

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

Coloured covers/  
Couverture de couleur

Coloured pages/  
Pages de couleur

Covers damaged/  
Couverture endommagée

Pages damaged/  
Pages endommagées

Covers restored and/or laminated/  
Couverture restaurée et/ou pelliculée

Pages restored and/or laminated/  
Pages restaurées et/ou pelliculées

Cover title missing/  
Le titre de couverture manque

Pages discoloured, stained or foxed/  
Pages décolorées, tachetées ou piquées

Coloured maps/  
Cartes géographiques en couleur

Pages detached/  
Pages détachées

Coloured ink (i.e. other than blue or black)/  
Encre de couleur (i.e. autre que bleue ou noire)

Showthrough/  
Transparence

Coloured plates and/or illustrations/  
Planches et/ou illustrations en couleur

Quality of print varies/  
Qualité inégale de l'impression

Bound with other material/  
Relié avec d'autres documents

Continuous pagination/  
Pagination continue

Tight binding may cause shadows or distortion along interior margin/  
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure

Includes index(es)/  
Comprend un (des) index

Title on header taken from:/  
Le titre de l'en-tête provient:

Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/  
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

Title page of issue/  
Page de titre de la livraison

Caption of issue/  
Titre de départ de la livraison

Masthead/  
Générique (périodiques) de la livraison

Additional comments:/  
Commentaires supplémentaires:

Wrinkled pages may film slightly out of focus.  
Pagination is as follows: [2], i-viii, 63-78, [4]

This item is filmed at the reduction ratio checked below/  
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

*Robert Bell*

# THE MINING REVIEW

Established 1882

I. XIII.—No. 4.

1894—OTTAWA, APRIL—1894.

Vol. XIII.—No. 4.

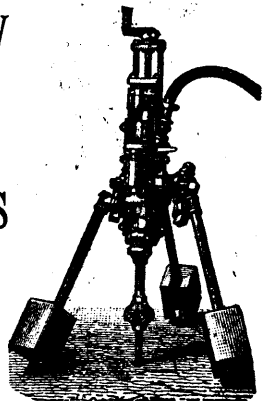
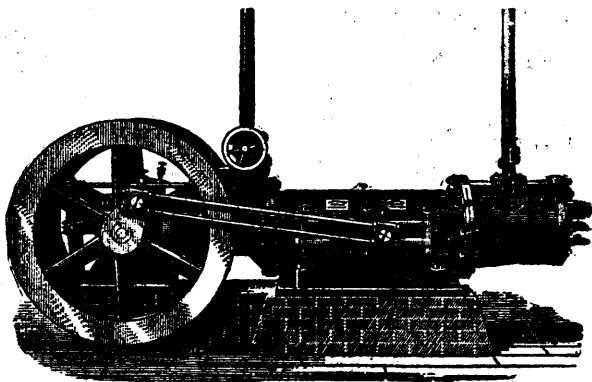
## CANADIAN RAND DRILL CO. SHERBROOKE, QUE.

Mining, Tunneling & Rock-Working Machinery

STRAIGHT LINE COMPRESSORS.

DUPLEX, COMPOUND & CONDENSING COMPRESSORS

With MEYER or CORLISS VALVE GEAR  
For ECONOMICAL PLANTS.



THE JENCKES MACHINE CO., Sole Agents,

16 VICTORIA SQUARE, MONTREAL.

HALIFAX HOTEL, HALIFAX.

632 CORDOVA STREET, VANCOUVER.

## INGERSOLL ROCK DRILL CO.

# ROCK DRILLS FOR MINES, TUNNELS AND QUARRIES.

STRAIGHT LINE, DUPLEX & COMPOUND AIR COMPRESSORS.

Stone Channelling Machines, Coal Mining Machines,

AND COMPLETE PLANTS OF MINING, TUNNELLING AND QUARRYING MACHINERY.

203 ST. JAMES STREET, MONTREAL.



SECTION OF CONVEYOR.

### JEFFREY CHAIN BELTING

For Elevators, Conveyors for handling Coal, Ores, &c. Also  
Manufacturers of Coal Chutes, Tipples, &c.

## JEFFREY COAL MINING MACHINES

OPERATED BY ELECTRICITY AND AIR POWER.

Coal Drills, Motor Cars, Etc., Etc.

COAL SCREENS.

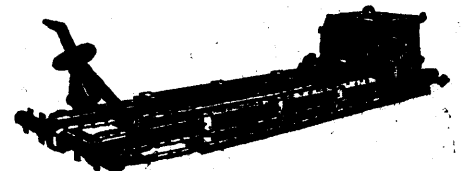
Mines Examined and Estimates Made.

SEND FOR ILLUSTRATED CATALOGUE.

**THE JEFFREY MANFG. COMPANY,**

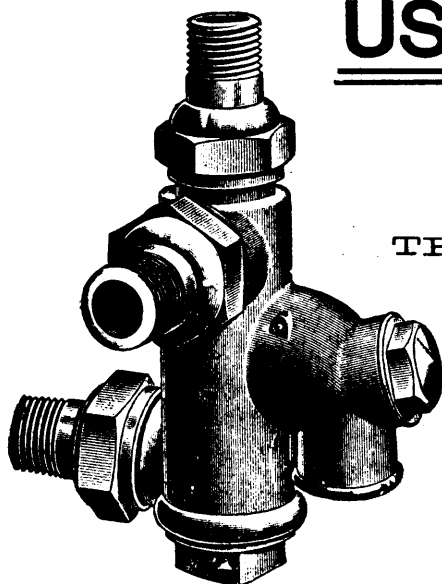
New York Branch, 168 Washington St. COLUMBUS, OHIO. Chicago, Branch, 48 South Canal St.

Robb Engineering Company, Agents, Amherst, Nova Scotia.



**USE THE BEST!**

**TAKE NO OTHER!!**



THE

**Penberthy Injector,**

THE ONLY INJECTOR MADE WHICH IS  
**ABSOLUTELY AUTOMATIC.**

**70,000** IN USE IN THE UNITED STATES  
AND CANADA!

Sold by all large Steam Supply Houses.

Used by all large Traction Engine Builders.

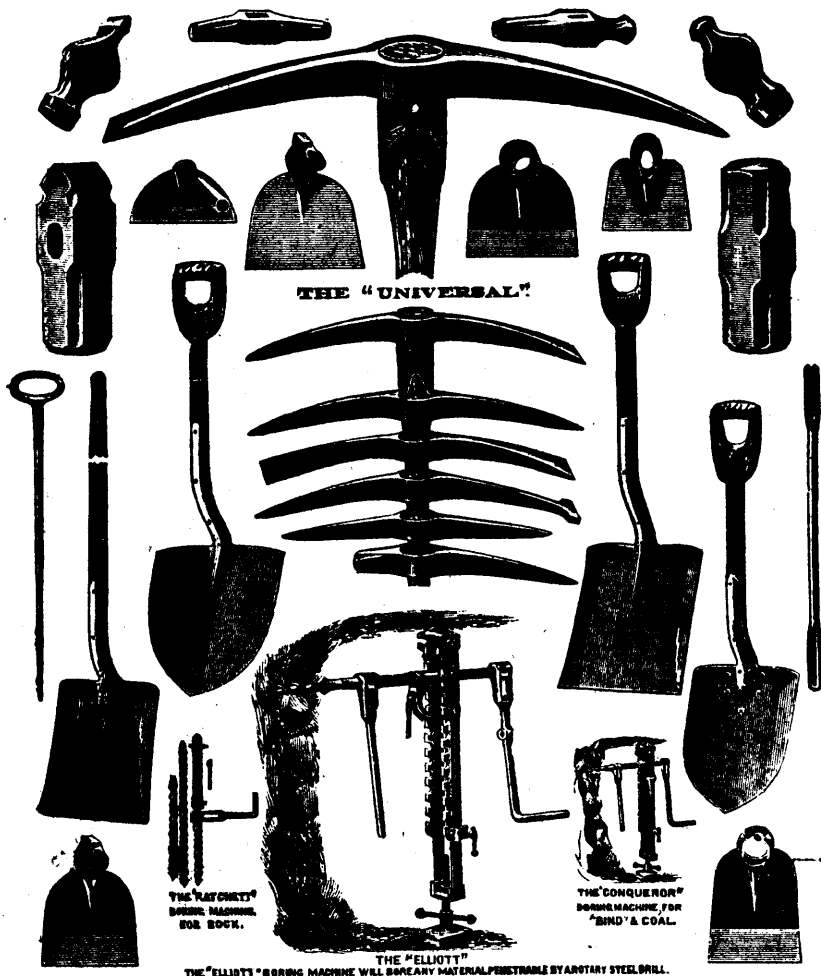
Used by EVERY LIVE, WIDE-AWAKE Steam-user in America.

Write for Prices to

Waterous Engine Works Co., Brantford; Garth & Co., Montreal; A. R. Williams, Toronto; I. Matheson & Co., New Glasgow, N.S.;  
McKelvy & Birch, Kingston; Macdonald & Co., Halifax; McKeough & Trotter, Chatham;  
Spratt & Gray, Victoria, B.C.; Robb Engineering Co., Amherst, N.S.; or

**PENBERTHY INJECTOR CO., Manufacturers, Windsor, Ont.**

Address Letters to Detroit, Michigan, U.S.A.



THE "UNIVERSAL"

THE "RAYBERRY"  
BORING MACHINE  
FOR ROCK.

THE "CONQUEROR"  
BORING MACHINE FOR  
"BIRD" & COAL.

THE "ELLIOTT" BORING MACHINE WILL BORE ANY MATERIAL PENETRABLE BY ANY STEEL DRILL.

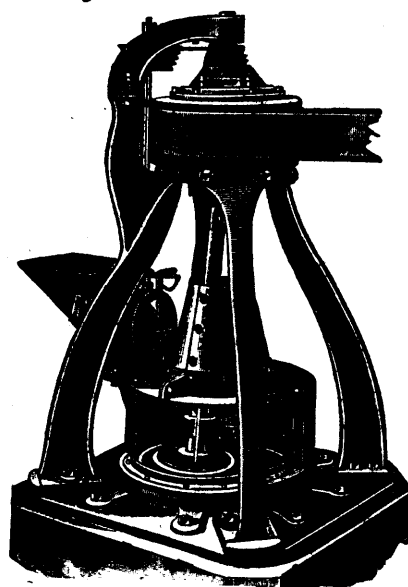
SPECIAL TOUGH MINERS DRILLSTEEL.

**THE HARDY PATENT PICK CO. Limited**  
SHEFFIELD, ENGLAND.

**THE GRIFFIN MILL**

The Only Perfect Pulverizer

OF QUARTZ, PHOSPHATE  
GOLD ROCK,  
OR SILVER FOUNDRY  
ORES, FACINGS,  
PLUMBAGO, And All Other  
PORTLAND Refractory  
CEMENT, Substances.



Will work either wet or dry, and deliver a finished product. Capacity, 3 to 4 tons per hour on Phosphate Rock, 1½ to 2 tons per hour on Portland Cement, Quartz or Ores, depending on hardness of material to be pulverized and fineness of product. Grinds from 80 to 250 Mesh with equal facility.

