light of the facts I have mentioned," said Justice Martin, "I feel safe in asserting that if a Commissioner was to administer this Act with the assistance of an independent medical board, he would have settled and determined the whole matter in dispute between the parties in three hours."

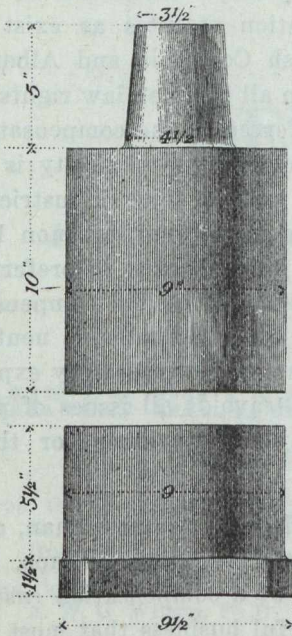
Lawyers as a class would be the last to suggest that statutes should be framed to give them the maximum employment, and the moral pointed by these parallel statements requires no elaboration.

Not only does administration by a Workmen's Compensation Board provide impartial handling, but it leads to expeditious and skilful handling. The administrative and medical officers of a Compensation Board, handling many thousands of cases in a year, become as impersonal, as correct, and as skilful in their work as fallible men can hope to become.

No cheaper or more equitable form of administration is possible. As the 1917 Ontario Report puts it: "Practically all the money contributed by employers goes to workmen or their dependents as compensation. The administrative body has no motive to give the workmen less than he is entitled to, and no motive to charge the employer more than he should pay."

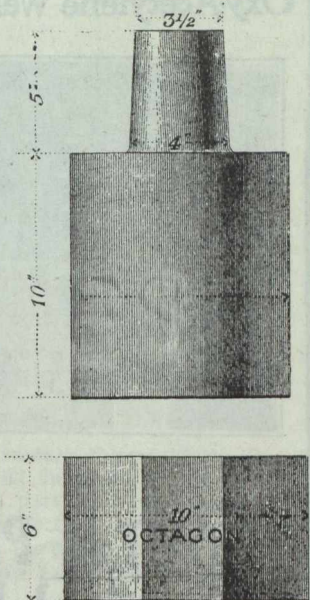
From the workmen's point of view, there is no convincing reason that can be given to him why he should receive differing treatment in regard to compensation for injury, according as he may be injured on this or that side of a provincial boundary.





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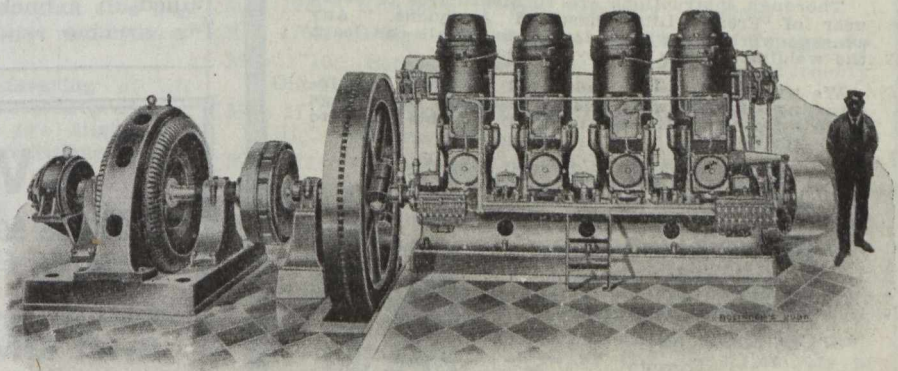
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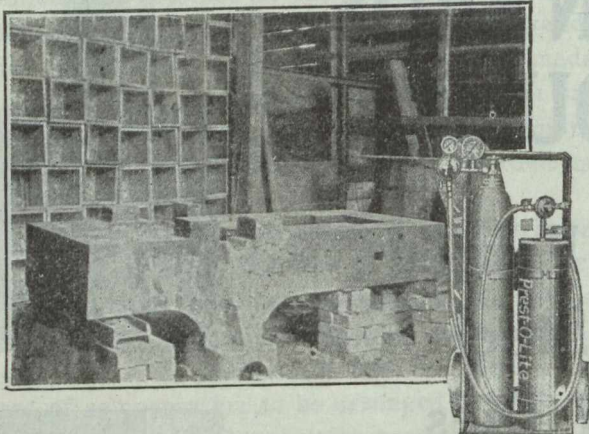
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From the employer's viewpoint, it should not be forgotten that such compensation statutes as exist in Ontario, Nova Scotia, British Columbia and Alberta, take away from the workmen all common law rights by virtue of the privileges conferred in the compensation acts of those provinces. Common law liability is an uncertain and erratic one, and in some industries—most industries in fact—the menace of common law liability, as interpreted by a jury, is not to be preferred to an all-inclusive payroll assessment for compensation purposes, administered by a skilful and neutral state board which eliminates every unnecessary expenditure in administration, and avoids all issues of possible disagreement with injured workmen, or their dependents.

