

CANADIAN MINING JOURNAL

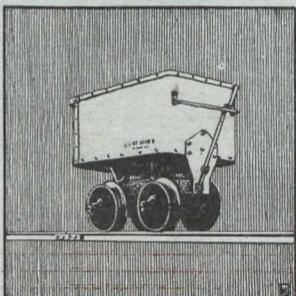
VOL. XLI.

GARDEN CITY PRESS, Ste. Anne de Bellevue, JANUARY 30, 1920.

No. 4.

CANADIAN STEEL FOUNDRIES LIMITED

Transportation Building, :: MONTREAL



TRACKWORK

and

CARS

for

INDUSTRIAL RAILWAYS

MANGANESE-STEEL

for special trackwork and for all machine parts exposed to heavy wear.

Acid and Basic Open-Hearth Steel and Ferro-Alloy

CASTINGS

up to 50 tons



Best by Test

Hollow and Solid Swedish Drill Steel

Results!

Are your Drilling Operations
yielding completely satisfac-
tory results?

Have you troubles with steel
that doesn't stand up?

"DOUBLE ESS"

genuine Swedish Drill Steel is
used and highly recommended
by leading mines in Canada
and the United States.

It will increase your footage
and lower your cost.

Quotations rendered promptly
Address our nearest branch.

Swedish Steel & Importing Co., Limited

Montreal

New York

Seattle

Denver

San Francisco



PROVINCE OF ONTARIO



BUREAU OF MINES

HON. H. MILLS, Minister of Mines.

Ontario's Mining Lands

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

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

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

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

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

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

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

Thos. W. Gibson,

Deputy Minister of Mines,

Toronto, Canada

Metallic Nickel. 98.40—99.00%

Shot
HIGH AND LOW CARBON

Ingots
25 LB. AND 50 LB. SIZES

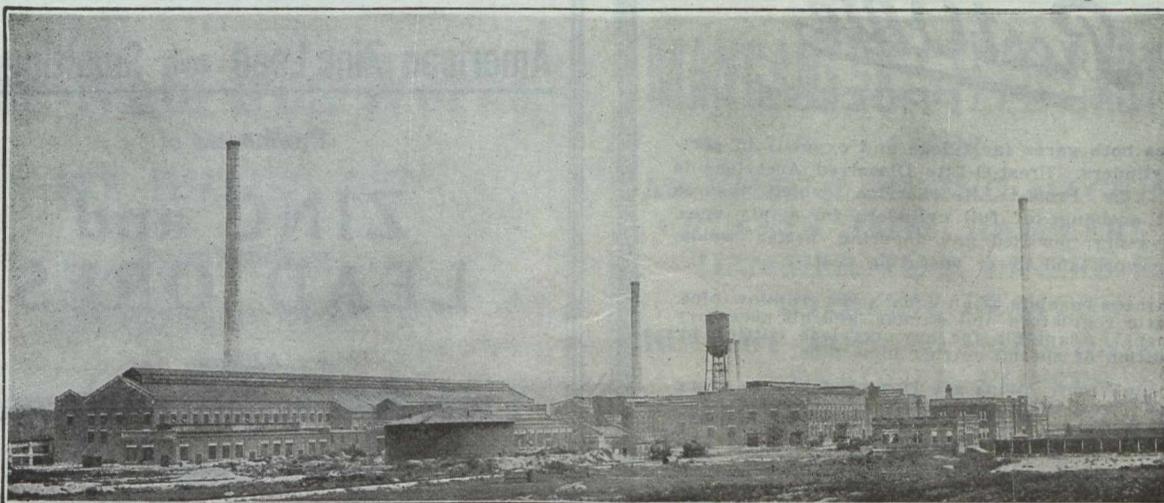
Nickel Oxide 77.2%



PRIME METALS OF UNIFORMLY HIGH QUALITY
AND HIGH NICKEL CONTENT FOR THE MANU-
FACTURE OF NICKEL-STEEL, NICKEL-SILVER,
ANODES AND ALL REMELTING PURPOSES.

Our best technical advice is at your service.

THE HOME OF INCO NICKEL



Refining Division

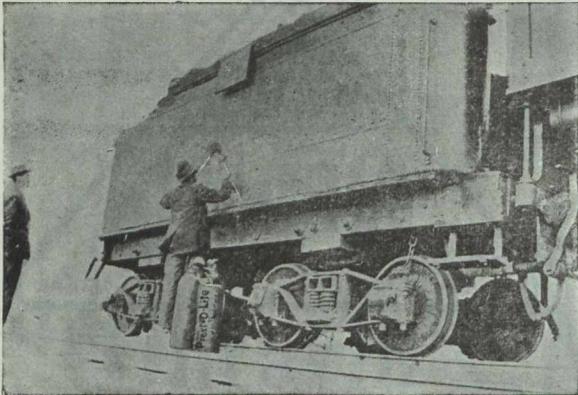
Port Colborne, Ont.

The International Nickel Company of Canada, Limited

HARBOR COMMISSION BUILDING

Toronto, Ont.

OxyAcetylene Welding and Cutting



Rapid Repairing "On the Spot"

This illustration shows an operator repairing a leaky tank car right on the track, at a trifling expense, by the Prest-O-Lite Process of Oxy-Acetylene Welding. Railroads, Mines, Factories and Machine Shops everywhere have adopted this process, and are saving hundreds of thousands of dollars annually.

Costly tie-ups are avoided—valuable castings and machine parts are saved from the scrap pile—and many economies and improvements are effected both in repairing and manufacturing.

Prest-O-Lite PROCESS

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the welding process quickly and easily.

We will gladly send illustrated literature and interesting data showing actual instances of savings made by others. It may suggest valuable ideas to you. Write for it.

Address Department C -- 108

Prest-O-Lite Company
of Canada, Limited
Prest-O-Lite Building
Cor. Elm St. and Centre Ave.
Toronto

Plants at:—
Toronto, Ont. Shawinigan Falls, Que.
Merritton Ont. St. Boniface Man.



World's Largest Makers of Dissolved Acetylene

THE BEST BY TEST

SISCO Drill and Tool Steel

FOR SALE BY

Northern Canada Supply
Co. Limited

COBALT, HAILEBURY, SOUTH
PORCUPINE, TIMMINS

5

American Zinc Lead and Smelting Co.

Purchasers of

ZINC and LEAD ORES

Address

1012 Pierce Building, St. Louis, Mo.

Exploration Department

For the purchase of

MINES Gold - Silver - Lead - Zinc - Copper

Address

55 Congress Street, Boston, Mass.

Dominion Coal Company
 Limited
 Glace Bay Nova Scotia

19 Collieries
 Output—5,000,000 tons annually

“Dominion” Coal
 Screened, run of mine and slack
 “Springhill” Coal
 Screened, run of mine and slack

Collieries at Glace Bay, C.B., and Springhill,
 N.S.
 Shipping Ports—Sydney and Louisburg, C.B.,
 and Parrsboro, N.S.

For Prices and Terms Apply to:
Alexander Dick, General Sales Agent,
 112 St. James Street, Montreal

or at the offices of the Company at
 171 Lower Water Street, Halifax, N.S.

and to the following Agents:

R. P. & W. F. Starr, St. John, N.B.
 Buntain, Bell & Co., Charlottetown, P.E.I.
 Hull, Blyth & Co., 1 Lloyds Ave., London, E.C.
 Ravvey & Co., St. John's, Nfld.

PUMPS
of all kinds

Sinking Pumps
Boiler Feed Pumps
Fire Pumps

Centrifugal - Pulsometer
Duplex - Triplex

SEND US YOUR INQUIRIES

Mussens Limited

MONTREAL WINNIPEG VANCOUVER TORONTO:
 Confederation Life Building

The Wabi Iron Works
 LIMITED
 NEW LISKEARD, ONT.

MANUFACTURERS OF
Mine and Mill Machinery

Crushers, Ball Mills
Tube Mills, Elevators

Ball Mill and Tube Mill Liners
 in Chilled Iron, Manganese
 and High Carbon Steel

MANGANESE STEEL CASTINGS
 FOR

All Kinds of MINING MACHINERY,
 CRUSHER JAWS, HAMMERS AND
 HAMMER TIPS, LINERS FOR
 CYCLONE BEATERS
 BUCKET TIPS, STAMPS AND DIES,
 DREDGER POINTS

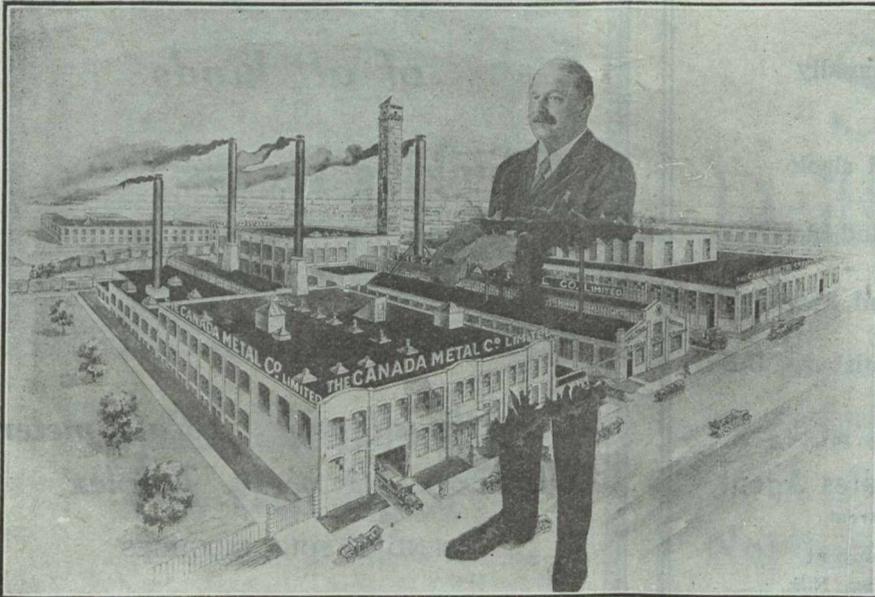
Mild Steel Castings for all purposes

Electric Process—therefore the BEST

Our Special Quality “HYMANG”
 BALLS FOR BALL MILLS RE-
 DUCE COST OF ORE PER TON
 CRUSHED

CANADIAN BRIKESHOE CO., LIMITED
 SHEPROOKE, QUEBEC

It is a great responsibility to recommend a BEARING METAL where human life depends upon it.



W. G. Harris
President.

Tell us of your difficult Bearing Problems. We can help you.

Imperial Genuine Bearing Metal

For High Speed, heavy Engine bearings.

Harris Heavy Pressure

For General Machine bearings.

Aluminoid Bearing Metal

For Light countershaft work.

THE CANADA METAL COMPANY LIMITED

TORONTO

MONTREAL

WINNIPEG

VANCOUVER

EVERITT & CO.

40 CHAPEL STREET, LIVERPOOL, ENGLAND

Tel. Address: "PERSISTENT"

**BUYERS OF CANADIAN MINERALS, METALS, ALLOYS, METALLIC RESIDUES
COBALT ORE, OXIDE, RESIDUES, NICKEL ORE, OXIDE, ETC.**

**MOLYBDENITE, WOLFRAM, SCHEELITE, MANGANESE ORE, CHROME ORE, CORUNDUM, GRAPHITE
METALS & ALLOYS**

**COBALT, TUNGSTEN, MOLYBDENUM, NICKEL, ALUMINIUM, FERRO - SILICON, FERRO - CHROME, ETC
ASBESTOS—CRUDE, FIBRES, SHINGLE STOCK.**

NICKEL



THE MOND NICKEL COMPANY, LTD

39 Victoria Street London, S.W.

Also Makers of

Copper Sulphate,
Nickel Sulphate, and
Nickel Ammonium Sulphate

MINING OPPORTUNITIES IN NORTHERN MANITOBA

Mineral Areas

Approximately three-fifths of the total area of Manitoba is Pre-Cambrian, and all but a small part lies in Northern Manitoba. In the Pre-Cambrian in Ontario, the well-known camps of Sudbury, Cobalt and Porcupine have been developed. In Northern Manitoba there was practically no prospecting until the Hudson Bay Railway gave access to the mineral districts. There are three fields in particular to which attention is now directed—The Pas Mineral Belt, the Cross and Pipestone Lakes area, and the Oxford Lake, Knee Lake, God's Lake and Island Lake area.

Development

Since 1915, development has been rapid in The Pas Mineral Belt. Twenty million tons of low-grade copper ore have been explored by diamond drilling at Flin-Flon Lake. High-grade copper is exported from Schist Lake to the smelter at Trail, B.C.; three and three-quarter million pounds of copper have already been realized. Copper prospects are under development on Athapapuskow Lake, Copper Lake and Brunne Lake. The building of a smelter will give impetus to the development of a large copper industry. Gold is now produced at Wekusko Lake, and important discoveries have been made on Copper Lake, and on Knee Lake on the Hayes River route.

Transportation

Transportation is available by the Hudson Bay Railway, by the Ross Navigation Co. Steamboats on the Saskatchewan River, and by wagon roads built into the producing areas by the Manitoba Government. Wekusko Lake may be reached in less than one day from The Pas. The Hudson Bay Railway gives easy access to several promising districts where little prospecting has yet been done.

Mining Regulations

The mineral resources are under Federal control, and the Dominion Mining Laws apply to Northern Manitoba. No mining license is required. Work to the value of \$100 per year must be performed for a period of five years on claims filed under the quartz mining regulations. The office of the Mining Recorder for Northern Manitoba is at The Pas.

Opportunities for Capital

The district is comparatively new, and there are several very promising properties which may be acquired at reasonable prices. Financial and mining companies would be well advised to have their engineers inspect these properties at an early date.

For maps, reports and general information, apply to—

THE COMMISSIONER OF NORTHERN MANITOBA

THE PAS, MANITOBA.

PROFESSIONAL DIRECTORY

J. MACKINTOSH BELL

MINING ENGINEER & GEOLOGIST

Office with Messrs. BAIN, BICKNELL & CO., Lumsden Building, TORONTO.
London Address: c/o Bank of New Zealand, 1 Queen Victoria Street, E.C.

PENNSYLVANIA SMELTING CO.

Purchasers of

SILVER & LEAD ORES

Office: Pittsburgh, Pa.

Works: Carnegie, Pa.

Dwight & Lloyd Sintering Company, Inc.

**SPECIAL PROBLEMS
IN ORE TREATMENT**

29 BROADWAY, NEW YORK CITY

Cable Address:—"SINTERER."

DOMINION ENGINEERING & INSPECTION CO.

Testing Engineers and Chemists
Mill, Shop and Field Inspection of Steel Structures.
Tests and Inspection of Iron and Steel Pipe, etc.
Locomotives, Cars, New and Second-Hand Equipment.
Testing of Metals, Cement, Etc., — Industrial Chemistry,
Metallurgy a Specialty.
HEAD OFFICE & LABORATORIES
320 Lagachetiere Street West, Montreal.
BRANCH OFFICES: Toronto, Winnipeg and Vancouver.

Canadian Laboratories, Limited

ASSAYERS AND CHEMISTS

410 Crown Office Building, TORONTO

"We Analyse Anything."

Special Rates Send for Prices Phone Main 5063

JOHNSON, MATTHEY & CO. LTD.

Buyers, Smelters, Refiners & Assayers of Gold, Silver, Platinum, Ores, Sweeps, Concentrates, Bullion, &c.

Offices—Hatton Garden, London, E.C.

Works—Patricroft, Manchester, England

Cables: "REVORG," Toronto Telephone Main 6870
(Western Union and Bedford McNeil Codes)

GROVER & GROVER

BARRISTERS, SOLICITORS, ETC.

George A. Grover
John I. Grover

157 Bay Street
TORONTO

Telephone Main 3813

E. M. Chadwick, K.C.

David Fasken, K.C.

M. K. Cowan, K.C.

Harper Armstrong

Alexander Fasken

Hugh E. Rose, K.C.

Geo. H. Sedgewick.

James Aitchison

Cable Address: "Chadwick" Toronto

Western Union Code

Fasken, Robertson, Chadwick & Sedgewick
Barristers, Solicitors, Notaries

Offices: Bank of Toronto,
Cor. Wellington & Church Sts.
58 Wellington St. East, Toronto

CAPPER PASS & SON, LTD.

Bedminster Smelting Works, BRISTOL
ENGLAND

SELL

Antimonial Lead
Antimony Alloys
Tin Alloy

BUY

Ores, Mattes, Residues or Drosses,
Containing Tin, Copper, Lead or Antimony

J. T. DONALD & CO.

ASSAYERS

Industrial and Analytical Chemists.
Metallurgical Analyses, Microphotographs

318 Lagachetiere St. W.
MONTREAL

43 Scott Street
TORONTO

LEDOUX & CO.

Assayers and Samplers

Office and Laboratory: 99 John St., NEW YORK

Weigh and Sample Shipments at
Buyers' Works, representing the
Interests of Sellers in all Transactions.

We are not Dealers or Refiners

SMITH & TRAVERS COMPANY

LIMITED

CONTRACT DIAMOND DRILLING
FOUNDATIONAL WORK A SPECIALTY
DIRECTION OF EXPLORATORY WORK
DETAILED GEOLOGICAL MAPPING
SAMPLING AND VALUATION OF MINES
MINES EXPLORED FOR AN INTEREST

SUSBURY :: :: ONT.

SUSBURY DIAMOND DRILLING COMPANY LIMITED

We contract for all classes of Diamond
Drill work.

Saving a large percentage of Core is
our specialty.

We solicit enquiries.

SUSBURY, ONT. - - - Box 958

PROFESSIONAL DIRECTORY

M. P. McDONALD

MINING ENGINEER

EXAMINATIONS, SAMPLING, REPORTING
EXPLORATION AND ASSESSMENT WORK

Telephone 6

COBALT

MILTON HERSEY COMPANY LTD.

MINING ENGINEERS AND ASSAYERS

EXAMINATION OF MINERAL PROPERTIES
MINE OPERATION AND MANAGEMENT
ASSAYING AND ANALYSING OF ALL ORES

MONTREAL

JAS. G. ROSS
Consulting Mining Engineer

WINNIPEG

THE DORR COMPANY

Metallurgical and Industrial Engineers

DENVER
1009 17th St.

NEW YORK
101 Park Ave.

LONDON, E.C.
16 South St.

JOHN A. DRESSER

MINING GEOLOGIST

701 Eastern Townships Bank Building
MONTREAL, CANADA

JAMES McEVOY

MINING ENGINEER AND GEOLOGIST

(Specialty Coal Mining)

77 Toronto Arcade, Yonge St., TORONTO, Ont.

Phone Main 1889

ROBERT H. STEWART

MINING AND METALLURGICAL ENGINEER

VANCOUVER BLOCK
VANCOUVER, B.C.

GEO. R. ROGERS

MINING ENGINEER

905 TRADERS BANK BUILDING, TORONTO

Examinations, Sampling and Re-
porting on Mines and Prospects

Telephone M. 2625

Alfred R. Whitman

Mining Geologist

UNDERGROUND PROGRAMMES. OREBODY PROBLEMS

43 Exchange Place, - - - New York

HAILEYBURY, ONT., Opposite Post Office

W. F. FERRIER

CONSULTING
MINING ENGINEER AND GEOLOGIST

204 Lumsden Bldg. Toronto, Ont.

J. B. TYRRELL

Mining Engineer,

534 CONFEDERATION LIFE BUILDING
TORONTO, - - - CANADA

208 Salisbury House, London, E.C. 2, England

JOHN C. ROGERS

MINING ENGINEER

Examination and Exploration of Mining Properties
with a View to Purchase.

COPPER CLIFF - ONTARIO

Phone M. 1889

Established 1873.

Cable address "Heys"

THOS. HEYS & SON

Technical Chemists and Assayers

Rooms M and N, Toronto Arcade
YONGE STREET, - - - TORONTO, ONT.
Sampling Ore Deposits a Specialty.

Cable Address:
"Linsey"

Codes: Broomhalls
Western Union

G. G. S. LINDSEY, K.C.

BARRISTER, SOLICITOR, Etc.

Bank of Toronto Building - - TORONTO

Special attention given to Mining Law

Phone Adelaide 1032

R. W. BRIGSTOCKE

MINING ENGINEER

Box 643

HAILEYBURY, - ONTARIO

REGINALD E. HORE

Consulting Geologist

(Specialty: Pre-Cambrian Ore Deposits)

Office: 1402 C. P. R. Bldg., TORONTO

Phone Ad. 3310

A. A. HASSAN

CONSULTING GEOLOGIST
and ENGINEER OF MINES

Westbrook Hotel Bldg., FORT WORTH, TEXAS

Any Code

Cable Address: "HASSAN"



CUT GEARS

All Types Any Size
Large Capacity.

Hamilton Gear Company Limited
Van Horne St. . . . TORONTO

L. P. BURNS, LIMITED
Manufacturers of STEEL PLATE WORK
Tanks, Penstocks, Smokestacks, etc.
Dealers in Railway and Power Plant Machinery
BANK OF HAMILTON BUILDING - TORONTO

Oldest Experts in
Molybdenite
Scheelite
Wolframite
Chrome Ore
Nickel Ore
Cobalt Ore
Cerium, and
all Ores
and Minerals

GEO. G. BLACKWELL, SONS & CO., Limited
Metallurgists, Mine Owners, Merchants, Manufacturers
THE ALBANY, LIVERPOOL, ENGLAND

Talc
Mica
Barytes
Graphite
Blende
Corundum
Fluorspar
Feldspar

Largest Buyers, Best Figures, Advances on Shipments, Correspondence Solicited
Cables—Blackwell, Liverpool, ABC Code, Moring & Neal Mining and General Code, Lieber's Code, and Muller's Code.
ESTABLISHED By GEO. C. BLACKWELL, 1869

DIAMOND DRILL CONTRACTING CO.
SPOKANE, - WASHINGTON.