NO JOURNALS IN GRINDING CHAMBER. BALL RIGID ON SHAFT HAVING DIRECT POSITIVE ACTION ON MATERIAL. MINIMUM POWER PRODUCES MAXIMUM AMOUNT OF PRODUCT. IT IS ABSOLUTELY GUARANTEED IN EVERY RESPECT, BOTH AS TO CONSTRUCTION AND CAPACITY. FIRST COST, WEAR, AND OPERATING EXPENSE MUCH LESS THAN STAMP MILLS. LARGE NUMBER OF MILLS IN USE ON DIFFERENT MATERIALS WITH POSITIVE SUCCESS IN EVERY INSTANCE.

Correspondence solicited, and illustrated descriptive pamphlet furnished on application to

**BRADLEY FERTILIZER CO., 92 State St., Boston, Mass.**

# POLISHED STEEL SHAFTING . .

## Nova Scotia Steel & Forge Co.

(LIMITED.)

### NEW GLASGOW, NOVA SCOTIA.

Every Bar Guaranteed Straight and True to Size  
within  $\frac{1}{32}$  of an Inch.

BOXING EXTRA AT COST.

Shafts of our Standard Sizes up to 3 inches in diameter we keep in stock, in lengths from 12 to 18 feet, varying by 2 feet.  
On orders from stock cut to other lengths, we charge for length from which we cut.  
Prices for Special Sizes, varying from list of actual sizes given above, will be furnished upon application.

All orders filled as per Actual Size column unless otherwise specified.

Prices Subject to Change Without Notice.

This is not Hot Polished or Cold Rolled Steel, and will not spring when keyseated. If your Wholesale Hardware Firm cannot supply you write direct to the Works, New Glasgow, Nova Scotia.

### PRICE LIST.

Nominal Size of Shaft.	Actual Size of Shaft.	Weight per ft.	Price per lb.	Nominal Size of Shaft.	Actual Size of Shaft.	Weight per ft.	Price per lb.
1 1/4	1 1/4	4.13	4 1/2 cts.	2 3/4	2 1/4	18.91	4 cts.
1 3/8	1 3/8	5.01	"	3	2 1/2	22.59	"
1 1/2	1 1/2	5.94	"	3 1/4	3 1/8	26.60	"
1 5/8	1 1/2	7.46	"	3 1/2	3 1/8	30.94	"
2	1 3/4	9.83	4 cts.	4	4	42.33	5 cts.
2 1/4	2 1/8	12.53	"	4 1/2	4 1/2	53.57	"
2 1/2	2 1/8	15.55	"	5	5	66.13	"

## AUSTEN BROTHERS.

RAILWAY, COLLIERY AND GOLD MINERS' SUPPLIES.

No. 124 HOLLIS STREET, HALIFAX, N.S.

ALL GOODS AT MANUFACTURERS' PRICES.

## MACDONALD & CO., LIMITED.

MANUFACTURERS AND DEALERS IN—

PUMPING MACHINERY, IRON PIPES, FITTINGS, &c., &c.,  
**FOR MINERS' USE.**

Call or Write us for Prices.

HALIFAX, N.S.

## I. MATHESON & CO

ENGINES, \*  
BOILERS, \*  
QUARTZ CRUSHING \*  
MILLS, \*  
WINDING GEAR, \*  
PUMPING M'CHY \*  
STEEL SHOES & DIES. \*  
WRITE FOR PRICES.

ENGINEERS  
AND  
BOILER MAKERS

NEW GLASGOW  
NOVA SCOTIA

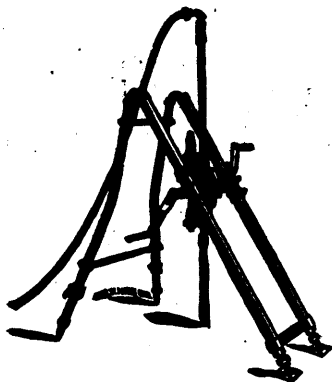
THE BEST PLACE IN CANADA  
\* FOR \*  
GOLD MINING MACHINERY

## TRURO FOUNDRY & MACHINE CO

GOLD ENGINEERS  
MINING BoilerMakers' and Founders  
TRURO N.S.

MACHINERY WITH LATEST IMPROVEMENTS

WINDING ENGINES  
Special Mixture, Shoes & Dies  
with the BEST RECORD IN THE WORLD  
Wearing quality unsurpassed  
ROTARY SAW MILLS.



"M" Drill—Hand Power.

Capacity—300 ft. depth.

Removes  $1\frac{1}{4}$  inches solid core.

## DIAMOND DRILLS FOR PROSPECTING MINERAL LANDS.

The Sullivan Diamond Drill is the simplest, most accurate, and most economical prospecting drill for any kind of formation, hard or soft, in deep or shallow holes.

The Diamond Drill brings to the surface a solid core of rock and mineral to any depth, showing with perfect accuracy the nature, quality and extent of the ore-bearing strata, and with great saving in time and expense over any other method.

Complete stock of all sizes, driven by hand or horse power, steam, compressed air or electricity. For sale by

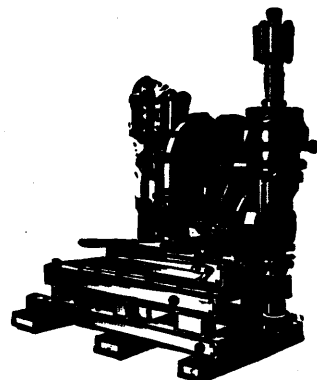
**SULLIVAN MACHINERY COMPANY,**

Successors to DIAMOND PROSPECTING CO., 54 & 60 N. Clinton St., CHICAGO, ILL., U.S.A.

MANUFACTURERS AND DEALERS IN

Sullivan Diamond Prospecting Drills, Channeling Machines, Rock Drills, Hoists and other Quarrying Machinery.

Hoisting and Hauling Engines, Cages, Triples, and other Coal Mining Machinery. Contractors for Prospecting Mineral Lands with the Diamond Drill.



"N" Drill—

Capacity—2,000 ft. depth.

Removes  $1\frac{1}{4}$  inches solid core.



SEND FOR CATALOGUE.

## ELECTRIC BLASTING

**VICTOR ELECTRIC PLATINUM FUSES.**

Superior to all others for exploding any make of dynamite or blasting powder. Each fuse folded separately and packed in neat paper boxes of 50 each. All tested and warranted. Single and double strength, with any length of wires.

**"FULL-UP" BLASTING MACHINE.**

The strongest and most powerful machine ever made for Electric Blasting. No. 3 fires 30 holes. No. 4 fires 50 holes. No. 5 fires 100 holes. They are especially adapted for submarine blasting, large railroad quarrying, and mining works.

**VICTOR BLASTING MACHINE.**

No. 1 fires 5 to 8 holes; weighs only 15 lbs. Adapted for prospecting, stump blasting, well sinking, etc. Standard Electric Fuse and Blast Tester, Wire Reels, new design. Leading and Connecting Wires.

Manufactured only by

**JAMES MACBETH & CO.,**

128 MAIDEN LANE, NEW YORK CITY

## HAMILTON POWDER CO.

Manufacturers of Sporting, Military and Blasting

**GUNPOWDER, DUALIN, DYNAMITE and ECLIPSE**

Dominion Agents for Safety Fuse, Electric Blasting Apparatus, Etc.

**OFFICE: 103 ST. FRANCOIS XAVIER STREET, MONTREAL.**

Branch Offices and Magazines at all Chief Distributing Points in Canada.

## OTTAWA POWDER CO., LIMITED.

ESTABLISHED 1891.

**MANUFACTURERS OF DYNAMITE AND TRIOLINE.**

Dealers in Safety Fuse, Platinum Fuses, Detonators, and all Blasting Supplies.

**PRINCIPAL OFFICE: BUCKINGHAM, QUEBEC.**

ALL ORDERS PROMPTLY ATTENDED TO UNDER GUARANTEE OF EXCELLENCE.

## BOILER AND PIPE COVERINGS,

**Absolutely Fire Proof.  
Light and Easy to Apply.**



Indestructible by heat; will save from 10 to 40 per cent. in fuel, and give dry steam at long distances.

**H. W. JOHNS MANUFACTURING COMPANY,**

Sole Manufacturers of H. W. Johns' Asbestos Roofing, Sheathing, Building Felt, Asbestos, Steam Packings, Boiler Coverings, Roof Paints, Fire-Proof Paints, &c.

**VULCABESTON Moulded Piston-Rod Packing Rings, Gaskets, Sheet Packing, &c.**

Established 1858.

**87 MAIDEN LANE, NEW YORK.**

Jersey City, Chicago, Philadelphia, Boston, London.

*The Science and Art of Mining*

Published Fortnightly. Price 3d.

Has the Largest Circulation of any Mining Journal in the United Kingdom.

Specialy Interesting to all Persons Connected with Mines.

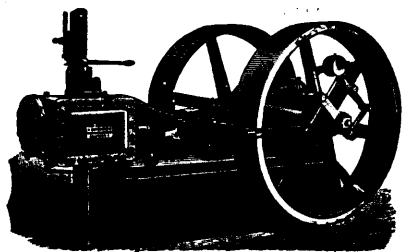
The Publishers will send a Specimen Copy to any Miner on receipt of Post Card.

Publishers:

**THOS. WALL & SONS, 27 Walgate, Wigan, England.**

Editor: **C. M. PERCY, Wigan School of Mines.**

**ROBB-ARMSTRONG ENGINES.**  
SIMPLE and COMPOUND. AUTOMATIC or THROTTLING GOVERNOR.



BUILT ON THE AMERICAN INTERCHANGEABLE SYSTEM.

**THE MONARCH ECONOMIC BOILER**

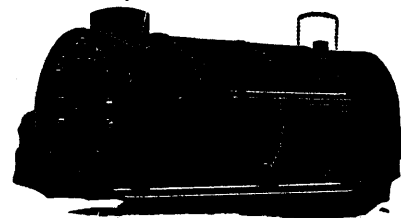
—COMBINES ALL THE—

**ADVANTAGES**

—OF—

Light Portable Forms

—WITH THE—



**HIGHEST POSSIBLE ECONOMY.**

—MANUFACTURED BY—

**ROBB ENGINEERING COMPANY, LTD.**

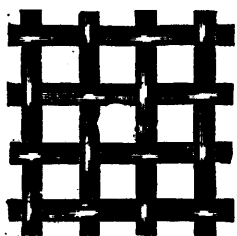


**AMHERST, NOVA SCOTIA.**

**MINING AND MILL MACHINERY.**

Steam Engines, Rock Crushers, Boilers, Derricks, Steam Pumps,  
Water Wheels, Brass and Iron Castings  
of every description.

**ALEX. FLECK, VULCAN IRON WORKS, OTTAWA.**



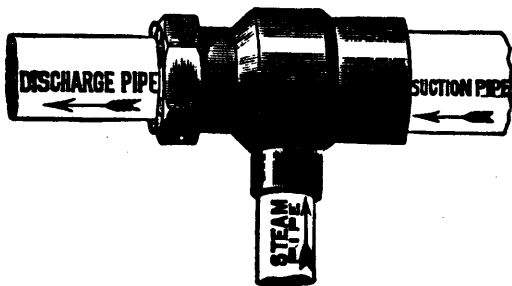
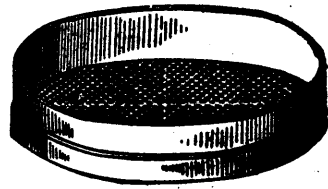
**HEAVY WIRE CLOTH**  
IN  
BRASS, IRON AND STEEL.