There is another point. Employers are human, and oftener than may be admitted by some perhaps, are humane, and the contesting of a compensation case is in many instances a distasteful business that most executives would be glad to be relieved of.—From *Iron & Steel of Canada*.

### Pocket Manual on Fire-Damp Testing, Issued by the B. C. Mines Dept.

The "Journal" has received, with the compliments of the Minister of Mines for British Columbia, a very neat and handy pocket-manual of instructions in testing for fire-damp in coal mines. The heights of cap corresponding to certain ascertained percentages of fire-damp are shown by two diagrams, the flame being shown in red, and the gas-cap in blue. An interesting feature is the difference in the size of the gas-cap for the same percentages of inflammable gas (methane) in the air between the Coast and Nicola Valley Districts and the Crowsnest Pass Mines. For example a 2½ per cent content of fire-damp in the Crowsnest Pass mines will show a 5/16ths cap, where the same percentage of fire-damp in the Coast Mines would cause a half-inch cap. It is stated by those who work in the Crowsnest District that the mine gases there contain a remarkably high percentage of ethane.

The little manual of the Mines Department is contained in a buckram envelope, and is thus protected for carrying round in the vest-pocket.

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An air compressor oil or gas driven, direct drive preferred capable of running 3 to 5 rock drills.

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# CANADA

## DEPARTMENT OF MINES

HON. MARTIN BURRELL, *Minister*

R. G. McCONNELL, *Deputy Minister*

### MINES BRANCH

#### Recent Publications

Iron Ore Occurrences in Canada, Vol. II. Compiled by E. Lindeman, M.E., and L. L. Bolton, M.A., B.Sc. Introductory by A. H. A. Robinson, B.A.Sc.

The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.

Building and Ornamental Stones of Canada (British Columbia). Vol. V., by W. A. Parks, Ph.D.

Peat, Lignite and Coal; their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.

Annual Mineral Production Reports, by J. McLeish, B.A.

The Coal-fields and Coal Industry of Eastern Canada, by F. W. Gray.

Occurrences and Testing of Foundry Moulding Sands. Bulletin No. 21, by L. H. Cole, B.Sc.

Analyses of Canadian Fuels. Parts I to V, by E. Stansfield, M.Sc., and J. H. H. Nicolls, M.Sc.

Clay Resources of Southern Saskatchewan, by N. B. Davis, M.A., B.Sc.

Summary Report of the Mines Branch, 1917.

The Mineral Springs of Canada. Part II., by R. T. Elworthy, B.Sc.

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

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

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

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

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

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

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

### GEOLOGICAL SURVEY

#### Recent Publications

Summary Report. The annual Summary Report of the Geological Survey is now printed in parts. Applicants should therefore, state what particular geologist's report is required, or what subjects they are interested in.

Memoir 95. Onaping Map-Area, by W. H. Collins.

Memoir 105. Amisk-Athapapuskow Lake district, by E. L. Bruce.

Memoir 107. Road materials in the vicinity of Regina, Saskatchewan, by L. Reinecke.

Memoir 108. The Mackenzie River basin, by Charles Cam-sell and Wyatt Malcolm.

Memoir 109. The Harricaw-Turgeon basin, northern Quebec, by T. L. Tanton.

Memoir 110. Preliminary report on the economic geology of Hazelton district, British Columbia, by J. J. O'Neill.

Memoir 112. Geology of the district belt of southwestern Alberta, by J. S. Stewart.

Map 42A. Duncan sheet, Vancouver Island. Geology.

Map 44A. Sooke sheet, Vancouver Island. Geology.

Map 115A. Sheep river, Alberta. Topography.

Map 164A. St. John, New Brunswick. Topography.

Map 179A. Onaping; Sudbury and Timiskaming districts, Ont. Geology.

Map 183A. Harricaw-Turgeon basin; Abitibi, Timiskaming and Pontiac, Que. Geology.

Map 1585. Mackenzie River basin. Geology.