Contractors for all kinds of Diamond Drill Work.
Complete Outfits in Alberta and British Columbia.
Write for Prices.

AGENCY:—
ROSSLAND, B. C.

PLATINUM
BOUGHT AND SOLD

GOLDSMITH BROS.
SMELTING & REFINING CO. LTD.
24 Adelaide Street West
TORONTO

NEW YORK CHICAGO SEATTLE

Milling and Mining Machinery

Shafting, Pulleys, Gearing, Hangers, Boilers, Engines, and Steam Pumps, Chilled Car Wheels and Car Castings, Brass and Iron Castings of every description, Light and Heavy Forgings.

Alex. Fleck, Ltd. - Ottawa



BERGER
Monitor Transits & Levels
FOR USE IN MINES
C. L. BERGER & SONS
BOSTON, MASS., U. S. A.

J. M. CALLOW President
GENERAL ENGINEERING COMPANY
(Canadian Branch)
CONSULTING METALLURGICAL ENGINEERS
363 Sparks St. Ottawa, Ont.

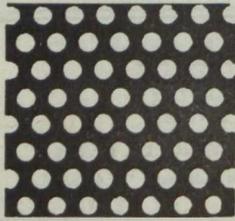
CALLOW PNEUMATIC SYSTEM OF FLOTATION
Complete Laboratory at 363 SPARKS ST., OTTAWA, ONTARIO, for the testing of Gold, Silver, Copper, Lead, Zinc, Molybdenum, and Other Ores.
HEAD OFFICE, - SALT LAKE CITY, UTAH, (U.S.A.)
New York Office, 120 Broadway

H. H. CLAUDET
Canadian Representative

PATENTS
TRADE MARKS AND DESIGNS
PROCURED IN ALL COUNTRIES

Special attention given to Patent Litigation
Pamphlets sent free on application

RIDOUT & MAYBEE
156 YONGE STREET, TORONTO, ONT.



PERFORATED METALS For Every and All Purposes in all Metals

Elevator Buckets (plain and perforated).
Conveyor Flights and Trough, also
General Sheet Iron Work.

HENDRICK MANUFACTURING CO., Carbondale, Penna., U.S.A.
New York Office: 30 Church St.

Deloro Smelting & Refining Co.

LIMITED

SMELTERS AND REFINERS OF

Silver Bullion

Cobalt Oxide and Metal

Nickel Oxide and Metal

Refined White Arsenic

“STELLITE” High Speed Tool Metal

Head Office and Works - - - - DELORO, Ont.
Branch Offices - - - - 200 King Street West, Toronto

MADE IN CANADA

STEEL WIRE ROPE

We are manufacturing Steel Wire Rope for all purposes, and have in Stock at each of our Warehouses a good assortment of standard sizes in Siemens Martins Steel, Crucible Cast Steel, Plough Steel and Extra Plough Steel Qualities.

We also manufacture and carry in stock all kinds of

Bare and Insulated Electrical Wire and Cable

Write nearest Office for Quotations.

Canada Wire & Cable Company, Limited

TORONTO

Telephone: Belmont 2300

District Offices and Warehouses:

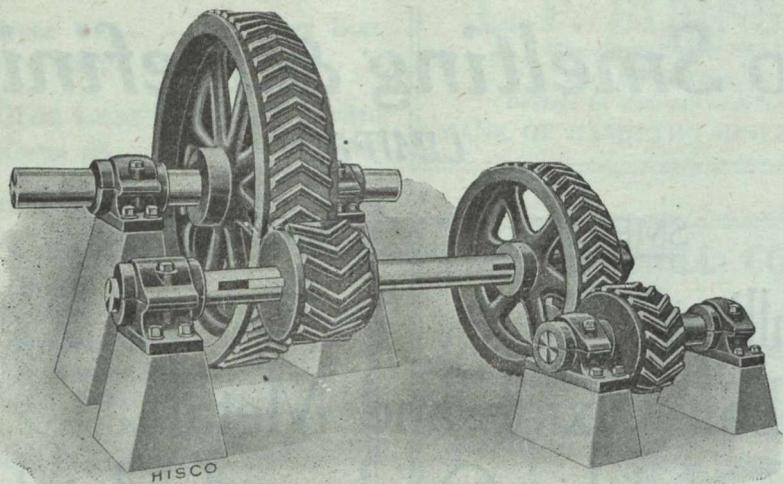
674 Barrington Street, HALIFAX

592 Notre Dame Ave., WINNIPEG

143 Beaver Hall Hill, MONTREAL

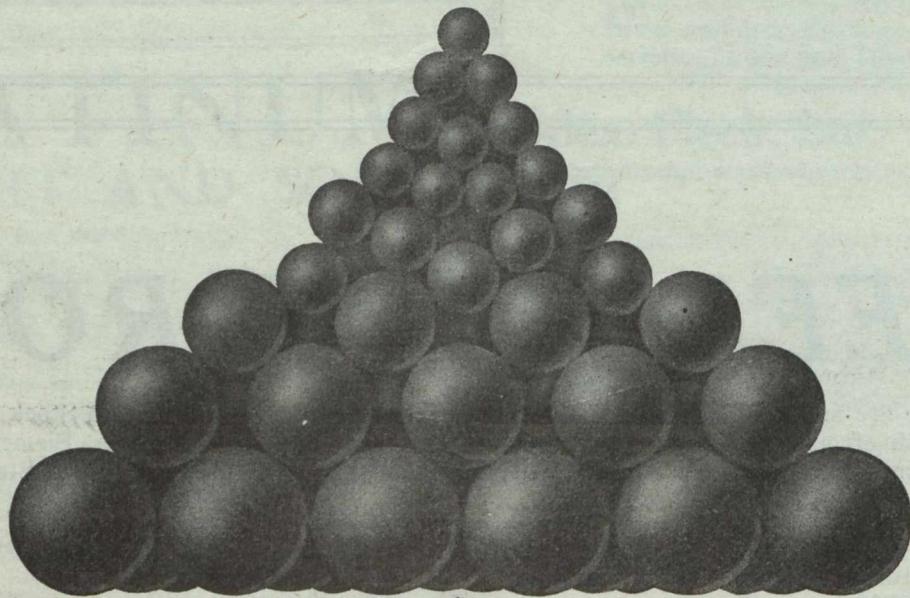
738 11th Ave. W., CALGARY

358 Water Street, VANCOUVER, B. C.



MACHINE MOULDED GEARS NO PATTERN REQUIRED

**Gears and Pinions, Chrome or Manganese,
Crusher Jaws, Concaves and Mantles, Chrome
Steel Shoes, Dies, Bossheads and Tappets,
Forged Chrome Steel Balls.**



**Sizes 3, 4, 5 and 6 inch carried in stock
Special sizes from 6 inch up, made to order**

Write us for quotations on your requirements

HULL IRON & STEEL FOUNDRIES, LIMITED

Makers of Mining Equipment

HULL,

CANADA

Canadian Mining Journal

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

VOL. XLI.

GARDEN CITY PRESS, 30th January, 1920
Ste. Anne de Bellevue, Que.

No. 4

CONTENTS

Pages 75 to 96.

Editorial:

The Provision of Pit Timber	75	Asbestos. Book issued by Asbestos & Mineral Corporation	85
The Legal Status of Workmen's Compensation Boards	75	The Rainy Lake Gold Area, Ontario. by J. J. O'Connor.	85
Lower Percentage of Mine Fatalities in British Columbia	76	British Engineers Visit Cape Breton Collieries & Steel Plants	86
Some Startling Facts About Canada's Forests Raw Material for Wood-using Industries in very serious Condition. By Frank J. D. Barnjum	77	Annual Meeting of the Canadian Mining Inst. Toronto	86
Bedford McNeill's General and Mining Code	80	New British Order of Permitted Explosives	86
Correlation of pre-Cambrian Formations By R. E. Hore	81	Northern Ontario Letter	87
Notes from the Meeting of the Geological Society of America. By Cyril W. Knight	81	G. W. V. A. at Cobalt ask special licensing privileges	89
Oil Possibilities in the James Bay Region	82	Toronto Notes. By our Staff Correspondent	90
Report of the Coal Mining Industry Commission, Province of Alberta, 1919.	83	A Reply to the Civil Service Commission, by L. Reinecke	91
Marked Decrease in the British Columbia Mine Fatalities during 1919.	84	Metal Quotations	91
		The Industrial Use and Limitations of Respirators, Gas Masks, and Oxygen Breathing Apparatus by A. C. Fieldner, U. S. Bureau of Mines	92
		The Microscopic Investigation of Coal	94

Published every Friday by The Mines Publishing Co., Limited, at the Garden City Press, Ste. Anne de Bellevue, Que. 'Phone 165.

J. J. Harpell, Managing Director.

A. S. Christie, Eastern Manager,
Room P-30, Board of Trade Building, Montreal.
'Phone Main 266.

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

F. E. Payson, Pacific Coast Manager,
507 Board of Trade Bldg., Vancouver, B.C.
'Phone Sey. 3920.

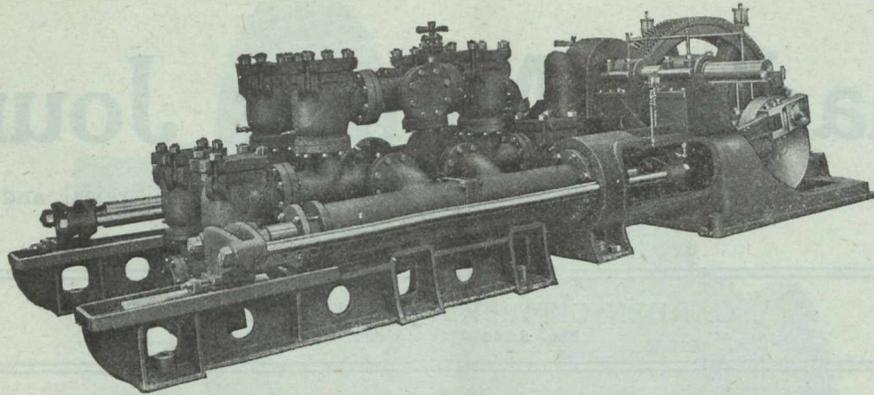
Changes in advertisements should be in the Publishers' hands ten days before the date of issue.

F. W. GRAY, Editor,
Ste. Anne de Bellevue, Quebec.

REGINALD E. HORE, Consulting Editor,
1403 C. P. R. Building, Toronto.

The editor cordially invites readers to submit articles of practical interest which, on publication, will be paid for.

Subscription to any address in Canada, United States and British Empire, \$5.00 yearly. Other countries postage extra. Single copies, 15 cents.



Gould Fig. 1612. Size 6 1/2" x 20". Double-Acting, Outside End Packed Horizontal Duplex Plunger Pump. For High Pressure Service

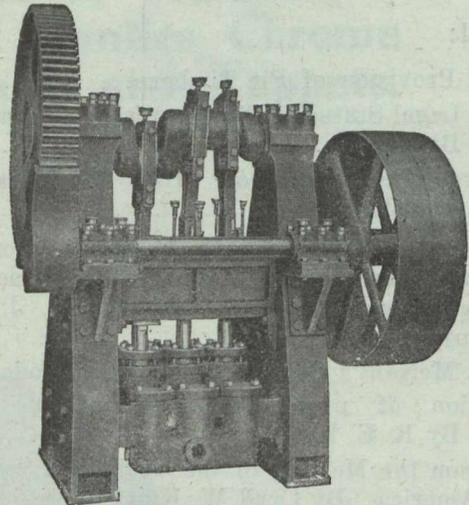
FOR General Water Supply, Municipal Waterworks, Oil Pipe Lines, and General Services, requiring high pressure and large capacities.

Capacities ranging from 155 gallons per minute at 1500 pounds pressure to 705 gallons per minute at 335 lbs. pressure. Complete data and description in bulletin 115. Copy on request.

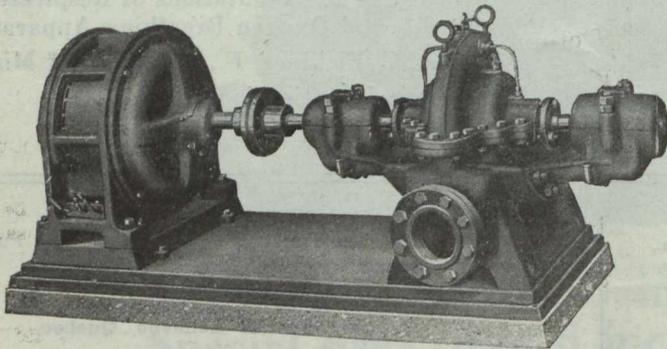
FIG. 1628. For general water supply, Municipal Waterworks, Mine Pumping, etc., where the total net head does not exceed 1305 feet. Made in six sizes, with capacities ranging from 9,360 gallons to 37,500 gallons per hour and for 140 to 565 pounds Working Pressure.

The Frame consists of two standards carrying the main bearings. Crank shaft is steel, accurately machined and the bearings are phosphor bronze. The gearing, Cylinders and valve boxes are charcoal iron. Cross-heads are fitted with adjustable bronze shoes which run in bored Guides. Connecting Rods are cast steel and the plungers cast iron, accurately machined.

Complete data and description in Bulletin 103. Copy on request.



Goulds Single-Acting Triplex Pump



Goulds Fig. 3030. Single Stage, Double Suction Centrifugal Pump, direct connected to an open type motor

FIG. 3030. For general water supply, hot water circulating in heating systems for irrigating, drainages, booster and mine service, and many similar services, where the total net head does not exceed 150 feet, the Goulds Single Stage, Double Suction Centrifugal Pump excels on account of the high efficiency obtained. 80 to 8000 gallons per minute, based on cold, clear water 150 feet head or 65 pounds pressure.

Complete data and description in Bulletin 110. Copy on request.

GOULDS PUMPS FOR EVERY SERVICE

COMPLETE SET OF BULLETINS ON REQUEST

THE CANADIAN FAIRBANKS-MORSE CO. Limited

St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg,
Saskatoon, Calgary, Vancouver, Victoria.

EDITORIAL

The Provision of Pit Timber

The relation between lumbering and mining has always been very close in Canada, and the subject is at this moment one of keen debate in Northern Ontario.

The branch of the mining industry preeminently interested in the timber supply is that of coal-mining as a suitable and moderately priced supply of timber for the support of roof and sides in coal-mines is a first consideration. This was well evidenced by the position of the coal-mines in Britain during the war, and the scarcity of suitable pit-timber is one reason why much attention is now being paid by French and Belgian and British colliery owners to the possible substitution of concrete as a roof support in coal-mines. For certain purposes, however, no really satisfactory substitute has yet been found for the timber pit-prop, although the greater use of structural materials in collieries is probable.

In Canada, the districts most interested in a supply of suitable pit-timber are the prairie coalfields and those of Nova Scotia, in particular the coal-mining districts of Cape Breton Island. As the coal-mining companies of Nova Scotia are now most heavily interested in timber lands, there is for the Nova Scotia coal-mining industry at any rate, matter for thought in an article on Canadian forests by Frank J. D. Barnjum, which is reproduced from "Pulp and Paper" in this issue of the "Journal."

Singularly, however, the timber lands owned by the coal and allied steel companies of Nova Scotia, do not contain quite the growth that is most suitable for pit timber, or more specifically, for pit props; as the timber on these lands is of comparatively large growth, and has been acquired by the companies referred to more as a reserve for general lumbering purposes than for the supplying of pit props. For example, the lands owned by the Dominion Steel Com-

pany in New Brunswick furnish board lumber, shingles and a large amount of barrel staves and package lumber for the shipping of nails and small-sized steel products. The very valuable lands in southeast Nova Scotia, controlled by the Dominion Steel Corporation, through its control of the Cumberland Railway and Coal Company, constitute one of the best general lumber reserves in Nova Scotia, from which such sizes as standard-gauge and pit-gauge sleepers are produced, together with heavy pit-timber and booms. The lumber properties acquired by the Nova Scotia Steel Company and recently largely increased by the purchase of the Rood, McGregor interests, are intended to provide lumber for car-building primarily.

Mr. Barnjum's article points out very conclusively the disappearing quantity of spruce timber in Eastern Canada, which he regards with trepidation because of its effect upon the life of the pulpwood industry. The growth that is suitable for pulpwood is precisely the growth that is required to furnish the ordinary pit-prop, and the coal-miner is, we believe, just as entitled to express concern at the prospect for pit-prop supply. The spruce of Northern Cape Breton is a small tree, of slower growth than in the districts mentioned by Mr. Barnjum, its habitat develops just those qualities of toughness and strength that are desirable in a pit-prop. The supply of pit-props in Nova Scotia has been steadily growing more restricted in Nova Scotia for some years past, and the cost has, of course, increased very rapidly, and is likely to increase with even greater rapidity in the future. The provision of a future supply of pit-timber is therefore a matter that interests coal miners in Nova Scotia very vitally, particularly in view of the likelihood of an enlargement of the number and extent of longwall extractions as the deeper and thinner coal seams are attacked.

The Legal Status of Workmen's Compensation Boards

Many surprising things have in recent months come out of Manitoba, but nothing more upsetting than Mr. Justice Mather's recent judgement that the Workmen's Compensation Board of Manitoba is a court, and that its constitution is *ultra vires* of the powers of the provincial government of Manitoba.

Mr. Justice Mather's judgment seems to touch the

vital fact that lies at the bottom of our modern conception of workmen's compensation, which is that compensation for injuries sustained in and arising out of the course of employment is an inherent right of the workman, and therefore not subject to adjudication in a court of common law. This is why the recourse to common law proceedings is debarred by the

Workmen's Compensation Act of several of the provinces. It has been suggested that in Manitoba Mr. Justice Mather's judgment can be made to harmonise with the powers of the Provincial Legislature, and that the existing law can be made *intra vires* by an amendment giving an injured workman the power to elect whether he will submit his case to the Commissioners of the Workmen's Compensation Board, or will proceed under the common law; but while such an expedient might assist in the situation created by the recent judgment, it would strike at the root principle of the most approved and certainly most helpful system of disbursement of workmen's compensation yet devised.

If the Manitoba Act is *ultra vires* of provincial powers so are the acts of Ontario, Nova Scotia and British Columbia, and very large sums of money, touching the lives of thousands of dependents are involved.

The following opinion by a Winnipeg lawyer, taken from the Winnipeg "Free Press," seems not only to put the matter very clearly, but to indicate that the latest ruling on a novel point may not be sustained on appeal. The opinion referred to is as follows:—

"The effect of Chief Justice Mathers' ruling that the Workmen's Compensation Board is a court will simply be that the Dominion government will have power to appoint the members of the board, and that the province cannot appoint them as in the past.

"The same point arises in connection with the public utilities commission.

"A view contrary to that advanced by Chief Justice Mathers has been held by many authorities, and this is that Workmen's Compensation boards are essentially administrative bodies vest-

ed with incidental judicial attributes to enable them to pursue a simple and efficient course of administrative work, and that such boards are not courts because they are invested with some of the formal functions of judicial tribunals. The board is, according to this view, simply exercising such powers as the legislature itself might exercise, but which for convenience the legislature has delegated to the board."

There is another side to the general question of workmen's compensation, namely, that a unification of provincial laws, the adoption of a common scale of compensation, pensions and reserves, and a coordinated scheme of administration is likely to be one of the developments of the future. Already, the Workmen's Compensation Boards of the different provinces have formed an association for the study of these matters, and it will also be recollected that a unification of compensation acts and compensation rates was unanimously recommended by the Industrial Conference held in Ottawa last September. Mr. Justice Mathers' judgment is not likely to affect the enlargement of the general principle of workmen's compensation, and its delivery at this juncture will in the long run prove helpful, pointing out as it does some of the very wide powers that have been vested in Workmen's Compensation Boards, and indicating the possibility that the future may bring with it the necessity for federal supervision. As a practical instrument for the equitable disbursement of workmen's compensation, in the most economical manner and with the maximum avoidance of legal assistance and reference, the Workmen's Compensation Boards have proved their striking usefulness, and their retention—with some possible modification of their powers—may be assumed as very probable.

Lower Percentage of Mine Fatalities in British Columbia

Our Victoria correspondent reports a gratifying decrease in the rate of mine fatalities in British Columbia during 1919. There is always a certain reluctance on the part of miners to note the absence of fatalities or their decrease, for reasons that are understandable, but not quite explainable to those who are outside the freemasonry of the miners' craft. The time when fatalities are decreased is precisely the moment when watchfulness should be increased, for in mining, as has been said of politics, eternal vigilance is the price of safety. With this reservation, the record of British Columbia mines during 1919, is one on which the industry and those who govern it are to be congratulated.

The Editor during a hurried visit to a few of the Vancouver Island collieries, was most favorably im-

pressed by the attention which is paid to first-aid and mine-rescue work and the inspectorial system of the Province, so far as it was possible to judge by hurried observation, seems to be both well staffed and well regulated. The coal-seams comprised within the Province of British Columbia are distinguished by a remarkable variety of geological occurrence; and the differing character of the mine gases, both as to quantity and composition is a circumstance that seems to have been well noted by the authorities. The little vest-pocket manual on the height of gas-caps, which was noted in the "Journal" of 24th December as being issued by the Department of Mines, is one indication of the interest which is taken by the Department of Mines in the education of the miners with regard to the peculiarities of the local mine gases.

Some Startling Facts About Canada's Forests

Raw Material for Wood Using Industries in a Very Serious Condition

By FRANK J. D. BARNJUM, Annapolis Royal, N. S.

(From "Pulp and Paper.")

Mr. Barnjum is not a stranger to Montreal as it is the city of his birth, being a son of Francis E. Barnjum who came to Canada from London, England, in 1856, and a nephew of Major Fred S. Barnjum who was one of Montreal's best known citizens forty years ago.