**RIDDLES OF ALL DESCRIPTIONS**  
ALWAYS IN STOCK  
FOR MINING PURPOSES.

**THE MAJOR MANFG. CO.**

23 & 25 COTE STREET, MONTREAL.

Send Specifications and get Quotations.



**VAN DUZEN'S STEAM JET PUMP.**

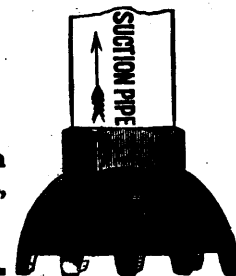
From 5 to 40 Dollars Each.

**SAVES YOU BUYING A \$500.00 PUMP.**

For the following uses:  
For pumping cold water, liquids other than water, and air and vacuum pump. For paper mills, chemical, gas and sugar works, tanneries, mines, quarries, irrigating, draining, etc.

Send for Catalogue and Price List.

**GARTH & CO., MONTREAL.**



**CARRIER, LAINÉ & CO.,**  
FOUNDERS, MACHINISTS AND BOILER MAKERS,  
LEVIS, QUE.

Engines, Boilers, Steam Pumps, Hoisting Gear and all Machinery for Miners, Contractors and Quarrymen. Also Builders' Castings, Stoves, Stove Fittings, Hollowware, Flour and Saw Mill Machinery, Marine Engines and Boilers, etc., etc.

**WRITE FOR OUR PRICES.**

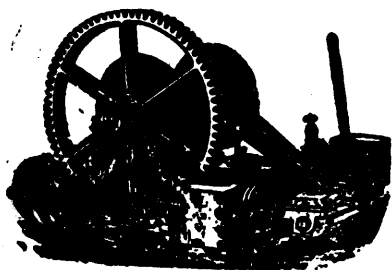
**MILLER BROS. & TOMS,**

MANUFACTURERS OF

**STEAM ROCK DRILLS AND HOISTING ENGINES,**

Mining and Contractors' Plant, Etc., Etc.

**110-120 KING STREET, MONTREAL, QUE.**



If you want

# BAGS

FOR PACKING

ASBESTOS, PHOSPHATES, ORES, &c.,  
Send to us for Samples and Prices.

Every Quality and size in stock.

Specially strong sewing for heavy materials.

Lowest prices compatible with good work.

We now supply most of the Mining Companies, and those who have not bought from us would find it to their advantage to do so.

**THE CANADA JUTE COMPANY (Ltd.)**

17, 19 & 21 ST. MARTIN STREET,

**MONTREAL.**

Established 1882.

## BUTTERFIELD'S HINGED PIPE VISE

MADE IN TWO SIZES.

No. 1 Holds from 0 to 2½ inch pipe.

No. 2 Holds from ½ to 4½ inch pipe.

**SIMPLEST AND BEST  
IN THE MARKET :**

Butterfield & Co. are makers of all Tools for working Water, Gas and Steam Pipe, Stocks and Dies and all kinds of Taps.

—MANUFACTURED BY—

**BUTTERFIELD & CO., ROCK ISLAND, P.Q.**

## WIRE ROPES

Crucible Cast Steel Ropes  
for Hoisting, Inclines,  
Mining, &c.

**WIRE ROPE**

Seimans-Martin for Trans-  
mission of Power, Ele-  
vators, Hoists, &c.

Galvanized Ropes for Derrick Stays, Ships' Rigging, &c.

WRITE FOR CATALOGUE AND PRICES.

MANUFACTURED BY THE

**B. GREENING WIRE Co., LTD**

HAMILTON, CANADA.

## MINING MACHINERY.

IMMEDIATE SALE—CHEAP.

—THE FOLLOWING—

## Machinery & Equipments

The whole Nearly New and in Good State of Preservation.

- 1 35 h. p. Steel Locomotive Boiler complete (Jenckes)
- 1 30 h. p. " " " (Leonard)
- 2 30 h. p. " " " (Bannerman)
- 2 25 h. p. " " " (Leonard)
- 1 25 h. p. " " " (White)
- 2 7" x 10" Double Cyl. Double Drum Hoists (Jenckes)
- 1 7" x 10" Single Cyl. Single Drum Hoists (Jenckes)
- 2 7" x 10" Double Cyl. Single Drum Hoists (Lidgerwood)
- 7 3" Sergeant Drills with Tripods and Four Columns
- 4 Little Giant Drills with Tripods and Three Columns,
- 1 No. 3 B Drill with Tripod (Rand) [Rand
- 1 No. 2 Drill with Tripod (Rand)
- 24 Steel Rock Buckets
- 6 Dumping Cars
- 10 Sets Derrick Irons Complete
- Platform Scales Chains
- Electric Batteries Single and Double Pulley
- Patent Packing Blocks
- Cotton Waste Galvanized Thimbles
- Steam Hose—new Steel Barrows
- Galvanized Rope, new & old Duplex Plates
- Steel Hoisting Rope—new Blacksmith Tools
- Steel Hoisting Rope—old Miners' Picks—assorted
- Hemp Rope—new and old Striking Hammers
- Boarding House Fittings Sledge Hammers—assorted
- Kitchen Ranges Cobbing Hammers
- Assorted Stoves Shovels
- Screens Crow Bars
- Cobbing Plates Ejectors
- Chilled Car Wheels Assorted Globe Valves—new
- Axles and Axle Boxes and old
- Dumping Brackets New Spare Parts for Rock
- Cast Iron Clamps Drills
- ¾, 1½ and 1¼ Octagon Sand Pumps
- Steel Drills Steel or Cornish Bells

APPLY AT ONCE TO

**A. BENSON,**

BUCKINGHAM, QUEBEC.

**BALBACH  
SMELTING & REFINING  
COMPANY,**

EDWARD BALBACH, JR. - PRES'T.  
J. LANGELOTH, - - VICE-PRES'T.  
Newark, New Jersey.

Smelters and Refiners of  
Gold, Silver, Lead, and  
Copper Ores.

Bullion and Argentiferous Copper  
Matte Received on Consign-  
ment or Purchase.

Smelting and Refining Works:  
Electrolytic Copper Works:  
NEWARK, N. J.

Buena Fe Sampling Works:  
Agency, SABINAS COAHULLA,  
Mexico.

**F. CIRKEL,  
MINING : ENGINEER.**

(Graduate, Academy of Mines, Axchen, Germany.)

Reports on Mica Deposits, Asbestos, Phosphate

78 QUEEN STREET,  
OTTAWA.

M. A. BUCKE, Grad. S.P.C. H. E. T. HAULTAIN, Grad. S.P.C.  
(Late of Freiberg, Germany.)

**BUCKE & HAULTAIN  
ASSAYERS**

Consulting, Mining and Electrical Engineers,  
KASLO, KOOTENAY, B.C.

MINING PROPERTIES MANAGED

Assessment and Development Work Supervised.

Burland's Old Dominion Crescent Brand

**CINNAMON PILLS**

THE ONLY GENUINE  
RELIEF FOR LADIES.

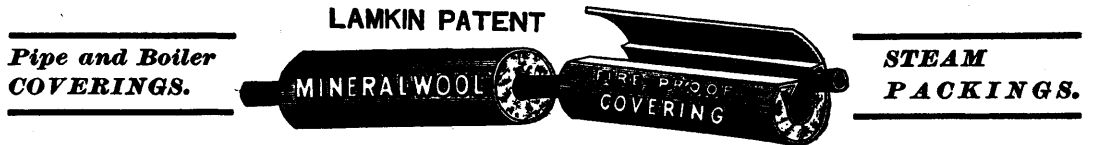
ASK YOUR DRUGGIST for Burland's Old Dominion  
Crescent Brand CINNAMON PILLS. Shallow rectangular  
metallic boxes sealed with crescent. Absolutely safe and  
reliable. Refuse all spurious and harmful imitations.  
Upon receipt of six cents in stamps we will reply by return  
mail, giving full particulars in plain envelope. Address,

**BURLAND CHEMICAL CO.**

Please mention this paper. Morse Bldg., N. Y. City.

**The CANADIAN MINERAL WOOL CO. Ltd.**

122 BAY STREET, TORONTO



ASBESTOS GOODS OF EVERY DESCRIPTION.

**CANADA ATLANTIC RAILWAY.**

THE SHORT FAVORITE ROUTE

BETWEEN

**Ottawa and Montreal**

**6 TRAINS DAILY 6**  
EXCEPT SUNDAY.

PULLMAN BUFFET PARLOR CARS.

Close Connections at MONTREAL with Trains for

**QUEBEC, - HALIFAX, - PORTLAND**

And all Points EAST and SOUTH.

FAST THROUGH SERVICE BETWEEN

**OTTAWA, NEW YORK and BOSTON,**

And all NEW ENGLAND POINTS.

Baggage checked to all points and passed by customs in transit.  
For tickets time tables and information, apply to nearest ticket  
agent of this company or connecting lines.

E. J. CHAMBERLIN, General Manager. C. J. SMITH, Gen. Passenger Agt.



**MINING LAWS OF ONTARIO.**

ANY person may explore Crown Lands for minerals.  
Mining lands may be taken up as surveyed loca-  
tions or staked claims.

Locations range from 40 to 320 acres.  
Claims range from 10 to 20 acres on vein or lode.  
Locations may be acquired in fee or under leasehold.  
Price of locations north of French River \$2.50 to \$3.50  
per acre, and south of it \$2 to \$2.50 according to distance  
from railway.

Rent of locations first year 60c. to \$1 per acre, and  
subsequent years 15c. to 25c. per acre.

Rent of claims, \$1 per acre each year.  
Claims must be worked continuously.

Royalty on ores specified in the Act, 2 to 3 per cent.  
of value at pit's mouth less cost of labor and explosives.

Royalty not charged until seven years from date of  
patent or lease, nor (as provided in s. 4 (3) of the Mines'  
Act, 1892) until fifteen years in the case of an original  
discovery of ore or mineral.

Original discoverer of ore or mineral on claim entitled  
to stake out a second claim.

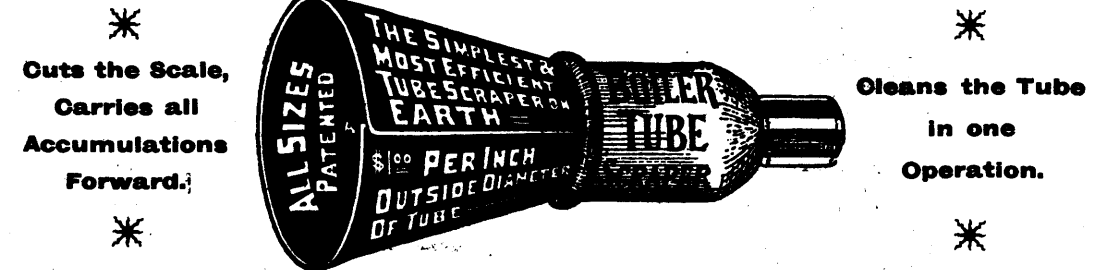
Crown Lands sold under provisions of mining laws in  
force prior to 4th May, 1891, exempt from royalty.

Copies of the Mines Act, 1892, may be had on applica-  
tion to

**ARCHIBALD BLUE,**  
Director Bureau of Mines.

TORONTO, April 24, 1892.