Map 1680. Portions of Grenville, Harrington, Chatham and Wentworth townships, Argenteuil county, Quebec. Geology.

Maps 1697 and 1698. Explored routes in a belt traversed by the Canadian Northern Ontario railway,—in two sheets: Sheet 1 Gogama to Missonga, Sudbury district; Sheet 2 Oatland to Penhurst, Algoma district, Ontario.

Map 1690. Whiteburn Gold District, N.S. Geology.

Map 1702. Klotassin, Yukon Territory. Geology.

Map 1708. Bridge river, Lillooet district, B.C. Topography.

Map 1710. Bothwell-Thamesville oil region, Kent county, Ontario.

Map 1712. Foothills of Southern Alberta, St. Mary river to Highwood river. Geology.

Map 1714. The Niagara peninsula, Ontario. Geology.

Map 1715. The Ontario peninsula. Geology.

Applicants for publications not listed above should mention the precise area concerning which information is desired.

The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon.

Communications should be addressed to The Director, Geological Survey, Ottawa.



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 Railways**

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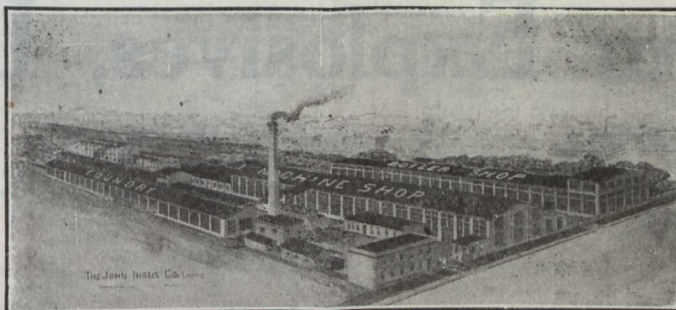
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Nanaimo, B.C. Northfield, B.C., Bowen Island, B.C., Parry Sound, Ont.



# The Canadian Miners' Buying Directory.

**Acetylene Gas:**

Canada Carbide Company, Ltd.  
Canadian Fairbanks-Morse.

**A.C. Units:**

MacGovern & Co.

**Agitators:**

The Dorr Co.

**Air Hoists:**

Canadian Ingersoll-Rand Co., Ltd.  
Mussens, Limited.

**Alloy and Carbon Tool Steel:**

H. A. Drury Co., Ltd.  
International High Speed Steel Co., Rockaway, N.J.

**Alternators:**

MacGovern & Co.

**Amalgamators:**

Northern Canada Supply Co.  
Mine and Smelter Supply Co.  
Wabi Iron Works.

**Antimony:**

Canada Metal Co.

**Antimonial Lead:**

Pennsylvania Smelting Co.

**Arrester, Locomotive Spark:**

Hendrick Manufacturing Co.

**Arsenic White Lead:**

Conlagas Reduction Co.

**Assayers' and Chemists' Supplies:**

Dominion Engineering & Inspection Co.  
Lyman, Limited  
Mine & Smelter Supply Co.  
Pennsylvania Smelting Co.  
Stanley, W. F. & Co., Ltd.

**Assayers and Chemists:**

Milton L. Hersey Co., Ltd.  
Campbell & Deyell  
Ledoux & Co.  
Thos. Heys & Son  
C. L. Constant Co.

**Asbestos:**

Everitt & Co.

**Balls:**

Canadian Foundries and Forgings, Ltd.  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
The Wabi Iron Works.  
The Hardinge Conical Mill Co.

**Ball Mills:**

Hardinge Conical Mill Co.  
Hull Iron & Steel Foundries, Ltd.  
Mine and Smelter Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
The Wabi Iron Works.

**Balances—Heusser:**

Canadian Fairbanks-Morse Co., Ltd.  
Mine and Smelter Supply Co.

**Babbit Metals:**

Canada Metal Co.  
Canadian Fairbanks-Morse Co., Ltd.  
Hoyt Metal Co.

**Ball Mill Feeders:**

Fraser & Chalmers of Canada, Ltd.  
Hardinge Conical Mill Co.  
Hull Iron & Steel Foundries, Ltd.

**Ball Mill Linings:**

Hardinge Conical Mill Co.  
Hull Iron & Steel Foundries, Ltd.

**Belting—Leather, Rubber and Cotton:**

Canadian Fairbanks-Morse Co., Ltd.  
Link Belt Co.  
The Mine & Smelter Supply Co.  
Northern Canada Supply Co.  
Jones & Glasco.