Mr. Barnjum's business career began with the firm of Taylor Brothers, in the old Union Building on St. Francis Xavier St., as office boy. He later moved to Maine, where his first timberland purchase was made twenty-eight years ago and from thence to Nova Scotia, where he has been largely interested for the past twenty years.

* * *

The time has now fully arrived when an embargo or export duty should be placed on the large amount of fee land wood that is being shipped across the line from the principal pulpwood producing provinces of Quebec, Ontario and New Brunswick. (Pulpwood exports from Nova Scotia are practically negligible, amounting to only 770 cords in 1917, the last Government report available.)

These provinces now have enormous investments in pulp and paper mills which are increasing in number every year, and it seems incomprehensible that the owners and security holders of these splendid monuments to Canadian industry and brains should longer sit idly by and allow this steady stream of raw material to slip away from their very mill doors. The consumption of pulpwood in Canada has reached such enormous proportions that a halt should be called in such suicidal policy.

Surely Mr. Phillip T. Dodge, President of the International Paper Company, who is in a position to know better than any other authority, sounded a sufficient warning to Canada when he made the statement that the pulpwood supply of the Eastern States was practically exhausted and that they must look to Canada for their future supply.

There are two ways that the shipment of this wood can be prevented, one is by an embargo or export duty created by the Provincial governments, and the other is by a combination of the Canadian mills purchasing all this fee land wood year by year and making a division of the same on a basis of the shortest rail haul to the various mills.

The settler and farmer will also be benefited as with this wood all manufactured in Canada he will have a market nearer home, not only for his wood but a bigger and better market for his farm produce as well.

To offset the tremendous loss of standing timber caused by the spruce bud worm in Canada during the past two or three years, no paper mill should cut a living growing tree on its own limits just as long as it can buy a cord of this fee land wood that is daily crossing the line, simply cutting the burned and blown down timber and salvaging such worm killed timber as is economically possible.

I am not cutting a tree on my own lands while I can buy a cord of wood; notwithstanding the fact that I have the largest amount of standing timber of any pulp company in Canada, based on the capacity

production of my mills, and to which holdings I am adding as rapidly as possible.

The million or more cords of wood that is being annually shipped to the United States, returning only about 15 million dollars, if made into pulp and paper here would not only enrich this country to the extent of more than eighty million dollars per year, but would prolong the life of all of our pulp and paper mills a period of at least five or six years beyond their present expectancy.

This large additional income is doubly important in view of the unfavorable trade balance between the two countries, and would to a large extent help to correct the present deplorable condition of exchange.

Canada is in a very independent position as the United States simply must have our paper—she has no alternative. Newsprint cannot now be landed in New York from Scandinavia for less than \$170 per ton, 8½¢ per pound, and even then only in limited quantities. Our production has increased to such an extent that we are now producing a total of 800,000 tons of paper per year, which is very nearly half the consumption of the United States, and we shall very soon be producing much more than half, owing to the fact that many of the American mills will be forced out of business from lack of a wood supply. Strange as it may seem many of their mills do not own an acre of timberland. With the exception of the Oxford Paper Company, and the Great Northern Paper Company, the larger mills in the United States own timberlands which will provide a supply adequate only for a very few years. The greatest asset the paper companies have today who own timberlands, is their raw material supply. But the American mills should be stopped from drawing the life blood of our Canadian wood using industries. They can find no fault with such action as self preservation is the first law of nature and I am very sure if the case were reversed the American mill owners would have taken this action long before this. However friendly neighbors may be, it is hardly reasonable to expect the mill owner in one country to allow the raw material to be removed, almost from his mill yard, to supply the mills of another country with the possible closing down of his own industry.

Some may question the power of the provincial government to act, but the highest legal tribunal of the State of Maine ruled that it was constitutional for a state to regulate even the size of the trees a man may cut on his own private land. Anyone who bought land in this country bought it subject to the laws then existing, as well as to any regulations that might be imposed in the future.

Annual Increment Leaves a Net Loss.

The wood resources of Canada have been so grossly exaggerated that very few are aware how meagre our supply of available wood really is. I have spent a large portion of the past few years in a personal investigation of the Canadian situation, the results of which are so alarming that I have refrained from publishing my findings.

The theory of an annual growth that has been indulged in so freely in the past has simply become a

popular delusion. There is, of course, a gross growth, and a net growth under some conditions, but to offset this the annual wastage by fire, wind, insects and fungi, taking the country as a whole, far over-runs the gross growth. Consequently we are simply consuming our capital year after year.

If anyone has any question as to the enormous amount of this wastage, let him explore the woods of Ontario, Quebec and New Brunswick, where one can travel day after day and see nearly everywhere the vast destruction caused by the spruce bud worm alone. There are millions of acres in these provinces where over fifty per cent of the standing pulpwood has been completely destroyed.

To emphasize further this question of growth, it is only necessary to refer to the recent reports on the growth in some sections of Quebec, which show only about 30 board feet per acre, meaning about one 6 inch tree per acre per year. It has never been disputed that there is no actual accretion in virgin timber as the mortality more than offsets all growth. Furthermore, even in cut-over land when one realizes that it is only necessary to have an average of one ordinary sized tree per acre per year blow down, how easy it is to see that the annual growth is wiped out by this one process of destruction. I have seen thousands of acres laid flat by wind, not only in cut-over lands but also in so-called virgin stands. So much for wind.

Now with regard to the losses from forest fires, the spruce bud worm, borers and fungi. The figures are so appalling that I dare not commit the result of my findings to print, but these losses are so enormous that no one who is sincere will attempt to deny that they far over-balance any annual growth that there is in Canada or the United States. Cut out this mythical annual growth theory and what are we doing? As I said before, we are simply using up our capital.

One often sees the statement in print that we are "using more than three times our annual growth," while in fact, as previously stated, there is no annual growth to use, for the reason that enemies of the forest, cited above, destroy much more than the growth.

The timberland owner has the satisfaction of knowing that even if he has lost one half of his standing timber, by the ravages of the spruce bud worm, still what he has left is worth double the previous price per cord, as the destruction is country wide, and the consequently diminished supply will necessarily create an immediate and substantial advance in land and stumpage prices.

If some of the paper mills of the United States had not gone so far afield for their wood last year by invading the more remote sections of Ontario and Quebec, where the freight alone amounted to \$16.00 or more per cord and accepted wood down to a diameter limit of one and one half to two inches, they would be short of wood to-day.

Logging by Aeroplane—Not Yet.

In some of the wild estimates of our supply of standing timber made in the past, they have simply taken the map of Canada, determined the number of square miles, and arbitrarily figured so many cords per acre. Now as logging by aeroplane has not been perfected as yet, there are only two ways you can get out wood, namely, by river or railroad. About all the more important rivers of Canada have been logged on and driven, from the very earliest days. Many of them have been practically stripped or cut out, while others are being operated pretty well back to their head-

waters, so far remote that it takes two years or more to drive logs to the mills.

In the case of the railroads the condition is pretty much the same with the exception of possibly the Transcontinental, but inasmuch as this road was built beyond the height of land, there is very little wood available north of this road, as the rivers all drain away from it towards Hudson Bay. This leaves only the territory that lies south of the railroad, but as sawmills are springing up along this line, like mushrooms over night, and as fire is taking a heavy toll in this section, the paper mills will derive only a small supply from this source. Every time a railroad is built in a wooded country, more wood is burned up than is hauled out.

When talk is made about obtaining pulpwood from the cold northern sections that have not been opened up, where it takes 150 years to grow a four inch tree, where the snow falls to a depth of 15 feet and the thermometer registers 50 below zero, it will be only when pulpwood has reached a price more than \$75.00 per cord. We hear Alaska suggested as a possible field for the making of paper, but all of the above handicaps apply to this section, except along the coast, as well as the fact that it is 4000 miles distant from the large paper consuming market.

All anyone needs to know is that in the United States more than 5,500,000 cords of wood are used annually for pulp alone, in order to realize that this appalling shrinkage in our capital stock of standing timber must necessarily all too soon wipe out the remaining supply.

Beyond Conception Is 5½ Million Cords

I want the reader to pause a moment when he reads this paragraph, five million five hundred thousand cords—not feet, but cords, used every year in the United States for pulp, and principally in the Eastern and Middle States. Few can realize just what this really represents, but to try and make this comprehensible, it means a solid pile of four foot wood, twelve feet high reaching clear across the continent, or a pile four feet high, nine thousand miles long, and yet we may travel for days on the railroads and hardly see a spruce tree. Personally I should not want to take the contract to furnish this amount for even one year, and where is it to come from after the next ten years?

Imagination can hardly grasp the real significance of the terrifying estimate of the annual consumption of all wood products in the United States, namely 244 million cords. Even this estimate of consumption is doubtless conservative, as it is impossible for the Government to obtain complete reports of all actual production.

Tremendous Losses by Fire.

In addition to this enormous amount that is being cut, fire is taking a terrible toll as well. Over a billion feet of timber was destroyed this present year in just one State—Montana. This means two million cords or nearly half the entire amount consumed for pulp in one year, destroyed by the fire fiend in one state. Last year the same thing happened in Minnesota, and this same thing has been going on since this country was first settled and to such an extent that 75 per cent of the original stand of timber has been destroyed by this same cause, and yet some authorities will still talk of an annual growth.

It is a curious fact that some of the coldest sections are the most prone to fire, such as Newfoundland, British Columbia, Northern Ontario, Northern Quebec, Minnesota, Alaska, etc. These fire zones are just as well defined as land and water.

Increase in Consumption Overlooked.

In many of the estimates that have been made as to the length of time our standing timber will last, the important question of the increase in consumption is quite overlooked, and as showing what an important factor this is, I will simply cite a 5 year period in the St. Maurice Valley, where the increase amounted to 200%, or at the rate of 40% per year.

Thus far I have largely discussed principally the pulp-wood consumption, and yet when you add to this the extraordinary demand we have in sight for lumber for new construction the world over, it simply adds to the danger that is facing this country from a premature exhaustion of a supply of raw material for our magnificent paper mills, which today are the second most important industry in Canada, and which with a proper and judicious guarding of our raw material, will shortly occupy first position.

The paper mills which have a wood supply will make large profits in the future, as there are so many American mills which have no supply of their own and will be forced out of business on that account, which will make a continued shortage of paper from this time on. Furthermore, no government can for any length of time, interfere with the natural law of supply and demand, or make a spruce tree grow in less than 50 to 75 years.

As showing what effect lumber and other products of wood may have on the price and scarcity of pulpwood, I will simply note that in some sections, owing to the abnormally high price of laths, pulpwood is being sawn into laths netting from \$30.00 to \$35.00 per cord for the wood at point of shipment.

Prophecy Has Come True.

In an article which I wrote three years ago when the publishers were complaining of $2\frac{1}{4}$ cents paper, I then stated that the question of the future would be not one of price, but of obtaining paper at any price.

That prediction has already proved only too true in a much shorter time than I anticipated.

I have devoted the past 28 years to the study of the one subject of timberlands and wood supply, and during this period I have seen lands go from \$1 to \$15, \$20 and up as high as \$50 per acre for the same lands; and stumpage go for \$1.50 for a mark of logs that only took 4 to the thousand, to a price of \$20 per 1000 for a mark of 12 to the thousand; pulpwood from a low price of four dollars to a high of thirty-two dollars per cord, and spruce lumber from a low of twelve to a high of sixty dollars per thousand. Stumpage in New Brunswick even has been sold as high as \$15 per thousand during the present year.

In 1890 they were cutting trees that took not more than six or seven to make a thousand feet of lumber, while to-day they are cutting to such a small diameter limit that in many sections it takes 40 trees to make a thousand feet. I saw one pile of wood out on the Transcontinental containing 4000 cords, where the largest stick was $4\frac{1}{2}$ inches and from that it ran to $1\frac{1}{2}$ inches, with the average size running under 3 inches.

In one section of the Pacific Coast where the United States Government estimate a stand of eighty-six

billion feet, the highest authority in the timber cruising line, and one who knows more of that particular section than any other man, from actual cruises says the figure 8 wants to be dropped, as there is not over 6 billion at the very most. Another example I have in mind is a certain territory which was estimated to contain 25 million cords of pulpwood and where, after operating 7 or 8 years, and cutting out only about 250 thousand cords, all the available wood was cut, and at a severe loss, so that further operations of the property was abandoned.

I have in mind another limit that had been estimated to contain 16 cords to the acre, that was examined by a very competent cruiser, who found it ran nearer 16 acres to the cord, as he expressed it. I can cite several cases where the shrinkage in estimates are just as striking as those above enumerated.

In connection with this phase of the subject, I cannot help thinking of the reply an old lumberman made when at one of the Canadian Forestry meetings in Montreal. The question of shortage in supply was being discussed, and one of the members suggested that we did not know what there might be for timber in the unexplored regions. The old lumberman replied that "in any section that the Canadian lumbermen did not know what there was, there wasn't anything."

More Attention to Mills than Materials.

The great trouble with the paper mills in the past has been that the management have been devoting their whole thought and time to speeding up their paper machines, installing new and improved machinery, and improving their water powers, all of which is of course, very desirable; but while they have been doing this they have lost sight of the most vital question, viz. a supply of raw material to keep these mills running.

The newspaper publishers are not without blame for the present shortage in newsprint, for every time they have fought a legitimate advance in price, they have made it more difficult and expensive for the mills to do business, especially under Government control and regulation, and with regard to price it is not nearly as surprising that newsprint has advanced from 2 to 4 cents per pound and higher than it is that eggs have advanced from 25c to \$1.00 a dozen. A hen can be produced in a year, while these trees that are being made into paper have taken from 75 to 250 years to grow, and as they are becoming more and more remote from the mills, must necessarily become more costly to procure. Think even of the cost of toting supplies back into the woods, a distance of 70 miles, the cost of which in many instances, amounts from \$50 to \$60 per ton for haulage alone!

Newspapers must accept the inevitable, as all other legitimate lines of business have done, and simply pass the cost along by increasing the price of their papers and their advertising rates. The newspaper has become a public necessity—no one will do without it to-day, and papers will sell just the same, whether the price is, 2, 3, or 5 cents per copy. And when the paper mills are forced to use some annual crop as a substitute for trees in making paper (which time is not far distant) paper instead of costing 4 cents per pound will cost 24 cents or more. So far as the American publishers are concerned, it is of course immaterial to them whether newsprint comes from Canada or the United States, so long as they are assured of a paper supply while the trees last.

When the public begins to realize that this timber, which is being cut today as if it were an annual crop, has been growing from 75 to 250 years, and the only way it can be reproduced is by re-planting, planting with the present high cost of labor amounts to a matter of \$12 to \$15 per acre, to which must be added the cost of the land, which is from \$3 to \$10 per acre, something will be done. This brings the cost per acre of these plantations of tiny little seedlings from \$15 to \$25, with an annual charge for interest, taxes and fire protection for at least a matter of 50 to 75 years before another crop can be harvested.

In addition to this there is a possible loss from fire and the spruce bud worm, and other enemies; for it must be borne in mind that fire is always with us, and the bud worm returns in cycles of from 20 to 35 years, and further, that each recurrence, as the lands become harder cut, increases in violence.

Imminent Increase in Price of Timberland.

As soon as the above facts are absorbed, as they are beginning to be quite rapidly at the present time, timberlands will be selling on a much higher scale than they are to-day, and my prediction is that the biggest rise in timberland values that has ever been known, will take place within three years.

There is not a commodity in the world that is selling so much below its real value as an acre of timberland to-day. Think of a crop that has been 50 to 250 years growing, and that under most favorable conditions will take from 50 to 75 years to reproduce with all the attendant risks, and an actual cost of \$75.00 to \$125.00, selling today at \$10 to \$15 per acre for land and all, while an annual crop of cereal or potatoes brings from \$15 to \$100 or even more per acre, above cost of planting and harvesting, and without the land.

How to Remedy this Situation.

It is far better to look this question of a rapidly diminishing timber supply squarely in the face and try by practical methods to put off the day of reckoning as long as possible, and I advocate the following remedial measures:

An active campaign of education carried on by literature, and illustrated lectures, so as to reach all timberland owners and the public in general.

The creation of a strong public sentiment by various methods, so as to establish a greater appreciation of the value of forests to all, and a desire on the part of the public to help actively in preventing forest fires.

Improvement and enlargement of the present fire protective service.

Reforestation on a large scale by Governmental appropriation, regardless of cost.

Burning of slash under certain conditions and in certain cases.

Change the present wasteful methods of logging by a closer supervision of woods operations by intelligent practical foresters.

An embargo or export duty on raw material taken from fee lands; or the

Annual purchase of fee land wood by a combination of all the Canadian mills.

I will personally subscribe ten thousand dollars to the Canadian Forestry Association, if each of the other pulp and paper mills in Canada will subscribe a like amount, to be used in carrying out the work outlined above, under the direction of an Executive Committee

to be appointed by the subscribers to the Fund. This will give us a fund worthy of the name and will enable us to do some real work.

I am giving freely of my time and money towards an educational campaign along these lines, as I feel that it is the duty of every Canadian citizen to do everything in his or her power to safeguard, preserve and perpetuate our forest resources as they are the backbone of our country.

Reforestation Will Help

With regard to reforestation, I am glad to note that the bud worm has not invaded this part of Nova Scotia owing largely to the fact that it is practically all spruce, the amount of fir being almost negligible, and probably also to the fact that the spruce is of such a sound, vigorous and rapid growth. I presume that the quality and growth here is due to the fact that the soil and climatic conditions are ideal for spruce growing, the amount of precipitation being very great. Records at Halifax covering a period of 35 years show an average annual rainfall of 57 inches.

I have a sample section of red spruce tree in my office that shows a growth of 20 inches in 20 years, an inch a year in diameter. That is of course abnormal, but it is a fact that spruce makes the most rapid growth here of any section on this Continent, which hints at possibilities in reforestation that are not applicable elsewhere. This phase is well worth the serious consideration and careful investigation of the Canadian Forestry Association.

In the old days when railroads were first built in Nova Scotia and timberlands were of little value and there was no such thing as fire protection, this Province shared the fate of the rest of Canada and vast areas were destroyed by fire, but this is a thing of the past, as Nova Scotia has to-day one of the very best forest fire protective systems, and her citizens are thoroughly alive to the fact that timber is one of the most important assets.

BEDFORD McNEILL'S GENERAL & MINING CODE.

The well-known Bedford McNeill's Mining & General Code was for some reason not one of the permitted cable codes during the War. The prohibition on the use of this code has now been removed, and it is possible to use it again in cabling any English-speaking country. Those who have had occasion to use McNeill's Mining & General Code can best appreciate its adaptation to the needs of mining men. The code words themselves are sensible, being combinations of ordinary English words, and not, as many codes are, puzzling aggregations of unpronounceable consonants. Bedford McNeill himself died during the war as a result of exposure on war duty, but his widow survives him, and needs the revenue derived from the sale of the code.

W. R. INGALLS SEVERS CONNECTION WITH "ENGINEERING AND MINING JOURNAL"

The latest issue of the Engineering and Mining Journal announces that Mr. W. R. Ingalls, who was for many years Editor of this periodical, and has for a short period acted as Consulting Editor, has now severed his connection with the "Journal" and will devote his whole time to professional work.

Correlation of Pre-Cambrian Formations

By R. E. HORE.

As mining development and geological study go on new information is constantly being obtained concerning the geology of the Lake Superior regions. As the metal production of the Lake Superior states comes almost entirely from pre-Cambrian formations, those who explore Northern Ontario and Manitoba, also pre-Cambrian areas, benefit by the work done in the United States. An endeavor has been made by geologists of both countries to correlate information gathered by numerous workers and there has resulted a certain degree of uniformity in nomenclature. Contemplated changes in nomenclature in the United States are therefore of interest to some of the readers of this journal.

Classification of rock formation is properly based upon observed facts. As more and more new observations are recorded it becomes from time to time advisable to modify any classification. An attempt, however, has been made to leave undisturbed as long as reasonably possible the classification adopted by the U. S. Geological Survey for the pre-Cambrian formations of the Lake Superior States. Two geologists well known in Canada—Van Hise and Leith—are largely responsible for the classification used advantageously for several years past.

Other workers in the same region have made many observations which satisfy them that the classification adopted by Van Hise and Leith needs modification. There is a difference of opinion, however, as to the advisability of making radical changes in the accepted correlation. R. C. Allen, State Geologist of Michigan, proposes that revision should be made at once and presented his case before the Chicago meeting of the A. I. M. M. E. in September last. In the January 1920 bulletin of the Institute there are published some contrary opinions.

Whether changes are made by the U. S. Geological Survey or not the discussion will help to make it clear there are likely to be found difficulties in applying the classification used by U. S. Geological Survey. Studies in new areas and new studies in old areas show the necessity of keeping an open mind when undertaking to determine structural relations in our mineral areas. Existing classifications are useful if used, as Mr. Hotchkiss advises, merely as a starting point for detailed work. It is questionable, however, whether revision, as advocated by Mr. Allen, would not give a better starting point for new work, as well as give an opportunity for correcting inaccuracies in old descriptions.

In Ontario an attempt has been made to correlate some pre-Cambrian formations in widely separated areas, but it is recognized by the Bureau of Mines' geologists that it is wise to avoid general use of the names adopted for some of the formations in the areas first studied here and in Michigan. A few areas have been mapped in detail and local names are largely used. Thus at Cobalt there is a mapped area which serves as a basis for geological study for many miles of surrounding country. At Porcupine, Kirkland Lake and Sudbury there are other mapped areas which also serve as key areas. Correlation of the formations in any of these areas with those in the others and with those of Lake Superior is full of uncertainties and is fortunately of much less consequence

to the mining industry than is the determination of the structural relations in the individual areas.

It is of course important that from time to time an attempt should be made to correlate facts observed in all parts of the pre-Cambrian, but so long as there is much uncertainty in correlation, the use of local names is preferable.

