

CANADIAN MINING JOURNAL

Vol. XL

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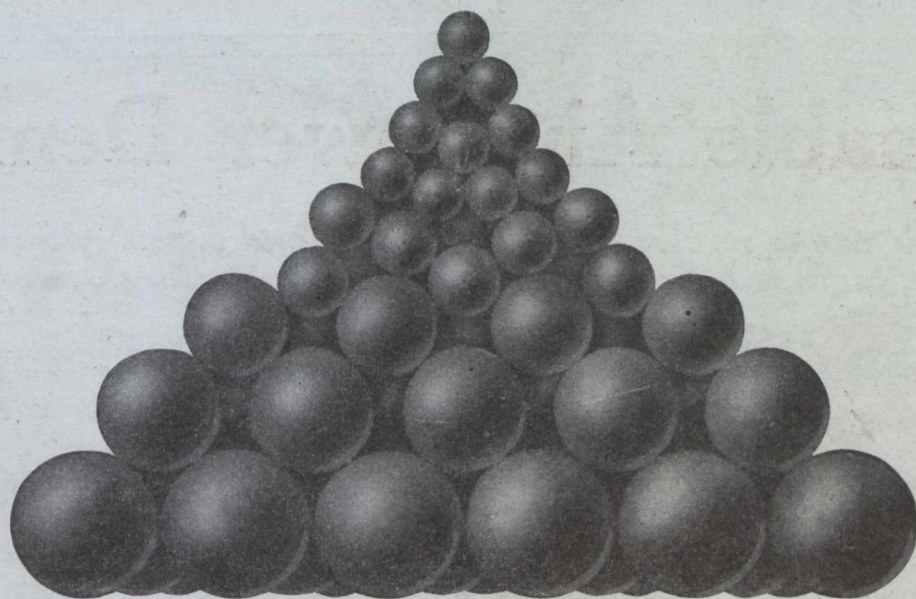
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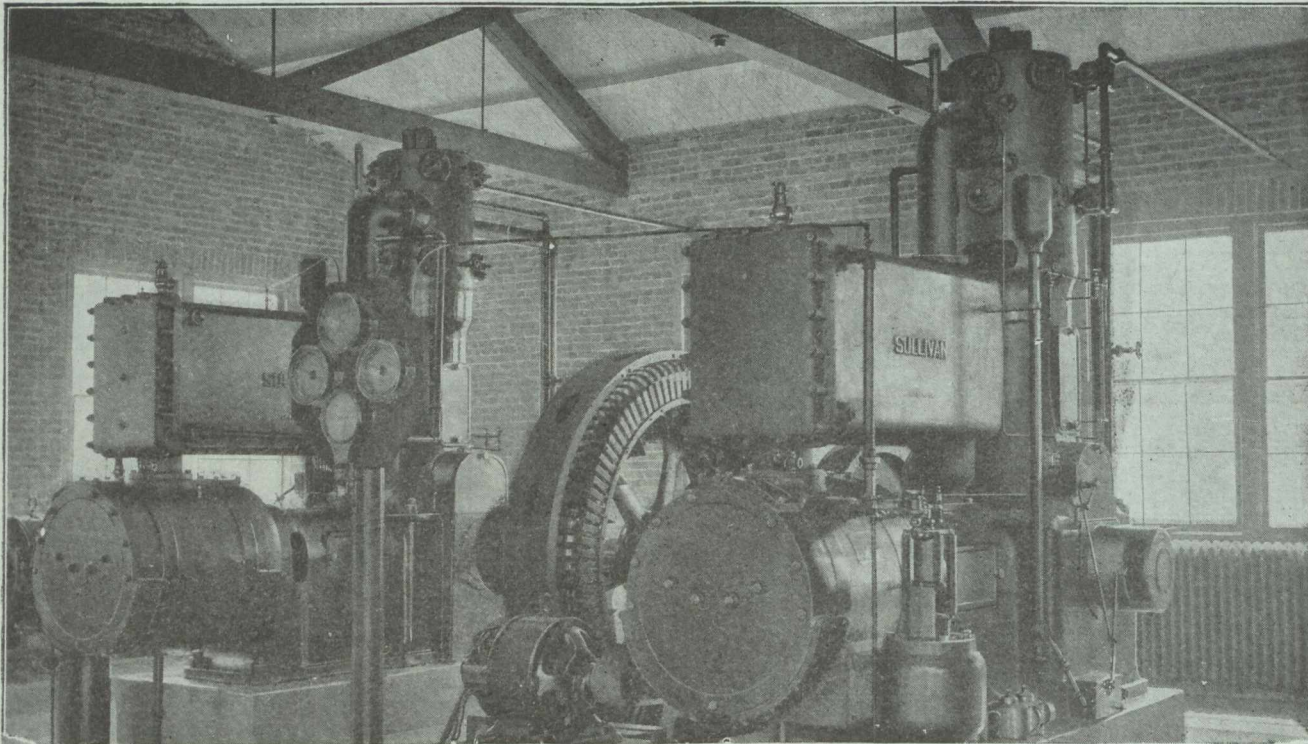
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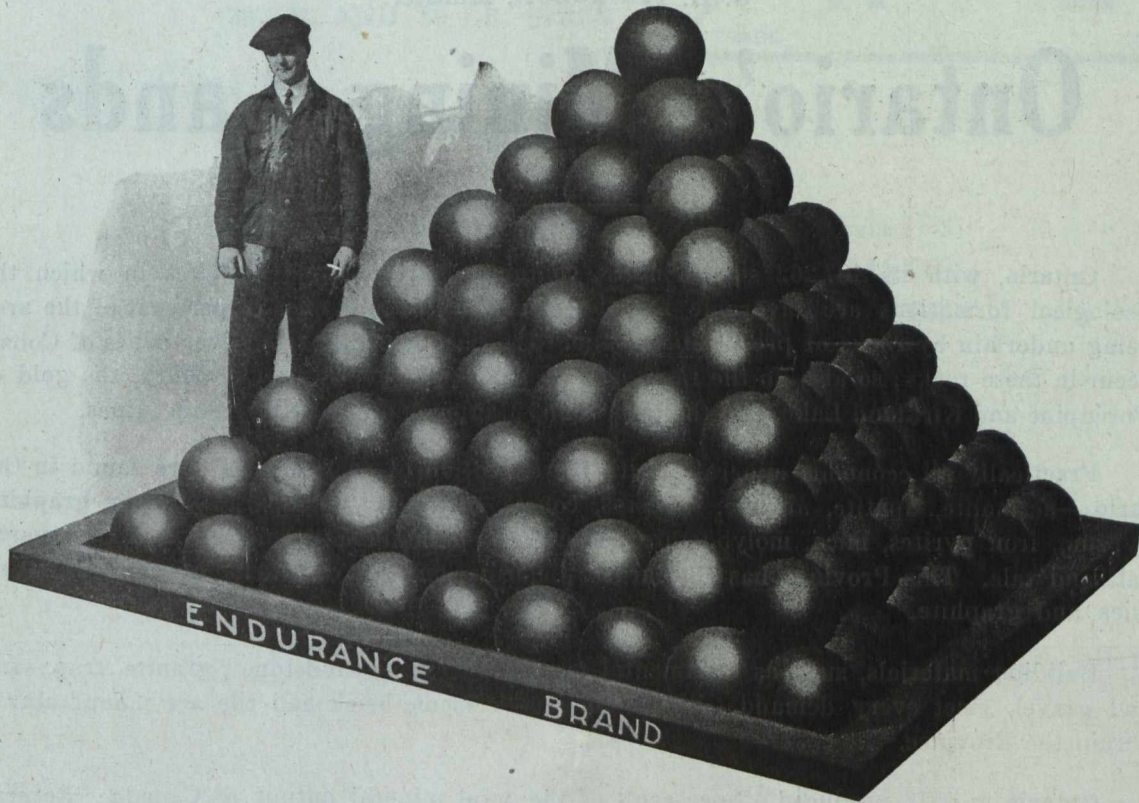
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Ontario in 1918 produced 45 per cent. of the total mineral output of Canada. Returns made to the Ontario Bureau of Mines show the output of the mines and metallurgical works of the Province for the year 1918 to be worth \$80,308,972 of which the metallic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

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

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

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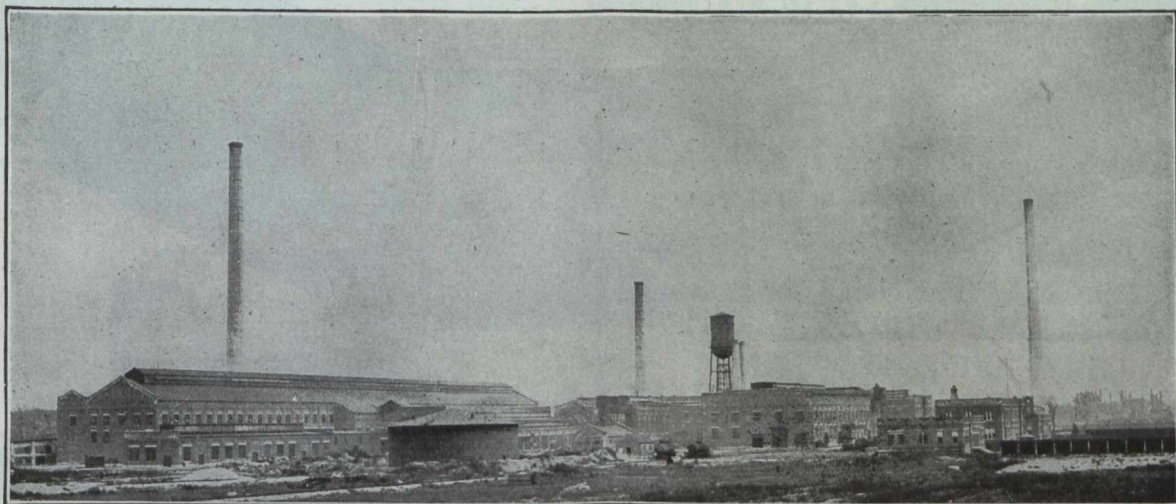
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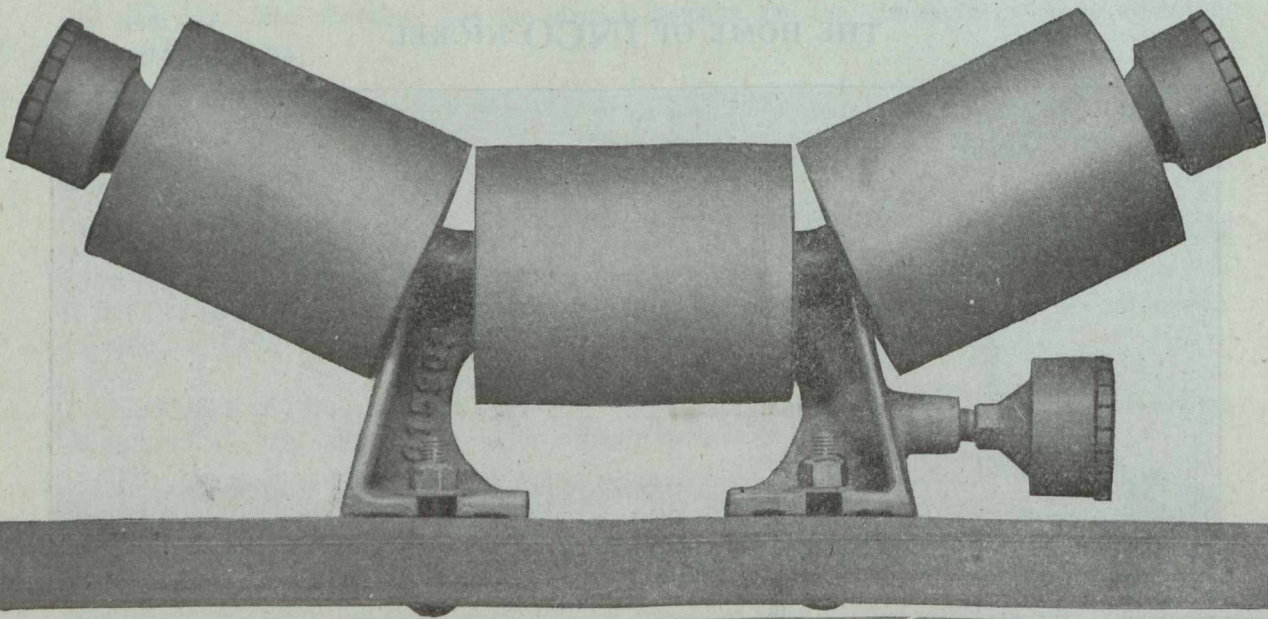
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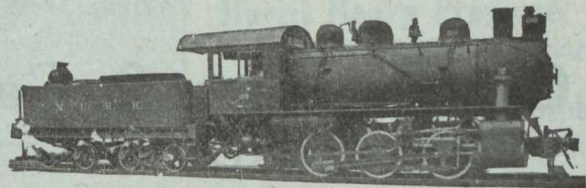
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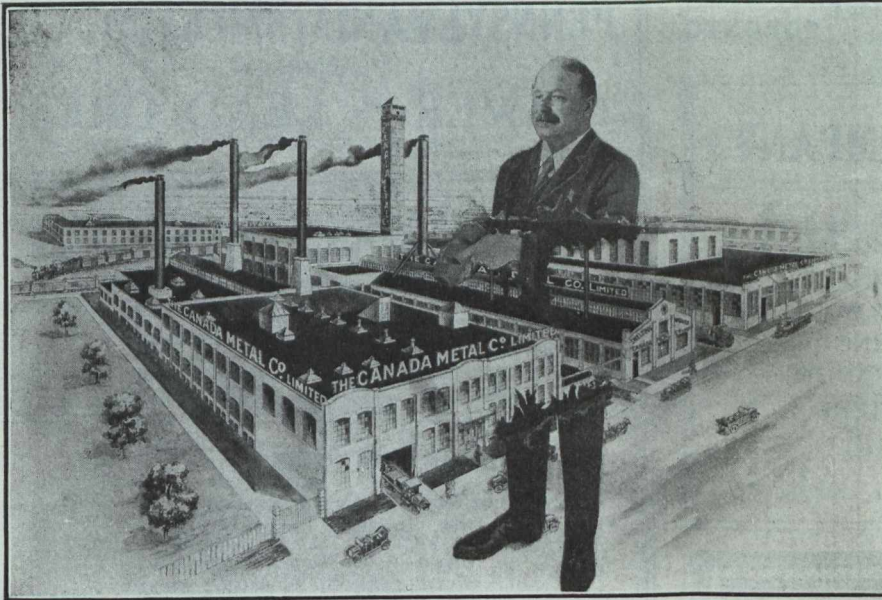
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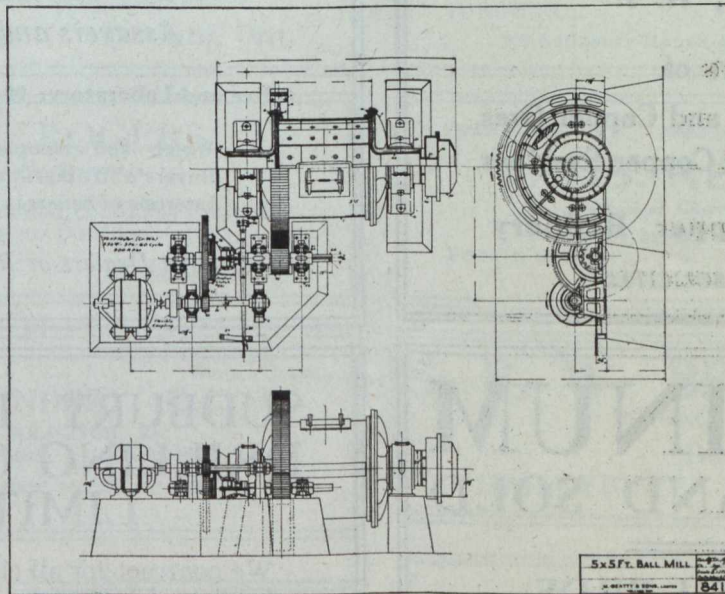
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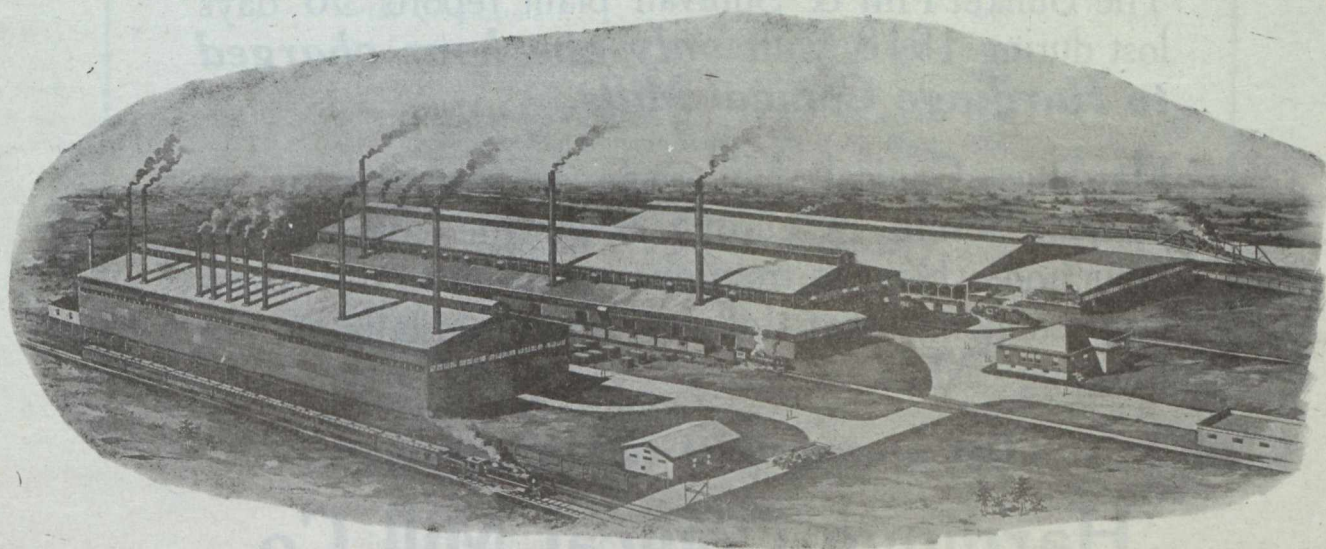
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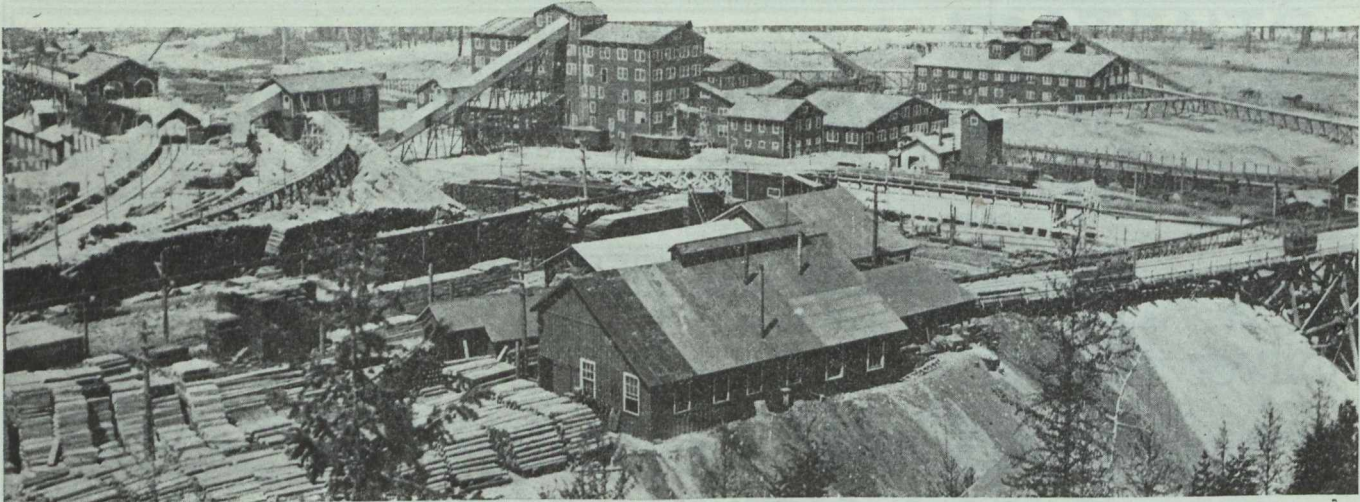