**KEEP YOUR BOILER TUBES CLEAN AND SAVE YOUR FUEL.**



**DARLING BROTHERS,**  
Reliance Works, 112 Queen Street, MONTREAL, QUEBEC.

**Chemical and Assay Apparatus.**

AGENTS FOR THE DOMINION FOR THE

**MORGAN CRUCIBLE COMPANY, BATTERSEA, ENGLAND,**

AND FOR THE

Analytical and Assay Balances & Weights of Beckers Sons, Rotterdam.

Microscopes of E. Leitz, Wetzlar. Kavalier's Bohemian Glassware. Royal Berlin and Meissen Porcelain.  
Platinum Wire, Foil, Crucibles and Dishes. Swedish Filter Paper. Chemically  
Pure Reagents and Volumetric Solutions.

An Illustrated Priced Catalogue on Application.



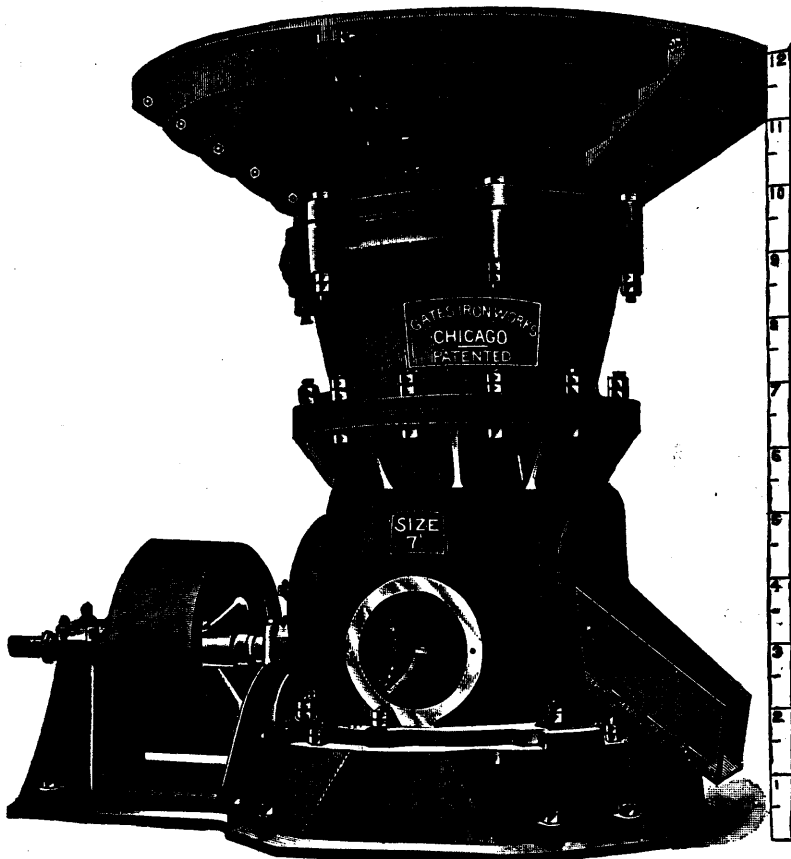
**LYMAN, SONS & CO.**

380, 382, 384 and 386 St. Paul Street,

**MONTREAL.**



## THE GATES ROCK AND ORE BREAKER



### THE HIGHEST TYPE OF ROCK BREAKING MACHINERY!

The Gates Gyrotory Breaker is used on every Continent, having been adopted by the largest Mining Companies in the world. It has supplanted all other forms of breakers.

We Manufacture also, STAMP MILLS, CORNISH ROLLS, CONCENTRATORS and all classes of MINING MACHINERY.

Address for Catalogues **GATES IRON WORKS,**  
50 P. South Clinton St.,  
CHICAGO, U.S.A.

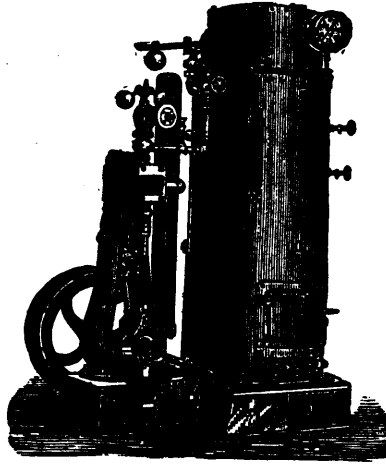
BRANCH OFFICES:  
136 Liberty St., New York.  
237 Franklin St., Boston.  
173a Queen Victoria St., London, E

## BERTRAM ENGINE WORKS CO.

Successors to Doty Engine Works Co., and  
John Doty Engine Co., Ltd.

MANUFACTURERS OF

## MINING MACHINERY



Marine and Stationary Engines and Boilers.

Hoisting and Vertical Engines.

Ore Crushers.

Stamp Mills and

General Machinery.

We Guarantee First-Class Work and Prompt Shipment.

Prices and Estimates on Application

## BERTRAM ENGINE WORKS CO.

Bathurst and Niagara Sts.,

TORONTO, CANADA.

## MINING MACHINERY FOR SALE.

35 H.P. PORTABLE BOILER, STEAM HOIST,  
STEAM PUMP, ROCK DRILL, DIAMOND  
DRILL AND OTHER MINING MA-  
CHINERY AND TOOLS.

USED BUT SHORT TIME AND IN GOOD CONDITION.

G. L. WOODWORTH, MARMORA, ONT.

## HOW IS THIS?

Something unique even in these days of mammoth premium offers, is the latest effort of Stafford's Magazine, a New York monthly of home and general reading.

The proposition is to send the Magazine one year for one dollar, the regular subscription price, and in addition to send each subscriber fifty-two complete novels during the twelve months; one each week.

Think of it. You receive a new and complete novel, by mail, post paid, every week for fifty-two weeks, and in addition you get the magazine once a month for twelve months, all for one dollar. It is an offer which the publishers can only afford to make in the confident expectation of getting a hundred thousand new subscribers. Among the authors in the coming series are, Wilkie Collins, Walter Besant, Mrs. Oliphant, Mary Cecil Hay, Florence Marryat, Anthony Trollope, A. Conan Doyle, Miss Braddon, Captain Marryatt, Miss Thackeray and Jules Verne. If you wish to take advantage of this unusual opportunity, send one dollar for Stafford's Magazine, one year. Your first copy of the magazine, and your first number of the fifty-two novels (one each week) which you are to receive during the year will be sent you by return mail. Remit by P. O. Order, registered letter or express.

Address:

STAFFORD PUBLISHING CO.

Publishers of

STAFFORD'S MAGAZINE,

P. O. Box 2264.

New York, N.Y.

Please mention this paper.

## REDDAWAY'S PATENT



Specially adapted for Heavy Drives in Damp or Exposed Places,  
in Mines, Saw Mills, Paper and Pulp Mills, etc.

CHEAPER, LIGHTER, MORE PLIABLE & MORE DURABLE THAN DOUBLE LEATHER.

W. A. FLEMING, SOLE AGENT FOR CANADA .. ..

57 St. Francois Xavier St., MONTREAL. - Victoria Chambers, OTTAWA.

ADVERTISE IT WILL PAY YOU

In The Canadian Mining Review.

**John E. Hardman, S.B.**  
**MINING ENGINEER,**  
**Oldham, Nova Scotia.**  
 Can be consulted on all matters pertaining to the profession  
 The development and management of Gold Properties a specialty.

**TO USERS OF THE DIAMOND DRILL.**  
 Diamond Drill Bits set Promptly by an Efficient Man All Work Guaranteed.  
 Bort and Carbon Diamonds for sale. Same terms as New York. Prospecting with American Diamond Drill at per foot or by the day.  
**McRae & Co.,**  
 OTTAWA.

**J. & H. TAYLOR.**  
**CALVANIZED FLEXIBLE STEEL WIRE ROPE**  
 COLLIERY ROPES A SPECIALTY.  
**Wrought Iron Pipe for Gas, Steam and Water.**  
**BRASS and IRON VALVE GATES and COCKS.**  
 ENGINE AND BOILER APPLIANCES.  
 751 CRAIG STREET, - - MONTREAL

**J. T. DONALD,**  
*Assayer and Mining Geologist.*  
 156 St. James St., Montreal.  
 Analyses and Assays of Ores, Fuels, Furnace Products, Waters, etc., etc. Mines and Mining Properties Examined and Valued.

**R. C. CAMPBELL-JOHNSTON**  
 (of Swansea, India, and the United States.)  
**METALLURGIST, ASSAYER,**  
**AND MINING ENGINEER.**  
 Properties reported on. All assays undertaken. Furnaces and concentrating plants planned and erected. Treatment for ores given. Ores bought and sold. Box 40, Vancouver, B.C.

**T. D. LEDYARD,**  
**DEALER IN MINES, &c.**  
 57 COLBORNE STREET, TORONTO.  
**Specialties:**  
 BESSEMER IRON ORES PARTICULARLY LOW IN PHOSPHORUS  
**ASBESTOS.**

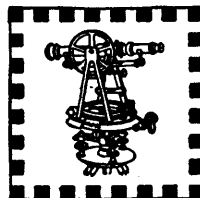
**THE AMERICAN METAL CO., Ltd.**  
 80 Wall St., New York. P. O. Box 957.  
 Sell Refined Pig Lead, delivered to all Canadian Ports, Copper, Copper Ores and Mattes, Tin, Lead, Spelter, Antimony, Nickel, Aluminum, Bullion and Iron.  
**Advances Made on Consignments.**  
 AGENTS FOR: (Babach Smelting and Refining Co. Newark, N.J. Henry R. Merton & Co. London, Williams, Foster & Co., Ltd., Swansea. Metallgesellschaft, Frankfort-on-Main)

**E. E. BURLINGAME'S**  
**ASSAY OFFICE AND CHEMICAL LABORATORY**  
 Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention.  
**Gold & Silver Bullion Refined, Melted and Assayed, or Purchased.**  
 Address, 1736 & 1738 Lawrence St., Denver, Colo.

**FIRE PROOF**  
**ROOFING**  
 ILLUSTRATED CATALOGUE FREE  
**METALLIC ROOFING CO.**  
 MANUFACTURERS, TORONTO

**C. V. M. TEMPLE**  
 (Formerly President Megantic Mining Co., P.Q.)  
**MINES AND MINING LOCATIONS FOR SALE.**  
**CORRESPONDENCE SOLICITED.**  
**Office and Residence:**  
**47 ST. GEORGE ST., TORONTO, ONT.**

**CANADIAN REPRESENTATIVE:**  
 HENRY DE Q. SEWELL, Dominion and Ontario Land Surveyor, Mining Engineer, etc., Port Arthur, Ont., A. M. Inst. C.E.  
**LONDON REPRESENTATIVES:**  
 LANE GAGGE & ANDREWS, Solicitors, Arundel St. Strand, London.  
 R. C. CAMPBELL-JOHNSTON, (of Swansea, India and the States), Metallurgist, Mining Engineer, Vancouver, B.C.



**HOME STUDY OF MINE SURVEYING**  
 To commence, students only need to know how to read and write.  
 Send for FREE Circular to The Correspondence School of Mines, Scranton, Pa.