One of the reasons why the writer would be pleased to see the U. S. Geological Survey adopt Mr. Allen's proposal to revise the classification of the pre-Cambrian in Michigan is that readers of governmental reports often fail to appreciate the conditions under which reports are written. The geologist gets together all the known facts and attempts to classify them so as to permit a better understanding of them. His conclusions are not final, but should serve as working hypotheses. To be used successfully they should be taken for what they are and revised promptly when new observations show the need. For experienced geologists like Hotchkiss and Allen the revision of the Van Hise-Leith classification is quite unnecessary, for they know its limitations, but for many who seek information about mineral-bearing rocks a more up-to-date working hypothesis should be provided.

INTERESTING NOTES FROM PAPERS READ BEFORE GEOLOGICAL SOCIETY OF AMERICA—BOSTON, Dec. 29th.

By CYRIL W. KNIGHT.

That the Kennecott copper company in Alaska have 220,000 tons of copper ore blocked out in a glacier was one of the interesting pieces of information given out during the Boston meeting of the Geological Society of America which was held December 29th to 31st. This information was presented in a brilliant and notable paper on the geology of the ore deposits of Kennecott, Alaska, by Prof. M. Bateman, of Yale University. Prof. Bateman showed that the occurrence of the copper ore in the glacier is easily explained. The ore body proper occurs on limestone on a mountain. As erosion proceeded, blocks and fragments of the ore were carried down the side of the mountain into the valley and became incorporated in the glacier in great enough quantities to form a mixture of ice and ore sufficiently rich to mine at a profit. The Kennecott copper company is the only concern in the world which is carrying on such unique mining operations.

There were many other papers of interest presented at the meeting of the Society, one of the most noteworthy of which was an account by the President, I. C. White, of some results of deep drilling in the Appalachian oil and gas fields. It is probably not generally known that the deepest well in the world has been drilled in West Virginia. It reached a depth of 7,579 feet. Unfortunately at that great depth the rock caved, on account of the fact that no casing was used in the lower parts, and the hole had to be abandoned. The drillers had, however, arrived to within 600 feet of their objective—the Clinton Medina sand, in which oil and gas was expected to be tapped. The company which drilled the hole gave generous facilities to the United States government in connection with the accurate determination of temperatures at various depths in the hole. It was found that at a depth of 7,500 feet the

temperature was 168 degrees Fahrenheit. While this well ultimately proved a failure, because drilling operations had to be abandoned, nevertheless another well has been started to tap the same horizon, and this time the company is taking no chances, and will therefore ease the hole to the bottom.

In connection with the work of the staff of geologists attached to the American army in France, during the Great War, some curious information was obtained by Colonel Brooks, who was in charge of the geological staff. Among other things Colonel Brooks was able to prove that the German army used divining rods in their attempts to obtain water behind the lines for drinking or other purposes. Documentary evidence is in the possession of the United States government that this superstitious and mediaeval method of finding water was in use by the Germans and that lengthy reports were made regarding the results obtained.

OIL POSSIBILITIES IN THE JAMES BAY REGION.

Of interest in connection with the development of northern Ontario is the possibility of the occurrence of oil in that part of the province lying south of James Bay. Although shales and limestones of Palaeozoic age have long been known to underlie this area, the age, succession and structural features were little known. In order to ascertain the oil possibilities of these sediments Dr. M. Y. Williams of the Geological Survey made a study during the summer of 1919 of the exposures along Mattagami and Abitibi rivers. In summing up the results of his investigations Dr. Williams states:

Extensive basins of sedimentary rocks of Palaeozoic age or later are commonly found to contain oil accumulations, which may or may not be indicated by oil seepages or springs. The extensive Palaeozoic area to the south and west of James and Hudson bays, is known to contain formations of the same age as oil-bearing formations elsewhere, but to date no oil seepages are known to occur. Owing, however, to the long period of weathering along the rivers, which may have dissipated any oil formerly present, and to the heavy burden of clay, silt and muskeg moss which covers the interstream areas, the lack of observed oil seepages is not to be wondered at.

The Trenton formation outcrops on the Nelson and Churchill rivers, the Niagara on the Nelson, the Albany and the intervening rivers, and the Salina and the Onondaga ("Corniferous") on the lower Albany river and the Moose river with its tributaries. From analogy with other occurrences, these formations may be expected to contain oil. Economic accumulations, however, may only be looked for where there is an impervious cover to retain oil in the formation, and where the structure of the formations is favourable for oil accumulation.

In this region drained by the Moose river and its tributaries, the Onondaga limestone and the Salina shales are known to occur, but the Niagara and Trenton have not been observed, although they may be present beneath the outcropping formations. The Salina is not generally oil-bearing, but some of the lower dolomitic beds of this formation contain large quantities of oil in parts of southwestern Ontario, notably in Tilbury Township, Kent county. As the Salina consists of alternating shales and limestones, it is probable that suitable cover is present for any oil-bearing horizons which may be present. The Salina formation as a whole is generally well covered by younger formations.

The Onondaga limestone, which has been the most uniformly productive formation of southwestern Ontario, outcrops at the surface over wide areas, as already described, and for that reason an impervious cover is generally lacking. In the vicinity of the Long Rapids of the Abitibi river, and about 4 miles above the Long rapids of the Mattagami river, the Onondaga is covered in part by impervious shales. The areas known to be covered, however, are comparatively small and unless larger areas occur beneath the interstream regions in the vicinity, it is scarcely likely that extensive accumulations of oil are present in the Onondaga. The shale areas, however, probably indicate the deepest part of the basin (that is the greatest accumulation of sediments) and consequently a suitable location for testing the lower formation.

The structure in the Long Rapids region of the Abitibi river consists of a well-marked series of low folds, the major anti-clines being represented respectively by the limestone areas near the head and the foot of the Long rapids. The axes appear to extend north about 65 degrees east, and the dips of the limbs probably average 6 degrees, although one was noted measuring 13 degrees. Smaller, subsidiary folds are superimposed on the larger folds, the whole structure being clearly expressed in the exposures on the islands and in the banks of the river. The proximity of the Pre-Cambrian gneiss reported about 4 miles to the northeast on the Little Abitibi river suggests that the folding is due to the unevenness of the underlying crystalline rocks.

On the Mattagami river the formations lie nearly flat.

Among the islands in the Moose river below Grey Goose island, a series of folds occur with axes running nearly east and west and with dips as high as 25 degrees. The large island, next to the lowest of the group, lies in a syncline but has at its head a sharp local anti-cline with dips to the north of 15 degrees and to the south of 25 degrees. The gypsum deposits appear to indicate a broad, low anticline, and the Salina red and grey shale and limestone series of the third lowest island of the Grey Goose group, evidently form the northern limb of another anticline. The alignment of the gypsum outcrops of Moose river, Gypsum "mountain" and of the French River valley suggest the location of one of the best marked anticlines in the region.

As Pre-Cambrian crystalline rocks out-crop at various places throughout the region east of the Abitibi river, it is scarcely probable that the Palaeozoic basin is very deep anywhere in their vicinity. It is more likely that the basin is deeper to the west, the centre possibly being near the centre of the Onondaga outcrops in the inter-stream region between the Moose and Albany rivers. It is doubtful whether a depth of Palaeozoic strata greater than 600 or 700 feet is to be expected even there.

A full report on Dr. Williams' investigations will be published by the Geological Survey, Ottawa.—*Geological Survey Bulletin*.

Mr. A. D. Matheson, the Asst. Manager of No. 1 Colliery of the Dominion Coal Company, has been appointed Manager of Caledonia (No. 4) Colliery, succeeding the late Mr. John Casey, whose death was reported in the last issue of the "Journal" Matheson was Underground Manager at Caledonia for a number of years previous to his appointment as Asst. Manager at No. 1 Colliery.

Report of Coal-Mining Industry Commission, Province of Alberta, 1919

To His Honour The Lieutenant Governor-in-Council:

The undersigned Commissioners appointed by Your Honour by Commission bearing date the fourth day of June in the year of Our Lord One Thousand Nine Hundred and Nineteen, in accordance with the powers contained therein beg leave to report that they have held sessions at Edmonton, Calgary, Drumhuller, Wayne, Edson, Lethbridge and Blairmore, and have examined seventy-four witnesses, being, in the estimation of your Commissioners, a fair representation of all persons interested in the Coal-mining Industry, including the general public.

Your Commissioners have made inquiry into and upon all matters pertaining to or concerning the Coal-mining Industry of the Province of Alberta, and have considered various resolutions, correspondence, and exhibits, which have been submitted bearing on the questions under investigation. All of these are herewith respectfully presented for your consideration, together with a copy of the evidence taken.

Your Commissioners herewith submit their Report, which has been made from the evidence submitted, and are of the opinion that the following matters have an important bearing on the Coal-mining Industry.

1.—*Extension of Markets.*

Many mines only operate one half of the year or less. If more continuous operation is obtained, the result will be a reduction in the price of coal to the consumer and steadier employment to the workman.

2.—*Working Agreements and Method of Handling Disputes.*

Provisions for making working agreements, the settling of disputes and such matters that employer and employee deal with, are not satisfactory.

3.—*Housing Conditions and Sanitation.*

At many mines the living and housing conditions, and matters pertaining to health and sanitation, are not in a satisfactory condition.

4.—*Educational Facilities.*

In some camps the educational facilities are inadequate.

5.—*Loss of Capital Investment.*

Much capital expenditure has been lost on account of failure to obtain reliable information about properties and marketing condition before operations are commenced; and also owing to lack of sufficient capital being provided to carry on operations to a successful issue.

6.—*Loss of Market.*

A considerable loss of market has been sustained owing to—

- (a) Cessations of work;
- (b) Shortage of railway cars;
- (c) Misrepresentation as to size and quality of coal.

7.—*Sub-leasing.*

Sub-leasing of coal leases issued by the Federal Government has the effect of unnecessarily increasing the cost of coal to the consumer.

8.—*Freight Rates.*

Existing freight rates militate against the marketing of Alberta coal in Manitoba and the United States.

9.—*Purchasing, Mine Equipment and Power.*

Mine equipment and power, under the present system, are too expensive.

10.—*Conservation of Coal.*

Large quantities of coal have been and are being lost through improper mining methods, as well as through cessations of work.

11.—*Hospitals.*

In many mining camps the hospital facilities are inadequate.

As the natural resources are not vested in the Crown in the right of the Province, but in the Crown in the right of the Dominion, or in private ownership, it is difficult for your Commissioners to determine what should be done with many of the questions which have been brought before them. Your Commissioners are of the opinion that, for the best interests of the mining industry in this Province, steps be taken at as early a date as possible to have the natural resources vested in the Crown in the right of the Province.

Your Commissioners further submit for your consideration the following recommendations, and unanimously recommend that the same be provided for, as far as possible, by legislation at the coming session of the Legislature:

Recommendations.

1. (a) That employees be required to use every effort to see that all coal is mined properly, and free from impurities, so that the best product will be obtained from the working face.

(b) That employers be required to see that all coal is properly prepared and graded before shipment.

(c) That railway cars are properly cleaned before being loaded.

(d) That better facilities for more prompt dispatch of cars from the mines to the point of consumption be obtained.

(e) That all invoices for coal sold, either by owners or dealers, shall have inserted on them the size and kind of screen over or through which such coal passes, and the name of the mine from which the coal is supplied.

(f) That in order to get correct weights, better provision be made for the taring of railway cars.

(g) That steps be taken to establish testing stations in different Provinces, particularly in Manitoba, so that the buying public may be given information as to the uses and values of different coals.

(h) That a complete system of advertising Alberta coal be undertaken.

(i) That attention be given to the question of storage of coal by both consumer and dealer.

2. That a permanent Commission be appointed and given power by legislation to make working agreements and provide for the settlement of disputes.

3. That living and housing conditions and matters pertaining to health and sanitation be dealt with by the said Commission.

4. That the said Commission co-operate with the Department of Education with a view to seeing that satisfactory educational facilities are provided for all children of school age.

5. That before mining operations are commenced, the question of the advisability of opening a mine in any particular field, as well as the question as to the amount of capital required to open in that field, be referred to and approved by the said Commission, and that the administration of the regulation passed by Order-in-

Council P.C. 2303, by the Federal Government, a copy of which is herewith attached, be vested in the said Commission.

6. That all matters pertaining to loss of market be placed under the jurisdiction of the said Commission.

7. That sub-leasing of coal lands, leased by the Federal Government, be prohibited.

8. That the services of an expert be obtained to investigate the question of freight rates, including the question of a preferential rate on slack coal, and a reduced rate on coal during the summer months previous to the movement of grain, and that the report of such investigation be submitted to the said Commission, with a view to bringing the facts before the Railway Commission for adjustment.

9. Your Commissioners are of the opinion that considerable saving would be attained if owners would establish some central purchasing agency, thereby standardising equipment; also that a considerable saving would be attained if the power used were obtained from central power plants located in the various fields. The carrying out of these suggestions, in the opinion of your Commissioners, would decrease the cost price of coal, and would not only be a saving to the consumer, but, in addition, would tend to increase the market.

10. As this Province has within its borders the largest known coal resources in the world, the conservation of this heritage should be zealously guarded. Your Commissioners therefore recommended that you obtain authority from the Federal Government for the same Commission to be given full powers for the safe-guarding of this national asset.

11. That districts be formed, and proper hospital facilities be provided, in the various mining fields.

12. That legislation be enacted at the coming session, making provision for the appointment of a Commission which would be representative of—

- (a) Owners;
- (b) Workmen;
- (c) Consuming Public;
- (d) Provincial Government.

That such Commission, in addition to the matters above mentioned, have such authority as may be given to it from time to time by Regulation.

That such Commission also be made responsible for the proper equipment and running of mines to ensure safety.

Evidence has been submitted with respect to Old-Age Pensions and Compulsory Health Insurance, but your Commissioners have not obtained sufficient evidence to reach a final conclusion, and recommend that the matter be further investigated.

Dated at Edmonton this twenty-third day of December, A.D., 1919.

John T. Stirling, Chairman.
Walter Smitten,
John Loughran,
W. F. McNeill,
Harvey Shaw.

Extract from Order-in-Council P.C. 2303, dated the twenty-first day of September, A.D., 1918, being the Regulation referred to in section 5 of the Recommendations:

"The lessee shall, before opening any mine on the lands described in the lease and before extracting any coal therefrom, submit to the Minister plans and specifications showing in detail the manner in which it is

proposed to open up, develop and operate such mine, and if the location contains more than one seam of coal detailed information shall be furnished as to the particular seam which it is proposed to develop. No work shall be commenced for the recovery of coal, and no coal shall be extracted until such plans and specifications have been approved by the proper officer of the Department. The procedure to be adopted in opening up and operating a mine on the lands leased, as well as the particular seam of coal which shall first be operated shall at all times be in accordance with the provisions of regulations duly approved by the Minister, and failure to comply with the requirements shall render the lease subject to cancellation in the discretion of the Minister."

MARKED DECREASE IN BRITISH COLUMBIA MINE FATALITIES DURING 1919.

Only twelve fatal accidents occurred in the coal mines of British Columbia during 1919. This is a new record of a very satisfactory character. Never before in the history of coal mining in this Province has it been equalled. In point of number of deaths it has been paralleled once in the last twenty years. This occurred in the year 1905, but it is to be remembered in considering the statistics of that year that there then were little more than half as many men employed in and around the mines as now is the case.

This announcement regarding the operation of the coal industry of the Province was made yesterday by Hon. Wm. Sloan, Minister of Mines. That he was gratified is scarcely an adequate expression of his sentiment. He trusted that with the evident growing interest manifested by miners in the acquirement of knowledge of mine gases and their greater appreciation of the importance of the "Safety First" principle, a further reduction in the fatality rate might be looked for. Mr. Sloan complimented Mr. George Wilkinson, Chief Inspector of Mines, on the evidence of the efficiency of Mines' Inspection Staff of the Provincial Bureau of Mines.

Of the twelve accidents referred to four were the result of falls of rock; four resulted from falls of coal; and an equal number occurred in the handling of mine cars in haulage. The fatalities were divided among the Collieries as follows:

Canadian Collieries (D) Ltd., Cumberland..	5
(All of whom were Orientals.)	
" " Extension..	2
Canadian Western Fuel Co., Nanaimo, B. C...	4
Crow's Nest Pass Coal Co., Coal Creek..	1

—
12
—

An estimate of the fatalities per thousand of employees would put the percentage at approximately 2.2 as compared to the average of the past ten years of 5.098. This year's average, therefore, compares very favourably with that of Great Britain and other European countries, which is worthy of special note, when it is borne in mind that in the coal fields of the United Kingdom and of the Continent there are so many more miners actively engaged that it takes more than one serious accident to materially affect the general average at the end of a given period.

Only one fatality occurred in the mines of the Crow's Nest Pass District during 1919. This again is a record. If the mines of Eastern British Columbia Field be considered apart from the rest of the Province, it is the lowest mark since the first year of their development, over twenty years ago.

Mr. Wilkinson notes, in his report, that the majority of these twelve fatal accidents could have been avoided had ordinary care been exercised.

Still another record has been established by the metalliferous mines of the Province in 1919. There were but six fatal accidents throughout British Columbia in connection with the metal mining industries. This is the lowest in the history of metalliferous mining in British Columbia.

It is estimated that fatalities per capita of employees will work out at approximately 1.2 per cent, in comparison with an average over the last ten years of 3,899.

These accidents are tabulated as follows:

Falling down shafts, chutes, raises etc.	5
By breaking compressed air pipe	1
	—
	6
	—

The majority of these accidents, too, were avoidable had ordinary care been exercised.

ASBESTOS.

The mining and manufacturing of asbestos is well illustrated on a recently published volume entitled "Asbestos, from mine to finished product." In this book sixty plates are used to reproduce scenes about asbestos mines in Canada and manufacturing plants in the United States. Some excellent photographs of different types of raw asbestos are also shown. The Asbestos and Mineral Corporation of New York are the publishers.

Several plants are used to depict scenes in the Quebec asbestos mining areas. These give a very good idea of the way the material is mined and treated there and of the necessary plant.

A series of plates is used to show specimens of asbestos from all parts of the world. In each case the properties of the material are mentioned. Regarding the Canadian asbestos the publishers say "this material is a true chrysotile asbestos of great tensile strength and silkiness, and must be distinguished from asbestos found in other parts of the world." The photographs show that some asbestos of comparatively little value closely resembles in appearance the Canadian asbestos. Low tensile strength and harshness of fibre detract from the usefulness of asbestos from many places.

A series of plates used to illustrate the manufacture of asbestos gives some idea of the processes of making asbestos lumber, paper, etc. Particularly interesting are the views showing the spinning of asbestos for textile purposes. These photographs from a modern asbestos textile manufacturing plant indicate clearly some of the qualities essential in asbestos and show why Canadian asbestos is so highly valued.

Anyone interested in asbestos will find useful information in this book, which by the way is very well printed on good paper and attractively bound in cloth. The Asbestos and Mineral Corporation has published a limited edition for complimentary distribution.

THE RAINY LAKE GOLD AREA, ONTARIO.

By J. J. O'CONNOR.

For over twenty years the lower Seine River gold-bearing area, has been practically an abandoned field. It is coming back to its own very fast. The current year is certain to see extensive developments carried on, that, in the opinion of the best informed, will place it in the permanently producing class.

The pioneer spirit of adventure that first brought this field into notice, was displayed by citizens of Duluth and other Americans, in their operations on the United States side of Rainy Lake, at Rainy Lake City, Bell City and other bustling camps of the early '90s.

Many old timers will recall the trip made from Tower to Rainy Lake, in the winter of 1896-97, by sleigh and dog team, by the late Capt. W. H. Mack, of Cleveland, Ohio, an account of which, he published in the "Marine Review" of that period, under the heading "A Golden Cruise," in which he described the venture most graphically, and the quest that prompted it.

The operations on the American side of the Lake, naturally directed attention to the Canadian side, and by 1895 mining activity was well underway, on such well known properties as the "Foley" "Golden Star" "Ferguson" "Olive", and others, Mining was carried on at the "Foley" and "Golden Star" on quite an extensive scale, under the greatest difficulties, for some years.

Several mills were erected, from two of these, the "Foley" and "Golden Star", over \$200,000 in bullion was shipped.

Transportation costs were the great handicap in the early days. All supplies had to be brought in via Kenora, on the Canadian Pacific Railway, over 200 miles away, over the Lake of the Woods, Rainy River, and Rainy Lake, necessitating transfers at Fort Frances.

The mining system then in vogue, was not well suited for the development of the maximum of possibilities. Modern methods of gold recovery, greatly increase the possibilities in this field, while transportation facilities are revolutionized, and are now ideal.

The gold-bearing area is situated one mile south of Mine Centre station, on the Canadian National Railway, and connected with it by a good waggon road. It is one mile wide, and four miles long, extending in a north-east, and south-westerly direction, bounded on the southern extremity, by waters navigable for steamers from Fort Frances, 40 miles to the westward, on the Canadian National Railway.

The country rock of the gold-bearing area, is an altered granite. The quartz veins, of workable value, occur altogether in the granite rock, with the exception of the "Golden Star" which is along a small dyke extending from the main mass of the granite.

The only development carried on during the past five years, has been done by private parties, mainly in high-grading on the "Isabella" and "Ferguson" properties.

Most of this has been done during the past eighteen months. Very gratifying results have been obtained from this work, with only the crudest kind of appliances.

The showings made by this work are remarkable. They have uncovered several veins, 18' to 2' in width, showing visible gold in many places.

The veins, vary in width from a few inches up to 8 and 9 feet. Over 60 of these have been located with-

in the gold-bearing area. Visible gold has been observed in 18 of them, fine gold in numerous others, and 23 of them are considered undoubtedly rich in irregular shoots, by men competent to voice an opinion, after careful examination.