**Belting:**

R. T. Gilman & Co.

**Belting (Transmission):**

Goodyear Tire & Rubber Co.

**Belting (Elevator):**

Goodyear Tire & Rubber Co.

**Belting (Conveyor):**

Goodyear Tire & Rubber Co.

**Blasting Batteries and Supplies:**

Canadian Ingersoll-Rand Co., Ltd.  
Mussens, Ltd.  
Northern Canada Supply Co.  
Canadian Explosives, Ltd.

**Bluestone:**

The Consolidated Mining & Smelting Co.

**Blowers:**

Canadian Fairbanks-Morse Co., Ltd.  
MacGovern & Co., Inc.  
Northern Canada Supply Co.  
Fraser & Chalmers of Canada, Ltd.

**Boilers:**

Northern Canada Supply Co.  
Canadian Ingersoll-Rand Co., Ltd.  
Marsh Engineering Works  
MacGovern & Co., Inc.  
R. T. Gilman & Co.  
Fraser & Chalmers of Canada, Ltd.  
The John Inglis Company  
Wabi Iron Works.

**Blue Vitriol (Coniagas Red):**

Canadian Fairbanks-Morse Co., Ltd.

**Bortz and Carbons:**

Diamond Drill Carbon Co.

**Boxes, Cable Junction:**

Standard Underground Cable Co. of Canada, Ltd.  
Northern Electric Co., Ltd.

**Brazilian Rough Diamonds:**

Diamond Drill Carbon Co.

**Brazilian Mica:**

Diamond Drill Carbon Co.

**Buggies, Mine Car (Steel)**

Hendrick Manufacturing Co.

**Brazilian Ballas:**

Diamond Drill Carbon Co.

**Brazilian Rock Crystal:**

Diamond Drill Carbon Co.

**Brazilian Tourmalines:**

Diamond Drill Carbon Co.

**Brazilian Aquamarines:**

Diamond Drill Carbon Co.

**Bronze, Manganese, Perforated and Plain:**

Hendrick Manufacturing Co.

**Buckets:**

Canadian Ingersoll-Rand Co., Ltd.  
The Electric Steel & Metals Co.  
R. T. Gilman & Co.  
Hendrick Manufacturing Co.  
Link-Belt Co.  
M. Beatty & Sons, Ltd.  
Marsh Engineering Works  
Mussens, Ltd.  
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Northern Canada Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works

**Buckets, Elevator:**

Hendrick Mfg. Co.

**Cable—Aerial and Underground:**

Northern Canada Supply Co.  
Standard Underground Cable Co. of Canada, Ltd.

**Cableways:**

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Fraser & Chalmers of Canada, Ltd.  
Mussens, Ltd.  
The Wabi Iron Works  
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**Cages:**

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Northern Canada Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
Mussens, Ltd.  
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## Canadian Miners' Buying Directory.—(Continued)