**LEDOUX & COMPANY,**  
 9 Cliff St., New York.  
**Engineers, Metallurgists & Assayers.**  
**Public Ore Sampling and Storage Works**  
 All the principal buyers of furnace materials in the world purchase and pay cash against our certificates of assay, through New York banks.  
 By special permission of the Secretary of the Treasury of the United States, cars of ore or Copper matte passing through in bond can be opened and sampled at our works.  
 Consignments received and sold to highest bidder. Send for circular giving full particulars.  
**Mines examined and sampled. Assays and Analyses of all kinds.**

**SPECIALISTS IN MICA,**  
 MINERS' AGENTS,  
**RICHARD BAKER SON & CO.**  
 6 & 7 CROSS LANE, LONDON, ENG.

**G. MICKLE,**  
**Consulting Mining Engineer and Assayer.**  
**SUDBURY, ONTARIO.**

**W. de L. BENEDICT, E.M.,**  
 Mem. Am. Inst. Min. Eng.  
**Mining Engineer and Metallurgist,**  
 REPORTS ON MINES AND MINERAL LANDS.  
**PHOSPHATE A SPECIALTY.**  
 No. 18 Broadway, Rooms 617 & 618,  
 New York.

**EBENE E. OLCOTT,**  
**Consulting Mining Engineer & Metallurgist.**  
 18 Broadway, New York City.  
 Cable Address: - - - "Kramolena."  
 Mines examined and reported on. Will act as permanent or special advising engineer of mining companies.  
 Special facilities for making working tests on ores.

**WM. HAMILTON MERRITT, F.C.S.**  
 Associate Royal School of Mines, &c.,  
**MINING ENGINEER and METALLURGIST,**  
 Will report on Mines and Mineral Properties.  
**ADDRESS:**  
**15 Toronto St., Toronto, Ont.**

**F. H. MASON, F.C.S.**  
 First-class Certificates in Chemistry and Metallurgy from the Royal School of Mines, London—Late Chemist and Assayer to the Newbery-Vautin (Patents) Gold Extraction Company, Limited.

**Assays & Complete Analyses of all Minerals**  
**THE ASSAY OFFICE,**  
**ARLINGTON PLACE, - TRURO, N.S**

**Irwin, Hopper & Co.,**  
**MINERS AND SHIPPERS OF MINERALS.**  
**BOARD OF TRADE BUILDING,**  
**MONTREAL, CAN.**  
 Asbestos, crude and manufactured. Phosphate, Mica, Plumbago, Soapstone, &c.

**MICHIGAN MINING SCHOOL**  
 A State School of Mining Engineering, located in the heart of the Lake Superior mining region, giving practical instruction in Drawing, Blue-printing, Mechanics, Mechanism, Properties of Materials, Graphical Statics, Mechanical and Electrical Engineering, Shop-practice, Analytical and Technical Chemistry, Assaying, Ore Dressing, Metallurgy, Plane, Railroad and Mine Surveying, Hydraulics, Mining, Mineralogy, Petrography, General, Economic, and Field Geology, etc. Has Summer Schools in Surveying, Shop-practice, and Field Geology. Laboratories, Shops and Stamp Mill well equipped. Tuition free. For Catalogues apply to the Director Houghton, Mich.

**ROBIN & SADLER**  
 SPECIALTIES  
**Leather Belting**  
**DYNAMO BELTS**  
**WATERPROOF BELTING**  
 MONTREAL TORONTO  
 2516 & 2520 NOTRE DAME ST. 129 BAY ST.

**BOOKS OF INTEREST**  
 TO  
**Engineers, Mechanics, Etc.**  
**Mathematical Instruments,**  
**Squares, Scales, Compasses,**  
 and a full line of  
**Engineers' Drawing Supplies.**

**W. DRYSDALE & CO.,**  
**BOOKSELLERS AND STATIONERS.**  
 237 St. James St., Montreal.

**ORFORD COPPER CO.,**  
**Copper Smelters**  
 Works at Constable's Hook, N.J., opposite New Brighton, Staten Island. Copper Ore, Mattes, or Bullion purchased. Advances made on consignments for refining and sale. Specialty made of Silver-bearing Ores and Mattes.  
 —SELL—  
**INGOT AND CAKE COPPER.**  
**President, ROBERT M. THOMPSON,**  
**Treasurer G. A. LAND.**  
 Office 37 to 39 Wall Street, New York.

# H. H. FULLER AND CO.

41-45 UPPER WATER STREET, HALIFAX, N.S.

WHOLESALE AND RETAIL DEALERS IN

BUILDERS', BLACKSMITHS' and GENERAL HARDWARE.

## MINING AND MINE SUPPLIES A SPECIALTY.

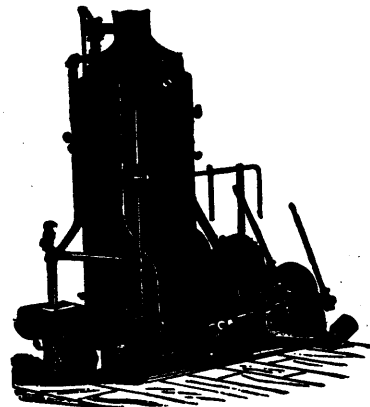
SOLE AGENTS FOR NOVA SCOTIA FOR

**BOSTON BELTING CO'S RUBBER GOODS,  
REEVES WOOD SPLIT PULLEYS.**

CORRESPONDENCE SOLICITED.

P. O. Box 178. Shipments promptly and carefully attended to.

# M. BEATTY & SONS, WELLAND, ONT.



HOISTING  
ENGINES.  
—  
ENGINES  
FOR  
Mines  
AND  
Inclines.

Horse-Power Hoisters,  
Stone Derrick Iron,  
Centrifugal Pumps,



Dredges, Derricks, Steam Shovels, Suspension Cableways,  
AND OTHER CONTRACTORS PLANT.  
ANGUS M. THOM CO., MONTREAL.

ALL KINDS OF  
**RUBBER GOODS for MINING PURPOSES**  
 MANUFACTURED BY  
**THE CUTTA PERCHA AND RUBBER MFG. CO. OF TORONTO.**  
 OFFICE 43 YONGE ST TORONTO. FACTORIES AT PARKDALE.  
 Steam & Air Hose, Rubber Bumpers and Springs, Fire Hose, Pulley Covering, Rubber Clothing & Boots

# Pumps & HYDRAULIC MACHINERY

**FOR MINING, ALL CLASSES**

NORTHEY, LD.  
TORONTO



CONDUCTED BY . . . . . B. T. A. BELL.

## THE OFFICIAL ORGAN

—OF—  
 THE GOLD MINER'S ASSOCIATION OF NOVA SCOTIA,  
 THE UNITED MINING SOCIETY OF NOVA SCOTIA,  
 THE ASBESTOS CLUB, QUEBEC,  
 THE GENERAL MINING ASSOCIATION OF QUEBEC.

OFFICES:

Victoria Chambers, 140 Wellington Street,  
 OTTAWA.

Vol. XIII. APRIL, 1894. No. 4

### The Heavy Metal Trade Under the New Tariff.

A careful examination of the changes that have been made in the heavy metal schedule of the tariff shows that the principle pursued by the Government has been to give a reasonable amount of protection to natural or established industries, and at the same time to reduce to a merely nominal or revenue basis the duties on such articles as are not at present manufactured in the country, or can only be made here under very adverse conditions.

The careful investigations made by the Finance Minister and some of his colleagues, during the past summer, and the interviews they have had with all classes of manufacturers and consumers, have been productive of good results, for the Finance Minister has shown an intimate knowledge of the conditions of this business in its various branches of manufactory and importing.

The duty and bounty on pig iron have been maintained at the previous rates of four dollars and two dollars per ton respectively. This has without doubt been due to the strong representations made by the pig iron manufacturers, that the industry is still very young and a much longer period than seven years is necessary to establish it on a firm and safe basis. The past two or three years have shown a great advance in this manufacture, for whereas in 1891 the quantity of iron produced was only 23,897 tons, it is anticipated that the year ending 30th June, 1894, will show an output of about 60,000 tons. It must also be remembered that the competition of American iron is at present of a most exceptional character. Prices are ruling in the United States that do not begin to give any profit to the manufacturer, while in a great many cases they are admitted to be below cost. There is not the slightest doubt that the native ores of Canada can be melted into pig iron as cheaply as those of any other country, and it is to be hoped that the development of this industry will receive a fresh impetus from the settlement of the tariff question for another period of years.

A bounty of two dollars per ton has also been granted on puddled iron and steel ingots made in this country. The effect of this will, we hope, be the re-opening of the puddling furnaces of the Londonderry Iron Co. which have been closed down, owing to the almost total substitution of scrap for puddled iron by the rolling mills. The question arises here, why should not the rolling mills make their own puddled iron, as is done in nearly every mill in Great Britain? At present there is very little outlet for the mill and forge iron produced by the Nova Scotia furnaces, the quality of which appears to be eminently suited for puddling purposes. This is a question which we think should be seriously considered by the rolling mills of this country; in view of the increased and increasing duty on scrap iron.

The reduction to a uniform basis of the duties on manufactured iron and steel is a very satisfactory change. Indeed it is difficult to understand why these two metals, so much alike in quality, and now so nearly the same in price, were taxed at different rates of duty. Bar iron and steel, hoops and sheets, etc., thicker than No. 17 gauge are now dutiable at ten dollars per ton in place of thirteen dollars and twelve dollars as before. This is rather a serious drop in the bar iron duties, when it is taken in conjunction with the increase on their former raw material, viz., scrap iron, which is now dutiable at three dollars instead of two dollars as before, and will be increased to four dollars after 1st January, 1895. With puddled bars down however from nine dollars to five dollars, and a strong chance of their being made in the country, it is likely that some change will take place in their method of manufacture. Bar iron rolled entirely from scrap, unless this scrap is selected in the most careful manner, is never so uniform and reliable as that rolled from puddled bar and scrap combined, and the complaint that ordinary Canadian iron was not always satisfactory for imported work, had a very large element of truth in it. We fancy also that makers will prefer the use of puddled bars as being much more convenient and satisfactory to handle and work. It is not likely however that much change will be made this year while the duty remains at three dollars, more especially as the increase of duty has been more than counterbalanced by the low prices at which scrap is offered on account of its accumulation in the United States, much beyond their power of utilizing it in the present depressed state of business there.

The tendency is now more and more for mild steel to take the place of iron, and it is in this direction that we look for a large development in the near future. The bounty which has been established for the next five years will, we think produce good results in this department. It should enable the Nova Scotia Steel and Forge Co. to supply the demand that must now spring up from the rolling mills for blooms and billets. In our opinion that company never had such a chance as now of showing what they can do in this direction.

### EN PASSANT.

At a special meeting of the Council of the General Mining Association of the Province of Quebec, held at Sherbrooke on 12th instant, it was unanimously decided to abandon the June meeting at Quebec and accept the courteous invitation of the Dominion Coal Co., Ltd., the General Mining Association, Ltd. and the Mining Society of Nova Scotia, to hold a united meeting at Sydney, Cape Breton, during the week commencing 7th July. Every effort, we understand, will be made to ensure a large attendance.

We are pleased to announce to our readers that we have made arrangements with Mr. W. L. Blakemore, M.E., assistant manager of the Dominion Coal Co., Ltd., to furnish the REVIEW with a series of articles on the coal industries of Cape Breton. The series, which will begin with our next issue, will deal with: (1) Railway and shipping arrangements; (2) Surface equipment; (3) Methods of mining; (4) Hauling machinery; (5) Coal cutting appliances; (6) General development of Cape Breton mines.