Highly favourable report have been made on different properties in this field, by such well known mining engineers and geologists, as the following: Frederick Gleason Corning, Horace G. Cole, J. H. Chewett, R. A. Kerr, E. P. Rathbone, and Horace V. Winchell.

The Swedish-Canadian Mines, Limited, have taken over the "Foley" and will operate it to capacity during the current year.

It is confidently believed by the best informed mining men, and mining engineers, who have spent more than one season in making critical examinations of the whole area, that there is no more promising ground in Ontario, than the Rainy Lake field. With prudent mining, and economical management, the field has a bright future.

ENGLISH ENGINEERS VISIT CAPE BRETON COLLIERIES AND STEEL PLANTS.

General Sir Newton Moore and Mr. F. W. Harbord, the well-known English metallurgist, visited the collieries of the Dominion Coal Company, the shipping piers at Sydney and Louisburg, and the Steel Plant at Sydney during the week ending the 24th. Later they visited the collieries and Sydney Mines Steel Plant of the Nova Scotia Steel and Coal Company, and returned to Halifax, calling at the Trenton Works of the Nova Scotia Company en route. At Halifax, General Moore and Mr. Harbord will meet Col. Grant Morden and Mr. Benjamin Talbot, who is also prominent in the technical progress of steel manufacture in Britain. These gentlemen are members of the Advisory Board of the Dominion Steel Corporation, the other members being Sir William Beardmore, Viscount Furness, and Mr. Henry Steel, with Col. Lorne Hamilton as Secretary of the Committee.

ANNUAL MEETING OF THE CANADIAN MINING INSTITUTE.

The Secretary of the Canadian Mining Institute has issued a final notice of the 22nd Annual General Meeting of the Institute, which will be held in the King Edward Hotel, Toronto, on Monday, Tuesday and Wednesday, March 8th, 9th and 10th next. Members are strongly advised to make their hotel reservations early, and Mr. Cyril W. Knight, of the Provincial Bureau of Mines, Toronto, who is Secretary of the Local Committee, will be glad to make such reservations, if he is notified in time.

DRESSES AND ADDRESSES.

Bradley Stoughton, secretary of the A. I. M. E., has an apt way of classifying addresses. At a recent meeting of the San Francisco section of the institute he said that public addresses are of two kinds: One is like a mother Hubbard dress—it touches only a few places but covers everything. The other is like a modern gown—it touches everywhere but covers nothing.—E. & M. Journal.

PERMITTED EXPLOSIVES

British Order.

In the Explosives in Coal Mines Order of the 14th November, 1919, the explosives which have passed the Rotherham Test are listed as follows:—

PART I.

Explosives.	Permissible	Pendulum
	maximum charge in	swing in inches.*
	ozs.	
Ammonite.....	18	2.44
Ammonite No. 1.....	24	2.42
Ammonite No. 5.....	26	2.41
A. 2 Monobel.....	22	2.44
Bellite No. 1.....	20	2.74
Cambrite No. 2.....	24	2.00
Denaby Powder.....	18	2.74
du Pont Permissible No. 1.....	18	2.82
Dynobel No. 3.....	18	2.50
Dynobel No. 4.....	30	2.35
Essex Powder.....	38	2.17
Expedito.....	32	2.62
Haylite, No. 2.....	18	1.96
Haylite No. 3.....	16	2.44
Kentite.....	18	2.64
Monarkite.....	18	2.30
Monobel No. 1.....	10	2.81
Negro Powder No. 2.....	20	2.21
New Fortex.....	10	2.61
Rex Powder.....	20	2.61
Roburite No. 4.....	18	2.86
Samsonite No. 2.....	26	2.49
Samsonite No. 3.....	24	2.42
Seamex.....	36	2.54
Stomonal No. 1.....	20	2.68
Stomonal No. 2.....	30	2.57
Super-Cliffite No. 2.....	30	2.53
Super-Excellite No. 3.....	36	2.73
Super-Rippite.....	18	2.53
Thames Powder.....	32	2.78
Thames Powder No. 2.....	23	2.59
Viking Powder No. 1.....	26	2.44
Viking Powder No. 2.....	18	2.50

PART II.

Bobbinite.

Permitted only for the purpose of bringing down coal in certain mines, and only until 31st December, 1920.

* This is the swing given to the ballistic pendulum at the Home Office Testing Station by firing at it a shot of 4 ounces of the explosive. It may be compared with the swing of 3.27 inches given by a shot of 4 ounces of gelignite containing 60 per cent of nitro-glycerine.

PROPOSED MONUMENT TO MINE EXPLOSION VICTIMS AT STELLARTON, N. S.

A proposal is mooted to raise the sum of \$10,000 to erect a monument in joint memory of the victims of the explosion at the Allan Shaft Mine which occurred in January 1918, and those who died in the disasters of 1873 and 1880 at the Drummond and Ford Pits respectively.

Northern Ontario Letter

THE SILVER MINES.

The year-end annual reviews of the leading metal authorities in London and New York tend to strengthen the belief of the silver mine operators that the quotations for silver during 1920 may be expected to continue high. The point is emphasized that Great Britain and the United States, now being in possession of the greater portion of the world's gold, must be expected to cling to it as long as possible and thus fortify their standing, as creditor nations. This leaves but the one precious metal—silver, to meet the demands of the Eastern countries. With production declining, and with low stores, not only does a continuation of the present high quotation appear probable, but a possible increase is indicated.

Comparatively speaking, wages are high in Cobalt. Machine runners are being paid \$5.50 a day, made up of \$4 regular wage and a high price of silver bonus of \$1.50 a day. As a result of the high cost of labor, the non-producing mines having no product to balance accounts, are laboring under a real handicap. The producing mines, of course, in receiving increased price for their silver are still left with added profit after the bonus is deducted. The condition is one that has appeared to retard to a certain extent the scope of operations among the small prospective silver mines.

The Beaver Consolidated has made another rich strike at a depth of 510 feet, and altogether with the several other discoveries reported within the past three or four months, offers reasonable promise of the year 1920 being a profitable one for the company. Some exceptionally rich ore is being bagged.

As indicated in reference to negotiations between the Coniagas and the Trethewey Companies during the past two weeks, as reported in these columns, the Coniagas has succeeded in purchasing the Cobalt mine of the Trethewey Company. The price is stated to be \$100,000. On Jan. 31st a special meeting of the shareholders of the Trethewey Company will be called for the purpose of considering and, if approved, ratifying the agreement already entered into by the directors. From this date forward, the Trethewey will concentrate its efforts in exploring and developing its property in the Gowganda district.

At the Chambers-Ferland, as a result of work being carried on in the No. 4 workings, a substantial tonnage of low grade ore is being developed. In addition to this work, a cross-cut is being driven south through the territory lying between the Nipissing and the La Rose. Up to the present only one shift has been engaged on this work, but it is proposed to add to forces and make more rapid headway. As yet no new veins have been encountered, with the exception of a number of small stringers. In regard to the reported negotiations for the tailings pile on the Chambers-Ferland, the holders of the option with whom is associated H. Cecil, have let a contract to M. P. McDonald for the sampling of the tailings pile. The option price is stated to be \$55,000. The deal will probably hinge upon results obtained in the present sampling operations.

The McKinley-Darragh has been compelled to close down its pumping equipment for the winter, and thus discontinue the treating of the sand tailings pile in the bed of Cobalt Lake. The flotation plant, however, is to be utilized in treating tailings from current operations. These tailings, in part only, have formerly been treated in a small flotation unit in the mill, but will now be diverted to the big flotation plant. The small flotation unit will be closed.

Diamond drilling at the 310-ft. level of the Adanac has so far failed to produce any satisfactory results. The hole is being driven entirely in the diabase formation and the chances of encountering commercial deposits of ore is considered meagre.

The Crown Reserve Mining Company is making good headway in the exploration and development of the Canadian-Kirkland property in the Kirkland Lake district. It is learned that a high degree of efficiency for the size of the operation has been established in the cost of work. In spite of the strike which commenced June 12th and continued until fall, the property, since early in May has been equipped with a mining plant, and work carried to the first level.

In the Supreme Court of Canada, Mr. Justice Middleton has reversed a decision formerly rendered in connection with the litigation involving the Bailey-Cobalt mine. The present judgment is sweeping, and leaves the company free to accept the offer recently made by A. J. Young to merge the Bailey with the Northern Customs Company. This will probably now be carried out; unless, of course, the opposing faction succeed in appealing the case. As to this, there appears to be a good deal of uncertainty.

Mr. Justice Middleton's judgment, after upholding the power of the Court below to sanction the offer made by A. J. Young to acquire the assets of the Bailey Cobalt Mines, Limited, proceeds as follows:—

"It remains to consider whether the offer should be accepted. In substance it provides for the turning over of all the assets to a new Company; this company will pay the creditors in full, the largest creditor limiting his claim to a fixed amount; shares in the company will then be given to the shareholders of this company. The creditors welcome the offer as it procures them payment in full when they expected a loss. The shareholders—save a few represented by Mr. Laidlaw—are anxious to accept, for in this they see their only chance to obtain anything. The minority—putting the matter bluntly—seek to prolong litigation in the hope that some one may be forced to buy them off or may be induced to do so for the sake of peace. This is not presented nakedly but made of thin cloak of optimism and many charges of fraud and misfeasance against their having the largest claim as creditors. For here truth could not appear naked and remain unashamed.

The other creditors and shareholders prefer the speedier and more certain solution proposed to the prospect of long drawn out and highly problematical litigation. The attacked creditors make some concession in inducing their claim perhaps not as much as in the opinion of some they ought to do, but they will go no further. Mr. Laidlaw's clients propose no alternative save a cash settlement with them. They can procure no better offer, and ask the Court to compel the great majority of those concerned to throw away the substance in an attempt to grasp that which seems very like a shadow—though called a hope and an expectation.

I adopt the words found in the judgment already referred to, and think that when a very large majority of the shareholders desire that the offer should be accepted, it is the duty of the Court to give effect to their wishes.

Then should terms be imposed? There is nothing in our Statute analogous to the provisions which guided Mr. Justice Kay—on the contrary there is the provision in the Ontario Act, under which the Company was incorporated, by which the Company has power to "sell or dispose of the undertaking

of the company of any part thereof for such consideration as the company may think fit, and in particular for shares, debentures, or securities of any other company having objects altogether or in part similar to those of the company," if authorized by the vote of 2/3 of the stock of the company.

This ought to be the guide, if there is to be any guidance by analogy, rather than a provision in an English Act not found in our own.

But I would go further and would determine that the shares were always subject to this control by the majority and that the liquidation did not destroy this charter provision but made it subject to the approval of this Court and the superior rights of the creditors.

The appeal should be allowed, and the matter should be referred back to the Master to carry out the sale. The liquidator should have his costs out of the assets. No other order should be made as to costs.

During the week ended Jan. 23rd, four Cobalt companies shipped an aggregate of five cars containing approximately 353,135 pounds of ore. The Larose was the heaviest shipper, with two cars:

A summary follows:

Shipper.	Cars.	Pounds.
LaRose	2	144,186
Northern Customs	1	87,910
Temiskaming	1	81,095
Crown	1	39,944
Totals	5	353,135

During the corresponding period no bullion shipments were reported.

THE GOLD MINES.

The gold mining industry and the problems met with at the leading mines have ceased to be regarded as temporary. The management of the various mines throughout the North have long since considered the industry to be permanent. However, economic conditions have been unfavorable, and adverse influences have occurred with such frequency as to necessitate temporary shifts to offset the abnormal and changing conditions. Public men, in connection with road-building, assistance in attracting workmen to the mines, and in dealing with duties on mining machinery, and so on, have shown little or no interest, and have for the industry no advantages. This attitude has not helped to create the very desirable impression of permanency.

However, although public men and the government are offering a minimum of assistance, the mining companies themselves are building their future upon permanent foundations; and this determination to deal in a permanent way with the industry bids fair to shame the government into at least some measure of departure from its present lethargy.

The Dome Mines is reported to be making good headway in the exploration of the Dome Extension. While work has long since been carried onto the Dome Extension at the 600-ft. level, the first intimation that mining operations had been carried across the line at the 1150-ft. level came this week. Net production at the Dome as a result of milling operations is stated to be running high and by March 31st, the close of the company's fiscal year, a large cash surplus will likely be shown. The officials of the Porcupine Crown and the Crown Reserve Mining Company have concluded a visit to the Moneta property. As to the possibility of the Porcupine Crown acquiring control of the Moneta, opinion is divided. This week an unoffi-

cial rumor is in circulation to the effect that the deal is not likely to go through but that the Moneta interest themselves are considering the installation of a mining plant to be followed by exploration work at their own initiative.

The question of the option which the McIntyre-Porcupine holds on the Plenaurum property is a live topic at present. As to whether or not the deal will go through or another extension of time be granted has not been stated officially.

In the Kirkland Lake district, one of the most interesting developments is found in the result of work at the Ontario-Kirkland mine. At a depth of 500-ft. a considerable amount of work has been done and several thousand tons of commercial ore is stated to be in sight. Altogether about 1000 feet of underground work has been done. According to official advice to the Journal, a good deal of the ore will average close to \$20 to the ton. The development is interesting and important in that it opens up added possibilities in the area lying immediately south from the present producing zone.

During 1919, according to the annual statement just issued by the Lake Shore, the profit and loss account shows a deficit of \$47,000. Net profits for the year amounted to \$38,273.49 and the balance brought forward for 1918 of \$44,978.08. The labor strike which lasted throughout the whole of the summer was a serious handicap, in spite of which the mine produced close to \$300,000. Mill heads averaged close to \$25 a ton. During the year two dividends were paid amounting to \$100,000 in addition to which was \$25,000 put aside as "provision for contingencies."

In the Township of Lebel activity is increasing. It is stated by interested parties that about eight new companies will be formed within the next few weeks for the purpose of exploring mining properties in that township. The territory which is attracting interest is a strip about two miles in width and running from West to East through the township.

J. A. Hough, mining recorder for the Larder Lake and Swastika districts for the past thirteen years has tendered his resignation, to take effect March 1st. Mr. Hough, it is understood, feels that the salary attached to the office is inadequate, and the political situation too uncertain to allow him to remain in the service any longer. He will accordingly devote his attention to mining.

In regard to the question of the construction of light railways in the North, the Canadian Light Railway Construction Company through Mr. J. W. Solloway requested publication of the following:—

In view of misleading statements appearing in the public press in reference to the use of light railways for outlying districts of the North Country, we beg to submit the following for your information.

The situation in the North Country is as follows: For the past ten years, railway extensions, good roads, et., have been promised for these districts or the subject in some form has been under consideration by various Governments but very little has been done.

The idea of building light railways is to give undeveloped districts immediate transportation facilities. The construction of light railways is only temporary. Their operation

will assist development of water power and of the mining industry. When the business increases to warrant same the light railways can be turned into electric or standard roads. The light rails and equipment can be transferred to new fields to be used again as a method of assisting development.

The idea is to use light railways to assist the development of new and undeveloped districts. They are cheaper to build and maintain than macadamised roads, and at the same time do the business on short hauls up to their capacity of a standard railway and the operation of same is a commercial and business proposition. The plans of the Canadian Light Railway Construction Company are only to build branch lines (not trunk lines).

Light narrow gauge railways embody three economic principles.

Low cost of Construction, Maintenance and Operation. In addition they can be quickly laid down and run over almost any kind of country. They proved to be the most economical and successful method of transportation adopted by the allies during the war. Commercially they have been used in France, Belgium, Germany and Russia for the past twenty years as feeders to the main railways, and it is proposed to use them in the same capacity in this country.

The Canadian Light Railway Construction Company are not advocating light railways in preference to Government owned standard or electric roads.

G. W. V. ASSOCIATION AT COBALT ASKS FOR EXTENSION OF SPECIAL LICENSING PRIVILEGES TO RETURNED WAR VOLUNTEERS.

Following is a Copy of Resolution passed by Cobalt Branch G. W. V. A. at a regular Meeting, held on Jan. 19th, 1920.

Whereas a great number of Prospectors and Miners in Northern Ontario voluntarily enlisted in His Majesty's Canadian Expeditionary Force and went Overseas and fought in the Great War:

And Whereas upon their return and demobilization they are obliged under the Law at present existing, to outlay large sums in order to perfect their Titles to Mining Claims held by them prior to their enlistment, in order that the same may be secured by Patent and the Titles to the same as infeasible;

And Whereas upon their demobilization they find that they have not sufficient funds to make the outlay necessary in the premises in order that their interests acquired before enlistment be protected;

And Whereas prior to their enlistment they duly paid their Miner's Licence Fees, and for the recording of their Mining Claims, and had they not enlisted would have been in a position to have complied with all the provisions of the Mining Act of Ontario;

Therefore be it resolved that the Temiskaming Branch of the G. W. V. A. hereby endorse the following position of the Prospectors and Miners namely:—

That the Government relieved such Prospectors and Miners so having enlisted from the performance of any Assessment work upon Mining Claims which we staked out and recorded, and upon which thirty days' assessment work had been performed prior to the enlistment of the recorded holder or owner thereof, and that the provisions of the Mining Act of Ontario with respect to the performance of working conditions and surveys and Patents be waived, and that the said Prospectors and Miners so having enlisted be granted a Patent freed from the necessity of performing the balance of such assessment work or from the necessity of paying the fee to the Crown in other cases necessary before Patent issues, and that in the event of any of their Mining Claims being situated in unsurveyed territory that the Crown pay the cost of the survey of the same in order that Patent shall issue to such recorded holder or owner.

And be it further resolved that in the event of such Prospector or Miner being a partner or holder of an interest in a Mining Claim with a civilian, or one who has not served Overseas in the Great War, in default of such civilian, or one who has not so served, performing his due share of the as-

essment work required under the provisions of the Mining Act of Ontario, and filing proof of the same in accordance with the provisions of the said Act, then within thirty days after such default the Prospector or Miner so having served may file a notice with the Mining Recorder in the Mining Division in which such claim is located to the effect that he desires to complete the assessment work required by his defaulting partner or partners, and upon such notice so having been filed the Mining Recorder of Mining Commissioner may grant to such Prospector or Miner so having served sufficient time according to the exigencies of the case to permit him to complete the assessment work of his defaulting partner or partners, and the whole Mining Claim shall thereupon vest in the Prospector or Miner so having served.

And be it further resolved in the case of a Returned Soldier wishing to, or being capable, of, completing the work on his already existing Claims, he may forgo the above grant, and shall be entitled to stake three more claims on his new licence, which he was deprived of doing owing to his having so served, and be given a free Patent **without cost**, said Claims to be staked within one year of the date of the new Amendment of the Mining Act of Ontario being passed, the said right to apply to any Prospector or Miner who may not have been the possessor of a Claim or Claims at the outbreak of the War;

And be it further resolved that it is the feeling of this Branch of the G. W. V. A. that equivalent consideration be extended to the Prospecting and Mining Industry as has been shown to the agricultural community."

A Reasonable Feature.

Regarding the above, the request for consideration as regards working conditions appears to be favourably regarded in the mining districts. That is to say: The prospector who lost a lot of time in the service of the country seems to be entitled to protection for work which he would otherwise have been able to complete.

The Objectional Feature.

As regards the second last paragraph in the above resolution, the Bureau of Mines must be prepared to reject it. Were such to become law, it would mean that several hundred thousand men in Canada would be privileged to stake out three mining claims and secure a free patent. It would probably mean that unscrupulous interests could hire thousands of these men who are not interested in mining, have them stake claims and secure patent in return for a more or less small amount of money. It might mean that a million claims, or approximately four million acres of land would become tied up, without the necessity of work or payment.—J. A. McRae.

Dr. Jas. S. Stewart, who has been in charge of the Edmonton office of the Geological Survey, has tendered his resignation. Dr. Stewart has been specializing in the gas and oil possibilities of the great plains of Alberta and the northwest and while not on special field work was engaged in Bureau of Information work. After 10 years' experience with the Geological Survey and with the highest attainable university degree, Dr. Stewart is leaving a salary of \$2,100.

John R. Cox, of the Topographic Division of the Geological Survey, has also resigned to join the S. Pearson and Sons Petroleum Company. Several student assistants in the Topographical Division have also signed contracts.

While little has so far appeared in print it may be said that the work of the division interlocks with that of the geologists, and a loss in one affects both.

—Ottawa Journal.

TORONTO NOTES.

(From Our Staff Correspondent.)

Dr. W. G. Miller Emphasises Canada's Possession of Strategic Minerals.

Addressing the Royal Canadian Institute in Toronto on Jan. 10th, Dr. W. G. Miller, Provincial Geologist, outlined some of the outstanding mineral products, including the virtual control of gold by the British Empire, with about two-thirds of the world's output. In iron and steel, he said, the Empire does not show up so well only about eleven per cent of the world's iron and ten per cent of its copper, being produced in the Empire. In silver and lead, however, the Empire produces about seventeen per cent of the world's output, but in certain Canadian minerals the Empire controls the world supply. These are nickel, cobalt and asbestos. About one-seventh of the whole world's supply of coal is found within the borders of the British Empire, but in petroleum the Empire is a small producer, with prospects, however, of great expansion. Search, under Imperial auspices, is being made for petroleum in various parts of the world, including even Papua in the South Pacific.

It was pointed out by Mr. Miller as a curious fact that before the war, while Great Britain possessed virtual control of certain minerals there were no facilities for refining them, and the bulk of the ores were exported. This state of affairs, which he described as most unsatisfactory, applied to such minerals as tungsten, but during and since the war, conditions have altered and the Empire has now sufficient refining facilities to supply all its needs.

"As regards Canadian mineral industry," he said, "it may be said to have had a rapid and satisfactory development during the last two decades and holds out great promise for the future. For example, during the past two or three years, discoveries of important mineral deposits in northern Manitoba, a province that has heretofore been considered only from an agricultural standpoint, showed the great possibilities there are in our vast unprospected regions. Other Suburbys, Cobalts and Porcupines await the prospector and miner in these regions surrounding Huron Bay, and extending to the Arctic regions. Great regions of promise for the miner lie tributary to the Pacific and on the eastern seaboard vast mineral resources are yet to be utilized.