- Cables—Wire:**  
Standard Underground Cable Co. of Canada, Ltd.  
Canada Wire & Cable Co.  
Fraser & Chalmers of Canada, Ltd.  
Northern Electric Co., Ltd.  
R. T. Gilman & Co.
- Cam Shafts:**  
Canada Foundries & Forgings, Ltd.  
Hull Iron & Steel Foundries, Ltd.
- Car Dumps:**  
Sullivan Machinery Co.  
R. T. Gilman & Co.  
Canadian Fairbanks-Morse Co., Ltd.
- Carbide of Calcium:**  
Canada Carbide Company, Ltd.
- Cars:**  
Canadian Foundries and Forgings, Ltd.  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Fairbanks-Morse Co., Ltd.  
John J. Gartshore  
MacKinnon Steel Co., Ltd.  
The Electric Steel & Metals Co.  
Northern Canada Supply Co.  
Marsh Engineering Works  
Mine and Smelter Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
R. T. Gilman & Co.  
The Wabi Iron Works
- Car Wheels and Axles:**  
Canadian Car Foundry Co., Ltd.  
Burnett & Crampton  
Hull Iron & Steel Foundries, Ltd.  
John J. Gartshore  
Marsh Engineering Works, Ltd.  
The Electric Steel & Metals Co.  
The Wabi Iron Works
- Carriers (Gravity):**  
Jones & Glassco
- Castings—Brass**  
The Canada Metal Co., Ltd.
- Castings (Iron and Steel)**  
Burnett & Crampton  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
The Electric Steel & Metals Co.  
The Wabi Iron Works
- Cement Machinery:**  
Northern Canada Supply Co.  
Hadfields, Limited  
Hull Iron & Steel Foundries, Ltd.  
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
- 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
- Coal:**  
Dominion Coal Co.  
Nova Scotia Steel & Coal Co.
- Coal Cutters:**  
Sullivan Machinery Co.  
Canadian Ingersoll-Rand Co., Ltd.
- Coal Mining Explosives:**  
Canadian Explosives, Ltd.
- Coal Mining Machinery:**  
Canadian Ingersoll-Rand Co., Ltd.  
Sullivan Machinery Co.
- March Engineering Works  
Hadfields, Ltd.  
Hendrick Mfg. Co.  
Fraser & Chalmers of Canada, Limited  
Mussens, Limited  
R. T. Gilman & Co.
- Coal and Coke Handling Machinery**  
Link-Belt Co.
- Coal Pick Machines:**  
Sullivan Machinery Co.
- Cobalt Oxide:**  
Coniagas Reduction Co.  
Everitt & Co.
- Compressors—Air:**  
Canadian Fairbanks-Morse Co., Ltd.  
Smart-Turner Machine Co.  
Canadian Ingersoll-Rand Co., Ltd.  
Northern Canada Supply Co.  
MacGovern & Co., Inc.  
R. T. Gilman & Co.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
The Mine & Smelter Supply Co.
- Concrete Mixers:**  
Canadian Fairbanks-Morse Co., Ltd.  
Northern Canada Supply Co.  
Gould, Shapley & Muir Co., Ltd.  
MacGovern & Co., Inc.  
Mussens, Limited  
R. T. Gilman & Co.
- Condensers:**  
Canadian Fairbanks-Morse Co., Ltd.  
Smart-Turner Machine Co.  
Northern Canada Supply Co.  
MacGovern & Co., Inc.
- Concentrating Tables:**  
Mine & Smelter Co.  
Deister Concentrator Co.  
The Wabi Iron Works
- Converters:**  
Northern Canada Supply Co.  
MacGovern & Co., Inc.
- Contractors' Supplies:**  
Canadian Fairbanks-Morse Co., Ltd.
- Consulters and Engineers:**  
Hersey Milton Co., Ltd.
- 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.
- Cranes:**  
Canadian Fairbanks-Morse Co., Ltd.  
Link-Belt Co.  
R. T. Gilman & Co.  
Smart-Turner Machine Co.  
M. Beatty & Sons, Ltd.
- Crane Ropes:**  
Allan Whyte & Co.  
Greening, B., Wire Co., Ltd.
- Crucibles:**  
Canadian Fairbanks-Morse Co., Ltd.  
Mine and Smelter Supply Co.
- Crusher Balls:**  
Canada Foundries & Forgings, Ltd.  
Hull Iron & Steel Foundries, Limited, Hull, Que
- Crushers:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Hardinge Conical Mill Co.  
The Electric Steel & Metals Co., Ltd.  
R. T. Gilman & Co.  
Lyman, Ltd.  
Mussens, Limited  
Mine and Smelter Supply Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works



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

**Cyanide Plant Equipment:**  
The Dorr Co.**D. C. Units:**  
MacGovern Co.**Derricks:**

Smart-Turner Machine Co.  
M. Beatty & Sons, Ltd.  
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.  
M. Beatty & Sons  
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.  
Sullivan Machinery Co.  
Northern Canada Supply Co.  
Canadian Rock Drill Co.  
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, N.J.  
Mussens, Limited

**Drill Steel Sharpeners:**

Canadian Ingersoll-Rand Co., Ltd.  
Northern Canada Supply Co.  
Sullivan Machinery Co.  
Canadian Rock Drill Co.  
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.  
H. A. Drury Co., Ltd.  
Hadfields, Limited

**Dynamite:**

Canadian Explosives  
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:**

M. Beatty & Sons  
Sullivan Machinery Co.  
Northern Canada Supply Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
The Wabi Iron Works

**Engineering Instruments:**

C. L. Berger & Sons

**Engines—Automatic:**

Canadian Fairbanks-Morse Co., Ltd.  
Fraser & Chalmers of Canada, Ltd.

**Engines—Gas and Gasoline:**

Canadian Fairbanks-Morse Co., Ltd.  
Alex. Fleck  
Fraser & Chalmers of Canada, Ltd.  
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.  
Marsh Engineering Works  
Fraser & Chalmers of Canada, Ltd.

**Engines—Marine:**

Canadian Fairbanks-Morse Co., Ltd.  
MacGovern & Co., Inc.