Mr. A. M. Evans, M.E., lately in charge of the asbestos properties of the King Bros., at Black Lake, has accepted a position under the Dominion Coal Co., Ltd.—we believe at their Govrie mine, Cow Bay. Mr. Evans was one of the founders of the General Mining Association and the secretary of the hospitable Asbestos Club, from the members of both of which he leaves with heartiest good wishes.

In another place we publish a letter from Mr. J. B. Hammond. No injustice was intended, nor indeed we think done, to Mr. Hammond in our editorial comments of last issue on the meeting of the Ontario Mining Association, and we are quite ready to acquit him of any charge of dishonest dealing. Our remarks respecting the transaction in mining lands were, however, entirely founded upon the statements made in his own address. We understand Mr. Hammond's subject of complaint to be that while he was in New York in the latter part of 1890 "advertising and negotiating the sale of a large and valuable mining property" in the Sudbury district the Government without warning withdrew the mining lands in that district from sale, and that although on his return immediately at the time of such withdrawal he tendered the purchase money in person for the property in question, it was refused, and he was unable to procure a title. The point of our comment was that Mr. Hammond had, according to his own admission, offered for sale a property which he did not own, which so far as his own account goes he had not indeed taken any action to acquire. Whether he was acting in his own behalf or in behalf of others, does not affect the point; apparently the negotiations were entirely in his own hands and he knew the position in which the title stood. If the money had been paid to the Government previous to the with-

drawal of the lands in December, 1890, patent would have issued as a matter of course, even after the withdrawal took effect. If a portion of the purchase money had been paid and considerable expense incurred in surveying the lands or developing the mines thereon, payment would have been accepted under the provisions of the advertisement notifying the public of such withdrawal, and of the Act to amend the Mining Act passed in the session of 1891, and patent would have issued under the old Act which imposed neither royalty nor compulsory development. It was also provided in the Act that an actual explorer or prospector who had done certain development work might procure title under the old Act to a location not exceeding 160 acres. Had Mr. Hammond's case come under any one of these classes, he would have had no difficulty in securing a patent; that it did not is proof that few or none even of the ordinary preliminary steps had been taken to acquire title from the Crown.

Mr. Hammond would probably hesitate to offer for sale property which he knew to be another's, without the latter's knowledge and consent; but in mining districts and among mining brokers the lands of the Crown, that is of the public, are looked upon as fit subjects of speculation and negotiation before any ownership whatever in them has been acquired. Such a doctrine applied to private property would probably lead to unpleasant results, and we cannot but think that upon reflection Mr. Hammond will admit that it is open to objection so far as public property is concerned also.

From a correspondent who has lately been through the Sudbury district we learn that the Wahnapiatae district is attracting considerable attention as a gold field. The quartz veins (if they are veins, which the Geological Survey questions) are small, rarely exceeding twelve to eighteen inches in width, but show free gold, some of the specimens being well dotted with visible specks or "sights" of the precious metal. A three-quarters' interest in one of the properties was sold to an Ottawa party last week for \$10,000. The mines in Algoma are reported as very quiet. The Vermillion remains absolutely closed, without even a caretaker on hand. The Ophir is reported as being run with a reduced force, and the Creighton has recently employed an expert to make a thorough examination, but his report is not yet made public.

Now that the prospector is again in the field in Ontario, the question has been revived as to the necessity of having some public sampling works or metallurgical laboratory in the Province to which sample lots of a ton weight or more may be sent, and for which the correct metallurgical process may be determined. It has been suggested that the Government of Ontario take a leaf out of the book opened by Victoria and New South Wales in Australia, and British Columbia in Canada, and provide the funds whereby the

new mining school at Kingston may be equipped with machinery and laboratories for such purposes.

It is a fairly legitimate proposal, inasmuch as the Province will ultimately receive full value for its investment from the increased population and greatly increased taxable property that will result from a proper and healthy growth of its great mineral resources.

Mr. James Baird, whose portrait we publish elsewhere in this issue of the REVIEW, is one of those deep-chested, hearty Northmen of strong individuality, who so often make the most of unpromising surroundings, and ignoring difficulties that would dishearten less determined men, attain a measure of success. James Baird was born in Northumberland in 1840, and under his father, who had a small landsale colliery, he began work as a driver underground at the age of eleven. Later on he helped with his father's contracts, exploring and sinking, and when seventeen years of age he was accepted as a coal cutter. For a few years he varied the scene of his labors and familiarized himself with several modes of working coal in Northumbrian and Scottish collieries; the changes that he made from pit to pit were not always intentional, but were often necessitated by the strikes so rife in the labor world of that period. In 1863, hearing of the gold diggings of Nova Scotia, he decided to try his fortune in the New World, but in neither of the districts of Montagu or Waverley did he find the "strike" he then sought, so he looked again to coal and went to Cape Breton. At Sydney mines a labor strike for the seventh time directed his attention elsewhere, and the spring of 1866 found him exploring the south head of Cow Bay. His explorations led to that locality being bought up by a company, and he was appointed manager. Later on, the Reciprocity Treaty with the States having lapsed, he became the company's lessee. In this position he played many parts, and in turn performed the duties of miner, engineer, wharf-builder, and shipper, thus adding to his varied experience. In the meantime he had paid England a visit and made a tour in the United States. Finally he left Cow Bay in 1883 to accept charge of the Chignecto mine, which he managed with credit for many years, though not without anxiety to himself, for he had frequently to contend with mine fires; in fact his first Sunday at Maccan was thus spent underground. On another occasion we expect to publish his experience in dealing with spontaneous combustion in pits. On the transfer of the Joggins mines in 1890 the management was put into the hands of Mr. Baird. He thoroughly reorganized the system of working and successfully adopted the longwall method. Mr. Baird is the inventor of a railway frog of much merit, and he is one of the most active members of the Board of Examiners for granting certificates to colliery officials.

Ontario is to be congratulated in having at last succeeded in organising an association of

mining interests, which commends itself to the hearty support and encouragement of all in any way interested in the development of the mineral industries of the Province, and which bids fair in a short time to rival the older societies in Quebec and Nova Scotia. The initial meeting of the Ontario Mining Institute, though very hurriedly convened, was favored with a large and representative attendance, and great unanimity and enthusiasm characterised the proceedings. A detailed report of the meeting will be found elsewhere in this number.

We appeal to the mining men of Ontario of all conditions and capacities to unite for mutual benefit in maintaining this organization, which may be made the means of great individual culture and pleasure, as well as the instrument of the province's material progress in the development of her mineral wealth. If any one has a criticism to make, or a suggestion to offer, instead of uttering it in a carping manner in the press, let him show his genuine interest in the mining industry by joining the Institute and trying to make it what he thinks it ought to be. The first regular meeting for the reading and discussion of papers and the transaction of business will be held in Toronto, in September, when we understand a large and varied assortment of contributions to the mining literature of Ontario will be submitted by the best authorities.

Considerable interest is being taken in the discoveries of gold which are reported from the Rainy River district. The Huronian formation, in which all the gold reefs of the Lake of the Woods, Rainy Lake and Rainy River districts are found, strikes north of Port Arthur about six miles. It crosses the Canadian Pacific near Kaministiquia station, crops up at the international boundary near Gunflint Lake, Minn., on the line of the Port Arthur, Duluth and Western railway, and continues well along the boundary to Rainy lake. Gold veins have been tested and proved to carry free milling ore on Lake Shebandowan. The townships of Moss, Partridge and Osinawe Lake, south and west of Savanne, on the Canadian Pacific, at Lake Harold in the Atikokan region, and Lake Wabigoon. Samples of ore have been taken from all these localities carrying from \$15 to \$1,500 in gold per ton. The only means of access to this country will be either by steamer to Port Arthur or by rail to Winnipeg; and by Canadian Pacific to Rat Portage, thence by steamer to Rainy Lake.

The doings of the Mining Society of Nova Scotia are in the eyes of the editor of the *Journal News* of Stellarton, N.S., as the flaunting of a red garment before a mad bull. Flicks of his tail we have erstwhile noticed, followed our references to the quarterly meetings of this Society, but after our last issue, reporting the success of the annual meeting, he could restrain himself no longer. He perspired gall, and dipping his pen in the drops that caught in his beard—a beard, by the way, as false in color as



*MR. JAMES BAIRD.*

his assumption to be the one and only exponent of mining interests in Nova Scotia he overflowed with personalities.

Who is this being who ventures to leave the plane of impersonal discussion when others take up matters of which he claims to be the heaven (?) sent guardian. Is he immaculate, a Chesterfield in manners, or a Breckinridge in tone? Does his commanding presence, the dignity of his person, the measured sweetness of his accent, the modesty of his demeanor, the scrupulousness of his dealings with the humble men whose patron he is, leave him like Caesar's wife and unbegrimed.

Or can it be he sees not himself as others see him, as welcome as a gust of March wind in the legislative halls; respected with the respect accorded a tarantula: hailed as well met at those leaden state functions to which he is *once* annually bidden, as a blast from a charnel house would be at a funeral breakfast. He sneers, does this little blue haired terrier, at the dinner to which his master, Mr. Fielding, found time to attend even in the midst of a political campaign. Has the fellow ever really dined: does he know the meaning conveyed by the words "after dinner," or that there is a wide difference and a respectable middle ground between a dinner of herbs and drunken orgies? Nerve food he talks of—had he referred to "tangle leg" as an efficacious stimulant for the preparation of temperance speeches he could have spoken with authority.

There is another aspect of this attack that must not be overlooked. This embodiment of envy, hatred and malice may as well at once understand that by lying and slandering the Mining Society he is not going to deter members from discussing subjects of interest to their profession. He drags in the P. W. A. for a purpose to rouse if he can class prejudice and bring him in the dues that are fast making him a man of wealth. He wants an excuse too for playing the skunk and squirting his venom over those who do not sheer aside and leave him the full width of road his egotism demands—a line of writing that is sure to give delight to the baser sort, but which we know is deprecated by the vast majority of the working men of Nova Scotia.

The earliest known geological map is that of England, published by William Smith, in 1815-19. In a recent paper, Sir Archibald Geikie has something of interest to say regarding it. He writes: "Before geology became organized into a definite branch of science, men began to perceive that our fundamental requisites, as a grand work for the show of the rocks of the earth's crust, alike in the theoretical and industrial aspects, lay in the delineation of the respective areas of these rocks upon maps. At first, the maps so constructed were merely rough representations of the general distribution of the mineral masses. They were mineralogical, or as they were called then, geognostical, that is

they only aimed at an indication of the relative positions of the rock at the surface. It was not until the time of William Smith that geology was supplied with the means of determining the true succession of the stratified rocks, apart from even lithological characters, which had previously been the only guide. Well may we look back upon that great pioneer as the father of English Geology. In every department of the science, we may trace the direct or indirect influence of his fruitful labors. But in no branch of investigation has this influence been more profound than in geological map-making, and in the assistance which geological maps have furnished to the onward progress of the science. The earliest true geological map, as distinguished from its geognostical or mineralogical predecessors, was the famous map of England, laboriously constructed by Smith himself, after years of patient investigation, and published in 1815-1819. The appearance of this map marks an epoch in the history of the science. It showed now for the first time how the successive stratified formations of the earth's could cover be recognized and traced, apart altogether from their varying mineral characters, and how the geological structure of one country could be logically compared with that of other countries. In fullness, accuracy, and artistic delineation, an enormous advance has been made, during the last three generations in the construction of geological maps, but the initial impetus of this advance must unquestionably be traced to the land surveys of William Smith."