Announcement was made this week by Mr. Sweeney, of Northern Securities Limited, Toronto, which controls the Nipissing Extension Mines, Limited, that he had purchased the Thompson-Gowganda property in the Gowanda district, a property in which Premier Borden, Sir Edmund Osler, Hon. Dr. Pyne, E. A. Kemp, Lieut.-Col. Hendrie and others formerly held large interests. Mr. Sweeney states that the deal has been completed and that a new company of Canadian and American capitalists is now being formed to operate the holding.

Gilbert Sheridan, ("Shorty"), one of the popular old-timers of the Porcupine, was married at Trinity Church, Galt, recently, to Miss Evelyn Turner, daughter of Mr. and Mrs. Turner, formerly of the Dome, but latterly residing at Galt, Ont. Mr. Sheridan was for years on the Dome staff and more recently has been in charge of the Hollinger stores. Mr. and Mrs. Sheridan will reside at Timmins.

Among the Canadians mentioned this week by the British War Office for distinguished services in the war is Lieut.-Col. "Joe" Boyle, the former widely-known Klondike miner. Col. Boyle, who was head of the Canadian Klondike Mining Company at Dawson City, will be remembered as having organized, equipped and despatched to the front his own machine gun detachment at his own expense in the early stages of the war. He served chiefly in Roumania where he became a national hero through being able to save several Roumanian deputies from Boleshevists. He also rendered valuable assistance to the royal family. The Colonel's old home is in Woodstock Ont., he being a son of the late Charles Boyle who was prominent in Canadian racing circles.

Toronto mining men were interested in the announcement from Winnipeg this week that Provincial Engineer L. B. Copeland had left for the Copper Lake Gold district, where he will have charge of the construction of a winter road from Herb Lake to Copper Lake, in the gold district. The length of the road will be about fifteen miles. It was also stated that Engineer V. H. Campbell would leave shortly for the Rice Lake Gold district for the purpose of making a survey for a road in that district from Lake Winnipeg to the Rice Lake district.

A meeting of the Toronto branch of the Canadian Mining Institute was held on Saturday when preliminary arrangements were made for the annual meeting of the Canadian Mining Institute to be held in Toronto probably on March 8, 9 and 10. Indications are that this will be one of the most successful and interesting meetings the Institute has ever held. It was also decided to invite students resident in Toronto who are members of the Mining Institute to attend the periodical meetings of the Toronto branch without extra fee.

Alexander P. MacAuley, a well-known Toronto mining engineer has been awarded \$100,000 damages by the United States Supreme Court in his suit for malicious prosecution and false arrest, against Theodore P. Starr, New York jeweller. MacAuley was arrested in St. Louis in 1917 and held on suspicion of being a notorious confidence man. Starr was held responsible for the mistake and the prosecution and action was taken against him by the victim.

According to the report of Major Birkett, Resident Mine Manager for Nipissing Extension Mines, made to Northern Securities, Limited, in Toronto, No. 2 shaft has been continued to a depth of 100 feet and a station 10 feet by 10 feet has been cut at the 90-foot level. Forty-three feet of cross-cutting to connect with the new vein has been done and a drift to explore the known vein in the No. 2 shaft and has been started for the purpose of picking up a chute of ore. It is believed that the present work has carried the engineer to the edge of a chute where a 30-ounce assay was obtained. The veins in No. 2 shaft and the drift of the 20-foot level are said to show silver values and the Manager says that there is no geological reason, as shown by the performance of the veins in Cobalt, why the veins should not develop into producers.

Northern Securities, Limited, Toronto has issued a statement in regard to the Bailey Cobalt Mines, stating that the Company has been in litigation for five years, but that during that time the mine has been kept free from water and in the charge of a caretaker. An offer has been made by certain large interests to form a new company and amalgamate the Bailey Mine with the Northern Customs Mill.

Proposed Air Service for the North Country.

Toronto mining men were interested in the announcement from Cobalt that Messrs. Bishop and Barker, the noted Canadian airmen, through Captain Staler, had asked the Temiskaming Board of Trade of New Liskeard, to use its influence for the establishment of an airplane service in the North country. The board's annual meeting endorsed the project, contending that such a service would be of great assistance in the mining and lumbering industries. The necessity for Hydro power and a trunk road and extension of the Nipissing Central Railway were outlined as the urgent needs of the district. In connection with the proposed air line it is said that a proposition has been made looking to the installation of five machines for an outlay of \$50,000 at a point of points somewhere along Lake Temiskaming which would enable mining men who have to make more or less frequent trips under conditions of hardship into such districts as Matachewan, to cover the distance in an hour or so.

The aeroplane would not only carry a couple of men into the back mining areas, but would carry packs and baggage as well and thus obviate the hardships attendant upon the use of the tump-line and the rough going generally.

James Nelson, a pioneer operator in Baden township in the Fort Matachewan district, is in Toronto. He recently encountered some very high grade gold ore on his property and he has three men at work following up his find and he is in the city arranging to take in a good steam prospecting plant and possibly a diamond drilling outfit before the snow goes, in order that development work may be carried on aggressively during the coming summer. Mr. Nelson is arranging for the organization of a company for the purpose of taking over the property and carrying on active mining operations.

The Hughes McElroy Gold Mines, Limited, in which several Toronto mining men are interested, has just been granted a provincial charter. The company will take over the nine Hughes claims in McElroy Township on which considerable development work has already been done and on which a limited amount is now in progress in the way of sinking test pits on two of the veins of the property. This property adjoins the Mondoux property on the north the Mondoux having recently been transferred to other Peerless Gold Mines, Limited, which is controlled by Alexander McKinnon and Sherley Ogilvy of Montreal. It will be recalled that there was a big discovery of gold on the Mondoux last fall. Eight drill compressors have been installed, together with three boilers and hoist and several camp buildings are under construction, while a good road is being built through from Larder Lake.

A REPLY TO THE CIVIL SERVICE COMMISSION.

Editor, Citizen:—A statement from the Civil Service Commission in regard to the Geological Survey appeared in your paper yesterday with the request that it be given wide publicity. In substance it asserts that "the British Petroleum Company, a powerful corporation, etc., approached a member of the Geological Survey staff who had been receiving \$2,600, but who under the classification will at once increase to \$3,300, and offered him \$6,200 to start with. Another on the same salary was offered \$5,100. Both these men admit that the new schedule is fair and as liberal as the government is justified in offering for their services."

The above statement is so wierdly inaccurate that one wonders whether the commission has taken to kidding the public. It is true that one of the men who is leaving is receiving \$2,600 in the Civil Service. The rest of the statement is absolutely contrary to the fact. The fortunate individual with a salary of \$2,600 "who under the classification would be at once increased to \$3,300" received an official notification from his deputy on December 29th that he had been classified by the Civil Service Commission as an associate geologist, for which position there is a beginning salary of \$2,580. Of the six other men who accepted outside positions, one at salary of \$2,700, was reclassified at a beginning salary of \$3,300, three at salaries from \$2,300 to \$2,500 were classified as associate geologists, two at salaries of \$2,100 and \$2,300 as assistant geologists, beginning salary \$1,680. None of these men would, it is true, have received lower salaries than they had been given previously, but only one was assured of a substantial increase. Six men accepted outside positions soon after. The commission asserts that the government cannot compete with such salaries and that the nation would not sanction it. We believe that the nation would have endorsed the modest recommendations of the deputy minister of mines that each of these men be raised to the class above that in which his old salary fell.

The Civil Service Commission is faced with a difficult task in their attempt to apply a scheme of reclassification to such a large and intricate organization as the Civil Service, and in this effort they deserve support. They have made the mistake of underestimating the value of the services of trained geologists. Theoretically, the reclassification as applied to them was fair; as put in practice by the commission it was not. An assured and immediate increase of twenty five per cent in their salaries would have retained the services of nearly all of the seven deserters. A rigid application of the schedule issued on Dec. 29th will, no doubt, work the other way.—L. REINECKE. Ottawa, Jan. 20th, 1920.

METAL QUOTATIONS.

Fair prices for Ingot Metals at Montreal, January 28th 1920.

	Cents per lb.
Electro Copper	24 1/2
Castings Copper	24
Lead	10 1/2
Zinc	12
Tin	73
Antimony	13
Aluminum	34

Industrial Use and Limitations of Respirators, Gas Masks, and Oxygen Breathing Apparatus

By A. C. FIELDNER.

(By permission of the United States Bureau of Mines.)

During the last year the Bureau of Mines has received many inquiries regarding the use of army gas masks in the industries for protection against poisonous and irritating gases. These inquiries show a general belief on the part of the public that this type of mask will protect the wearer, under all conditions, against any gas whatsoever and even in absolutely irrespirable air to the exclusion of the more cumbersome mine rescue breathing apparatus or the air helmet with hose connection to pure air. This erroneous belief will no doubt be further confirmed by millions of discharged soldiers who have been trained in the use of the gas mask and have been taught that it gives them absolute protection against all gases used or likely to be used in warfare. These men will not realize that out in the open air of the battlefield, the percentage of gas in the air can never be nearly as large as may occur in the confined spaces of a factory operation. A mask may afford complete protection under outdoor conditions and break down at once when used indoors where a gas container has burst and filled a closed room with gas. It must also be remembered that the absorbents in the army respirator, which filter out the poisonous gas, are especially designed for the gases used in warfare, and as a matter of fact do not protect against the more common industrial gases, as, for example, illuminating, natural, producer and blast furnace gas.

In view of these limitations of the army gas masks, which, if not realized, will lead to serious accidents and fatalities, the Bureau of Mines is issuing this brief statement of the industrial use and limitations of dust respirators, gas masks, and oxygen breathing apparatus.

Dust Respirators.

More or less protection from dust and liquid mists is obtained by the use of a simple dust respirator, which removes these particles of dust or mist by means of a filter of moist sponge, cotton or wool pad, porous paper or even a very fine mesh metallic gauze. The respirator may inclose the mouth and nose only, or it may be combined with a face mask containing eye-pieces if the eyes must also be protected. The simple "pig snout" respirator containing a moist sponge has been on the market for years. It is highly uncomfortable to wear, is rather insufficient for removing fine dust, and most workmen prefer to tie a large handkerchief over their nose and mouth. Some improvement has been made in recent years, but on the whole a really efficient and comfortable dust respirator that workmen will wear continuously is yet to be devised. There is an urgent need for such a device for safeguarding the health of workmen in the mining and metallurgical industries and in other dusty trades.

All of the present type of "pig-snout" respirators have an utterly inadequate filtering area. The inspired air is of necessity forced through this restricted area at a high velocity which prohibits the use of an effective filter because of the high breathing resistance it would have.

It has been shown that the injurious quartz particles which become imbedded in the lungs of "hard-rock"

miners are no larger than one to ten thousandths of a millimeter. Dusts of this degree of fineness require an extremely fine meshed filter, very much finer, indeed, than cotton or silk gauze or moist sponges as are commonly used.

A really effective dust filtering mask can be made by using rather dense felt or paper filter of large area, say 100 to 200 square inches, and attaching this with a hose connection and check valve to the facepiece of an army gas mask of the Tissot type. By using this large area the velocity of the inspired air through the filter is low—consequently the breathing resistance is quite low and the filtering efficiency becomes very good.

Army Gas Mask.

The army gas mask consists of a facepiece of rubber and cloth fabric, containing eyepieces and connected by means of a flexible rubber tube to a canister containing charcoal and soda-lime for filtering out the poisonous gas from the inspired air. The canister is supported in a knapsack slung from the neck.

The army gas mask is by no means the unusual protective appliance that is popularly believed. It does not afford universal protection against all gases, nor can it ever be of use in low-oxygen atmospheres. It furnishes no oxygen to the wearer and can only remove comparatively small percentages of poisonous gas from inhaled air, usually less than 1 or 2 per cent. Higher percentages may penetrate the canister and "gas" the wearer. The standard army gas mask will furnish protection against percentages not exceeding one or two per cent of the following gases in air: Sulphur dioxide, hydrogen sulphide, chlorine, carbon bisulphide, nitrogen peroxide, aniline vapor, benzyl bromide, benzyl chloride, chloracetone, chlorpierin, hydrogen chloride, phosgene, sulphur chlorides, xylol bromide, stannic chloride, titanium tetrachloride, silicon tetrachloride, hydrogen cyanide, benzol, gasoline vapor, and carbon tetrachloride.

It will be seen from the above that the mask has a wide field of usefulness in the chemical industries, around smelters, roasters, and acid plants where sulphur fumes are given off, and in the industries using chlorine and bleaching powder, and in rubber factories for sulphur chloride, carbon bisulphide and other volatile organic solvents. The army canister also contains cotton filter pads which remove irritating and poisonous dusts, which increase its usefulness around smelters where sulphur and arsenic fumes must be removed.

The army mask furnishes no protection whatever against carbon monoxide, which is the poisonous constituent of mine gases after fires and explosions in coal mines and of blast-furnace, producer and illuminating gases. For these purposes oxygen breathing apparatus or air helmets must be used.

It is expected that a carbon monoxide mask will become available in the near future which may be used for protecting against low concentrations of this gas.

Ammonia is another gas that will penetrate the standard army canister. However, a special chemical may be placed in the army canister which will adapt it for use around refrigerating plants.

Use of Army Mask by Firemen.

Whether or not firemen should adopt the general use of the army gas mask has been a much discussed question. Tests made by the Chemical Warfare Service and by the Bureau of Mines proved conclusively that the mask, when fitted with a canister containing filter pads, would protect the eyes and throat from the irritating and choking constituents of smoke. Men wearing the masks have remained in small rooms filled with dense smoke from small fires of wood, wet straw, pitch, rubber, and sulphur, for periods of thirty minutes without any discomfort whatever. These tests have been repeated by fire departments all over the country; as a result most of them have pronounced the mask safe, and have accepted it as a final solution of the vexing problem of smoke protection.

However, despite these tests, it must be kept in mind that the gas mask has pronounced limitations. It provides no oxygen if the wearer should step into a burned-out atmosphere, nor, will it protect against carbon monoxide, which may be present in fatal proportions in a closed room where a fire has been smoldering for some time.

The usual smoke test made by burning rags, wet straw, pitch, rubber, and sulphur for thirty minutes or an hour in a room, will not as a rule generate enough carbon monoxide to cause any effect. Consequently the results of all these tests were favorable to the mask.

Recently a long-time test was made in the Bureau's 1,000 cubic foot gas chamber at the Pittsburgh experiment station, in which a smoldering fire of 6 pounds of moist rags and excelsior was kept going without allowing it to burst into flames for a period of 4½ hours. At the end of one hour the chamber atmosphere contained 0.37 per cent carbon monoxide; in two hours, 0.62 per cent; in three hours, 0.95 per cent; and in 4½ hours, 1.13 per cent.

Some of this final air was drawn through a gas mask canister, then through a large bottle in which was placed a canary bird. The bird collapsed in half a minute. This experiment demonstrates that the gas mask will not protect a fireman under all conditions, and that it must be used with some caution.

The final solution of the problem of a mask for firemen will be the construction of a special canister having about three times the volume of the present army canister and containing in addition to the present filling of charcoal, soda-lime, and filter pads, special absorbents for ammonia and carbon monoxide. With such a canister a fireman could safely enter any atmosphere in which a safety lamp would burn.

Probably the strongest argument for the use of the present Army type of gas mask by firemen is that it will be a great help to them in the majority of cases, and that at any rate a fireman has to take chances in line with his duty.

Oxygen Breathing Apparatus and Air Helmets.

The self-contained oxygen breathing apparatus or air helmet can never be displaced by a gas mask for use in atmospheres deficient in oxygen. Such atmospheres are encountered in mine rescue work, in gas mains, blast furnace stoves, producer-gas or water-gas apparatus, etc. Aside from the lack of oxygen, carbon monoxide is also present, for which the gas mask is useless.

Air helmets or oxygen breathing apparatus should also be used instead of the gas mask for entering tanks, towers, and other closed spaces containing large quantities of irrespirable or poisonous gases, as, for example,

a gasoline tank containing some residual liquid. The concentration of vapors produced by volatile liquids in closed containers sometimes is too high to be removed entirely by gas-mask absorbents. The only safe protector in such places is a self-contained appliance or air helmet in which the wearer does not breathe any of the irrespirable atmosphere.

Importance of Expert Advice on Protective Appliances.

On account of the many factors entering into the use of protective respiratory appliances, the importance of competent advice on the selection and use of such appliances can not be over-estimated. In connection with the Bureau of Mines' work of safeguarding the health of miners and workmen in the metallurgical industries, a general investigation of respirators, gas masks, and breathing appliances is being undertaken at the Pittsburgh experiment station of the Bureau. This research will be conducted by experienced chemists and engineers who had charge of gas-mask research in the Bureau's war-gas investigations and subsequently in the Research Division of the Chemical Warfare Service, U.S.A. In the 1,000 cubic foot gas-chamber which has been built at this station, breathing appliances can be tested on men in any gas desired.

The industrial respirator investigation will include:

- (1) Advice on the suitability of the standard Army gas mask for use in various industrial gases.
- (2) Approval of industrial gas masks and respirators when properly submitted to the Bureau by the manufacturer in accordance with a schedule to be announced later.
- (3) Instruction of workmen at plants in the use of masks and respirators in a manner similar to that now being given by the Bureau in the use of oxygen breathing apparatus.

The A. B. C. of Iron & Steel: The Penton Publishing Company, Cleveland, Ohio edited by A. O. Backert. Third Edition. Cloth. 8 by 11 inches by one inch. 374 pages with Directory and Index. Price \$5.00.

This book epitomizes the technique and business extent of the iron and steel industry of the United States, and contains a series of chapters, each written by an authority in his particular specialty, on various branches of the industry, commencing with the mining of the iron-ore, dealing fully with transportation and fuel supply, with the basic processes of iron and steel manufacture, and with all the branches of fabricated steel. Chapters are included on malleable iron, steel castings and electric steel.

The book also contains statistics of the American iron and steel industry, and a complete directory of iron and steel works of the United States and of Canada, classified by firms and also by products. A complete index is attached.

The book is printed on fine stock and the illustrations are numerous and good. The article on Transportation of Ore on the Great Lakes contains a number of historical photographs showing how the transportation facilities of the Great Lakes have developed from small schooners of 15 to 20 tons burden to the great 10,000 ton freighters that are now used.

This book should be of considerable utility to all who have occasion to do business with the steel industry, and to advertisers of steel plant equipment.

The Microscopical Investigation of Coal

An address on the above subject, illustrated with lantern slides, was delivered by Mr. James Lomax at the December meeting of the Past and Present Mining Students' Association, at the Wigan and District Mining and Technical College. He said that a microscopical examination could give the chemist useful information regarding the various coal constituents. It was owing to the great difficulty in making a slice of coal sufficiently thin for microscopical use that coal had not had the attention of microscopical investigators which it would have received if the preparations had been quite as easy to prepare as in the case of other rocks. If a preparation from a sample of coal was to be made it would be useless to heat it in the same manner as an ordinary rock specimen. It was essential that the preparations should be so large cut usually from parting to parting, that when all were cut and finished they could be arranged in their order, showing a more or less thin transparent slice from floor to roof. When the preparations were held in front of a suitable light all the various laminae would be seen in colours according to their composition and density, the colours ranging from a light yellow to a deep ruby red. Generally the more yellow and red yellow, the higher the coal's volatility and the less the carbon contents. The preparations if viewed only in the manner indicated, were of some value. Moreover, on closer examination every lamina could be resolved into its original form, although it might be highly flattened and compressed. With the aid of palaeobotany it could be determined to what kind or genera of plants any given part of a seam owes its origin, what changes have occurred in the plant succession during the deposition of the vegetable debris now forming our coal substance. He had come to the conclusion, after an exhaustive study of a large number of seams, that almost all had had their origin in vegetable matter grown and deposited on the spot where it now rested. To his mind there were very few seams that owed their origin to drifted vegetable matter, and these showed a structure totally different from the seams they were considering.

It must be apparent to all who have studied the question that coals are not of equal value, this being impossible since it is to the plant remains that we owe our coals. Study of a recent peat bed of any considerable thickness will show that the growth and deposition of plant remains in the bed are not homogeneous, but that for a length of time the lower portion was composed mainly of the remains of equisetinae, oak, and other ferns, willow, &c., on the top of which came a deposit composed mainly of the remains of birch, hazel, and other shrub-like plants, this again being succeeded by a deposit of sphagnum, then again by cotton grass, willow, and other shrubs, a thick bed of the remains of pines, covered by a mixture of sphagnum seirpus and grass-like plants. Such a deposit is similar to that of the deposition of the vegetable remains during the carboniferous times, allowing for the difference in character and species of the plant remains. Such being the conditions we can expect a difference between one part of a seam and another, and also between seams in different horizons, and this being so there is bound to be a difference on carbonisation, and constituents of each distinctive class of vegetation will still have their effect on the

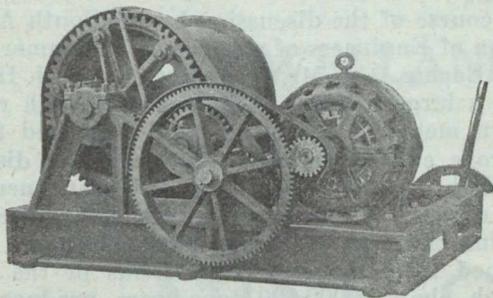
coal substance when carbonised. This is the reason why one class of coal may be quite as good as another of like heat value for a specific purpose, but would be useless for another, such as coking for metallurgical purposes. All bituminous coals do not coke, or if so, do not possess the properties of metallurgical coke. Hence it may be said that the various coals are individually adapted to one or more specific purposes from which they cannot be diverted without disadvantage.