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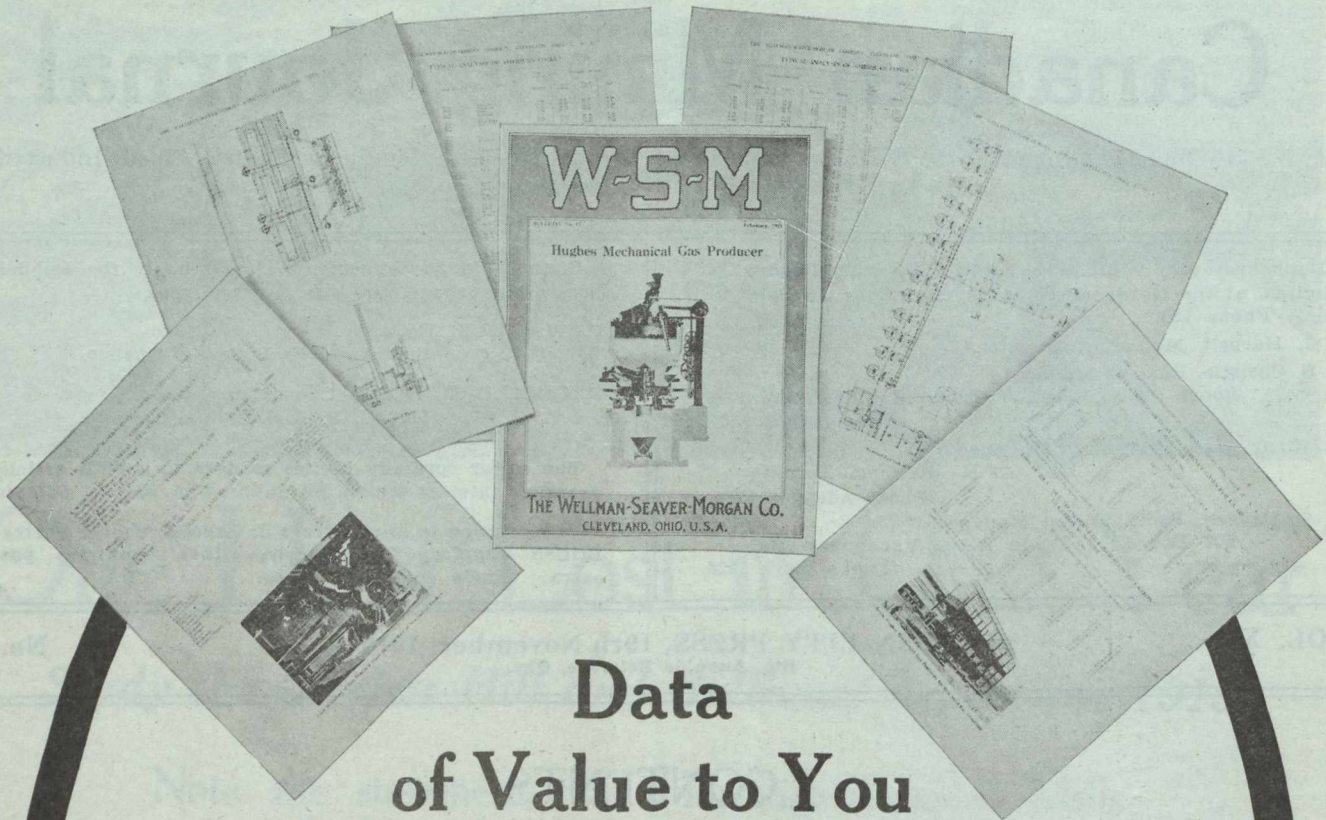
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CONTENTS

Pages 861 to 878.

Editorial:

"Who's Who in Canada, and Why?".....	861
The Levant Disaster	861
Gas Ignition and Sparking	862
The Mineral Wealth of Newfoundland.....	862
The Vancouver Meeting of the Canadian Institute of Mining & Metallurgy. 26th Nov. 1919.	863
Dover Well now Producing Oil and Gas.....	863
Metal Quotations	863
The Crude Oil Engine & its Adaptability to Min- ing Conditions	864
Gas Ignition by Sparking	865
The Disaster at the Levant Mine, Cornwall, Eng.	866
Our Northern Ontario Letter	867
The Sons of Mary. From New York Tribune....	869
Special Correspondence from British Columbia.	870
Obituary. The late E. L. Gilpin of Sydney, N.S.	872
Manitoba Notes	873
Nova Scotia Notes	874
Toronto Correspondence	875
An Unusually Placed Metallurgical Laboratory.	876
The Prospects of Railroad Electrification in America and Abroad. By F. H. Shepard.	877
Meeting of Toronto Branch of C.M.I.	878
A School Re-union "Toike-Oike"	878
Nickel Coinage Advocated in Canada. C.M.I. Bull.	878
A Silver Prophecy	878



Data of Value to You

In preparing our new twenty-two page Gas Producer Bulletin, we took the opportunity to gather under one cover the engineering data of value in the installation and operation of a Gas Producer Plant.

The tables and drawings shown above are typical of the ones included. Some of the subjects treated are:

Analyses of all American Coals.

Heating Value of Gases and Hydrocarbon Liquids in the State of Gas.
The Volume and Weight of Oxygen or Air Necessary to Burn One Pound of Various Elements, Together with the Products of Combustion.

The Volume of Oxygen and Air Necessary to Burn One Cubic Foot of Certain Gases Together with the Products of Combustion.

Combustion Data General Efficiencies of Furnaces.

Composition of Air.

Metric Equivalents.

Density and Weight of Gases.

Layout for Open Hearth Steel Plant.

General Layout of Gas Flues for Gas Producer Plant.

Heat Carried Away By Dry Chimney Gases per Pound of Combustible.

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EDITORIAL

"Who's Who in Canada and Why"

The Montreal "Journal of Commerce" has the following to say about the new edition of the Canadian "Who's Who:"

"The 1919-20 edition of "Who's Who and Why," edited by B. M. Greene and published by the International Press, Limited, Toronto, has made its appearance. It contains nearly 4,000 sketches, which is probably about the number of Canadians who are really entitled to inclusion in such a work of reference. For those who are concerned with industry, commerce and finance the list will be found fairly complete, though we note with some surprise the absence of Mark Workman, Sir Henry Pellat, Sir William Mackenzie, Hon. W. E. Edwards, F. Orr Lewis, W. I. Gear, F. H. Anson, Shirley Ogilvie, W. H. Moore, Dr. Milton Hersey, George Chahon, Jr., to mention only a few names which come to mind in connection with the world of directorships and business enterprise.

"But it is when we come to learning and the arts that we find the blank spaces most notable—blank, indeed, so far as the men who should be in a "Who's Who" are concerned, but filled up so far as type goes with the names of people whom few if any students of such a volume are ever likely to turn up. Out of 50 consecutive names in a portion of the book selected at random, 40 are company directors or managers with no other claim to fame, three are public officials, one is the principle of a ladies college, three are politicians, one is a publisher and editor, one is a judge and one (this is really astonishing) is a librarian. It is not possible, surely, that four-fifths of all the genuine attainment of Canadians is in purely business spheres and none of it in learning, literature or the arts."

We would add that judging from an inspection of the work there appear to be no men of note in the mining world of Canada. Of recent presidents of the Canadian Mining Institute we do not find included Mr. D. B. Dowling, or Mr. A. A. Cole. Practically no members of the Geological Survey are included. Dr. Ami, Theo. Denis and Dr. Miller are names we cannot find. The Fuel Controller, C. A. Magrath is not included, although the Assistant Fuel Controller, Mr. C. W. Peterson, is included. There is not to be found the name of a single superintending official of the Dominion Steel or Coal Companies. In Nova Scotia we miss the inclusion of such representative Canadians as Major the Rev. John Pringle, Moderator of the Presbyterian Assembly, and not unknown in Canada; the venerable Speaker of the Nova Scotia Legislative Assembly, the Hon. Mr. Goudge, and such persons as Prof. Sexton of Halifax, lately honored by Queen's University, the late George Gray of Stellarton, a most representative Nova Scotian, and the Hon. Robert Drummond. Even D. D. McKenzie, for a time leader of the Opposition at Ottawa, is not included.

The "Canadian Bookman" says: "Since the last publication of the late Mr. Morgan's admirable work, which is now many years old, we have no Canadian "Who's Who" except a volume to which admission can be procured by practically anybody upon payment of \$25, \$50 or \$100, and from which practically all distinguished Canadians who do not care to part with such a sum are sternly excluded."

So far as regards men of eminence in the mining profession is concerned, "Who's Who in Canada" is not a complete source of information.

The Levant Disaster

The disaster at the Levant Mine, by which 31 men were killed, and 11 very seriously injured, is one of the worst in Cornish annals, and will excite sympathy from emigrant Cornishmen and their descendants who are represented in every rock-mining camp the world over. The accident was of an unusual nature, said to be the only case of fatal accident from failure of a man-engine of this primitive type that has occurred in England. In this issue will be found an interesting historical summary of the Levant engine taken from the "Mining Journal" of London.

There are several examples in Nova Scotia of Cornish pumping engines, of the rocking-beam type, not now in use, which were installed by the General Mining Association in the early days of the coal-mining industry there. Those who have had to deal with fallen pump-spears know the damage they can create in a wooden-timbered shaft, and in the Levant case the work of rescue must have been most difficult and very dangerous, but aid came from every neighboring mine.

GAS IGNITION BY SPARKING.

The "Colliery Guardian" is an old-established trade paper whose editorials are always worth reading, and in this issue we reproduce an editorial which is in effect a summation of what is known, or more correctly what is not known, regarding the ignition of mine gas and dust clouds.

The reference to the possibility of sparking originating from frictional electricity is interesting when considered in relation to the recent dust explosion at the Port Colbourne grain elevator. Canadian readers will also be interested in the parallel drawn between the behaviour of a certain roof strata in the Minnie Pit, where 155 men lost their lives by a dust explosion, and the occurrences reported by Mr. J. T. Stirling and Sir John Cadman after investigation of the circumstances attending the Bellevue Mine explosion in Alberta.

The incident reported by the Chief Inspector of Mines for India, in which a flash of lightning ignited an explosive mixture of gas and air, is reminiscent of a well-authenticated incident in the Pictou Coalfield in 1893 mentioned in Hon. Robert Drummond's book* on the mines of Nova Scotia. "During an electrical storm lightning ran down the shaft, the hoisting steelrope acting as a conductor. The lightning set the gas on fire, but did little other damage. The fire did not continue." The two occurrences seem fairly parallel.

While no very definite conclusions are expressed by the writer in the "Guardian", one thing grows increasingly plainer as successive colliery explosions occur, which is, that coal dust represents the greatest danger to life of any conditions existing underground. It is the chief predisposing cause of colliery explosions, and when these disastrous phenomena occur, it becomes the chief agent of their extension and propagation.

In the Minnie Pit explosion, as in the Port Colbourne disaster, and in thousands of other explosions that could be cited, there may have been frictional electricity, or unsuspected sparking from siliceous rocks, or other obscure and little understood phenomena, but, if the dust cloud had not been there, there would have been no explosion.

THE MINERAL WEALTH OF NEWFOUNDLAND.

Apropos of the contention in the "Journal" of October 1st that Newfoundland badly needs a government geologist, the "Mining Journal" of London gives prominence to an interview with Sir Edgar Bowring, High Commissioner of Newfoundland, upon his return to London, which it will be noted is in general agree-

ment with these contentions. The "Mining Journal" correctly summarises the situation when it states that Newfoundland "does not yet know what she possesses in mineral wealth". A quotation from the interview seems timely and is given below.

"One of the most promising of Newfoundland's future prospects is connected with the wide and varied mineral wealth located from time to time, and it is strongly felt that the attention of enterprising mining pioneers, provided with adequate capital, would commence an era of great prosperity.

"The geological age of the Newfoundland rocks is largely pre-Cambrian, with Cambrian, Silurian, Devonian, and Carboniferous series, subsequently greatly planated by ice-action in post-Pliocene time. Whether the occurrence of fossil forms intermediate between those of America and those of early Palaeozoic Britain justifies the view that Newfoundland is a palaeontological stepping-stone between the two Provinces is a question for the specialist. What is certain is that the mineral wealth of the country is varied and great, and that it goes far beyond the copper, which, as our readers are aware, has been extensively worked since 1864, and the iron deposits which have been vigorously worked for many years by the great Canadian coal and iron companies. Chromite, nickel, antimony, lead, manganese, gold, and silver occur generally over extensive areas, and the coal deposits, which are expected one day to give a large output, have been sufficiently proved to warrant the most favourable expectations. The extent of the deposits at Codroy Valley and Bay St. George, to mention two of the coal-bearing areas, has not yet been accurately determined, but it has been proved that a huge Carboniferous syncline or trough underlies practically the whole of the Bay St. George district. The coal is of excellent quality, and one of the seams in the latter area is 4 ft 2 ins. in thickness. Oil shale also exists, and oil is produced, but it is noteworthy that the electricity produced by water-power is cheaper as a luminant than oil, and is used even in the smallest towns.

Notwithstanding that many reports have been made as to individual districts, Newfoundland does not yet know what she possesses in mineral wealth. A geological survey is now in progress, which will doubtless add materially to our knowledge."