Sir Archibald has also much to say regarding the relation of a Geological Survey to the public, and points out that, from the beginning of the Geological Survey of Great Britain, it has been continually referred to by all branches of the Government Service for information regarding questions in which knowledge of geology is required. The sinking of wells, the choice of sites for forts and Government buildings, the placing of graveyards, the selection of materials for buildings or roads, or nature of soils and sub-soils with reference to matters of drainage, these and many other subjects have been reported on.

A correspondent of the Halifax *Critic* writes to that paper declaiming against a bill which was passed at the last session of the Nova Scotia Assembly, amending Chapter 121 on "The Partition of Land" by making the provisions of that Act apply to leases of mining property as well as to real estate. The reason of the amendment is patent to all our Nova Scotia friends who, in the past, have been saddled by the once absurd practice of the Mines Department with an unwished for co-ownership in mining property. Two years ago, through the efforts of the old Gold Miners' Association, a change in the wording of one of the paragraphs of Chapter 7 (on Mines and Minerals) was made which prevented any future union of unwilling co-owners and made it mandatory to sell at public auction any property for which

there were two or more simultaneous applications. The effect of this change has been most salutary, and the prevention of future errors having been thus satisfactorily accomplished the next step was to provide legal and equitable means for the divorce of those owners who had been unwillingly, and in many cases, unwittingly forced into a joint ownership. The amendment spoken of (to Chap. 121) is the result. That it can be productive of anything but good, we are unable to see.

There are many cases, far too numerous in Nova Scotia to-day, where this unwilling and unequal joint ownership is directly responsible for the condition of inactivity in which these properties are found. Given diverse ownership, without any *co-partnership* by which the ownership may be dissolved, and in nine cases out of ten the natural unequal status of the owners will produce a condition of things ordinarily known as a "freeze-out, the inevitable and immediate result of which is the stoppage of work upon the property so owned. In nine cases out of ten also the disaffected parties will neither sell nor buy from each other, nor agree to sell to an outside third party. However much such a state of things may accord with the wishes of the owners, which we may be permitted to doubt in every case; it certainly is not in accord with the true development of the country, for the country's benefit as a commonwealth, particularly when, as is the case in Nova Scotia, the mineral development of the Province is perhaps its best asset.

It is not perhaps necessary to refer to the letter of this correspondent to the *Critic* further, as it is quite apparent that he has never read the Statute he refers to or he would never have written "The only fair way to do would be to sell the property at auction." It is expressly provided in the Chapter on the "Partition of Lands" that when the Commissioner cannot, from the nature of the property, make an equitable division, they are to so report to the Court, which will then order a public sale of the property for the benefit of all concerned. It is simply childish, and in exceeding bad taste, to complain of a chance of unfair treatment by Commissioners appointed by the Supreme Court of the Country, and to advise resisting such appointment is to lay oneself open to contempt of court.

The *Critic* does not publish the name of its correspondent, probably he is *non-est* and this letter, like so many others, may have originated in the editorial brain. It is in some points humorous, as for example when it says the law "is liable to be serious"—(we supposed all laws were serious)—and also when it alludes to the possible danger to "easy-going owners of shares in mines." If there are any "easy-going owners" who will be made serious and hardworking by this amendment, we think there is no need of justification for its passage without saying a word more.

A deputation interested in the production of Canadian graphite had an interview with the Dominion Government the other day and asked for a repeal of the proposed change in the tariff whereby imports of this mineral are to be brought in at 10 cents instead of 15 cents as formerly. The Walker Mining Company, which at present is making extensive preparations for a season of unusual activity at the Ottawa County mines, purpose manufacturing their well-known products on a large scale. The principals of the concern claim that the old tariff is necessary if their manufacturing business is to succeed.

The last act in the doleful history of the notorious General Phosphate Corporation (Ltd.) was played at Buckingham this month, when the machinery, plant and equipment was sold at public auction by the Receiver. The sale was insufficiently advertised, and the attendance of buyers, as a consequence, was meagre. The amount realized was a mere pittance, hardly sufficient, we should judge, to cover the expense of its removal from the mines to place of sale, and the commission of the auctioneer.

No judgment has yet been given in the suit of the Johnson's Company (Ltd.) and Bell's Asbestos Company (Ltd.). We hope to give the judgment of the Supreme Court in our next issue.

A good deal of attention is being directed just now to the Chaudiere gold district as a field of great promise for remunerative investment, and it is not unlikely that some important operations may be carried on this year by American and Canadian capitalists. By the way, this reminds us that as the DeLery leases expire this summer, a capital opportunity is afforded the Quebec Government for buying out the rights of this use less monopoly. \$55,000 is mentioned as the price at which the Seigniori rights may be acquired, but this would be a bagatelle, even to an impoverished treasury, in view of the undeniable richness of the territory which would accrue to the province. By throwing this field open to capitalists the Government would quickly recoup itself for the outlay, and the benefit to the Province would be great. The opportunity is truly a golden one and we trust the Quebec government will not let it pass without an effort to its acquisition.

In this connection the services of a qualified and thoroughly experienced gold mining engineer for a few months in the field would be a great stimulus to the interest that is being excited in this direction. It is undeniable, from the best of evidence, that the quartz districts alone will amply repay investigation. The report of such an engineer, employed by the Government, would be of the greatest service and value to contemplating investors during the coming season.

Mr. John Hardman, S.B., Oldham, President of the Mining Society of Nova Scotia, passed through Ottawa this month on a visit to Sudbury

on professional work in connection with certain reputed gold properties in that district.

The Hon. E. J. Flynn, Commissioner of Crown Lands, Quebec, purchased recently some fifty copies of the Journal of the General Mining Association of the Province of Quebec and distributed them among the leading mining institutes and public libraries of Great Britain and the United States. This is a practical way of advertising the resources of the Province for which the Commissioner is to be commended.

The other day we were pleased to have a call from Mr. Graham Fraser, of New Glasgow, and to find him sufficiently recovered from his recent severe illness to be moving about again. He is still, however, far from being well, and as he has been ordered a complete rest, it is not unlikely that the important iron and steel establishments of which he is the principal will have to do without his services for some time.

The construction of the magnificent coal handling plant of the Dominion Coal Company (Ltd.), at Montreal, is being rapidly pushed forward to completion. The discharging and loading capacity of these towers will exercise an important economy in time, labor and money to the syndicate.

The following table shows the number of tons of coal carried over the Intercolonial Railway from the Nova Scotia collieries to Chaudiere Junction and St. John for points west thereof, and to local stations in each year since the commencement of the trade in 1878-79:—

Year.	For the West.		To Local Stations.	Total.
	Via Chaudiere.	Via St. John.		
1876-77	.....	.....	103,420	103,420
1877-78	.....	.....	97,043	97,043
1878-79	300	.....	112,232	112,532
1879-80	1,097	.....	135,369	136,466
1880-81	6,102	4,022	174,483	184,607
1881-82	18,015	11,779	218,364	248,158
1882-83	12,837	22,296	227,380	262,423
1883-84	22,014	19,534	252,014	293,562
1884-85	133,440	1,775	215,791	349,004
1885-86	171,170	21,150	215,472	407,592
1886-87	192,871	27,556	233,178	453,585
1887-88	183,704	36,228	309,727	529,659
1888-89	160,026	27,923	338,538	526,487
1889-90	164,453	25,126	366,967	556,546
1890-91	113,996	39,213	344,829	498,038
1891-92	35,447	5,918	352,441	433,806
1892-93	136,868	3,775	402,653	543,296

It thus appears that the largest tonnage of coal carried over the road from the west was in the year 1886, when it reached 192,022 tons, since which the through coal traffic for points west of the Intercolonial Railway has been, on the decline.

A method whereby the sulphur in coals may be estimated, and their suitability for gas-making determined before purchase, has been introduced by Herr W. Hempel, an authority on coal gas in Germany. The coal to be tested is powdered and pressed into a little platinum-wire cylinder, and which a long platinum wire is attached, and

then burned. The combustion is effected in an ordinary glass bottle, which is fitted with a trebly perforated India-rubber stopper. Through this passes a tube with a glass stopcock, and which widens out into a cylinder; also two glass tubes, to the lower ends of which two thick platinum wires are fused. One of these wires carries the platinum cylinder or basket already referred to. A little mercury is poured into the tube so as to establish sure contact with the wires which lead the electricity. When the current is passed the platinum basket becomes white hot, the combination of the coal is effected, and the gaseous products containing the sulphur compounds are led off through the stopcock and examined chemically. There is practically an improvement on the more complex method originally devised by Berthelot.

The "Heathen Chinese" has no monopoly of "ways that are dark, and tricks that are vain," but he is a wily rascal all the same, and resorts to all sorts of devices for coming out on top of the Caucasian. He has been trying to palm off brass for gold in Queensland, and he has found that the trick was indeed vain, for it has landed him in jail. A splendid imitation of a 7dw. gold nugget made of brass was recently submitted for sale by a Chinaman to several private persons at Georgetown, but they were either suspicious or without the disposition or means to buy, and no business resulted. The son of Confucius then hied him to the Bank of N. S. Wales, where he was bowled out by the experienced bank officials, and landed in limbo. He is now doing six months hard, and probably planning further schemes for turning the baser metals into gold.

We have received a copy of a photographic representation of 33,000 yards of wire rope, loaded in one length on eight eight-wheeled bogie trucks. The rope, which was manufactured by Messrs. Felten and Guilleaume, of Carlswerk, Mulheim-on-Rhine, measured 5 1/2 in. in circumference, and weighed 210 tons.