**Engines—Steam:**

Canadian Fairbanks-Morse Co., Ltd.  
M. Beatty & Sons  
R. T. Gilman & Co.  
MacGovern & Co., Inc.  
Fraser & Chalmers of Canada, Ltd.

**Engineers:**

The Dorr Co.

**Ferro-Alloys (all Classes):**

Everitt & Co.

**Feed Water Heaters:**

MacGovern & Co.

**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:**

M. Beatty & Sons  
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  
Northern Canada Supply Co.

**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.
- Hose (Fire):**  
Goodyear Tire & Rubber Co.
- Hose (Packings)**  
Goodyear Tire & Rubber Co.
- Hose (Suction):**  
Goodyear Tire & Rubber Co.
- Hose (Steam):**  
Goodyear Tire & Rubber Co.
- Hose (Water):**  
Goodyear Tire & Rubber Co.
- Hammer Rock Drills:**  
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.  
Hadfields, Limited  
International High Speed Steel Co., Rockaway, N.J.
- High Speed Steel Twist Drills:**  
Canadian Fairbanks-Morse Co., Ltd.  
H. A. Drury Co., Ltd.  
Northern Canada Supply Co.
- Hoists—Air, Electric and Steam:**  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Fairbanks-Morse Co., Ltd.  
Jones & Glassco  
M. Beatty & Sons  
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.  
The Electric Steel & Metals Co.  
Mussens, Limited  
Sullivan Machinery Co.  
Canadian Ingersoll-Rand Co., Ltd.  
M. Beatty & Sons  
Marsh Engineering Works  
Fraser & Chalmers of Canada, Ltd.  
The Mine & Smelter Supply Co.
- Hose:**  
Canadian Fairbanks-Morse Co., 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.
- Lead (Pig):**  
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  
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:**  
The Dorr Co.
- Metallurgical Machinery:**  
The Dorr 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.  
International High Speed Steel Co., Rockaway, N.J.
- Mining Requisites:**  
Canadian Steel Foundries, Ltd.  
Dominion Wire Rope Co., Ltd.  
Hadfields, 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:**  
International Nickel Co.
- Motors:**  
Canadian Fairbanks-Morse Co., Ltd.  
R. T. Gilman & Co.  
MacGovern & 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 Mond Nickel Co., Ltd.

**Nickel Wire:**  
The Mond Nickel Co., Ltd.

**Oil Analysts:**  
Constant, C. L. Co.

**Ore Sacks:**  
Northern Canada Supply Co.

**Ore Testing Works:**  
Ledoux & Co.  
Can. Laboratories  
Milton Hersey Co.  
Campbell & Deyell  
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.

**Perforated Metals:**  
Northern Canada Supply Co.  
Hendrick Mfg. Co.  
Greening, B., Wire Co.

**Pig Tin:**  
Canada Metal Co., Ltd.  
Hoyt Metal Co.

**Pig Lead:**  
Canada Metal Co., Ltd.  
Hoyt Metal Co.  
Pennsylvania Manufacturing Co.

**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.  
Jones & Glassco  
R. T. Gilman & Co.

**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, Ltd.  
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.  
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.  
M. Beatty & Sons  
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:**  
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.

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

**Rope—Manilla:**  
Mussens, Limited

**Rope—Manilla and Jute:**  
Jones & Glassco  
Northern Canada Supply Co.  
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.  
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.  
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.  
M. Beatty & Sons  
R. T. Gilman & Co.

**Silice:**

Conlagas 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:**

Link-Belt Co.

**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.  
Hull Iron & Steel Foundries, Ltd.  
The Electric Steel & Metals Co.  
Hadfields, Limited  
The Wabi Iron Works

**Steel Drills:**

Canadian Fairbanks-Morse Co., Ltd.  
Sullivan Machinery Co.  
Northern Canada Supply Co.  
The Electric Steel & Metals Co.  
Canadian Ingersoll-Rand Co., Ltd.  
Mussens, Limited

**Steel Drums:**

Smart-Turner Machine Co.