If, as is stated, an adequate geological survey of Newfoundland is in progress, there can be little doubt but that the reward will be in exact proportion to the effort expended, and the announcement, if confirmed, is welcome and encouraging.

"If he play, being young and unskilled, for shekels of silver and gold,

Take his money, my son, praising Allah. The kid was ordained to be sold."—Certain Maxims of Hafiz.

"From the strictly national point of view, dependence on another nation for an indispensable raw material spells subservience, unless the dependent nation is prepared to face the consequence of a stoppage of the importation of this raw material.

"The dependence of Central Canada on United States coal is a cogent reason for the development of the coal mines of Nova Scotia to a point where, should for any reason the coal supply of central Canada be imperilled, the mines of our easternmost province could fill the breach."

—Extract from a memorandum prepared by the Editor, about 1916, for submission to Sir George E. Foster, Minister of Trade and Commerce.

* Minerals and Mining, Nova Scotia, pp. 343, q.v.

THE VANCOUVER MEETING OF THE CANADIAN INSTITUTE OF MINING AND METALLURGY, NOVEMBER, 26th. 1919.

Vancouver members of the Institute are working very hard in preparation for the shortly ensuing C. M. I. Meeting in Vancouver.

The Committees have been arranged, and are as follows:

Secretary Manager: Dr. E. T. Hodge, Professor University of British Columbia.

Banquet Speakers: Mr. Chas. Camsell, Director Western Branch Canadian Geological Survey.

Banquet Arrangements: Mr. S. W. Miller, Broker. Resolutions:—Mr. J. M. Turnbull, Professor University of British Columbia.

Reception: Mr. W. M. Brewer, Resident Engineer.

General Entertainment: Mr. J. L. Parker.

Accommodation: John D. Kearns, President Rotary Club.

Luncheons and Mineral Exhibit: Kenneth Robinson, Boring Contractor.

Machinery Exhibit: S. J. Crocker, Mining Equipment.

Finance: Mr. Nichol Thompson, Manufacturers' Agent.

Automobiles: G. S. Eldrige, Chemist.

Ladies: Mrs. Kenneth Robinson.

Smoker: Bradford W. Heyer, Editor B. C. Financial Times.

Stenographic: T. J. McIlveen.

Press: F. E. Payson, Pacific Coast Manager, Canadian Mining Journal.

The Mayor of Vancouver, on behalf of that City, is sending a personal invitation to every member of the Institute to attend the meeting.

Judging by the tone of the communications that are reaching the office of the "Journal," the West is calling this time in earnest, and if those who attend the Meeting are not given a thoroughly enjoyable time it will not be the fault of the Vancouver Committee, who are out to do just that.

Advance list of Papers.

The following is the list of papers expected to be read, subject to addition and changes:—

Wednesday, 26th November.

The Future of the Coal Industry in Alberta, O. E. Whiteside.

The Cassidy Colliery, Vancouver Island, E. G. Wilson.

The Future of the Coal Industry in the State of Washington, F. M. Freeman.

Thursday, 27th November.

Hydro-Metallurgy of Copper Sulphides, Wm. E. Green.

Treatment of Copper Ores, E. P. Mathewson.

New Methods of Hydro-Metallurgy in the Treatment of gold and silver, N. W. Freeman.

Taxation of Gold Mines, Frederick Bradshaw.

Geological Methods as applied at Butte, Montana.

Some interesting Geological Problems, D. C. Bards.

New Mineral Discoveries in the Stewart District, E. E. Campbell.

Friday, 28th November.

Platinum in British Columbia, R. W. Uglow.

Making up a Matte, H. N. Thompson.

Relations which should exist between the Government and the mining industry, R. W. Brock. Union Among Technical Men, J. M. Turnbull.

Saturday, 29th November.

Trip to Nanaimo and Cassidy Mines.

Trip to Britannia mills and mines.

Trip to Clayburn.

Note: Owing to the indifferent rendering of the telegram transmitting the above particulars, the titles of papers and names of authors are probably not quite accurately given.

DOVER WELL NOW PRODUCING GAS AND OIL

The "shooting" of the deep well of the Petrol Gas and Oil Company in the West Dover district, Ontario recently was very spectacular. The bore is 3,382 feet deep, and 150 quarts of nitro-glycerine were used in the shooting operation. Oil was sprayed by the explosion over great distances. The well is now producing steadily 2½ millions cubic feet of gas and 200 barrels of oil per 24 hours. The Petrol Company was advised by Dr. N. Y. Williams of the Geological Survey, whose paper in the "Journal" of September 3rd will be recalled by our readers.

Dr. Williams in referring to the Trenton formation in which this well is situated characterises it as "perhaps the most alluring and at the same time the most illusive of the oil and gas bearing formations of Ontario."

To Dr. Williams' study of this field, and the application of his knowledge in directing the position of wells, much of the success which has been obtained is due.

Geological research always pays, and pays exactly in proportion to the effort and time expended thereon.

METAL QUOTATIONS.

Fair prices for ingot metals in Montreal, 19th November, 1919.

	Per lb.
Electro copper	24c
Casting copper	23½c
Lead	8c
Tin	57½c
Zinc	9¾
Antimony	10½c
Aluminum	32c

Steel Bars	\$3.10
Plate	\$3.35

PERSONALS.

Mr. J. J. Harpell and Mr. F. W. Gray, expect to attend the Vancouver meeting of the C. M. I. next week.

Mr. George E. Leighton, for many years the Canadian representative of the Hardy Patent Pick Company, who recently returned from a trip to England, has joined the Canadian branch of Samuel Osborn & Co., of Sheffield, England, as Vice-President. Mr. Leighton will continue to represent the Hardy Company in Canada.

Mr. R. J. MacLean of MacLean and Barker has returned to Montreal from England. Mr. MacLean has charge of the erection of a large turbo-compressor installation at the Springhill Mines of the Dominion Coal Company.

The Crude Oil Engine and its Adaptability to Mining Conditions

The crude oil engine has during the last ten or fifteen years been developed and perfected, and as a result it is today gaining a very extensive use, even where the highest degree of efficiency and reliability is required. For marine purposes it has become a very serious competitor to steam, and it is only a question of time when the oil-engined vessel shall have driven the steam-engined vessel off the seas. The full Diesel-type engine is at the present time installed as prime mover in many vessels of up to 14,000 and 15,000 tons, while the semi-Diesel engine, which is being built in units up to 500 and 600 b. h. p., is extensively used for smaller craft, full-powered motor-ships of up to 4,000 or 5,000 tons capacity, as well as auxiliary sailing vessels, barges, tug boats, etc.

During the War the semi-Diesel engine was used rather extensively by the British Admiralty. A number of motor-monitors were, for instance, equipped with Bolinder surface-ignition engines, and other classes of vessels were similarly equipped.

Also for stationary purposes, engines both of the Diesel and semi-Diesel type are now being used quite extensively, particularly for municipal lighting plants, and as power equipment for mines and other industrial establishments, where cheap water power is not available. The oil engine is no doubt the most economical power equipment that can be found.

The Diesel engine consumes about 0.45 lbs of oil per b. h. p. per hour, while the semi-Diesel engine consumes slightly more. With fuel oil worth today on the Canadian market about six cents per gallon, a semi-Diesel engine of, for instance, 100 b. h. p. will not cost in running expenses more than 50 cents per hour, or \$5.00 for ten hours, and all other sizes of engines in proportion. This is, as will be seen, a very low cost as compared with a steam plant.

The oil engine also offers several other advantages. It does not require firemen. One man per shift is enough to operate even large units. It eliminates fire

hazard, which is an enormous advantage, particularly in certain localities. It does away with hauling and shovelling coal. The fuel oil can be taken through a pipe line from the tank car on the railroad siding to the fuel tank at the power house, from which it is automatically pumped up to the fuel service tank in the engine room.

For stationary purposes the semi-Diesel engine is generally adopted in preference to the full Diesel type. The latter is rather intricate, with a working pressure three times that of the semi-Diesel type.

The endeavor has been to simplify as much as possible the design of the semi-Diesel engine and to make it with as few working parts as possible, so that it might be operated with only the ordinary amount of care and attention required by a steam engine.

The accompanying sectional view of a 320 b. h. p. Bolinder engine illustrates the simplicity of design of this well known semi-Diesel type engine. The engine is of the two-cycle surface-ignition type and the working cycle is briefly as follows:

When the piston "A" at the end of its downward stroke is moving up towards the ignition chamber "E" the necessary air for scavenging and combustion is drawn through the air valves "B" into the enclosed crank case, and at the same time the air in the cylinder "D" is being compressed. When the piston "A" has reached its extreme upward position, a certain amount of oil is injected into the ignition chamber "E" through the nozzle "F," and the fuel charge ignites, resulting in the expansion of the gases driving the piston downward toward the shaft.

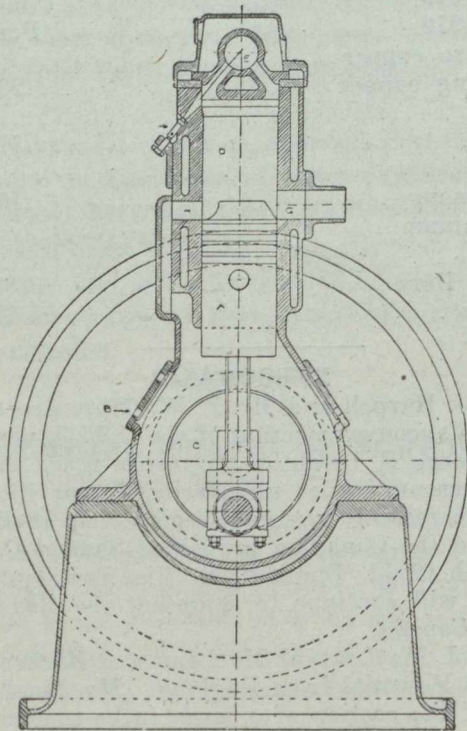
During this downward stroke of the piston, the air in the crank case is compressed. As the piston nears the end of its stroke the exhaust port "G" opens, and immediately afterwards the inlet air port "H." The burnt gases escape through the exhaust port "G," while the compressed air in the crank case, entering the cylinder by the air port "H," completes the scavenging work and furnishes the cylinder with air necessary to make up the next charge in the cylinder.

Low grade oil can be used as fuel, provided that it contains not less than about 18,000 b.t.u. per pound. Instances can be given where oil containing as high as 25 per cent asphalt has been used to advantage. A lighter oil is naturally to be preferred.

As to the durability of the oil engine, it has been established that engines of a good make will give satisfactory service during a great number of years with comparatively light repair bills. At an oil engine plant in a Canadian town it was surprising to learn recently that the engine had been in operation for over four years without the cylinder heads having been removed or the engine cleaned, and still the engine was running very well. Such a treatment of an engine should naturally not be encouraged, but it serves to show the dependability of this kind of equipment.

When using the oil engine in connection with electric generators it is advisable to have the generator directly connected with the engine, and by equipping the engine with a synchronizing device, two or more engines with generators attached can be run in parallel.

Some notable installations of this kind have been made during the last few years, and investigation of their applicability to mining conditions is to be recommended.



Section thru 320 H.P. Bolinder Engine.

GAS IGNITION BY SPARKING.

The last report of the Chief Inspector of Mines in India contains an account of a remarkable explosion of fire-damp caused by a discharge of lightning in the new shaft at the Sitalpur coal mine, belonging to the Bengal Coal Company. The explosion occurred during a thunderstorm, and the evidence showed that a flash of lightning had, to all appearances, passed down the shaft causing disruptive discharges at certain points between the guides and the winding rope, rending the latter at two places situated respectively 228 ft. and 278 ft. from the surface. The distance between the winding rope and the side of the shaft was 5 ft. 4 in., indicating a spark gap of this width, and an intensity of discharge which could not fail to ignite the explosive mixture of gas and air known to be present in the shaft. There is apparently no limit to the vagaries of lightning, and the occurrence, rare as it is, presents no element of mystery.

It is, nevertheless, highly interesting as indicating possibilities; and one is naturally led to remember a considerable number of cases in which mysterious explosions have occurred in pits under conditions where human agencies seem to be excluded. In 1915, M. Ferey described in a paper read before the Société de l'Industrie Minérale phenomena of a similar character to the above. In a pit liable to sudden outburst of gas, for the sake of safety, shot-firing was carried out from the surface. During a storm, in the year 1905, shots went off in two places after the detonators had been connected to the conductors. These shots were situated respectively 1,490 and 1,410 metres from the firing station. Realizing the possible danger from this cause, the precaution was taken to cut the conductors at the bottom of the shaft and to connect them just before firing. Even under these conditions a shot went off spontaneously, owing, it is believed, to lightning. In explaining this phenomenon, M. Ferey says that it is necessary to remember that the electrical conductivity of the earth is not perfect, and that the capacity of a conductor is more effective if its extremity is earthed; while a comparatively feeble current is sufficient to explode a detonator.

We may, however, travel beyond the comparatively intelligible circumstances of lightning flashes during thunderstorms and consider certain more speculative views respecting the development of electrical conditions possessing elements of potential danger in coal mines. Let us begin with the electrification of dust.

In an illuminating paper, read by Mr. W. A. Douglas Rudge before the Royal Society of London, it was shown that the mere raising of a dust cloud produces a large amount of electricity, the sign of which depends upon the material used. Generally, acid particles become positively and basic particles negatively electrified. Again measurable charges of electricity are produced when particles of quartz, felspar, mica and other substances are rubbed against other particles of their own kind. Thus quartz rubbed upon quartz causes the particles to be positively electrified, and at the same time a negative charge is given to the air. Previously, in 1901, Hesehus had shown in Russia, that pieces of the same material when rubbed together become electrically charged with the same sign, while the dust abraded in the process receives a charge of an opposite sign. These charges are sufficiently persistent to be measurable with a suitable electro-scope. Thus a puff of air containing 5×10^9 gr. of

dust of mercuric sulphide gave a charge to a collector of several volts; while a centigramme of corn-flour, blown into a large room, charged the air to an extent which raised the charge on a collector to a potential of 200 volts, and the effect persisted for some time. The exact explanation of these phenomena is not clear, but the effect seems to be due to surface contact or friction. Neither is it at once apparent in what way these experiments can have any bearing upon pit explosions.

But interest in such phenomena is re-awakened by the evidence recently given in connection with the Minnie Pit enquiry at Halmer End just concluded. In the course of this investigation evidence was given as to the remarkable behaviour of the roof of the Bull-hurst seam, known as Bulldog, which by rubbing under earth strain in the roof, and also by falling upon similar pieces on the floor, developed flares and flashes which seem to be different from ordinary friction sparks, and were referred to by Dr. Wheeler in his evidence at the enquiry, as frictional electricity sparks.

We do not propose to express any opinion just now upon the theory of sparking of the Bulldog as the possible cause of the Minnie pit explosion. It is interesting, however, in this connection, to recall the circumstances attending the Bellevue explosion, Alberta, occurring at intervals between 1910 and 1911, some of which took place when nobody was in the pit. These were investigated by Mr. J. T. Stirling and Sir John Cadman, and are believed to have been due to sparks produced by falling stones, a view which was supported by the fact that a large fall of rock marked the point of origin of one of the explosions. Experiments showed that the hard siliceous roof gave a brilliant display of sparks on falling, and when struck by a hammer the surface of percussion glowed red hot for an instant, owing probably to the ignition of bituminous matter in the stone. The sparks obtained by friction of one stone upon another could be made to ignite coal gas, a result which has not yet been obtained with the Bulldog of the Minnie pit. Negative laboratory experiments of this kind, however, are scarcely conclusive, because it is impossible to deal with such large masses of material as are concerned in falls of roof in the mine. The problem is also complicated by the possibility of electrical action, as suggested by Dr. Wheeler in his evidence at the Minnie pit enquiry, and there is clearly a case for further enquiry as to the possibility of firing methane by rock sparking on what we may term the grand scale. There is no reason to doubt the evidence brought forward by eye witnesses as to the remarkable character of the sparks seen in the Minnie pit. The length of flame alone seems to preclude the idea of more frictional sparks, and if they were in fact of an electrical nature, a temperature exceeding the ignition temperature of methane might easily be reached. We may, in fact, recall the circumstances of the explosion at the Maindy pit, Glamorganshire, on November 8, 1896, where a similar explanation seems to be sufficient to account for the occurrence.

It is unfortunate that in investigations of this character it is generally necessary to rely upon the method of exhaustion of other possible causes, a perfectly sound procedure when all the factors are known, but a dangerous practice where knowledge is incomplete.

—“Colliery Guardian.”

THE DISASTER AT THE LEVANT MINE, CORNWALL, ENG.

Failure of Cornish-Beam Man-Engine.