In order to illustrate how the microscope can be made useful take the question of generating power, the prime requisite being heat. In this case one class of coal which possesses a certain value per unit may seem just as suitable as another of a like heating value. The lantern slides give an idea of the different varieties of coal. One is taken from a bright and brittle humic coal which gives off a large volume of gas and liquid volatile matter, comparatively rich in benzene and its homologues. It is not my intention to go very deeply into the microscopical structure of the fuels, and I am only pointing out the distinguishing features. Such coal as the specimen under consideration is nearly always found next to the floor of a seam, and is chiefly composed of finely divided fragmentary plant debris. The plants from which the remains originated would be of a low order, and more or less small and dwarfed. Such coal on carbonisation contumaces and swells, forming at a low temperature a pasty mass, and if carbonised in a vertical retort the gases made in the lower part of the retort are with difficulty passed through to the upper part. Such coals very often form an almost solid mass in the middle portion of the retort causing it to hang, obstructing the passage of any further fuel. In using such coal great attention to this point is required, very often continual picking and stirring with long poker being necessary. The coke is soft and spongy the spongy cavities being formed by the imprisoned gas made whilst the material has been in a semi-plastic condition. In addition to gas such fuel is not good for steam raising purposes, for, as in the retorts, it swells and contumaces, stopping the air passages through the fire bars, which necessitates the use of the poker, causing to be made a large volume of black smoke in which the largest part of its heating properties is carried through the flues into the comparatively cold chimney stack, and onward into the atmosphere. Another picture shows coal similar in calorific value, volatile contents and ash, but which is microscopically different in composition. It is not as soft, and it is bright banded and laminated, the bright bands being sometimes formed of jetonised wood tissues more or less irregular in many of which the tissues are well preserved. These show them to be the remains of fairly large stems or branches chiefly of a Cordaitean species. The fine laminations are resinous bodies, and fine leaf laminae with here and there a few microscopores and megaspores. Such coal is seldom near the floor of a seam, but is generally found one-third the distance between the floor and the roof, and it may, as found in many seams, continue to the roof forming two-thirds of the thickness of a seam, or, as more generally is the case, give way to a spore coal. Such fuel gives a large volume of gas and a higher yield of volatile liquid products, especially

A MARSH HOIST

IS MADE THE RIGHT SIZE FOR YOUR MINE

and in either Steam Power or Electric Power



This shows one of our Electric Mine Hoists. We make many other types. Send for our catalogue of Mine Hoists, Cars, Cages, Buckets, etc., and see what we offer you. It will repay you.

From the little 10 Horse Power size for prospectors or small mines to the massive 50 Horse Power size, one of our 7 sizes should be just right for your mine.

We are specialists in the building of Hoisting Machinery of all sorts. For nearly a quarter of a century we have been designing and building Hoists, and have developed a Hoist that we are really proud of—proud because of the record of good work they have done, and are doing in mines, quarries, and other classes of work from one end of Canada to the other.

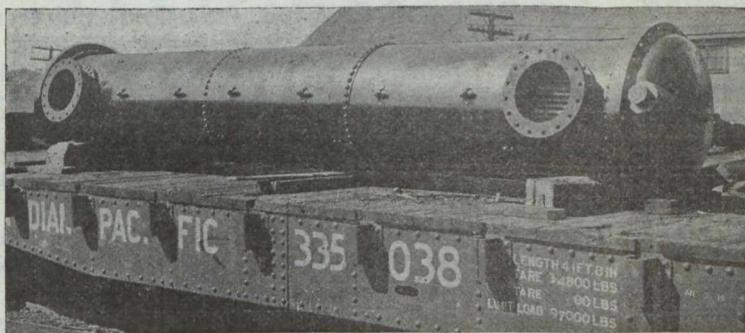
MARSH ENGINEERING WORKS, Limited

ESTABLISHED 1846

BELLEVILLE, ONTARIO, CANADA

Sales Agents:—MUSSENS, LIMITED, Montreal, Toronto, Winnipeg and Vancouver

STEEL PLATE WORK OF ALL KINDS FOR MINES—Particularly



AFTERCoolERS
AIR RECEIVERS
SKIPS
ORE BUCKETS
MINE CARS

MacKinnon Steel Co. Limited
SPERBEE COKE, - QUE.

Montreal Office: - 404 New Birks Bldg.

FOR PUMPS

that give

BETTER SERVICE
LONGER SERVICE

TRY

The Smart-Turner Machine Co., Limited
HAMILTON :: CANADA

C. L. CONSTANT CO.,

42 New Street - New York

SHIPPERS' AGENTS

FOR

Selling, Sampling and Assaying Ore,
Metals and Furnace Products

Entire charge taken of shipments from the receipt of bill
of lading to the collection of smelter's return

NOT CONNECTED WITH ANY SMELTER

Canadian Representative:

G. C. BATEMAN - Traders Bank Building, Toronto

of the benzine series. The tar oils are lighter and are more easily distilled, and the residual pitch is less than that obtained from the other or very soft coal; although if the same soft coal could be distilled without becoming pasty it would probably give quite as good results.

The next case of coal is much different both microscopically and macroscopically, being more compact and tough, and it does not break up in dice or cube-like pieces. It is laminated with alternating dull and bright looking bands, and it splits with a more or less slaty cleavage parallel to or along the bedding planes. Microscopically the laminae or alternating bands are found to be composed of layers of leaf-like humus, constituting the bright part, the dull looking part being composed of the flattened remains of fructiferous organs of a lycopodaceous nature in the form of megaspores and microspores. There may be, as is often found in some seams laminae of a resinous nature which are clearly the remains of resin droppings or exudations from resin ducts of some species of plants of that age. Such coals are the best both for steam and for gas-making purposes. They do not swell or become pasty, and consequently when used in a furnace or retort they do not obstruct the passage of air or gas through the thickness of coal on the fire bars or in the retort. The volume of gas made from this class of coal is fairly large, there being a high calorific value and illuminating power. The liquid volatile contents is also high, but contains a percentage of naphthalene. The residual tars are higher in proportion than in the soft coals, there being consequently more pitch. Such coals make excellent coke both for ordinary and also for metallurgical purposes.

Another class is the hard, tough, bony, grey-black looking coals, these being classed as hards. Macroscopically they are known to be composed of finely laminated bands, very regular, and extending over large areas, being found as a rule in thick seams (in the middle of the seam) and having both below and above one or both of the coals already mentioned. Generally from the floor upwards the soft coal gives place to the harder or less soft and this in turn to the Hards under consideration which may be classed: (1) The soft bright coal near the floor, humic coal with little or no structure, (2) the next bright and a little harder and more laminated, semi-humic coal, in which the microscope shows remains of leaves and resinous bodies, (3) more hard coal with bright and dull looking laminae, semi spore coal, (4) spore coal.

The latter when seen in thin sections is found to be composed of microscopores and megaspores, while it is variable in thickness, sometimes passing quickly into semi-spore or into humic coal, or it may be placed with lenticles of cannel, or canneloils coal. In some seams it forms the root coal, which is overlain in its turn by a more or less thick sandstone. It will be seen that we have in one seam four distinct classes of coal, the constituents being distinct and different from one another, and each producing different results on carbonisation. Anyone with a little practice can with accuracy distinguish and pick out all the four varieties. It is not meant to be understood that all seams are composed on similar lines, but in general most of the thick seams say over 5ft. or 6ft. in thickness are built up in the manner indicated, while others are composed of humic or semi-humic constituents, and may never have more than humic consti-

tuents, some may extend to the semi-spore condition, and some may be composed almost entirely of spores, this condition very often prevailing when the workable portion is preceded below by a thin band or stratum of bassy or inferior coal which represents the portion that is humic and semi-humic in other seams. From "Science and Art of Mining."

A SOUTH AFRICAN VIEW ON THE USE OF HAMMER DRILLS IN SHIPPING.

In the course of the discussion by the South African Institution of Engineers of a paper on "Hammer Drills for Rock Boring," by Mr. H. S. Potter, Mr. J. H. Veasey gave a large amount of information with respect to modern methods of stoping and suggested that it might prove economical to adopt a smaller diameter of hole and replace hand drills by light pneumatic hammer drills. In this connection he pointed out that during the year 1918 over 20,000,000 tons of ore were mined from stopes on the fields of the Rand, and which about 8,000,000 tons were produced by hand and about 12,000,000 tons by machine. Assuming eight tons per machine shift, 312 shifts per year, two native operators per machine, and four holes to a shift's work, it would require 4,800 machines and 9,600 native operators drilling 6,000,000 holes to break this 12,000,000 tons. If it were possible to do the same work with machines requiring only one native per shift, the saving to the industry on these 6,000,000 holes would be about 9d. per hole less cost for native labour, a total of £225,000 during the year, with 4,800 fewer natives. Assuming that these 4,800 natives would be available for other work, about 1,200 of them could be employed on light one-man stoping machines, which at eight tons per machine-shift would yield 9,600 tons per day increased output, or 3,000,000 tons per annum, while the remaining natives, viz., about three-fourths of the total, would be required for steel carrying, shovelling, and tramping the increased output. Again, in regard to the 8,000,000 tons obtained from hand stoping, it is difficult to say how many natives were actually employed on this work. But if it is assumed that one native breaks about 300 tons per annum, it would appear that about 27,000 natives were so employed. Neglecting the odd 7,000 as being engaged on work which might be entirely unsuited for light machines, and assuming that the remaining 20,000 could be used in connection with light machine stoping—allowing, as before, three-fourths of the total number for steel carrying, shovelling, tramping and incidental work—5,000 of these natives would be available for light one-man stoping drills, which at eight tons per machine-shift, and 312 shifts per year, would break 12,000,000 tons, an increase of 50 per cent, over hand work. It must not be inferred that any reduction in cost per ton mined has been foreshadowed in this last comparison. Hand stoping is one of the most economical methods of mining on these fields, and it is not suggested that a light machine and rig, requiring only one native per machine shift, will be cheaper so long as the old average is adhered to for a shift's drilling. Also it must be remembered that many concerns would not be justified in making the capital expenditure required for the necessary equipment of machines, rigs, hoses, steel and pipe-lines. At the same time it is believed that if these light one-man drills are allowed to do all they can in the hands of trained operators, light machine stoping will eventually be cheaper than hand stoping.

Electric Steel & Engineering, Ltd.

HEAD OFFICE:

WELLAND, - ONTARIO

MINING MACHINERY

ELECTRIC STEEL CASTINGS

HYDRAULIC MACHINERY

WORKS:

THE ELECTRIC STEEL & METALS CO., Limited - - WELLAND, ONT.

BOVING HYDRAULIC & ENGINEERING CO., Ltd. - LINDSAY, ONT.

THE WABI IRON WORKS, Limited - - - NEW LISKEARD, ONT.

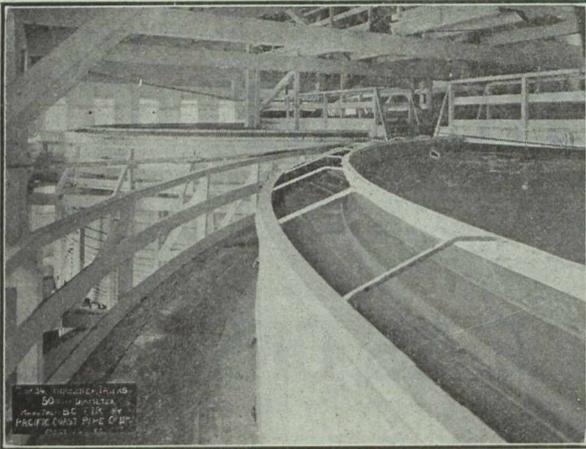
ELECTRIC STEEL & ENGINEERING, LTD.

WELLAND - ONTARIO

If you want a Reliable Casting, let us quote you on our ALL PIG mixture
 Specialists in HIGH CLASS Machinery Castings
 Manufacturers of Mining and Cement Mill Parts
 STANDARD GEARS ALWAYS IN STOCK

Sole Agents and Manufacturers for "Kilbourn's" Patent Tube Mill Lining

FOUNDERS PATTERNMAKERS MACHINISTS
BURNETT & CRAMPTON, Rigaud, Que.



Wood Mining Tanks

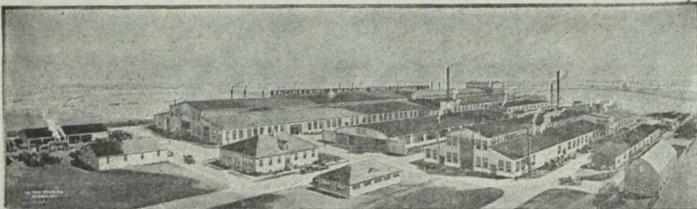
Of All Descriptions

Wood Stave Pipe

ILLUSTRATION SHOWS DORR THICKENER TANKS 50 FEET DIAMETER. MADE FROM B.C. FIR. INSTALLED BY US.

Pacific Coast Pipe Co., Limited

1551 Granville Street, Vancouver, B.C.



The Plant that delivers Service—

Worth knowing where you can get it. Anything you buy from us is right or it isn't shipped.

BOILERS	ALSO
Horizontal	Ore Cars & Buckets
Vertical	Steel Tanks
Locomotive	Plate Work

ENGINEERING & MACHINE WORKS OF CANADA, Limited
 ST. CATHARINES, ONTARIO

Eastern Sales Office: HALL MACHINERY CO., Sherbrooke

SUN*RAY

Carbide Cap Lamp

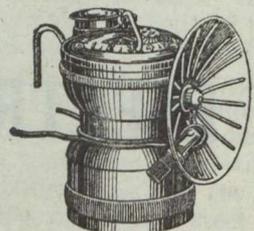
WORKS WITHOUT WATCHING

We want you to try a *SUN*RAY* Lamp, because we know its superior qualities will make you a permanent user of it.

It's so different from other lamps, that if you have been using one of the ordinary styles, your first trial of the *SUN*RAY* will be a delightful revelation to you. We are willing that you should try it at our expense, and we will gladly send you a sample if you will only write for it.

DEWAR MFG. COMPANY
 INC.

100 Wellington Street, West
 TORONTO, ONT.
 Canada



The Canadian Miners' Buying Directory.

Acetylene Gas:

Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.

A.C. Units:

MacGovern & Co.

Agitators:

The Dorr Co.

Air Hoists:

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

Alloy and Carbon Tool Steel:

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

Alternators:

MacGovern & Co.

Spielman Agencies, Regd.

Aluminium:**Amalgamators:**

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

Antimony:

Canada Metal Co.

Antimonial Lead:

Pennsylvania Smelting Co.

Arrester, Locomotive Spark:

Hendrick Manufacturing Co.

Arsenic White Lead:

Coniagas Reduction Co.

Assayers' and Chemists' Supplies:

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

Assayers and Chemists:

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

Asbestos:

Everitt & Co.

Balls:

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

Ball Mills:

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

Balances—Heusser:

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

Babbit Metals:

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

Ball Mill Feeders:

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

Ball Mill Linings:

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

Belting—Leather, Rubber and Cotton:

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

Belting:

R. T. Gilman & Co.

Belting (Transmission):

Goodyear Tire & Rubber Co.

Belting (Elevator):

Goodyear Tire & Rubber Co.

Belting (Conveyor):

Goodyear Tire & Rubber Co.

Blasting Batteries and Supplies:

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

Bluestone:

The Consolidated Mining & Smelting Co.

Blowers:

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

Boilers:

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

Blue Vitriol (Coniagas Eed):

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

THE CONIAGAS REDUCTION

COMPANY, LIMITED

St. Catharines - - - Ontario

Smelters and Refiners of Cobalt Ores

Manufacturers of

Copper Sulphate

Bar Silver—Electrically Refined

Arsenic—White and Metallic

Cobalt Oxide and Metal

Nickel, Oxide and Metal

Telegraphic Address:

“Coniagas.”

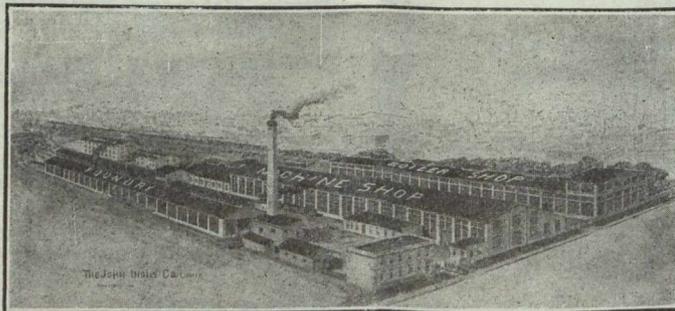
Codes: Bedford McNeill,

A. B. C. 5th Edition

Bell Telephone, 603 St. Catharines

ENGINES, BOILERS and TANKS

WRITE US
FOR PRICES
AND
SPECIFICATIONS



HEAVY
PLATE WORK
and
SPECIAL
MACHINERY

PLANT OF THE JOHN INGLIS CO. LIMITED

THE JOHN INGLIS COMPANY, LIMITED

14 Strachan Avenue, TORONTO, Canada

Representatives in Eastern Canada:
Ottawa Representative:

JAS. W. PYKE & CO., LTD., 232 St. James Street, MONTREAL
J. W. ANDERSON, 7 Bank Street Chambers

Canadian Miners' Buying Directory.—(Continued)

Cables—Wire:

Standard Underground Cable Co. of Canada, Ltd.
Canada Wire & Cable Co.
Fraser & Chalmers of Canada, Ltd.
Northern Electric Co., Ltd.
R. T. Gilman & Co.

Cam Shafts:

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

Car Dumps:

Sullivan Machinery Co.
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.

Carbide of Calcium:

Canada Carbide Company, Ltd.

Cars:

Canadian Foundries and Forgings, Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
John J. Gartshore
MacKinnon Steel Co., Ltd.
The Electric Steel & Metals Co.
Northern Canada Supply Co.
Marsh Engineering Works
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Car Wheels and Axles:

Canadian Car Foundry Co., Ltd.
Burnett & Crampton
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore
Marsh Engineering Works, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Carriers (Gravity):

Jones & Glassco

Castings—Brass

The Canada Metal Co., Ltd.

Castings (Iron and Steel)

Burnett & Crampton
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Cement and Concrete Waterproofing:

Spielman Agencies, Regd.

Cement Machinery:

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

Chains:

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

Chain Drives:

Jones & Glassco

Chemical Apparatus:

Mine and Smelter Supply Co.

Chemists:

Canadian Laboratories
Campbell & Devell
Thos. Heves & Sons
Milton Hersey Co.
Lefoux & 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.
Delster 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

Crude Oil Engines:

Swedish Steel & Importing Co., Ltd.

Crushers:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Hardinge Conical Mill Co.
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

Surplus Machinery and Equipment Property of U.S. Government

FOR SALE

Canadian Industrial Organizations are offered the opportunity of securing new and used machinery and equipment at attractive prices.

ACCUMULATORS	GENERATORS	SHAPERS
AIR COMPRESSORS	GRINDERS	SWITCH BOXES
BELTING	HOISTS	SCLEROSCOPES
BRINNEL MACHINES	LATHES	SCREW MACHINES
BLOWERS	MILLERS	TRUCKS
CHUCKS	MOTORS	TANKS (Quenching, Oil, Storage)
CIRCUIT BREAKERS	PRESSES	TAPS
DIES	PUMPS	TRANSFORMERS
DRILLING MACHINES	PULLEYS	TENSILE MACHINES
FORGES	PYROMETERS	THERMOMETERS
FURNACES	REAMERS	VICES
	SCALES	WELDING EQUIPMENT

We issue a weekly Bulletin, which shows the materials available for sale at date of issue. If you are not on our Mailing List, we request your name and address.

**Toronto District Salvage Board,
Ordnance Dept., U.S. Army**

39 Adelaide St., E.,

TORONTO, Ontario

Canadian Miners' Buying Directory.—(Continued)

- Cyanide Plant Equipment:**
The Dorr Co.
- D. C. Units:**
MacGovern Co.
- Derricks:**
Smart-Turner Machine Co.
M. Beatty & Sons, Ltd.
Marsh Engineering Works
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Mussens, Limited
- Diamond Drill Contractors:**
Diamond Drill Contracting Co.
E. J. Longyear Company
Smith & Travers
Sullivan Machinery Co.
- Diamond Tools:**
Diamond Drill Carbon Co.
- Diamond Importers:**
Diamond Drill Carbon Co.
- Digesters:**
Canadian Chicago Bridge and Iron Works
- Dies:**
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Dredger Pins:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
- Dredging Machinery:**
Canadian Steel Foundries, Ltd.
M. Beatty & Sons
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
R. T. Gilman & Co.
- Dredging Ropes:**
Allan, Whyte & Co.
Greening, B., Wire Co., Ltd.
R. T. Gilman & Co.
- Drills, Air and Hammer:**
Canadian Ingersoll-Rand Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Canadian Rock Drill Co.
The Mine & Smelter Supply Co.
Mussens, Limited
- Drills—Core:**
Canadian Ingersoll-Rand Co., Ltd.
E. J. Longyear Company
Standard Diamond Drill Co.
Sullivan Machinery Co.
- Drills—Diamond:**
Sullivan Machinery Co.
Northern Canada Supply Co.
E. J. Longyear Company
- Drill Steel—Mining:**
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rockaway, N.J.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.
- Drill Steel Sharpeners:**
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
Sullivan Machinery Co.
Canadian Rock Drill Co.
The Wabi Iron Works
- Drills—Electric:**
Canadian Fairbanks-Morse Co., Ltd.
Sullivan Machinery Co.
Northern Electric Co., Ltd.
- Drills—High Speed and Carbon:**
Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
Hadfields, Limited
- Dynamite:**
Canadian Explosives
Northern Canada Supply Co.
- Dynamos:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Company
- Ejectors:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
- Elevators:**
M. Beatty & Sons
Sullivan Machinery Co.
Northern Canada Supply Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
The Wabi Iron Works
- Engineering Instruments:**
C. L. Berger & Sons
- Engines—Automatic:**
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
- Engines—Gas and Gasoline:**
Canadian Fairbanks-Morse Co., Ltd.
Alex. Fleck
Fraser & Chalmers of Canada, Ltd.
Sullivan Machinery Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.
The Mine & Smelter Supply Co.
- Engines—Haulage:**
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
- Engines—Marine:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Co., Inc.
Swedish Steel & Importing Co., Ltd.
- Engines—Steam:**
Canadian Fairbanks-Morse Co., Ltd.
M. Beatty & Sons
R. T. Gilman & Co.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.
- Engines—Stationary:**
Swedish Steel & Importing Co., Ltd.
- Engineers:**
The Dorr Co.
- Ferro-Alloys (all Classes):**
Everitt & Co.
- Feed Water Heaters:**
MacGovern & Co.
- Flashlights—Electric:**
Spielman Agencies, Regd.
- Flood Lamps:**
Northern Electric Co., Ltd.
- Flourspar:**
The Consolidated Mining & Smelting Co.
Everitt & Co.
- Forges:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
- Forging:**
M. Beatty & Sons
Canadian Foundries and Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
- Frogs:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore
- Frequency Changers:**
MacGovern & Co., Inc.
- Furnaces—Assay:**
Canadian Fairbanks-Morse Co., Ltd.
Lymans, Limited
Mine & Smelter Supply Co.
- Fuse:**
Canadian Explosives
Northern Canada Supply Co.
- Gears (Cast):**
Hull Iron & Steel Foundries, Ltd.
The Link-Belt Co.
- Gears, Machine Cut:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Hamilton Gear & Machine Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Granulators:**
Hardinge Conical Mill Co.
- Grinding Wheels:**
Canadian Fairbanks-Morse Co., Ltd.
- Gold Refiners**
Goldsmith Bros.