**Steel—Tool:**

Canadian Fairbanks-Morse Co., Ltd.  
H. A. Drury Co., Ltd.  
N. S. Steel & Coal Co.  
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.  
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:**

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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

**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  
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

**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



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

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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 & Glasco

**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.

**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

**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.  
Dominion Wire Rope Co., Ltd.

**Wire Cloth:**  
Northern Canada Supply Co.  
Greening, B. Wire Co.

**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.

**Zincium:**  
Everitt & Co.

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

**Zinc Spelter:**  
Canada Metal Co., Ltd.  
Hoyt Metal Co., Ltd.

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Canadian Fairbanks-Morse Co., Ltd. . . . .		<b>H</b>		<b>P</b>	
Canadian Milk Products, Ltd. . . . .	7	Hadfields, Ltd. . . . .	50	Pacific Coast Pipe Co., . . . . .	
Canadian National Railways . . . . .	38	Hamilton Gear & Machine Co. . . . .	12	Peacock Bros., Ltd. . . . .	50
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Canadian Link-Belt Co. . . . .		Hassan A. A. . . . .	11	Prest-O-Lite Co. of Canada . . . . .	36
Canadian Laboratories, Ltd. . . . .	10	Hendrick Mfg. Co. . . . .	12	<b>Q</b>	
Canada Foundries & Forgings, Ltd. . . . .	47	Hersey, Milton Co., Ltd. . . . .	11	Quebec, Province of . . . . .	6
Canada Wire & Cable Co. . . . .		Heys Thomas & Son . . . . .	11	<b>R</b>	
Canadian Rock Drill Co. . . . .	49	Hull Iron & Steel Foundries, Ltd. . . . .	14	Ridout & Maybee . . . . .	12
Canadian Steel Foundries, Ltd. . . . .		Hore, Reginald E. . . . .	11	Rogers John C. . . . .	11