A very serious disaster occurred at the Levant mine on Monday last, involving the loss of at least twenty lives, and probably considerably more, as well as of injury to others. This is the most serious accident which we can remember to have occurred in Cornwall, and the circumstances under which it took place are equally remarkable. The cause of the disaster was the breaking of the connection between the engine and the reciprocating rod or beam which works in the shaft, and constitutes the man engine. Reference was made to the Levant man engine in a recent article in this paper describing a visit to the Levant mine, and it is the only machine of the kind working in this country and, perhaps, in the world.

While the man engine is generally spoken of in these days as a survival of a peculiar primitive character, it is interesting to note that at the time of its adoption in Cornwall it was generally preferred by the men to the skip winding then employed in collieries and other mines, and at Levant to-day the ore is wound in ordinary skips while the men use the man engine. The man engine was first introduced in the Hartz at the Spiegelthal mine, working to a depth of 110 fathoms. This was in 1833, and in a short time numerous other mines became similarly equipped. The principle was advocated in Cornwall by Mr. Charles Fox in 1834, and the first installation was put in at Tresavean, and put to work in January, 1842. A year and a half later it had been extended down to the 200-fathom. In 1845 a similar engine was installed at the United Mines, working to a depth of 210 fathoms. Both these engines were worked with double beams, the miner in travelling stepping alternately from one to the other. In 1851 a new system was installed at Fowey Consols, consisting of a single oscillating rod, with sollars on either side. Three single-rod engines were erected in this decade: Fowey Consols, 280-fathom; Dolcoath, 220-fathom; and Levant, 200-fathom. The rods of the man engine were made of Norway pine, in average lengths of 36 ft., joined together like pump rods, the stroke of the engine in all cases giving a travel of 12 ft. In Hunt's "British Mining" it is explained that owing to the great improvements made in the pumping plant in the early years of the nineteenth century mines were deepened rapidly, and the exertion of reaching lower levels by ladders was more than the older men could endure, and consequently that some form of mechanical haulage became necessary. The question was taken up by Mr. Michael Loan, who suggested following the example of the collieries and winding the men by ropes. The miners, however, would not accept the idea of being "brought up like coal and rubbish," and objected that if the ropes broke they would be killed. In consequence of this the idea of winding was given up and that of the man engine rod adopted. One of our correspondents, writing to the "Mining Journal" in 1860, argued strongly in favor of the man engine as follows: "During the last few years a notion seems to have been growing in Cornwall that the mechanical raising of men from deep mines is to be finally accomplished not by man engines but by safety skips, or some other modification of the system now in use in coal mines. Now we all know the dangers attending this system even in collieries where the shafts are always perpendicular, and it con-

sequently is an extremely doubtful question whether in incline shafts skips could ever be made sufficiently secure to be entrusted with human lives." He then proceeds to examine opinions expressed by the French Government expert, M. Moissenet, in a report on Cornish industry, in which he expressed the opinion that man engines were not only infinitely safer but much more economical, and likely eventually to supersede the winding system in use in collieries.

Curiously enough, although the Levant man engine has been working over sixty years, to say nothing of the plants in the other four mines, there does not appear to be any record of a similar accident in this country, or indeed of any accident at all involving more than the loss of one life; that is to say, due to individual carelessness of the men travelling, though there can be no doubt that to the novice using the machine for the first time an impression of great risk is conveyed. On the other hand, in Germany two similar accidents occurred in the eighties, in each of which eleven men lost their lives. Consequently, the immunity from serious accident which has characterized the man engine in this country appears to a large extent to have been a matter of good fortune and careful supervision of material rather than inherent in the system.

As to exactly what happened at Levant, as well as the magnitude of the disaster, full particulars are still wanting. It appears to be believed that the engine rod parted from the beam of the engine on the completion of the upward stroke, and that the whole beam then fell down the shaft, according to one account, to the bottom. The bottom of Levant is, we believe, about 330 fathoms deep, but how far the bottom of the beam is from the lowest point in the shaft we are not aware. The shock of the fall broke the beam in several places, and these sections falling in the shaft swept the sollars until they were wedged with debris and stopped. The most serious destruction was wrought in the upper part of the shaft, and no one was killed below the 140-fathom.

At the time of the accident the shifts were changing, and the beam was carrying a fairly full complement, so that the accident occurred at a moment when the effect was most serious. The mine possesses ladder-ways in the pumping shaft, and, of course, there is the skip shaft through which all the stone is wound, but it is not suitable for hauling men in the ordinary way. The great difficulty which has to be encountered in rescue work is the difficulty of reaching men who may be jammed in the shaft, which necessarily takes a long time to clear, and there is reason to fear that the number of casualties may reach considerably higher than is at present known, and that many of the injured must have suffered greatly before they could be reached.—"Mining Journal."

ECONOMIC DEPENDENCE SPELLS POLITICAL SUBSERVIENCE.

Canada should be in a position to meet her own coal needs from her own coal mines. Canada's status as a nation will never be fixed until every effort has been made to make this country self-supporting. That our present condition of subservience to a foreign nation, however friendly at this time, reflects the Canadian spirit, cannot be asserted in the presence of our victors returned from the great war.—"Montreal Star."

Our Northern Ontario Letter

The achievements of some of the leading silver mines in the Cobalt field during recent weeks directly reflects the strong position of commercial bar silver. The value of the output in a number of instances is reaching new high levels. As an instance of this is the Nipissing, which, as pointed out last week in the Journal is producing at the rate of upwards of \$500 every twenty-four hours.

The Mining Corporation of Canada has secured an option on the Buffalo, and is proceeding with an examination. At the time of writing, the consummation of a deal would appear to be probable. Lying adjacent to the Townsite property of the Mining Corporation, and containing a large quantity of low grade ore as well as possibilities of favorable developments, the Buffalo mine would appear to be a valuable acquisition to the Mining Corporation.*

In connection with the Buffalo Company, itself, a meeting is called for to-morrow (Nov. 20th) for the purpose of authorizing another reduction in capital. The company was originally capitalized at \$1,000,000 divided into 1,000,000 shares of the par value of \$1. each. Two years ago the capital was reduced to \$750,000 by paying shareholders 25 cents a share, and thus reducing the par value to 75 cents. Last year a similar reduction was made, thus leaving the company with \$500,000 capitalization, made up of 1,000,000 shares of the par value of 50 cents each. To-morrow's meeting is for the purpose of authorizing payment of 35 cents a share, thus reducing the capital to \$150,000 made up of 1,000,000 shares of the par value of 15 cents each.

The Lumsden Mine has been taken over by C. L. Campbell of Montreal, who announces that he is having the workings pumped out preparatory to making an examination. It is planned to thoroughly develop the property. Exploration work carried on several years ago resulted in one shipment of high grade ore being made. Sinking was carried to a depth of 400 feet with drifting and cross-cutting at four levels. This deal was referred to last week, the name of the "Drummond" being erroneously mentioned, and lacking the official details above given. Major Rattrey, formerly of the Borden Battery will have charge of operations.

The Penn-Canadian has evinced a desire to secure the Bailey-Cobalt mine on a fifty-fifty consolidation basis. The Penn-Canadian is equipped with a first class mining and milling plant as well as a fair amount of ore left in the mine, and with a tailings pile amounting to about 200,000 tons and estimated to contain around 750,000 ounces of silver. An attractive feature of the offer is the fact that the development of the Bailey-Cobalt could be proceeded with without any delay or expense in that the Bailey was originally opened up under lease through the workings of the Penn-Canadian and is connected up on all levels, with the exception of the lowest level. Last week, the of-

* Note: A later announcement by the officials of the Mining Corporation of Canada states that it has bought control of the Buffalo Mines Limited. No further particulars of the transaction were given, except that the reported purchase price of \$300,000 was incorrectly stated.

fer of the Northern Customs Concentrator Company through A. J. Young, came up before the Master in Ordinary in Osgoode Hall, Toronto, but objections were raised by the so-called minority interest with the result that the case was enlarged until today (Nov. 19th). It now develops that the minority interests claim to really control the Bailey. They appear to base this on the fact that the books of the company have been closed for over five years, and the present so-called majority interests are alleged to case their claim on the books as of five years ago.

The shareholders of the Trethewey having ratified the deal to acquire the Major property in the Gowganda district, as well as a lease of 112 acres under Miller Lake, the holdings of this company taken on added prospective value in which enters an added element of speculation. In view of the success met with on the adjoining Miller Lake-O'Brien Mine, the proposition is attractive.

Underground operations have been assumed at the Peterson Lake. The indications are, however, that no effort will be made at this season to treat the large pile of tailings from past operations and upon which appears to rest the best chances of commercial operations.

The Provincial is stated to have developed a considerable tonnage of low grade ore during recent months, although the importance of this has not yet been demonstrated.

At the Genesee property, a faulted zone has been encountered at a depth of 500 feet where lateral exploration is being carried on. Over a width of about seven feet assays show an average silver content of four ounces of silver to the ton. Although this is slightly below commercial grade, yet it indicates that operations are being carried on in the zone of enrichment and is pointed to as a promising development.

Philadelphia interests are still considering the advisability of opening the Silver Hill property, but, as yet, no definite announcement has been made. The property lies between the north-east part of the Nipissing and the Silver Bird property of the O'Brien.

During the month of October the Kerr Lake Mine produced 112,000 ounces of silver, the output being the highest for several months. This is at a rate of close to the average monthly output during the fiscal year ended August 31st when a total of 1,482,649.40 ounces was produced.

During the month the price of silver averaged close to \$1.20 an ounce lending an estimated value of about \$134,000 to the October production. This is at the rate of about \$1,612,800 a year, as compared with gross profits of \$1,637,143.71 during the past fiscal year, of which \$956,258.19 was net profit.

The Kerr Lake has put into practice the proposed system of workmen's committees, the personnel of which is men employed by the company. The new plan promises to give the utmost satisfaction.

It will be recalled that during the labor strike of last summer the mining companies refused to recognize the Western Federation of Miners, but made a proposal to the men that if they returned to work the companies would agree to the men forming workmen's committees at individual mines and in this way discuss with the management matters concerning the welfare

of the employees. Later on, after such individual committees are formed throughout the camp, they will probably select from among the number one central committee which will be recognized by the Mine Managers' Association as representative of the employes as a whole. In this way, union and non-union men alike share in a full measure of recognition as employees at the mines.

According to the annual statement just issued by the Hudson Bay Mines, the mine produced just a little over \$3,000 net profit during the fiscal year, the poor showing being attributed to the high cost of labor and material, and a natural decline in ore. Ore reserves are estimated to contain upwards of 100,000 ounces of silver, and, despite the unfavorable year just past, the management is optimistic over the outlook and predicts the new fiscal year will be a prosperous one.

In Cobalt there is a general tendency to regard the present quotations for silver as not likely to be marked by any very material recession. This factor, taken in conjunction with the indication that high costs have passed the crest, leaves the producing mines in a strong position. Average costs at the various leading producers amounts to about 55 cents an ounce, thus leaving a margin of about 70 cents an ounce as net profit. Compared with this, a few days ago, costs averaged around 25 cents an ounce and silver sold at an average of about 55 cents an ounce. Net profit of today, therefore amounts to more than twice as much per ounce of silver produced as was the case a few years ago. Offsetting this, of course, is the natural decline in production which has served to place the Camp as a whole on a profit earning basis about on a par with its banner days, when, although silver was cheap, yet gross production was at the peak, or more than double the present output.

Regarding the proposed plan, as outlined in last week's Journal, to construct light narrow gage railways to outlying mining camps such as Gowganda, nothing further of an official nature has been learned.

Silver Output for week exceeds half million dollars.

During the week ended November 14th, five Cobalt companies shipped a total of seven cars containing approximately 531,856 pounds of ore. The Buffalo was the heaviest shipper with two cars containing 198,000 pounds.

Following is a summary:—

Ore Shipments.		
Shipper.	Cars.	Pounds.
Buffalo	2	198,000
Trethewey	2	125,969
La Rose	1	83,475
Mining Corp.	1	64,414
Coniagas	1	60,000
Total	7	531,858

Bullion Shipments.

During the corresponding period the Nipissing and the Mining Corporation made heavy shipments of bullion, the total amounting to 344,671.23 fine ounces. With silver having been quoted at between \$1.25 and \$1.28 an ounce during the week, it is evident that the weeks' shipments had a value of well over \$400,000.

Following is a summary, in which it will be noted that the 60-bar shipment of the Nipissing was reported last Saturday:—

Shipper.	Bars.	Ounces.
Nipissing	60	80,811.51
Nipissing	148	200,517.48
Mining Corp.	64	63,342.24
Total	272	344,671.23

The value of the bullion, together with the estimated value of the ore shipped, brings the total value of the weeks shipments up to well over half a million dollars.

The Gold Mines.

Regardless of problems which still tend to worry the captains of industry, the gold mining industry of Northern Ontario continues to grow. Confidence in the future stability of prices, and a gradual decline in costs, and assured of longevity of the leading mines, freer rein to desired enlargement of operations appears to be one of the certainties of the future, not far distant.

The find at a depth of 1500 feet on the McIntyre-Porcupine is a confirmation of what had been learned by core-drilling. To all the leading mines it holds out added potentialities—assurance in fact. This company is now planning to continue the central shaft to a depth of 2000 feet. Continued development of ore to such a depth would unquestionably be followed by additions to the milling equipment. As the mine now stands, the physical condition and the milling facilities are adequate to make a net return of 20 per cent annually to shareholders. It is generally believed that the McIntyre will ask for a further extension of time on the option on the Plenaurum property.

The reported offer of \$10 a share for control of the Hollinger Consolidated is stated to have never been made, according to an official of the company, who is quoted as having said: "Even were such an offer made, it would not be accepted." In connection with dividends on the Hollinger, it would not come as a surprise were the present policy to continue for some few months longer, no increase being made with the possible exception of two dividends in December, one in the form of a Christmas bonus. The Hollinger has indicated commercial ore to a depth of 1800 feet by diamond drilling, and in due time underground work will be carried to that point and beyond. Up to the present the great volume of ore has been taken from levels down as far as 800 feet. Below that point, work has been chiefly of an exploratory nature.

At the Dome Mines, according to official advice, an average of about 30,000 tons a month is being treated. No official statement has been made regarding costs, but it is learned in usually reliable circles that average costs are now a little under \$4 a ton, being the lowest at any gold mine in the Dominion. Provided president J. S. Bache carries out his promise made some months ago, a dividend may be expected at the turn of the year, an announcement concerning which might be expected within the next month. As to the Dome Extension, a substantial tonnage will be treated in the Dome mill during the winter, the result of which will probably determine the course of the Dome in relation to the option it holds on Dome Extension and which holds good only until March.

Frank Hamilton, manager of the West Dome mine has made an examination of the Moneta property with a view to carrying on exploration work at or near the point where some "float" gold-bearing ore

was discovered by men who were digging a well. The Moneta, as well as the West Dome, is under the Pellatt Directorate.

Optimistic reports are in circulation in connection with the future plans of the Porcupine V. N. T., although official advice is decidedly difficult to obtain. In the Kirkland Lake district, a number of new operations are under way, in addition to the proven mines. Among the new ventures might be mentioned the Granby-Kirkland, Greene-Kirkland, Kirkland Combine, Marigold, etc. The latter is now in control of the property formerly known as the Lucky Cross. A number of short ore shoots have been found on the property, as indicated in a recent report.

The Wright-Hargreaves is not likely to acquire the control of the Sylvanite property, according to late official advice, despite many earlier rumors, that the Sylvanite would be absorbed by the former company. It is stated, that while differences appear to have cropped up in connection with the Tough-Oakes and the marging properties, yet the belief is still entertained that the Sylvanite may be ultimately included in the new consolidation.

The old mill on the Argonaut property (formerly the La Mine D'Or Huronia) in the Beaverhouse Lake section of the Larder Lake district is now in operation. It consists of stamps and straight amalgamation. It is being planned to add a ball-mill to the grinding equipment. In the meantime, the shaft has been continued from 80 feet to a depth of 200 feet at which point it is proposed to carry out lateral work. The ore contains considerable iron sulphides and is found difficult to treat with the present mill, the percentage of recovery not being as satisfactory as might be expected.

Another Ore Statement.

Following is a statement of ore shipments over the T. & N. O. Railway, for the month ending October 31st. (In tons of 2,000 lbs.)

SILVER ORE.

	Tons.
Cobalt Proper.	
Buffalo	573.45
Beaver	34.78
Coniagas	97.77
Dominion Reduction	32.50
Hudson Bay	30.69
La Rose	79.62
McKinley-Darragh	190.11
Mining Corporation	108.59
Nipissing	892.13
O'Brien	64.00
Penn Canadian	30.00
Peterson Lake	47.93
Thethewey	32.59
	<hr/>
	2,214.16

The above shipments were made to the following Companies:—

CANADA.

Deloro Smelting & Refining Co. Marmora	650.47
Coniagas Reduction Co. Thorold	97.77

UNITED STATES.

American Smelting & Refining Co. Pueblo	189.74
American Smelting & Refining Co. Chrono	44.00
Pennsylvania Smelting Co. Carnegie	220.11

ENGLAND.