Canadian Miners' Buying Directory.—(Continued)

- Gold Trays:**
Canada Chicago Bridge & Iron Works
- Hose (Air Drill):**
Goodyear Tire & Rubber Co.
- Hose (Fire):**
Goodyear Tire & Rubber Co.
- Hose (Packings)**
Goodyear Tire & Rubber Co.
- Hose (Suction):**
Goodyear Tire & Rubber Co.
- Hose (Steam):**
Goodyear Tire & Rubber Co.
- Hose (Water):**
Goodyear Tire & Rubber Co.
- Hammer Rock Drills:**
Mussens, Limited
The Mine & Smelter Supply Co.
- Hangers and Cable:**
Standard Underground Cable Co. of Canada, Ltd.
- High Speed Steel:**
Canadian Fairbanks-Morse Co. Ltd.
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rockaway, N.J.
- High Speed Steel Twist Drills:**
Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
Northern Canada Supply Co.
- Hoists—Air, Electric and Steam:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Jones & Glassco
M. Beatty & Sons
Marsh Engineering Works
Northern Canada Supply Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
R. T. Gilman & Co.
Mussens, Limited
Link-Belt Co.
- Hoisting Engines:**
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
M. Beatty & Sons
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Mine & Smelter Supply Co.
- Hose:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
- Hydraulic Machinery:**
Canadian Fairbanks-Morse Co., Ltd.
Hadfields, Limited
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Industrial Chemists:**
Hersey, M. & Co., Ltd.
- Ingot Copper:**
Canada Metal Co., Ltd.
Hoyt Metal Co.
- Insulating Compounds:**
Standard Underground Cable Co. of Canada, Ltd.
- Inspection and Testing:**
Dominion Engineering & Inspection Co.
- Inspectors:**
Hersey, M. & Co., Ltd.
- Jacks:**
Canadian Fairbanks-Morse Co., Ltd.
Can. Brakeshoe Co., Ltd.
Northern Canada Supply Co.
R. T. Gilman & Co.
Mussens, Limited
- Jack Screws:**
Canadian Foundries and Forgings Ltd.
- Laboratory Machinery:**
Mine & Smelter Supply Co.
- Lamps—Acetylene:**
Dewar Manufacturing Co., Inc.
- Lamps—Carbide:**
Dewar Manufacturing Co., Inc.
- Lamps—Miners:**
Canada Carbide Company, Limited
Canadian Fairbanks-Morse Co., Ltd.
Dewar Manufacturing Co., Inc.
Northern Electric Co., Ltd.
Mussens, Limited
- Lamps:**
Dewar Manufacturing Co., Inc.
- Lanterns—Electric:**
Spielman Agencies, Regd.
- Lead (Pig):**
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.
- Levels:**
C. L. Berger & Sons
- Locomotives (Steam, Compressed Air and Storage Steam):**
Canadian Fairbanks-Morse Co., Ltd.
H. K. Porter Company
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
- Link Belt**
Canadian Fairbanks-Morse Co. Ltd.
Northern Canada Supply Co.
Jones & Glassco
- Machinists:**
Burnett & Crampton
- Machinery—Repair Shop:**
Canadian Fairbanks-Morse Co., Ltd.
- Machine Shop Supplies:**
Canadian Fairbanks-Morse Co., Ltd.
- Magnesium Metal:**
Everitt & Co.
Hull Iron & Steel Foundries, Ltd.
- Manganese Steel:**
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Metal Marking Machinery:**
Canadian Fairbanks-Morse Co., Ltd.
- Metal Merchants:**
Henry Bath & Son
Geo. G. Blackwell, Sons & Co.
Coniagas Reduction Co.
Consolidated Mining & Smelting Co. of Canada
Canada Metal Co.
C. L. Constant Co.
Everitt & Co.
- Metallurgical Engineers:**
The Dorr Co.
- Metallurgical Machinery:**
The Dorr Co.
- Metal Work, Heavy Plates:**
Canada Chicago Bridge & Iron Works
- Mica:**
Everitt & Co.
Diamond Drill Carbon Co.
- Mining Engineers:**
Hersey, M. Co., Ltd.
- Mining Drill Steel:**
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, N.J.
- Mining Requisites:**
Canadian Steel Foundries, Ltd.
Dominion Wire Rope Co., Ltd.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
- Mining Ropes:**
Dominion Wire Rope Co., Ltd.
- Mine Surveying Instruments:**
C. L. Berger & Sons
- Molybdenite:**
Everitt & Co.
- Monel Metal:**
International Nickel Co.
- Motors:**
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
MacGovern & Co.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

Motor Generator Sets—A.C. and D.C.
MacGovern & Co.

Nails:
Canada Metal Co.

Nickel:
International Nickel Co
Conlagas 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.

Paints—Special:
Spielman Agencies, Regd.

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, L.
The Wabi Iron Works

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

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

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

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

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

Pulleys, Shaftings and Hangings:
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
The Wabi Iron Works

Pulverizers—Laboratory:
Mine & Smelter Supply Co.
The Wabi Iron Works
Hardinge Conical Mill Co.

Pumps—Boiler Feed:
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
Mine & Smelter Supply Co.

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

Pumps—Diaphragm
The Dorr Company

Pumps—Electric
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
Smart-Turner Machine Co.

Pumps—Sand and Slime:
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Electric Steel & Metals Co.
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:

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

Rolls—Crushing

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

Samplers:

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

Scales—(all kinds):

Canadian Fairbanks-Morse Co., Ltd.

Screens:

Greening, B. Wire Co.
Hendrick Mfg. Co.
Mine & Smelter Supply Co.
Link-Belt Co.

Screens—Cross Patent Flanged Lip:

Hendrick Mfg. Co.

Screens—Perforated Metal:

Hendrick Mfg. Co.

Screens—Shaking:

Hendrick Mfg. Co.

Screens—Revolving:

Hendrick Mfg. Co.

Scheelite:

Everitt & Co.

Separators:

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

Shaft Contractors:

Hendrick Mfg. Co.

Sheet Metal Work:

Hendrick Mfg. Co.

Sheets—Genuine Manganese Bronze:

Hendrick Mfg. Co.

Shoes and Dies:

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

Shovels—Steam:

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

Siline:

Conlagas Reduction Co.

Saline Refiners:

Goldsmith Bros.

Smelters:

Goldsmith Bros.

Sledges:

Canada Foundries & Forgings, Ltd.

Smoke Stacks:

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

Special Machinery:

John Inglis Co., Ltd.

Spelter:

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

Sprockets:

Link-Belt Co.

Spring Coil and Clips Electric:

Canadian Steel Foundries, Ltd.

Steel Barrels:

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

Stamp Forgings:

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

Steel Castings:

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

Steel Drills:

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

Steel Drums:

Smart-Turner Machine Co.

Steel—Tool:

Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
N. S. Steel & Coal Co.
Hadfields, Limited
Swedish Steel & Importing Co., Ltd.

Structural Steel Work (Light):

Hendrick Mfg. Co.

Stone Breakers:

Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Sulphate of Copper:

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

Sulphate of Nickel:

The Mond Nickel Co., Ltd.

Surveying Instruments:

C. L. Berger

Switches and Switch Stand:

Canadian Steel Foundries, Ltd.
Mussens, Limited.

Switches and Turntables:

John J. Gartshore

Tables—Concentrating:

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

Tanks:

R. T. Gilman & Co.

Tanks—Acid:

Canadian Chicago Bridge & Iron Works

Tanks (Wooden):

Canadian Fairbanks-Morse Co., Ltd.
Gould, Shapley & Muir Co., Ltd.
Pacific Coast Pipe Co., Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tanks—Cyanide, Etc.:

Hendrick Mfg. Co.
Pacific Coast Pipe Co.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tanks—Steel:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Chicago Bridge & Iron Works
Marsh Engineering Works
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Hendrick Mfg. Co.
The Wabi Iron Works

Tanks—Oil Storage:

Canadian Chicago Bridge & Iron Works

Tanks (water) and Steel Towers:

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

Canadian Miners' Buying Directory.—(Continued)

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.

Trucks:

Canadian Fairbanks-Morse Co., Ltd.

Tubs:

Hadfields, Limited

Tube Mills:

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

Tube Mill Balls:

Canada Foundries & Forgings, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Tube Mill Liners:

Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Turbines—Water Wheel:

MacGovern & Co.

Turbines—Steam:

Fraser & Chalmers of Canada, Ltd.
MacGovern & Co.

Twincones:

Canada Foundries & Forgings, Ltd.

Uranium:

Everitt & Co.

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.
Müssens, 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.

Zinc:

Everitt & Co.

Zinc:

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

Zinc Spelter:

Canada Metal Co., Ltd.
Hoyt Metal Co., Ltd.

WANTED

One 8-ft. Hardinge Pebble Mill.
One 5-ft. Tube Mill—16-ft. long, with end discharge through trunnion.

A. R. Williams Machinery & Supply Co.
MONTREAL

Wanted by Manufacturing Company**FIRST CLASS TRAVELLERS**

Calling on Hardware Dealers, Garages and Machinery Users, to push good class product as side line. Good seller, liberal commission.

Apply, giving full particulars as to area covered, etc.,

Box 5, CANADIAN MINING JOURNAL

Garden City Press

Ste. Anne de Bellevue, P.Q.

"ANTI-SULPHURIC" ENAMEL

The only reliable protection against the action of acid and chemical fumes. For batteries, battery rooms, chemical works, etc. — Used by Admiralty and War Office.

Made by: GRIFFITHS BRCS. & CO., London, England.
Spielman Agencies, Reg'd., 45 St. Alexander St., Montreal.

FORGINGS

SEND PRINTS FOR PRICES

CANADA

FOUNDRIES & FORGINGS, LIMITED

WELLAND, ONT.

Balbach Smelting and Refining Co.
Newark, N. J.

Buyers of

Gold, Silver, Lead and Copper Ores.
Lead Residues and Copper Residues.

Electrolytic Copper Refinery

INQUIRIES SOLICITED

THE CANADIAN MINING JOURNAL
ALPHABETICAL INDEX TO ADVERTISERS

A

Allan Whyte & Co. 6
American Zinc & Lead Smelting Co. 6

B

Balbach Smelting & Refining Co. 47
Bell, J. M. 10
Blackwell, G. C., Sons & Company 12
Beatty, M. & Sons 12
Berger C. L. & Sons 12
Brigstocke, R. W. 11
British Columbia, Province of 12
Burns, L. P., Ltd. 38
Burnett & Crampton 38

C

Canadian Allis-Chalmers
Can. Chicago Bridge & Iron Works
Canadian Explosives, Ltd.
Canadian Fairbanks-Morse Co., Ltd. 16
Canadian Milk Products, Ltd.
Canadian National Railways
Canadian Ingersoll-Rand Co., Ltd.
Canadian Link-Belt Co., Ltd.
Canadian Laboratories, Ltd. 10
Canada Foundries & Forgings, Ltd. 47
Canada Wire & Cable Co. 13
Canadian Rock Drill Co.
Canadian Steel Foundries, Ltd. 1
Canana Carbide Company
Canada Metal Co. 8
Canadian Brakeshoe Co. 7
Canadian Sirocco Co. 49
Capper Pass & Son, Ltd. 10
Consolidated Mining & Smelting Co.
Crane, Ltd.
Coniagas Reduction Co. 40
Constant, C. L. & Co. 35

D

Deister Concentrator Co.
Denver Rock Drill Mfg. Co.
Deloro Smelting & Refining Co. 13
Dewar Mfg. Co. 38
Department of Mines, Canada
Diamond Drill Carbon Co. 48
Diamond Drill Contracting Co. 12
Dominion Coal Co., Ltd. 7
Dominion Wire Rope Co., Ltd.
Donald, J. T. & Co. 10
Dorr Co. 11
Dresser, Jno. A. 11
Drury, H. A. Company
Dwight & Lloyd Sintering Co., Inc 10
Dominion Engineering & Inspection Co. 10

E

Electric Steel & Engineering, Ltd. 37
Electric Steel & Metals Co. 37
Engineering & Machine Works of Canada 38
Everitt & Co. 8

F

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

G

Gartshore, John J.
General Engineering Co. 12
Goldie & McCulloch
Goldsmith Bros., Smelting & Refining Co., Ltd. 12
Goodyear Tire & Rubber Co. of Canada, Ltd.
Grover & Grover 10

H

Hadfields, Ltd.
Hamilton Gear & Machine Co. 12
Hassan A. A. 11
Hendrick Mfg. Co. 12
Hersey, Milton Co., Ltd. 11
Heys Thomas & Son 11
Hull Iron & Steel Foundries, Ltd. 14
Hore, Reginald E. 11
Hoyt Metal Co.

I

Imperial Bank of Canada
International Business Machines
International Nickel Co. of Canada, Limited 5
International Nickel Company
Inglis, J. & Co. 40

J

Johnston, Matthey & Co. 10
Jones & Glassco

L

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

M

Manitoba, Province of 9
McDonald, M. P. 11
MacGovern & Co., Inc
MacKinnon Steel Co., Ltd. 35
Marsh Engineering Works 35
McEvoy, Jas. 11
Mine & Smelter Supply Co.
Mond Nickel Co. 8
Mussens, Ltd. 7

N

Northern Canada Supply Co. 6
Northern Electric Co., Ltd.
Nova Scotia Government
Nova Scotia Steel & Coal Co.

O

Ontario, Province of 4
Osborn, Sam'l Co., Ltd.

P

Pacific Coast Pipe Co. 38
Peacock Bros., Ltd.
Pennsylvania Smelting Co. 10
Prest-O-Lite Co. of Canada 6

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. 35
Smith & Travers Company 10
Standard Underground Cable Co. of Canada, Ltd.
Stewart, Robert H. 11
Spielman Agencies, Regd. 47
Sudbury Diamond Drilling Co., Ltd. 10
Sullivan Machinery Co. 2
Swedish Steel & Importing Co. 3
Swedish Steel (Bolinder's)

T

Toronto Iron Works
Toronto District Salvage Board 42
Tyrrell, J. B. 11

U

University of Toronto

W

Wabi Iron Works 7
Whitman, Alfred R. 11

Good Cores

Can only be obtained if proper care be exercised in the selection of diamonds. We are always ready to give our customers the benefit of our experience when selecting stones.

Write or wire at our expense for particulars.

THE DIAMOND DRILL CARBON CO.

Direct Importers
of
GARBONS & BORTZ
BALLAS

61 PARK ROW
New York - N.Y.



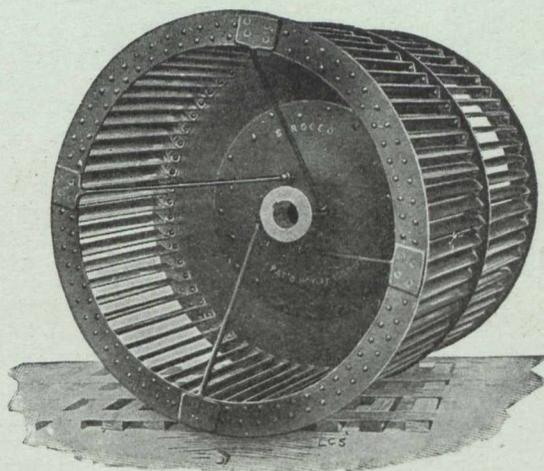
“Sirocco”

TRADE MARK

MINE FANS



Equipment in use at the Nova Scotia Steel & Coal Company's Mine.



DELIVER MORE AIR WITH LESS POWER

Ordinary mine fans use a lot of power, and did you ever figure out how much that power is costing a year?

Suppose you are using 200 h.p., an average of 7000 hours a year. If that power delivered to the fan costs less than 5 cts. per horsepower hour you are doing better than the average.

$$\text{Now figure: } \frac{200 \times 7000 \times 5}{100} = \$70,000$$

In many mines the figure is greater—we know of one mine where the yearly cost of power to operate the fans is figured at nearly \$125,000.

So when we say that Sirocco Mine Fans deliver more air with less power, we are talking money—getting right down to brass tacks.

The limited space at our disposal here prevents going into the reasons for Sirocco superiority, but they are explained thoroughly in our 66-page illustrated booklet on mine ventilation.

CANADIAN SIROCCO CO., Limited WINDSOR, ONTARIO

BRANCH OFFICES:—

CALGARY, Alberta
TORONTO, Ontario

WINNIPEG, Manitoba
MONTREAL, Quebec

BELLISS & MORCOM

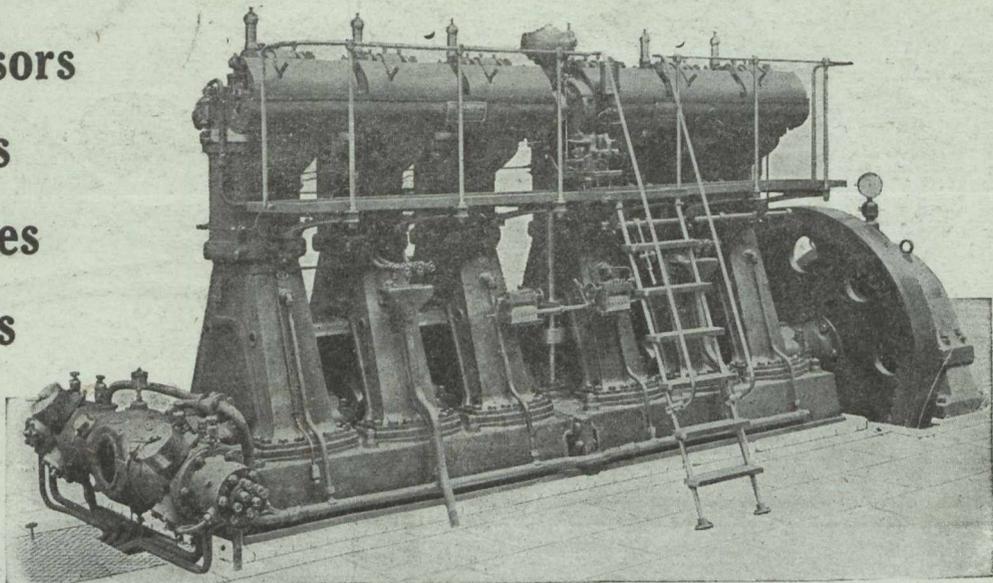
Air Compressors

Diesel Engines

Steam Turbines

Steam Engines

Condensers



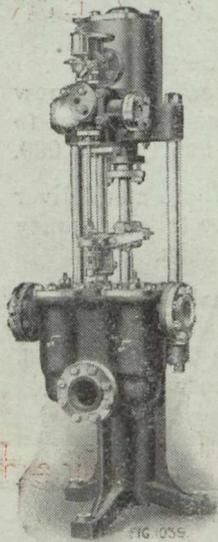
BELLISS & MORCOM DIESEL CRUDE OIL ENGINE.

LAURIE & LAMB

211 Board of Trade Building

MONTREAL

The "Tipton" High Pressure Vertical Direct-Acting Slow Speed Boiler Feed Pump



The pumps are designed for feeding with and against pressure up to 200 lbs. per square inch.

Specification:—The Pump End is of close grained cast iron fitted with a gun metal liner to the working barrel. The pump bucket is of gun metal fitted with ebonite rings which are made to expand by the pressure of water in the pump cylinder. The pump rod is of manganese bronze and is connected to the steel piston rod by means of an improved design of crosshead, which is made adjustable for wear on the crosshead pin.

Pump Valves:—In the smaller pumps each valve is fitted with a gun metal valve and seat but in the larger sizes gun metal group valves are fitted. The Steam Cylinder is neatly lagged with blue planished steel. The steam valve gear is of the positive type which renders the pump certain in action at very low speeds, and ensures a full stroke being made at each alternation. The number of moving parts in the steam chest valve gear has been reduced to the absolute minimum, thus obviating as far as possible unnecessary wear and tear and cost of frequent renewals.

Prices and full particulars will be sent on application

FRASER & CHALMERS OF CANADA, Limited

GUARANTEE BUILDING

::

MONTREAL, QUE.