Canada Carbide Company . . . . .		Hoyt Metal Co. . . . .	50	Rogers, Geo. R. . . . .	11
Canada Metal Co. . . . .	9	<b>I</b>		Reddaway, F. & Co. . . . .	
Canadian Brakeshoe Co. . . . .	7	Imperial Bank of Canada . . . . .	38	<b>S</b>	
Canadian Sirocco Co. . . . .		International Business Machines . . . . .		Shayne & Jaffe Co., Ltd. . . . .	
Capper Pass & Son, Ltd. . . . .	47	International High Speed Steel Co. . . . .		Smart-Turner Machine Co. . . . .	
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Coniagas Reduction Co. . . . .	39	International Nickel Company . . . . .		Standard Underground Cable Co. of Canada, Ltd. . . . .	
Constant, C. L. & Co. . . . .	7	Inglis, J. & Co. . . . .	39	Stewart, Robert H. . . . .	11
<b>D</b>		<b>J</b>		Sudbury Diamond Drilling Co., Ltd. . . . .	10
Deister Concentrator Co. . . . .	13	Johnston, Matthey & Co. . . . .	10	Sullivan Machinery Co. . . . .	
Denver Rock Drill Mfg. Co. . . . .	49	Jones & Glassco . . . . .		Swedish Steel & Importing Co. . . . .	
Deloro Smelting & Refining Co. . . . .	13	<b>L</b>		Swedish Steel (Bolinder's) . . . . .	35
Dewar Mfg. Co. . . . .	38	Laurie & Lamb . . . . .		<b>T</b>	
Department of Mines, Canada . . . . .	37	Ledoux & Co. . . . .	10	Toronto Iron Works . . . . .	
Diamond Drill Carbon Co. . . . .	48	Lindsey, G. C. S. . . . .	11	Tyrrell, J. B. . . . .	11
Diamond Drill Contracting Co. . . . .	12	Longyear, E. J. Company . . . . .	8	<b>U</b>	
Dominion Coal Co., Ltd. . . . .		Lymans, Ltd. . . . .	33	University of Toronto . . . . .	47
Dominion Wire Rope Co., Ltd. . . . .	7	<b>K</b>		<b>W</b>	
Dorr Co. . . . .	11	<b>M</b>		Wabi Iron Works . . . . .	
Dresser, Jno. A. . . . .	11	<b>N</b>		Whitman, Alfred R. . . . .	11
Drury, H. A. Company . . . . .	35	<b>O</b>			
Dwight & Lloyd Sintering Co., Inc . . . . .	10	<b>P</b>			
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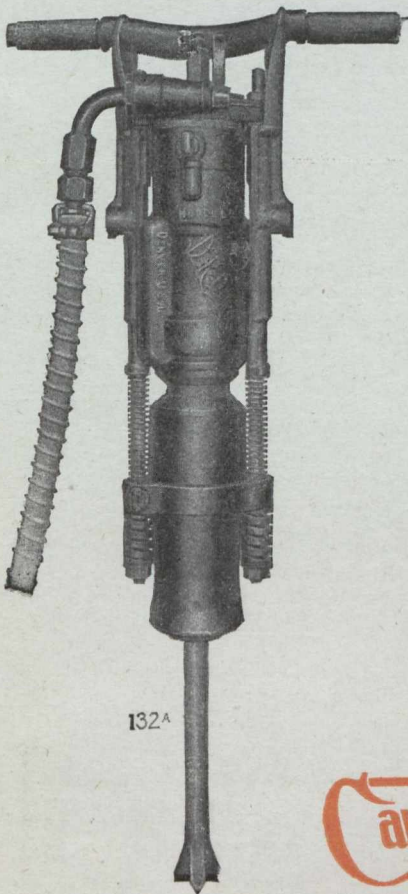
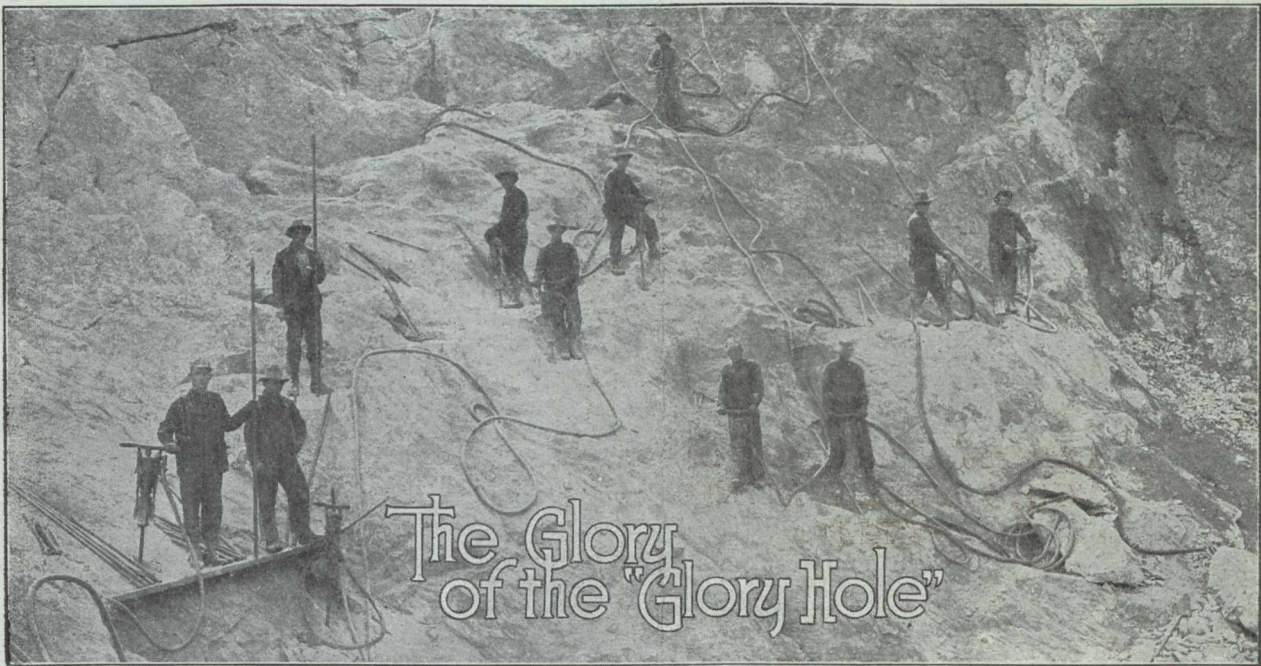
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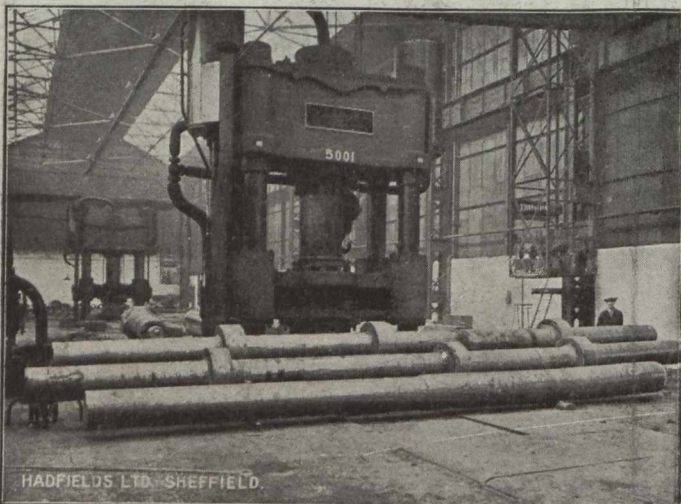
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