Henry Wiggin & Son Birmingham	1,012.07
	<hr/>
	2,214.16

NOTE.

Oct. 10th. Lowest price of silver during month	117,000
Oct. 30th. Highest price of silver during month	123,375
Average price of silver during month	119.192

THE SONS OF MARY.

The Sons of Martha have not to worry—of that their tetrarchs will take good care:
 And they care not a whit for the Sons of Mary, what they must suffer or how they fare.
 The Sons of Martha demand an increase (a favorite indoor game that they play):
 They spout and they riot until they win it—and Mary's Sons are the lads that pay.

The Sons of Mary in all the ages have dared the venture and taken the chance;
 They explore earth's riches and plan the bridges; invent the machinery, design the plants.
 It is through them that on every work-day the Sons of Martha have work to do,
 It is through them that on every pay-day the Sons of Martha get every sou.

They say to the railways, "Be ye fashioned." They say to the ships of the air, "Go, fly."
 They train the youth and they heal the stricken; the tears of the mourner they help to dry.
 They draft the maps and they paint the pictures; they carve the statue; the speech they speak—
 While the Sons of Martha are seeking solely to do less labor for more per week.

The Sons of Mary their lives have given to fight the fever and purge the filth;
 They graft the scion, they grow the blossom, they keep the fields of the world in tilth.
 They write the book and they chant the poem, they make the music and dream the dream:
 They to the Truth bear unselfish witness; they have the vision, they see the Gleam.

They do not preach that their only duties are spreading dissension and going on strike;
 They do not teach that it's square and decent to scamp their work as they damn well like.
 They aim to uphold a mind of fairness, not class suspicion and social strife.
 They, too, must think of making a living—but they sometimes think of making a life.

And the Sons of Martha esteem this silly, convinced that Fortune will yield reward
 To him that has the most brazen thorax, the lightest head and the strongest sword.
 This, it seems, is the sum of their Credo—this is the way their reasoning runs:

"Let's force the birthright and seize the blessing, and lay the burden on Mary's Sons!"

—G.S.S. in New York Tribune.

Special Correspondence

BRITISH COLUMBIA.

Both the Britannia Mining & Smelting Co. and the Granby Consolidated Mining & Smelting Co. have subscribed half a million dollars to the second Victory Loan now being raised in Canada.

Alice Arm, B.C.

The Mineral Claims Development Company, Ltd., of Vancouver, is developing the Homestake Group, Alice Arm. The object of this company is to take up and develop prospects to the point where they can be offered to operating companies as proved mines. The Homestake Group consists of four claims of which George Clothier, Government mining engineer, says:

"Taking into consideration the width and continuity of the vein, the persistence of the mineral content, the improvement in appearance on what little depth has been gained in the open cuts, the grade of ore exposed in some of the cuts, and its favorable situation for mining, there are good reasons to believe that the property might easily develop an immense tonnage of concentrating ore."

Col. Gilson is the president of the Mineral Claims Development Company and C. M. Houghton is vice-president. The latter has been identified with the mining industry in British Columbia for the past twenty years, having been one of the pioneers of Rossland, B.C.

Stewart, B.C.

This mining centre may be said to be 'all set' for the winter. While many of its inhabitants have come south to spend the more severe months of the season there will be some 150 people remain in the town until the spring. A school has been opened and a good class of children has been mustered. In short, Stewart, not much more than a year ago deserted and without prospect of rehabilitation, is assuming the aspects of a permanent community and its residents have the utmost faith in its future.

Chief among the causes of its sudden development is the discovery of the riches of the Premier Mine, on which work is to be continued during the winter and from which several shipments of exceedingly high grade ore are expected before the spring. The Big Missouri, Joker, Forty-Nine and Bush also are promising groups of mineral claims, which are confidently expected to prove the mineral worth of the district of which Stewart is the Canadian outlet. While they are not yet proved mines, development in some instances is well advanced, and trial shipments probably will be shipped to the smelters this winter. In addition there are many prospects, the surface showings of which are most encouraging, the result being that prospectors and operators predict that Stewart is to be a mining town of first importance in the Canadian Northwest and that this will become more generally recognized during 1920.

On the Big Missouri the drilling has ceased, to be resumed on the return of better weather conditions. Work is to proceed without interruption in the driving of a cross tunnel on the E. Pluribus Claim, on which a high grade body of ore is being developed. The Province Group, it is expected, will be developed by diamond drill next season. Drilling on the Forty-Nine also is finished for the year but a considerable force of men will be maintained during the winter months. The Bush Mines, situated to the north of the

Premier, are being extensively developed with encouraging results, ore of the first grade having been struck. On the New Alaska a tunnel is being driven to open up the ore body. The Nabob Group, on Glacier Creek, has been bonded by C. G. Shoning and associates of Lead Point, Wn. An assay of samples from this property secured by Mr. Skoning before the closing of the deal is said to have given returns of \$189 in silver to the ton at current prices. Mr. Skoning, who has come south, proposes returning in the spring with the machinery necessary to open up this group.

A number of old properties are expected to become active next year. One of these is the Indian, on which some work was done in 1910, some first-class galena being taken from it at that time. There also is the Hercules for which a deal is said to be pending.

Anyox, B.C.

The Hidden Creek Mine, of the Granby Consolidated Mining and Smelting Company has increased its ore reserves as a result of the past year's development. The quartz property operated to supply silica to the smelter is carrying larger gold values than formerly.

The company's by-product coking plant at Anyox is undergoing repair. Fourteen ovens, however, are again in operation.

Sandon, B.C.

The most active mining camp of the Kootenay is Sandon, which is regaining its past reputation of being the premier silver-lead centre of the Province. It is estimated that there are four hundred men working in the mine and mills of the Sandon camp, including the Alamo concentrator. Five mines are producing ore for Clarence Cunningham, the largest individual operator of the district. Of these the ores of the Idaho, the Sovereign, the Wonderful and the Old Richmond-Eureka, are treated at the Alamo concentrator. Queen Bess, which made a fortune for Mr. Cunningham, is shipping its high-grade silver ore south of the line for treatment. The Rosebery-Surprise Mining Company, Limited, is operating three properties in this camp, the Surprise and the Ivanhoe, which are shipping to the company's concentrator at Rosebery, and the Canadian, which is under development. This is in addition to the Bosun of New Denver, which employs forty men and sends ore to Rosebery. One of the oldest and biggest mines of the country, the Noble Five, is terminating a five-year period of deep development by erecting a big concentrator only less than that of Alamo in size, in which the machinery now is being installed. This is expected to be working early in the year if not before. Mill feed for two years is in sight. Honorable James Dunsmuir, owner of the Noble Five, acquired the Reco, an adjoining property, during the summer, and it is being developed on its own line, but eventually will be joined in deep development with the larger mines. The Silversmith is now in what is probably the largest ore shoot at present exposed in the district. The high grade ore having a width of four feet. This great ore body is between the eighth and tenth levels. The Rambler-Cariboo, to which has been joined the Jenny and Last Chance claims, also has struck a new body of milling ore, and ore is being milled from the 1,000, 1,200 and 1,300-foot levels. The McAllister at Three Forks is another mine of much promise. It is operated by the Spokane Silver Mines Limited and since its re-opening last August development has been in progress without cessation. There are now blocked out five thousand tons of ore. Be-

sides there are many smaller mines and a large number of prospects upon which work is being done. In brief, the present condition of the Sandon camp is better than it has been for years. Zinc, which was formerly useless, and in fact it was considered a handicap to ore, is now in the form of concentrates, a more or less important product at every concentrator. It is unnecessary to speak of the high market value which is the chief contents of the ore of the district. For these reasons mining men are looking forward to a period of remarkable prosperity.

A new strike of clean galena is reported in No. 1 tunnel of the Granville property, Sandon. The Granville group is twenty years old and the tunnel in which this ore body was disclosed is one of the two old drifts which penetrate the mountain from opposite sides giving it about a hundred feet of extreme depth. On the main working level, which consists of a long cross-cut to the vein, a crew of men has drifted forty feet on a three-foot width of mill feed which carries on the foot wall three inches of galena carrying high values in silver and lead. There are three veins on the property and some eight hundred feet of work has been done.

Nelson, B.C.

Some excellent samples of ore have been taken from the Grant group, which is situated on Woodberry Creek. This property is in a dry ore belt and assays from similar specimens to those produced have run 1,545 ounces of silver, very light in lead and no zinc. The property is being developed by a drift that has been carried 150 feet. A shipment of thirty sacks to Trail Smelter last year brought \$800.

It is the intention of the present owners to resume the development of the Athabasca Mine at Nelson. The mill will be put in operation. The Athabasca has been a large producer of gold during the past 20 years.

C. M. Moir, manager of the Spokane Mining Development Corporation, states that the Monarch Mine will be placed on a producing basis with as little loss of time as possible. Developed by open cuts, tunnels and shafts, two distinct ore bodies have been proven on the Monarch on different vein systems. The ore body developed last year produced three cars of ore from a 20-foot glory hole, the ore, which is self-fluxing, running 3½ per cent copper, and returning \$15 to \$18 a ton. There also is some value in precious metals. It is now intended to operate the property on the scale the known ore bodies warrant, and a compressor, air drills, serial tram, and electric power will be provided. Major MacDonald will be in charge. The carrying out of this programme of development should make the Monarch one of the most important properties from the standpoint of production in the district.

Quesnel, B.C.

R. W. Marsh has returned from Minneapolis, where he has been successful in financing a company organized to manufacture and operate his patent for the recovery of the gold and platinum values from the black sand. One of the leading dredging companies has investigated the patent and vouches for its practicability. Quesnel has been selected as the site for the first plant. Black sand will be purchased for treatment on the same basis as a smelter buys ore. The Process is an electro-chemical one and Mr. Marsh, the inventor, is one of the pioneers of the Caribod.

John S. Horgan of the Lightning Creek Gold Gravel and Drainage Company will have charge of that com-

pany's mining operations henceforth. It is proposed to sink a gravel shaft to the bed rock in the original channel near the centre of the company's property.

Britannia, B.C.

The Britannia Mining & Smelting Company has been short of water for power owing to the dry season, the heavy frost preceding the snow fall preventing the replenishing of the supply by the the thawing of the underlying snow. Consequently the turbo-generating plant has had to be put in commission to supply power. In this plant steam is generated by oil fuel.

Victoria, B.C.

The recovery of potash from cement plants is the subject of a booklet compiled by Dr. A. W. G. Wilson and issued by the Canadian Department of Mines. It is stated that the potash content of the raw mix at the Tod Inlet Cement Works, Vancouver Island, is 0.50 per cent and at the Bamberton plant, also Vancouver Island, 0.53 per cent, while the cement carries 0.44 and 0.47 per cent respectively. The loss of potash at Tod Inlet through the lack of a potash recovery plant is over two tons a day, and at Bamberton, when operating, over one ton a day. Dr. Wilson points out that fifteen plants in the United States have installed potash recovery equipment.

Hon. John Hart, Minister of Finance, has announced that none of the British Columbia lands of the late Augustus Heinze, which were offered at tax sales held in 1918, have been redeemed. Consequently these holdings have reverted to the Crown. The property is situate chiefly in the Nelson, Rossland, Slovan and Kettle River assessment districts and totals approximately 701,543 acres. At last year's tax sale the sum of \$55,000 was due in taxes. While some of this property was considered of value because of its mineral producing possibilities there was a quantity with much merchantable timber and a good proportion of agricultural land. Sections of the reverted lands form part of the grants made to the British-Southern and Columbia & Western Railways. Heinze acquired a half interest in these several years ago and since then no taxes have been paid.

The Ladysmith Smelting Corporation has taken a bond on a property situated on Thurlow Island belonging to the Green Lake Mining & Milling Company. The latter has been engaged in development during the summer.

Fort Steele, B.C.

The Victor Mine, Mouse Creek, is expected to be producing in the course of a few weeks. G. Gundry, who holds a lease, has obtained the necessary financial support and is purchasing the machinery required for a 50-ton concentrator, which it is hoped to have in operation before the winter is far advanced. The mine is a high grade silver proposition and there is said to be a considerable supply of rich mill feed available. It is planned to add to the capacity of the concentrator in the spring.

The Wild Horse Dredging Company, Wild Horse Creek, has suspended operations for the winter, the cold weather making it impossible to run the dredger to advantage. The company proposes operating vigorously next summer. This year delays were experienced in getting in machinery so that the actual season was short. These handicaps will not have to be faced next year.

Grand Forks, B.C.

J. E. Leonard, manager of the Chatterby Mining Company, which is operating the Lucille Dreyfus Mine, situated near the Great Northern Railway, two miles from Danville, Wn., has made the following interesting statement respecting the development of that property: "The ore body which has been yielding in the upper workings is to be sought by a cross cut, to be driven at an additional depth of 500 feet. The total depth to be attained will be 800 feet. We expect to complete the work in from 60 to 90 days. Operations will proceed with two shifts and with machine drills. A shipment of ore is to be made to the Trail Smelter immediately. The additional depth will be attained by use of a tunnel on the property of the Minnehaha Mining Company, on which the Lucille Dreyfus Company has a lease. This company also has obtained a lease on the compressor plant of the Minnehaha Company. Shipping ore in a body three to four feet wide is being followed by drift on the No. 3 tunnel level. This property has yielded considerable ore in the last three years." The company's officers are J. J. O'Connor, superintendent; A. D. Monnett, president, and Judge Chester F. Meller, secretary-treasurer. The head office is at Dayton, Wn.

Slocan, B.C.

A new discovery of dry silver ore is reported in the Bear River section by a party of prospectors returned from the hills for the winter and who propose to return as soon as the snow leaves to commence development. The property consists of three claims staked on Blue Mountain, which mark the location of a ledge, varying in width from one to three feet, and which has been traced for a distance of 600 feet. The samples show silver sulphide, native silver, and some gold. Assays run from 123 to 167 ounces of silver.

Trail, B.C.

Anticipating a program of development on an extensive scale the Consolidated Mining & Smelting Company is letting contracts for 765 feet of rails to be used on the new main level of the Sullivan Mine. Contracts also are to be awarded for 1,000 feet of tunnel and 500 feet of crosscutting. It is understood that the company, largely as a result of the present strike of the miners employed at the Sullivan Mine and the failure to date to reach an adjustment of the trouble, has decided to resort to the contract system of mining ore.

Ore receipts in gross tons for the week from October 22nd to 31st inclusive at the Trail smelter of the Consolidated Mining & Smelting Company totalled 4,897, the aggregate for the year to the date indicated being 275,597 tons. The largest contributors among the independent shippers were the Iron Mask, Kamloops, 845 tons; the Mandy, Le Pas, Manitoba, 406 tons; the North Star, Kimberley, 306 tons; the Quilp, Wn., 245 tons; the Standard, Silverton, 355 tons; and the Echo, Silverton, 104 tons. Of the company's properties the largest shipper was the Centre Star, Rossland, 1,422 tons. No lead or zinc ore was shipped from the Sullivan Mine, Kimberley, owing to the strike.

Kamloops, B.C.

The development of the Aspen Grove Mineral Claims, numbering 75 in all, is likely to be proceeded with before long. Joseph Errington, mining engineer, and a number of Eastern financiers, have taken a bond on this property. They propose doing considerable diamond drilling which would have been started be-

fore now but for the fact that Mr. Errington was detained in looking after interests at Brule Lake and at Cobalt.

Atlin, B.C.

There is a prospect that the immense deposits of hydro-magnesite in the Atlin district, British Columbia, will be developed. To place this property on a producing basis has been a problem before Nichol Thompson, of Vancouver, B.C., who with others is interested, for some years. Through correspondence he has interested British clients. Two difficulties have to be overcome. The first is that of transportation, the cost of which, because of the fact that the deposits are situated in the far northern interior, is somewhat high. The second is that of devising an effective as well as an economic method of calcining. Mr. Thompson recently was in receipt of advices from England that a process of successfully calcining fine powdered magnesite has been worked out so that at least one of the stated handicaps appears to have been overcome.

Dawson, Y.T.

About 120 new claims have been staked on Keno Hill and the extension of the new Mayo Silver district, and some 20 on Steep Creek, adjoining Lookout Mountain, since the middle of the summer. The Yukon Gold Company has an option on a group situated on Keno Hill where prospecting is in progress. The company also has staked water rights at Fraser Falls. Lookout Mountain, it is expected, will ship 500 tons or more silver and lead next spring. Moosehide, a well known creek north of Dawson, has been staked by John Lawrence and Chiefs Isaac and Silas, and 20 other Indians.

There seems to be a general tendency in the western provinces of Canada to adopt revolving tipples and shaking screens for the handling and screening of coal at collieries. This is in line with Cape Breton practice. There is no department of a colliery where so much unnecessary labor is possible as on the bankhead, and no department where careful layout of the bankhead tracks and screens for automatic handling, will effect so permanent a saving, both in labor and in coal breakage.

OBITUARY.

The death is announced of Mr. E. L. Gilpin of Sydney, N. S., following pneumonia, at an early age of forty-three years.

Mr. Gilpin was Property Agent of the Dominion Iron and Steel Company, and Secretary of the Employees Mutual Benefit Society. Joining the Steel Company's staff twenty years ago, before the plant was built, he had been in the Company's service for as long a time, if not longer, than any other official or employee. As Property Agent of the Company, he was brought much into touch with the municipal and civic officials of Sydney and district, and took much interest in the civic development of the City. As Secretary of the Benefit Society he was known to all the employees of the Company, and in other directions his activities were varied and extended.

Mr. Gilpin belonged to a family with a long and honorable record in Nova Scotia, his father, Dr. Edwin Gilpin, having been Commissioner of Mines for many years. His grandfather was Dean of the Cathedral of Halifax.

Manitoba Notes

Rice Lake Operators to Form Association.

In order to keep a vigilant eye upon the doings in the Rice Lake field, and also to ascertain its requirements, and if possible supply them, it is proposed to organize a strong association of mining operators, which will include all those now operating and who have received certificates from the public utilities commissioner.

The call has been sent out by Gordon C. McTavish, and the following is a copy:—

"Gentlemen:—A suggestion has been made that the time has arrived for the making of a concerted effort on the part of those having interests in the Rice Lake district, with a view to securing from the Dominion and provincial governments certain absolutely essential improvements.

"Certain interests are already working to this end, but it is felt that representations made by those who are now actively engaged or about to engage in actual mining operations will carry most weight with the proper authorities.

"The suggestion is that there should be formed a small association of mining operators including those now operating and those raising funds for the purpose of operating, and that the members should consist of two officials of each of the companies or syndicates involved. A copy of this letter is being sent to all of the companies operating in the Rice Lake district, which have received certificates from the public utilities commissioner, and in addition, to the Brooklyn Mining Company, Limited, which has not yet put its stock upon the local market, and to the Angus McDonald syndicate, which has raised its development funds by private subscription.

"It is proposed to hold a preliminary meeting in the lecture hall of the Board of Trade building on Friday, November 21, at 4 p.m., and you are urgently requested to be represented at such meeting by two of your officials.

"If you are interested in this project, a line from you to that effect and statement that you will be represented at the meeting above mentioned, will be very much appreciated.

"If any of the eligible companies, syndicates or private owners are omitted, it is hoped that intimation of that fact will be made to the writer before the date fixed for the meeting.

"Yours truly,

"G. C. McTAVISH,

Secretary Gold Pan Mines, Ltd."

THE GET-RICH QUICK BRIGADE.

The following excerpts from an article by "C.A.B." in the mining columns of the Manitoba Free Press have a wider application than the environs of Winnipeg.

"But of all the sickening depravity which the greed for gold is responsible for, perhaps the most repulsive is the subordination of persons who hold positions of trust, and whose conduct previously had not been above suspicion. The favorite game of the baser seller of stocks is to ferret out some journalist who can get their puffs into his paper under the guise of news. They do not as a rule pay him anything in cash—that

would be too crude; besides these gentry usually have a very distinct reluctance to parting with real money, but they allow this "press agent" to "underwrite a block of stock" at a low price. It is evidently then his duty to his wallet to boost this stock to such a point that he can sell (something he never paid for) at a profit. To the eternal credit of an underpaid class, it can be said newspaper men who lend themselves to such infamous deceits are few and far between, yet it is most unfortunately true that they exist, and apparently, for a time at any rate, flourish like young bay trees.

And the weak-kneed amongst the news-gatherers are not the only victims of the high priests of the Get-rich-quick cult. There is the man of budding scientific reputation, who standing, perhaps, on the threshold of what might have been a noble career, in a weak moment yields to the temptation of a big cheque and lends his name to reports, that while they help the sale of stock to the ignorant yet effectually debar the signer from the confidence and respect of men whose trust had been worth many gold mines to him, later on. The men at the head of a mining engineering profession are always above suspicion, otherwise they would not receive such princely pay. For instance, John Hays Hammond is known to have been paid \$250,000 a year and expenses, for a long period."

It may be said in defence of the journalist that his sins arise more often from lack of accurate knowledge than from deliberate depravity, and truth to tell the wiles of the stock promoter would deceive the very elect.

The Canadian journalist has moreover such an innate fear of "knocking" his district that he unconsciously helps the stock promoter.

Recently, an eminent mining geologist visited Winnipeg, and that part of his address given before the mining men of Winnipeg which referred to the similarity of Northern Manitoba to pre-Cambrian districts in other portions of Canada which had been proved to yield precious metals was given much prominence. The other part of the address, which concerned prospecting and wise investment, was not reported. Was it because the speaker said that no prospect in Canada had ever been developed into a mine by the sale of ten cent stock, and that an investor should set aside a tenth of the money that he intended to invest in a mine for the purpose of getting proper professional advice?

There is a certain town in the West, which defaulted on its bonds, and at one time in its history, the person who had doubts as to the financial sanity of the way things were progressing was intimidated by large bill-posters warning "knockers" to have a care, and dare not open his mouth, no matter how wise his counsel.

Canada is large enough, and rich enough not to fear "knockers," but it has many and grave reasons to fear the giddy, irresponsible and clamant booster.

CANADA'S PER CAPITA WEALTH.

Ottawa.—National wealth of Canada was \$19,002,000,000 in 1917, ranking the Dominion sixth among all countries. This shows per capita wealth of \$2,375, the highest of any country on the figures used, and most likely the highest on any current estimates of world wealth now available.

Nova Scotia Notes

The Bonar Head Colliery of the Dominion Coal Co.

The Dominion Coal Company announces that its engineers are surveying the route for the branch line from the Canadian National Railway to Bonar Head which is projected to give access to the site of the proposed new undersea colliery at that place. The completion of this railway is a necessary preliminary to the commencement of any heavy construction work or shaft sinking. As the Winter has now set in, the construction of the new branch railway is not likely to be undertaken until the Spring.

It is understood that the plans of the Dominion Coal Company's engineers contemplate the sinking of a shaft to the Sydney Main Seam, presumably as near to the coastline as seems advisable, and then driving out seawards to intersect the undersea continuation of the Main Seam by two cross-measure, or "stone" tunnels having a slight inclination in favour of the load. If the Dominion Company contemplates the extraction of coal to the maximum seaward extension of its leased areas, it will be necessary that the size of the shaft and tunnel openings shall be unusually capacious, and the construction work of very permanent and therefore quite costly character. The thickness and quality of the coal seams in the vicinity of the proposed new opening are not definitely known, and the character of the seams in the undersea area are necessarily a matter of conjecture, as no opening has yet been made upon this virgin territory.

The extent to which the Dominion Company will develop the undersea leases in the vicinity of Bonar Head will naturally depend upon the thickness and quality of the Sydney Main Seam and the other seams overlying and underlying it, so that it seems unlikely that the full programme of development announced in the newspapers will be undertaken until more is known of the physical characteristics of the coal in the undersea area. As the coal leases to the coastal barrier are held by the Nova Scotia Steel and Coal Co., the site of the new colliery will overlie the leased coal of the Scotia Company, and the permission of the Scotia Company will be required before the work of sinking the shaft and driving the tunnels is undertaken. This, however, is purely a formal matter, the procedure for which is prescribed by the Mines Act, and it is not to be expected that any difficulty will arise in this particular.

In view, therefore, of the necessity to build the branch railway, of the advisability of thoroly testing the character of the coal seams in the Bonar Point area before committing itself to a very large capital expenditure, it seems probable that much preliminary work will require to be done before any appreciable output of coal is secured from the undersea leases in this neighbourhood. The officials of the Dominion Company state that at least twelve months will elapse before coal is shipped from the projected colliery.

The Dominion Coal Company has requested permission from the Department of Immigration, which it is understood has been given, to bring in a number of miners from Belgium, France and Italy, to replace the men who went home to fight in 1914. In August and September of that year, some 800 miners answered the mobilization call and returned to Europe, including a number of British reservists. While the num-

ber of men on the Coal Company's payroll is of course much less than it was at the time of maximum outputs in the early portion of the war period, the deficiency is almost altogether in the men employed in producing coal at the face, a condition that more than anything else tends to high costs of production and restricted outputs.

Dominion Coal Outputs.

The production of the collieries of the Dominion Coal Company during September and October was as under:

Colliery.	September.	October.
1	21,733	29,378
2	47,679	53,388
4	26,234	28,462
5	5,984	7,050
6	18,284	19,420
9	21,909	25,202
10	9,005	11,587
11	14,139	14,869
12	15,674	16,265
14	14,872	18,510
15	10,328	12,892
16	12,609	14,834
21	11,670	13,247
22	12,508	15,411
	<hr/>	<hr/>
	242,628	280,615
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Springhill No. 2	33,599	34,410
Springhill No. 6	1,232	1,491
	<hr/>	<hr/>
	34,831	35,901
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Total	277,459	316,516

The Managers of the Dominion Collieries.

As a large number of changes have recently taken place in the positions of manager at the Cape Breton collieries of the Dominion Coal Company, the following list of the managers of the individual collieries, as the present time, may be of interest.

1	John Monroe.	A. D. Matheson, Ass.
2	P. T. Prendergast.	
4	John Casey.	
5	W. G. Ross.	
6	W. T. Chew.	
9	D. J. McCuish.	
10	Thomas McDonald.	
11	N. A. McDonald.	
12	A. R. McDonald.	
14	H. A. MacLeod.	
15	W. D. Haley.	
16	James Connors.	
17	John P. McIntyre.	
21	John McIntosh.	
22	Robert Simpson.	
24	James Moseley.	

Nova Scotia Steel and Coal Company's Production.

The output of the Scotia collieries during September and October 1919, and the corresponding production in 1918, is as under:—

	1919		1918	
	September	October	September	October
Princess	14,485	15,320	10,520	10,601
Florence	20,239	21,913	11,962	14,327
Scotia	7,926	8,184	7,287	7,002
Jubilee	9,708	11,090	10,182	11,516
	<hr/>	<hr/>	<hr/>	<hr/>
	52,358	56,507	39,941	43,446

The Government has placed an embargo on the export of coal from Canadian mines, in consequence of the serious situation occasioned by the strike of the bituminous coal-workers in the United States. This is a natural action, but it does not necessarily mean that water exports will be stopped, because transportation difficulties will prevent the full relief of Canadian coal production being applied to Canadian needs. The situation throws into high relief what the founders of the Dominion Coal Company always fully realized, namely that the development of Canadian mines is chiefly a matter of seasonal transportation. The coal mines of Nova Scotia are always forgotten and despised until outside sources of supply are interfered with, and then, this neglected province becomes a centre of great solicitude. There are people in Toronto who confuse Nova Scotia with Nova Zembla.

WANT CHANGES MADE IN MINING ACT.

Meeting in Toronto will discuss proposition submitted by Port Arthur Board of Trade—Nipissing Extension's program of development—Progress made at the Keora mine In Porcupine.

(From Our Toronto Correspondent.)

At the annual meeting of the Associated Boards of Trade and Chambers of Commerce to be held in Toronto Nov. 20 and 21, there will be discussed a resolution adopted by the Port Arthur Board of Trade which has a good deal of bearing on the Mines Act of Ontario. The resolution provides, amongst other things, that the recorder of a mining division have the power to issue special renewal license; that patents be issued for claims or parts of claims covered by water, where it can be shown that the granting of such patent will not interfere with navigation; that patents instead of leases be granted for mining locations in Crown forest reserves and timber berths where prospecting is permitted; that the assessment work consist of \$100 worth of actual mining work per 40-acre location per year, for a period of three years, when a patent shall be issued at the usual price per acre; that the assessment work may include cost of survey, not to exceed \$100 per location, and in the case of an iron location may include the cost of a magnetic survey; that in the case of claims taken up for iron and iron pyrites the assessment work may be applied on one or more of ten continuous claims and that the unorganized portion of the Fort Frances mining division be administered by the mining recorder of Port Arthur.

Starting their development work last February, the Porcupine Keora Mining Company, Limited, composed of Toronto and Philadelphia interests, has already spent \$70,000 in buildings, shaft-sinking and diamond drilling on their property in the Township of Whitney, Porcupine district. The work was carried on in order to test the northern ore body. To develop the low grade ore bodies will require an expensive plant and the company is not in a position to instal it, so they are starting with the high grade ore and from the treatment and sale of it will raise enough money for the company's own mill. An extensive drilling campaign has just been completed and according to the statement of the mine manager Nos. 1 and 2 diamond drill holes are down to 905 feet and 997 feet and Nos. 4, 5 and 6 were put down to 350 feet, while No. 7 is down to 1,000 feet, with the result that No. 1 vein, which was the objective in deep diamond drilling, has been

proven to contain the same values at the depth as are shown on the surface. In putting down No. 2 hole 76 feet below the surface, a new ore body was encountered which is now known as No. 5, and shows average width of 9 feet and an average value of \$17.44. This discovery caused the company to put down Nos. 4, 5, 6 and 7 holes over a total length of 700 feet and the results show an average grade of ore of \$20 to the ton, except in No. 4 hole, where the highest assay obtained was around \$12.00. The results of this diamond drilling encouraged the company to commence sinking a shaft to open up Nos. 5 and 6 at the point cut by the No. 5 hole, where vein No. 5 is shown to be 20 feet wide and averages \$110 per ton. No. 6 vein, 100 feet to the north, which will be opened up in the same work, shows 10 feet of \$47.56 per ton. The money is in the treasury to cover the cost of bringing the mine to a producing stage and it is expected that in five months' time the minimum production of 25 tons daily will be coming from No. 5 vein, netting the company between thirty and forty thousand monthly, according to the statement of the mine manager.

The Northern Securities, Limited, are in receipt of encouraging reports regarding the development program in prospect for the Nipissing Extension Mines, Limited, whose property of forty acres is situated in the Peterson Lake area of the Township of Coleman. According to the report Major E. H. Birkett, the resident mine manager of the mine is now in Cobalt in complete charge of the property and has commenced a careful campaign for development. His reports concerning the property and its possibilities are very favorable and he further reports that he has recently discovered a new vein on the Nipissing Extension which had never before been located. This discovery, he says, has been stripped for sixty feet and it averages one inch wide of smaltite and cobalt bloom. The wall rock carries leaf silver. The report states that the vein has been assayed and proved to carry 830 ounces of silver to the ton, while the wall rock carries 115 ounces of silver to the ton. The company bases its faith in the property on the richness of the veins as found by Consulting Engineer Strong.

Davidson Consolidated is announced to have extensive plans for the future. A townsite is to be laid out, a church and schoolhouse built, as well as a number of additional cottages for the accommodation of married employees. Timber is now being cut for these at the company's sawmill. A large addition is to be made to the mill building to accommodate additional equipment to bring capacity to 500 tons a day.

It may be laid down as an axiom that no modern nation can retain economic independence unless it possesses within its frontiers a sufficient supply of bituminous coal.

Coal is the motive power of civilization.

As this war and its preliminaries have abundantly demonstrated economic independence sooner or later spells political subservience.

The national future of Canada, its maintenance of national integrity and its political independence is bound up with the coalfields of Cape Breton Island.

Extent of territory, density of population, and agricultural wealth are only a menace if coal is absent.

In these times coal spells power, it is a necessity of nationhood.

—Extracts from a paper by the Editor, read before Mining Society of Nova Scotia, April, 1917.

AN UNUSUALLY PLACED METALLURGICAL LABORATORY.

Our metallurgical readers will be interested in the following account from the "Westporter Herald" of the Dorr Company's new laboratory and consulting offices near Westport, Conn., which Mr. Dorr has combined with a bird and small game sanctuary. This is a novel and praiseworthy example of the ruralization of industry.

About two miles from Westport, at the confluence of the Saugatuck and Aspetuck rivers in a picturesque stretch of woodland is an old mill which has been a landmark since the early days of the town. Built in pre-Revolutionary times when water power was a necessary part of business equipment, the mill was used for spinning, its operative force being brought from England. Owing to changes wrought by time and circumstances, it was transformed about seventy years ago into a grist mill and was known for miles around as Kelly's Mill to all the farmer folk who journeyed thither with their bags of grain from the season's harvest. Continuing to operate as a grist mill, it again changed ownership when considerable improvement in equipment was made and it became known as Sipperley's Mill. Two years ago the property was purchased by the Dorr Company, a large engineering and metallurgical research firm with offices in New York, Denver and London, England. The scope of the work at Westport includes analyses; extended research along various lines, and the investigation, development, testing and improvement of industrial, chemical and metallurgical processes. The mill has been entirely remodelled and refitted with an attractive library and conference room, sleeping accommodations for transient business visitors, a completely equipped analytical laboratory, and a testing plant of commercial scale tests along many lines. Surrounding the mill both up and down the two rivers is a tract of land consisting of forty-six acres, some in meadows and hillside, some in pond and waterways and the rest in natural woodland. Along the streams and in the meadows all kinds of birds native to New England are to be found in large numbers, likewise much small game. The rare wood ducks are here and the shy Heron, with thrushes and wood robins and all the little feathered songsters which seek the quiet of the undisturbed forest.

Last spring, through the untiring efforts of Mr. Herbert Fox and the generosity of Mr. Dorr, and their co-operation with the Nature Club of Westport, the services of Mr. Wilbur F. Smith, state game warden, were secured and through him the property was leased by the state for a Bird and Game Reserve and is now protected by state law from all hunting, either shooting or trapping, and is under the jurisdiction of Mr. Smith and the care of the Nature Club. Mr. Dorr has asked the Nature Club to establish feeding places and to put up bird houses. These have all been occupied this past summer, demonstrating clearly that the birds readily accept the offerings of their human friends.

The Junior Audubon Club of Westport, which numbers about four hundred members, will be glad to know that there is a bird reservation so near and the Nature Club hopes they will keep up their interest in observing and protecting the birds. A plan is being made for them all sometime to visit with their teachers this lovely natural bird retreat where may be seen so many birds which are too shy to venture away from the quiet wood, and also the five deer which have joined the wild colony at the Old Mill.

The townspeople, too, are asked to take an interest in this movement to protect the birds and game which so many times are thoughtlessly and ruthlessly destroyed and to assist the Nature Club by donations of suet, seed, nuts and grain for feeding during the cold winter months. Information regarding feeding and the making and placing of bird boxes may be obtained at the Public Library and any suggestions or advice from personal observation and experience will be gratefully received by the Nature Club, which looks for the hearty co-operation of all friends of birds and game to perpetuate this Preserve and show the appreciation which should be extended to Mr. Dorr for making it possible to have so beautiful a spot as this for a Bird and Game Reservation in our own town.

"BORE FOR POWER!" SAYS SIR CHAS. PARSONS.

In an address recently delivered in London, Eng., Hon. Sir Chas. A. Parsons, inventor of the Parsons turbine, said that "failing new and unexpected discoveries in science, such as the harnessing of the latent molecular and atomic energy in matter, the great position of England cannot be maintained for an indefinite period. At some time or other, more or less remote, the population will gradually migrate to those countries where the natural sources of energy are the most abundant."

England is using up its coal more rapidly than most other countries, and Sir Charles states that long before it reaches the point of exhaustion, it may pay England to import coal from countries where it is workable at lower cost. Ultimately water-power will be more rapidly developed, although the cost of harnessing all the water-power of the world would be about £8,000,000,000.

What shall England do to be saved from the disaster threatened by the exhaustion of its coal and the competition of other lands with plenty of cheap power? Sir Chas. Parsons' advice may be summed up in the one word: "Bore." There may be cheap power waiting, ready to be tapped, down deep in the crust of the earth, he says.

He recalled that some years ago he suggested boring a shaft 12 miles deep, or about 10 times deeper than any in existence. At that time the cost was estimated at £5,000,000, and the time that would be required at 85 years! Since then, he added, experiments have been made, showing that in limestone a depth of 15 miles is probably practicable, and in granite a depth of 30 miles might be reached.

"Little is at present known of the earth's interior," said Sir Charles. "When we consider that the estimated cost of sinking a shaft to a depth of 12 miles at present-day prices is not much more than the cost of one day of the war to Great Britain alone, the expense seems trivial compared with the possible knowledge that might be gained by an investigation into this unexplored region of the earth."

In Italy, at Lardarello, he said, bore holes have been sunk which discharge large volumes of high-pressure steam, which is used to generate about 10,000 h.p. by turbines. A similar project is on foot near Naples to supply power to the great works in that district.

Without promising that a 12-mile bore hole in England would yield ready-made steam-power, Sir Chas. Parsons urged that "the whole subject merits the most careful consideration."

THE PROSPECTS OF RAILROAD ELECTRIFICATION IN AMERICA AND ABROAD.

By F. H. SHEPARD*

The world-wide shortage of coal during the great war has emphasized more clearly than ever the necessity of fuel economy in industry, while the present shortage of labor and the certainty of its continuing scarcity throughout the construction period forms another most serious problem. But fortunately we have at our disposal a means that will greatly assist in alleviating both of these conditions; namely—electrification.

The use of electricity in industry saves both fuel and labor. This fact is recognized throughout the world today and in order to secure these advantages, practically all of the nations are now considering plans for the electric generation of power. In England, Belgium and France, among others, these plans are being prepared by official commissions, so that a tremendous activity in electrical power development may be expected with the stabilization following the advent of peace. In all cases, the ideal in view is a broad one: To use electricity for all possible power purposes, including railroad operation.

The operation of the railroads will naturally form an important part of any program of general electrification, for in almost every country the railroads form one of the largest users of fuel and labor. Nor are the advantages obtained from railroad electrification limited solely to economy in fuel consumption and the more effective use of labor. Among others, the following can be mentioned:

1. Greater speed of movement for the heaviest trains, due to the fact that electric locomotives can be made much more powerful than the largest steam locomotives.

2. Greater nicety of control.

3. Increased traffic capacity of existing tracks, terminals, grades, tunnels, and other points of traffic restriction, because when electricity is used, heavier trains can be operated at higher speeds and less time is consumed at terminals and in yards.

4. Operation where the use of steam is impossible or objectionable, as in long tunnels.

5. Independence of weather conditions, since the electric locomotive is not effected by cold weather.

6. More reliable operation, as proved by the statistics of all existing electrifications.

7. More effective use of all rolling stock, due to more expeditious movement of traffic.

8. These are some of the advantages that are now being obtained for the mere substitution of the electric locomotive for the steam locomotive, but they by no means tell the whole story.

Consider electric illumination. When first introduced, the electric lamp supplanted a gas or an oil light because of certain advantages it possessed, and at first it occurred to no one that it would ever do much more. But the electric lamp has within thirty years revolutionized illumination and has given us our light-flooded factories, with their greatly increased production and safety, and our Great White Ways as well.

A further example is the growth of our great city and interurban electric transportation service of to-

* Director of Heavy Traction, Westinghouse Electric & Mfg. Co.

day from the substitution of the electric motor for the horse on street cars.

There is good reason to expect that the electric operation of the railroads is capable of a similar development and will in time revolutionize our present transportation methods and provide us with services we know little or nothing about today.

Since the United States has an abundance of coal, railroad electrification here has been determined solely by local conditions. Passenger terminal problems caused the electrification of the New York Central at New York and the Pennsylvania at New York and Philadelphia. The limitations of the steam locomotive determined the electrification of the Baltimore tunnel on the Baltimore & Ohio, the Cascade tunnel on the Great Northern, the St. Clair tunnel on the Grand Trunk, the Hoosac tunnel on the Boston & Maine and the Detroit River tunnel on the Michigan Central. Examples of electrified railroads with freight as well as passenger service are the Norfolk & Western, the Chicago Milwaukee & St. Paul and the New York, New Haven & Hartford.

While the other electrifications are successful and interesting, the last three are more properly representative of general railroad electrification. The Norfolk & Western is an example of electrification under the heaviest conditions of freight traffic on a mountain grade. The Chicago Milwaukee & St. Paul has in operation the longest continuous mileage in the world, and when completed will cross five mountain ranges. The New York, New Haven & Hartford has a very large movement of both freight and passenger traffic. All three installations are successful and profitable and, when financial conditions are stabilized and the American railroad question settled, it is expected that all three will extend their electrified service.

In addition there are sections of railroads about the country where the present congestion of traffic or the availability of water-power warrants the early adoption of electric power. These possibilities alone promise under normal conditions of finance (as no engineering problems now remain to be solved) extensive activity in the electrification of railroads for many years to come.

Different from America, European and South American countries, with the exception of England alone, lack an adequate supply of fuel, but many of them including Norway, Sweden, Switzerland, Italy, Spain and Brazil, have large amounts of water power, while France has a moderate amount. These resources combined with the high cost of fuel make extensive railroad electrification in these countries inevitable sooner or later.

The neutral countries will probably be the first to undertake this work, Switzerland having a program covering a term of years well established, while both Norway and Sweden are giving active consideration to definite projects. In England, a considerable amount of electrification is in contemplation along with the general plan for the electrification of industry. A French Commission, composed of Government and railroad engineers, have already visited the United States in order to thoroughly familiarize themselves with American practice. The Italian Government will continue their definite program as soon as financial conditions permit. An official Belgian Commission is already planning to rehabilitate with electric power at least a portion of the railroads destroyed by the

Germans. In Spain, Brazil and South Africa as well railroad electrification is under active consideration.

It is evident, therefore, that the next decade will see a large amount of railroad electrification in almost every quarter of the world.

MEETING OF TORONTO BRANCH OF CANADIAN MINING INSTITUTE.

New Provincial Minister of Mines Addresses Institute Members.

Reports from Toronto of the meeting and dinner of the Toronto Branch of the Canadian Mining Institute on Saturday, at which Minister of Mines Mills and Attorney-General Ramsey were the specially invited guests, were reassuring to representatives of the mineral industries of Ontario. The new ministers, while not obligating themselves to do other than deal fairly with all classes and industries, proclaimed their purpose to promote economics and encourage capital.

Mutual felicitations and pledges of co-operations were exchanged. President Tyrrell voicing the sentiments of the mining fraternity, and Minister Mills frankly admitting his earnest desire to have Ontario in general and the Fort William district in particular retain the premier position. In so doing the Minister of Mines reviewed the out putting statistics of the current year and manifested a knowledge of the situation that evoked applause. He argued for increased production while humorously declaring that "it is a long way from the 'cab' to the cabinet," he being a locomotive engineer.

Professor Miller was most optimistic as to the future of North Country and ventured the projection that "there are more Cobalts and more Porcupines." He also directed attention to the fact that the nickel industry despite its adversities in the earlier years of its development, is the greatest of its kind and merited pride as such.

Messrs. Tyrrell and Haultain complimented the Ministers upon their plain-speaking. Among the business transacted was the election of Mr. Clifford E. Smith to the presidency of the Toronto branch, and the decision to invite the Canadian Mining Institute to hold its next annual meeting in Toronto.

"A SCHOOL REUNION."

Toike-Oike.

A reunion of the graduates of the School of Science and of the Faculty of Applied Science and Engineering is to be held in Toronto on the 12th and 13th of December. This reunion has aroused a great deal of interest among the alumni all over Ontario and at more distant points, and advanced indications are that almost all good school men will be on hand. A live program is being prepared to cover the Friday evening and all of the Saturday. Special railway rates are being secured from all points in Canada.

It is considered desirable to gather the alumni of the old school together at this time to renew the friendship and acquaintances of "Varsity" days upon which time the war has made great inroads. It is essential that any university or college that desires to stand in the front ranks of educational institutions should have a strong, active alumni, and this reunion is planned with a view to consolidating the existing

wealth of school spirit into an organization of that kind.

The alumni will be pleased to welcome the new dean, and to hear from him his hopes and his ideas for the future conduct of the school.

The move for a reunion has been most enthusiastically received wherever broached and the committee is endeavoring to get in touch with all graduates, but as the present list of addresses is very incomplete, they are unable to reach all of the graduates and will be pleased to send full details of the program to any alumnus on request to Mr. Joseph Bannigan, 7 King St., East, Toronto, Ontario.

NICKEL COINAGE ADVOCATED IN CANADA.

It must always remain a puzzle why Canada, the world's main producer of nickel, yet neglects to utilize the metal for coinage. If only for sentimental purposes, the official use in this way of such a typically Canadian metal as nickel would be most appropriate. But quite apart from that, it would be good business, for by the introduction of nickel 5-cent pieces, and for that matter also 10-cent pieces, in place of the present silver coins, the national treasury would effect a very considerable saving, certainly amounting to two or three hundred thousand dollars annually at the present high price of silver. Then again there are a variety of purposes, such as for cooking utensils, for which nickel and its alloys, notably Monel metal, are eminently suitable, not merely as a substitute for other metals, but owing to superior wearing qualities, cleanliness, and generally more "finished" appearance. These features would go far to outweigh the somewhat higher initial cost, and owing to its longer life the nickel article would probably be found to be little or no more expensive in the long run. We need an active campaign to popularise the use of nickel and its alloys, and this is especially true now that the refining of nickel has taken its place as a firmly established home industry.—Canadian Mining Institute Bulletin.

A SILVER PROPHECY.

In view of the record figure to which the price of silver has recently risen it is of interest to recall that an era of permanently dearer silver was predicted in a work on "Peace Problems in Economics and Finance," of which a second edition was published in February, 1918. In his preface to that edition the author, Mr. Uriel d'Acosta, declared that "the era of cheap silver, which has lasted about thirty years, has come to an end," and that "a permanently higher value for the metal has been established." The change in the value of the white metal, he contended, was the consequence of the impoverishment of the West and the greater prosperity of the East. Gresham's law, he added, applies itself to the whole of Western civilisation in driving silver to the East as a result of inflated paper currencies. In view of the European demand for silver for currency purposes and for the industrial arts it was hardly likely, in Mr. D'Acosta's opinion, that the value of silver will for many years to come be much less than it was in 1913. These prophecies, we think, form a rather striking example of what Lord Curzon once described as intelligent anticipation of events before they occur.

—Financier and Bullionist.

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We are specialists in the designing and building of Hoists. For nearly a quarter of a century we have been concentrating on this work, and have developed a Hoist that we know we have reason to be proud of.

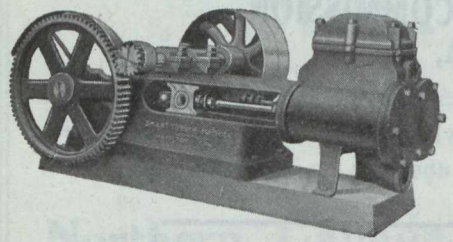
From one end of Canada to the other they are in use, and doing good work in Mines, Quarries, and other classes of work.

We also design special Hoists for special needs, and the experience we have been accumulating through all these years is at your service to enable you to equip your mine with just the Hoist you want.

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The Liverpool Post's gossip writer surmises that one reason for the optimism of the British Chancellor of the Exchequer is a vast discovery of gold in the Yukon territory. A solution to this mystery might be found in the politics of the aforesaid "Post." Englishmen have a sense of humor which it is asserted the peoples of other countries cannot understand.



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Quantity	Size	H.P.	Make	Pressure
1	34" x 14'	35		
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2	54" x 12'	60	NAGLE ENGINE	100 lbs.
1	60" x 14'	70		
1	60" x 14'	70	JOHN INGLIS	85 lbs.
1	60" x 14'	70		80 lbs.
1	60" x 16'	85	GOLDIE & McCULLOCH	120 lbs.
2	60" x 16'	100	GOLDIE & McCULLOCH	100 lbs.
1	60" x 16'	100		75 lbs.
1	66" x 14'	100		110 lbs.
1	66" x 14'	100		85 lbs.
2	66" x 15'	100		
2	66" x 16'	100	MURRAY IRON WORKS	125 lbs.
3	72" x 19' 6"	125	STEWART	140 lbs.
1	73" x 14'	125	GOLDIE & McCULLOCH	185 lbs.
3	72" x 21'	125	DILLON	125 lbs.
2	72" x 16'	135		100 lbs.
2	72" x 16'	135		80 lbs.
3	72" x 18'	150		135 lbs.
2	72" x 18'	150		140 lbs.
3	72" x 18'	150	BROWNELL	150 lbs.
2	72" x 18'	150		150 lbs.
2	72" x 18'	150	STEWART	140 lbs.
4	72" x 20'	170	KEELER	125 lbs.
2	72" x 18'	198	ROBB MUMFORD	125 lbs.
1	72" x 18'	216	UNIFLOW	125 lbs.
2	72" x 18'	250	KEELER	105 lbs.

LOCOMOTIVE TYPE BOILERS

1	40" x 15'	27	NAGLE ENGINE	100 lbs.
1	42" x 15' 3"	32		100 lbs.
1	44" x 14' 6"	37		100 lbs.
1	48" x 15'	49		100 lbs.
1	48" x 17'	55	E. LEONARD & SON	100 lbs.
1	57" x 21'	75		100 lbs.
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1		100		75 lbs.

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BOOTH BUILDING, OTTAWA,**

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Tender forms with full details of the goods and places at which samples may be seen, will be mailed when ready to those who have registered as requestd above.

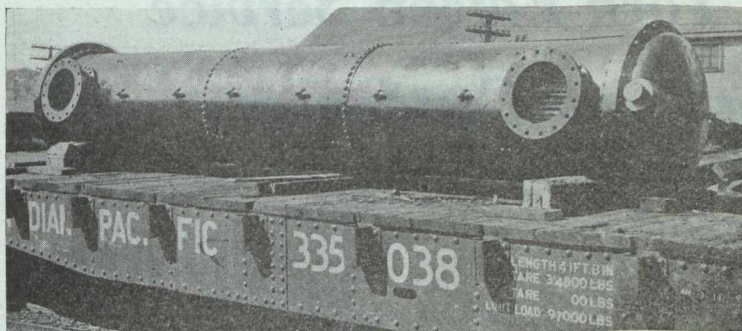
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Dominion, Provincial, and Municipal departments, hospitals, charitable, philanthropic, and similar institutions which are conducted for the benefit of the public and not for profit may purchase goods without tender at prices established by the War Purchasing Commission.

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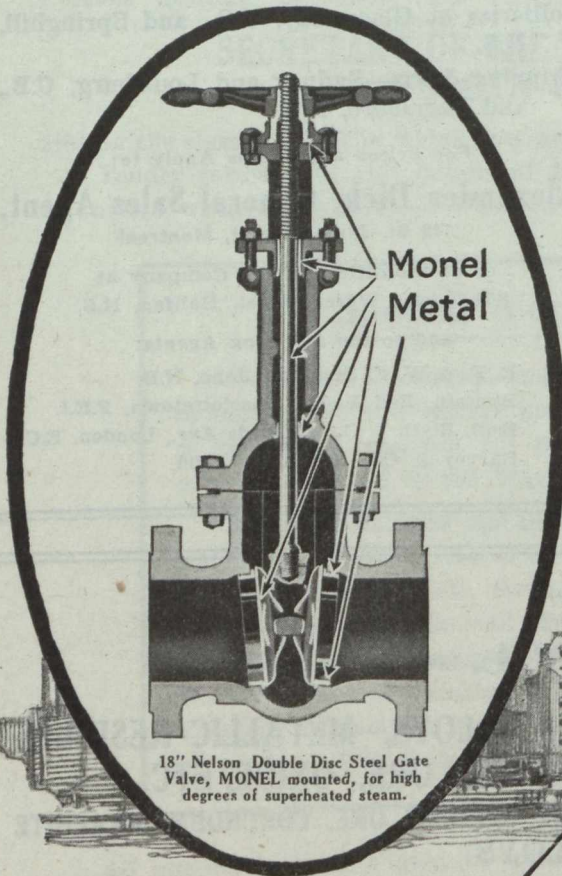
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18" Nelson Double Disc Steel Gate Valve, MONEL mounted, for high degrees of superheated steam.

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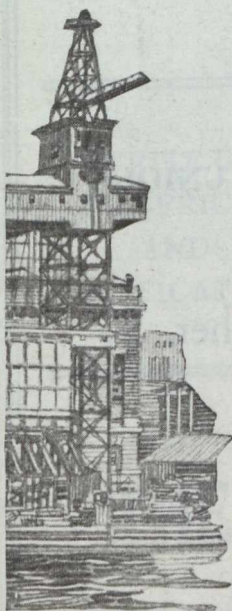
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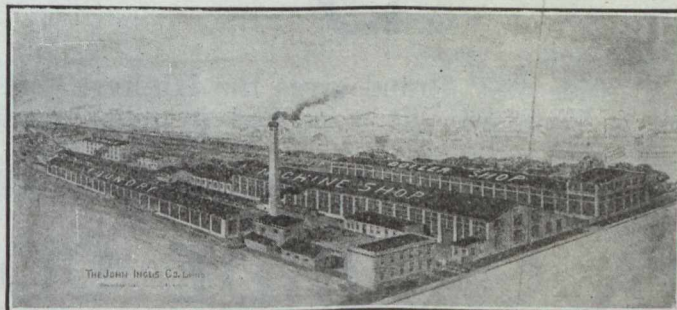
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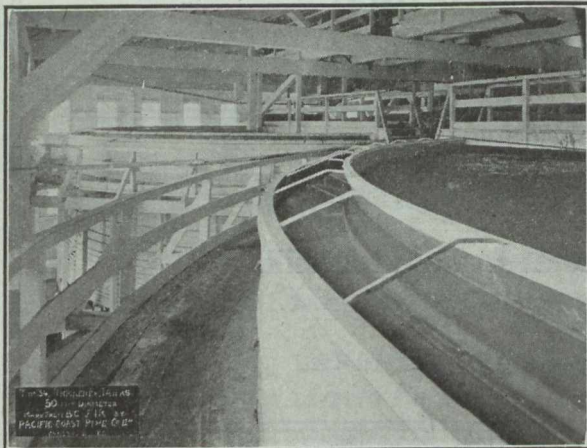
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AT

CHICAGO, SEPT. 22, 1919.

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:

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:

Coniagas Reduction Co.

Assayers' and Chemists' Supplies:

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

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

Balances—Hessner:

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

Babbit Metals:

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

Ball Mill Feeders:

Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.

Ball Mill Linings:

Hardinge Conical Mill Co.

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.
MacKinnon Steel Co., Ltd.
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:

M. Beatty & Sons, Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:

Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Mussens, Ltd.
The Wabi Iron Works

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.

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
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.
The Electric Steel & Metals Co.
The Wabi Iron Works

Cement Machinery:

Northern Canada Supply Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Burnett & Crampton

Chains:

Jones & Glassco
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
Link-Belt Co.
Greening, B., Wire Co., Ltd.

Chain Drives:

Jones & Glassco

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.
Hardinge Conical Mill Co.
The Electric Steel & Metals Co., Ltd.
R. T. Gilman & Co.
Lymans, 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.

Dredger Pins:

Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited

Dredging Machinery:

Canadian Steel Foundries, Ltd.
M. Beatty & Sons
Hadfields, Limited
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:

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

Frogs:

Canadian 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):

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.
Hadfields, Limited
International High Speed Steel Co., Rockaway, N.J.
- High Speed Steel Twist Drills:**
Canadian Fairbanks-Morse 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.
- Manganese Steel:**
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
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:**
International High Speed Steel Co., Rockaway, N.J.
- Mining Requisites:**
Canadian Steel Foundries, Ltd.
Dominion Wire Rope Co., Ltd.
Hadfields, Limited
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—ElectricCanadian 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.
 Mussels, Limited

Rolls—Crushing

Canadian Steel Foundries, Ltd.
 Fraser & Chalmers of Canada, Ltd.
 Hadfields, Limited
 The Electric Steel & Metals Co.
 Mussels, 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.
 Mussels, 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.
 Fraser & Chalmers of Canada, Ltd.
 The Electric Steel & Metals Co.
 The Wabi Iron Works

Shovels—Steam:

Canadian Foundries and Forgings, Ltd.
 M. Beatty & Sons
 R. T. Gilman & Co.

Siline:

Coniagas Reduction Co.

Saline Refiners:

Goldsmith Bros.

Smelters:

Goldsmith Bros.

Sledges:

Canada Foundries & Forgings, Ltd.

Smoke Stacks:

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

Special Machinery:

John Inglis Co., Ltd.

Spelter:

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

Sprockets:

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.

Steel Castings:

Canadian Brakeshoe Co., Ltd.
 Canadian Steel Foundries, Ltd.
 Fraser & Chalmers of Canada, 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.
 Mussels, Limited

Steel Drums:

Smart-Turner Machine Co.

Steel—Tool:

Canadian Fairbanks-Morse 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.
 Mussels, Limited
 R. T. Gilman & Co.
 The Wabi Iron Works

Sulphate of Copper:

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

Sulphate of Nickel:

The Mond Nickel Co., Ltd.

Surveying Instruments:

C. L. Berger

Switches and Switch Stand:

Canadian Steel Foundries, Ltd.
 Mussels, 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

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

Transits:
C. L. Berger & Sons

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

Transmission Apparatus:
Jones & Glassco

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.

Tube Mill Liners:
Burnett & Crampton
Fraser & Chalmers of Canada, 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.

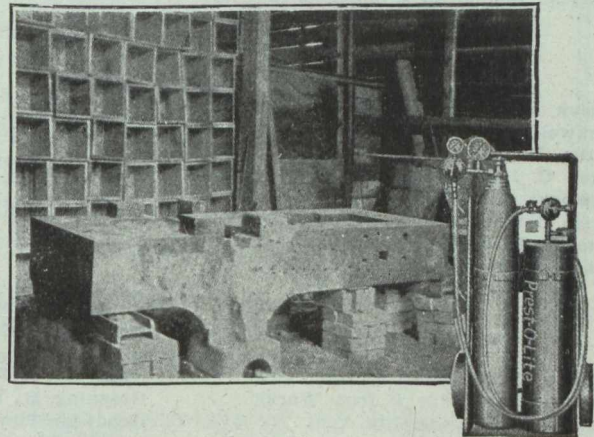
Woodworking Machinery:
Canadian Fairbanks-Morse Co., Ltd.

Zincblende:
Everitt & Co.

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

Zinc Spelter:
Canada Metal Co., Ltd.
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THE CANADIAN MINING JOURNAL
ALPHABETICAL INDEX TO ADVERTISERS

A
Allan Whyte & Co. 49
American Zinc Lead & Smelting Co. 8

B
Balbach Smelting & Refining Co. 10
Blackwell, G. C., Sons & Company 12
Beatty, M. & Sons 9
Berger C. L. & Sons 12
Brigstocke, R. W. 11
British Columbia, Province of
Burns, L. P., Ltd. 12
Burnett & Crampton 40

C
Canadian Allis-Chalmers, Ltd.
Can. Chicago Bridge & Iron Works
Canadian Explosives, Ltd.
Canadian Fairbanks-Morse Co., Ltd. 16
Canadian Milk Products
Canadian National Railways
Canadian Ingersoll-Rand Co., Ltd. . . .
Canadian Link-Belt Co. 6
Canadian Laboratories, Ltd. 12
Canada Foundries & Forgings,
Ltd. 3-10
Canada Wire & Cable Co. 8
Canadian Rock Drill Co.
Canadian Steel Foundries, Ltd.
Canada Carbide Company 40
Canada Metal Co. 9
Canadian Brakeshoe Co. 7
Canadian Sirocco Co.
Capper Pass & Son, Ltd. 12
Consolidated Mining & Smelting Co. 7
Coniagas Reduction Co. 39
Constant, C. L. & Co. 7

D
Deister Concentrating Co.
Denver Rock Drill Mfg. Co.
Deloro Smelting & Refining Co. . . 13
Department of Mines, Canada
Dewar Mfg. Co.
Diamond Drill Carbon Co. 48
Diamond Drill Contracting Co. 12
Dominion Coal Co., Ltd. 35
Dominion Wire Rope Co., Ltd.
Dorr Co. 11
Dresser, Jno. A. 11
Dwight & Lloyd Sintering Co. Inc. 12
Dominion Engineering & Inspection
Co. 10

E
Electric Steel & Metals Co.
Engineering & Machine Works of
Canada
Everitt & Co. 35

F
Fleck, Alex. 12
Ferrier, W. F. 11
Fasken, Robertson, Chadwick &
Sedgewick 10
Fraser & Chalmers of Canada, Ltd. 50

G
Gartshore, John J.
General Engineering Co. 12
Goldie & McCulloch Co.
Goldsmith Bros., Smelting & Refin-
ing Co., Ltd. 10
Greening, B., Wire Co.
Goodyear Tire & Rubber Co. of Can-
ada, Ltd.

H
Hadfields, Ltd.
Hall, G. C. & Co.
Hamilton Gear & Machine Co. . . . 10
Hardinge Conical Mill. 14
Hassan A. A. 11
Hendrick Mfg. Co. 12
Hersey, Milton Co., Ltd. 11
Heys Thomas & Son 11
Hull Iron & Steel Foundries, Ltd. . . 1
Hore, Reginald E. 11
Hoyt Metal Co.

I
Imperial Bank of Canada
International Business Machines
International High Speed Steel Co. 13
International Nickel Co. of Canada,
Limited 5
International Nickle Co. 36-37
Ingليس, J. & Co. 39

J
Johnston, Matthey & Co. 10
Jones & Glassco 49

L
Laurie & Lamb 50
Ledoux & Co. 10
Lindsey, G. C. S. 11
Longyear, E. J. Company
Lymans, Ltd.

M
McDonald, M. P. 11
MacGovern & Co., Inc. 33
MacKinnon Steel Co., Ltd. 35
Marsh Engineering Works. 33
McEvoy, Jas. 11
Mine & Smelter Supply Co.
Mond Nickle Co. 7
Mussens, Ltd. 7

N
Northern Canada Supply Co.
Nova Scotia Steel & Coal Co.
Nova Scotia Government

O
Ontario, Province of 4

P
Pacific Coast Pipe Co. 40
Peacock Bros., Ltd.
Pennsylvania Smelting Co. 10
Prest-O-Lite Co. of Canada 47

Q
Quebec, Province of

R
Ridout & Maybee 12
Rogers John C. 11
Rogers, Geo. R. 11
Reddaway, F. & Co.

S
Shayne & Jaffe Co., Ltd.
Smart-Turner Machine Co. 33
Smith & Travers Company 10
Standard Underground Cable Co.
of Canada, Ltd.
Stewart, Robert H. 11
Sudbury Diamond Drilling Co., Ltd. 10
Sullivan Machinery Co. 2
Swedish Steel & Importing Co.

T
Toronto Iron Works
Tyrrell, J. B. 11

U
University of Toronto

W
Wabi Iron Works 8
Whitman, Alfred R. 11

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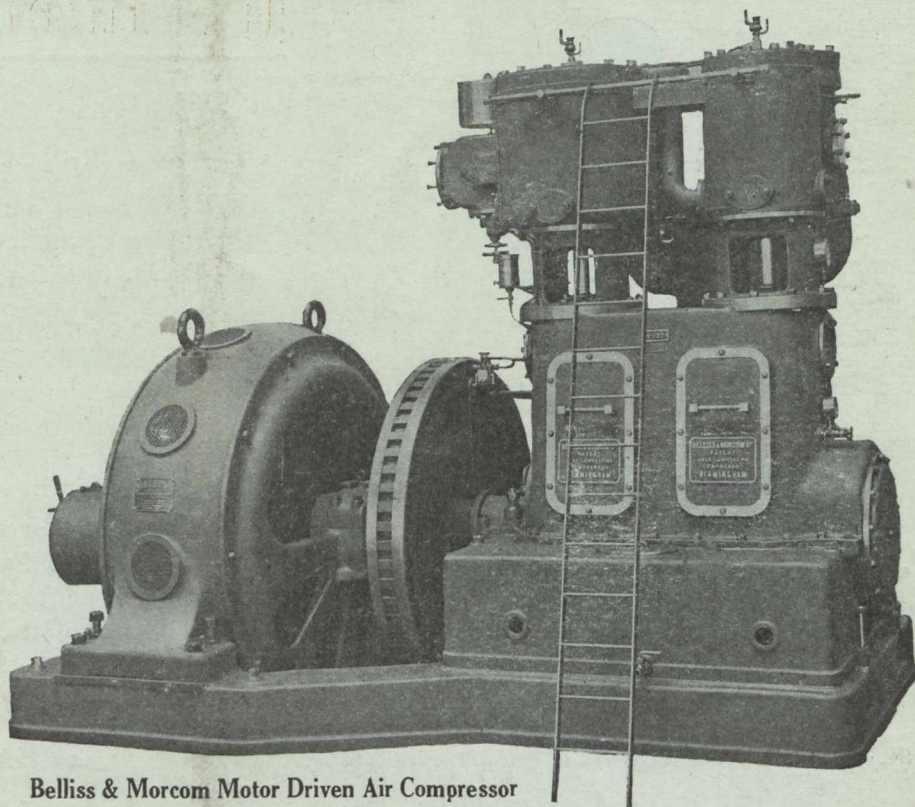
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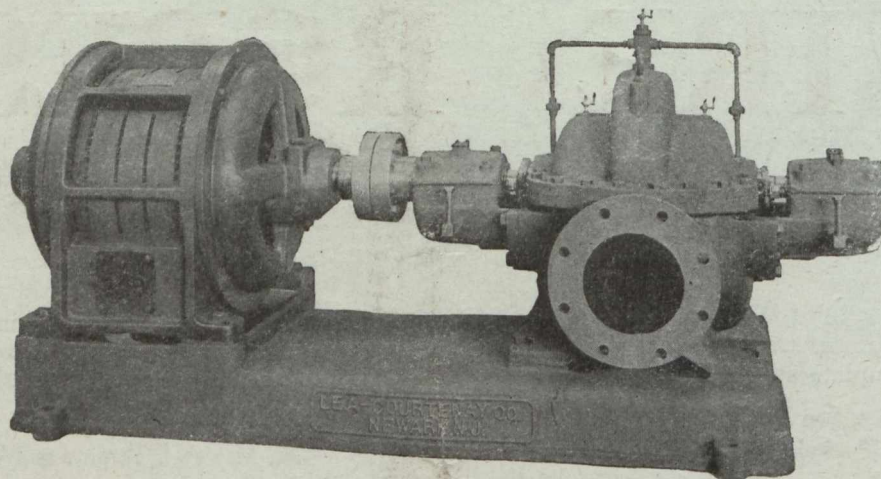
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