The rate of drilling different rocks is affected by several factors, the hardness and compactness of the rock and the weight, temper and drop of the drill being most important. Still, the minerals which compose a rock may be very hard, and yet the cementing may hold the grains so loosely that the drill will make rapid progress through the rock. A feldspar cement allows of rapid progress, while a silicious binding material would resist rupture. The fine-grained rocky and steeply dipping strata are difficult to drill. The following table is given by Professor O. C. Sarter in a paper before the Franklin Institute, to show the thickness of rock pierced by a chisel drill 20 feet long, 5 3/8 inches diameter, weighing 700 lbs., guided so as to make a round hole:

Triassic Clay Slate	.....	4 1/2 feet in 10 hours.
" Sandstone	.....	5 " " "
Silurian Limestone	.....	5 1/2 " " "
Hydro Mica Schist	.....	7 " " "
Potsdam Sandstone	.....	10 " " "



"Which is the best way to work collieries without blasting?" is the title of an article read before the Manchester Branch of the Institution of Mining Engineers, England, and is replete with good suggestions as to the manner of managing men, or, rather, their prejudices. He desired to introduce a system of mining without using powder. Eighteen years ago, he was burning 400 lbs. of powder weekly and fifteen years ago abandoned it altogether, after a battle with the employees and employers. He first experimented on piece work with increased progress. Then he extended the field of operations and the men themselves after considerable opposition consented to the trial and conceded the benefit derived therefrom. All the time, he kept the men in ignorance of his design of putting the entire mine under the system knowing that they would oppose any change which seemed to be at their expense. He says, "Up to that time we had made our wagon road in the floor, which is very hard in the Cannel mine, from 2 feet 6 inches to 3 feet thick. By careful observation I found that two men could do more work by getting roof down, without blasting, and without risk and no powder to pay for, than three men could do by the old system. Now, as I have remarked before, I had to prove this to the men's satisfaction. To do this I commenced with one or two places at first. This went on for a while and proved of such interest to the men that others wished to do the same. I allowed this to go on until, instead of 20 or more shots a day being fired we had only six." Now, he thought was the accepted time. He called the men together and suggested the change, but was met with resistance and a demand for an increase of 1s. per yard. He abandoned the plan, though he permitted such as desired to adopt the new system to do so. "As is always the case, some men went on the old system, but on more strict lines. Up to that time, shots had been fired day and night, whenever the men were ready. After the meeting, we allowed no shots to be fired between 12 o'clock at night and 6 in the morning, and then only by one man; if the men were not ready when he went, they had to wait till the next round. This state of things went on till 1878, when the men who were using powder asked me to allow them to work on the new system and cease blasting, as, they said, they could not keep up with those who had already abandoned its use. I very readily consented and we have not fired a shot in that class of work since, and we have not had one case where a man has asked to fire one." He employs picks, steel wedge, hammer and water. The use of compressed lime was not successful, but he was satisfied with quicklime and water especially where a large surface was to be lifted. In a strong floor, he puts holes 3 feet down, 3 inches in diameter and 2 feet apart. In these are placed tapered pricklers in quicklime 2 feet deep and under 1 foot of clay. The prickler is drawn, water poured on, a wooden plug driven and in twelve hours the coal can be "got" with pick and bads. The lessons drawn from a study of the report are trenchant; first it shows that the average per cent. of coal won from the commencement of mining to January 1st, 1893, is

about 44, if it is assumed that the buckwheat size had been prepared during that entire time. It states, however, that the conclusion reached by it is rather a saving of not more than 30 per cent. of the coal originally contained in the areas mined over. This may be increased to 40 per cent. by the utilization of the coal contained in the culm banks, and by the reworking of a part of the territory mined over. An estimate is made of the available marketable coal now still in the ground at 6,898,000,000 tons. One statement is made that should be impressive; i.e., that some of the collieries are using, under their boilers for pumping and hoisting purposes, from 15 to 25 per cent. of their production.

According to M. Eiffel the cost of any big engineering work in lives can be estimated with at least as much accuracy as the cost in money. "It has been ascertained," he said, "by statistical observation, that in engineering enterprises one man is killed for every million francs spent on the work. If you have to build a bridge at a cost of 100,000,000 francs, you know that you will kill 100 workmen." The argument, while rather an ingenious one, is not, we believe, borne out by facts. Take the Eiffel Tower, for example. Six and a half millions worth cost only four lives. The Forth Bridge, on the other hand, a contemporary points out, cost 45 million francs, while the lives of 55 men were sacrificed in connection with its construction. Then in regard to the Manchester Ship Canal, only 130 lives have been lost against an expenditure of 325,000,000 francs.

In the Ontario Legislature the Hon. A. S. Hardy, Commissioner of Crown Lands, gave notice of a resolution setting apart \$25,000 per annum for a term of five years from the 1st of July, to be paid as a bounty to miners and producers of iron ore upon all iron ore mined and smelted within the Province. The bonus will be paid at the rate of \$1 per ton of pig metal produced from such ores.

The British Columbia Legislature has passed a resolution, praying the Dominion Government to give a bounty on pig lead. "Whereas, by the Dominion Tariff a bounty of \$2 per ton on pig iron is allowed; and whereas there is a large quantity of lead ore in the Province which might be mined and become a valuable industry and source of profit: Therefore be it resolved, that the Dominion Government be urged to make a similar regulation in the tariff, and allow a bounty on pig lead."

The Hon. A. S. Hardy's amendment to the Ontario Mines Act will have passed its third reading by the date this issue is in the hands of our readers. It will, we understand, do away with all royalties heretofore reserved, and all lands sold or leased within five years from the passing of the Act will be exempt from royalties. It is quite evident that the Ontario Government is alive to the importance and well being of its mineral resources. The old law was a fair measure, to which no one acquainted with

mining legislation in other countries could raise objection, but the amendment, if it will conduce to more liberal investments of capital, will achieve a very desirable end.

We are sorry to see our friend Captain R. C. Adams of Montreal, involved in a law suit over the acquisition of his "Bon Ton" silver claim, Slocan District, in British Columbia.

The complaint sets forth that the initial post of the Bon Ton is on grounds occupied and known as the Diamond Cross claim and also that neither number one or number two post is in place, and there are no monuments or witness stakes to prove that such posts ever stood. The third and principal reason is that the record made by the defendants makes the course of the line from number one to number two post southeast, while the line as run by the Government surveyor is northeast, which brings the Bon Ton on the same ground as the License, the claim owned by the plaintiffs. The Bon Ton and the adjoining claim, the Big Bertha, have been very unfortunate for their owners. The Big Bertha was famous at one time as being one of the richest properties in the Slocan District. Four and one-half tons of ore that were milled at the Tacoma smelter carried 376 ounces in silver and 45 per cent. lead to the ton. In the summer of 1893 the ownership of the ground was disputed by the owners of the Bon Ton and after making a survey of the properties, the development work on the Big Bertha was found to be on the ground now claimed by the Bon Ton. Since then little or no work has been done on the latter mine, although it was the intention of the owners to put on a large force of men this spring. The suit promises to be a very complicated and interesting one as it involves several very fine points of law which have never come up before in a British Columbia court.

In a recent discussion of the work of the Geological Survey of Great Britain by members of the Mining Institute of Scotland, some pertinent criticisms were made which can with all truth be applied to the work of our own institution in this city. In most mercantile businesses it is the custom to advertise the articles sold and increase the agencies for their sale in different parts of the country. The opposite principle seemed to actuate the Geological Survey; advertising a new map or taking any means to push the sale of a publication was apparently a departure too sensible to be dreamt of. No wonder that the general public knew scarcely anything about the Geological Survey and its work. The work of the Survey in the mineral districts of Canada demands more attention. Instead of pushing on, at considerable expense, explorations in the "Barren Lands" and other outlandish sections of this great continent of ours, greater energy was desirable in the collection of mining information and the publication of new editions of mineral map with sections and accompanying memoirs, which would be of greater public utility than the almost purely scientific branch of the work. A vigorous stirring up of the dry bones in the Mining Bureau is urgently required if this section of the public service is ever to attain the respect and confidence of the people of this country.

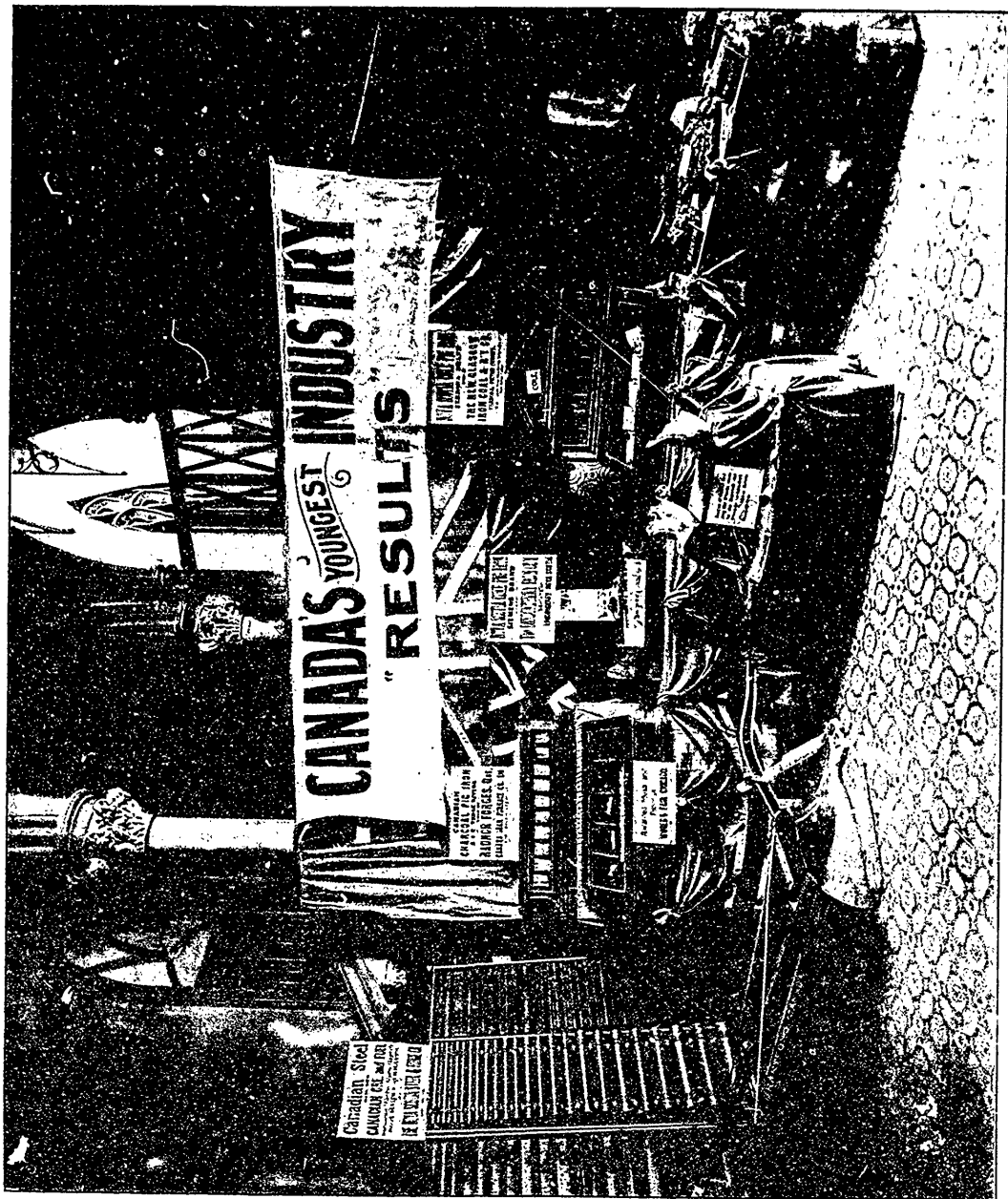


Exhibit of Canada's Iron and Steel Manufactures in the Main Entrance, House of Commons, during the Debate on the Tariff.

## CORRESPONDENCE.

## The Stellarton Journal and the Mining Society of Nova Scotia.

Editor Canadian Mining Review:—

SIR,—The *Journal* of this place comments on my address to the Mining Society at the annual meeting. The comments call for some notice. In the first place the Society is classed as a rival of the P. W. A., which has the *Journal* for its organ. This, as a study of your columns would make clear, is an entire misapprehension. No reference has been made to the P. W. A. at the Society's meetings, and no antagonism should arise. Clear and clean legislation is to be desired by those of both institutions who study the necessity of legislative interference. In the second place, my contention for a reconsideration of parts of the Mining Acts is based largely on those parts not expressing quite the intention of the framers of the Acts. Many of the working miners who have looked into the law find the difficulties I have already enumerated, though some of them, like the editor of the *Journal*, have been misled into believing the "intention" would supersede the strict letter of the law on a question arising in court. Finally, I may suppose, on the truth of the well known advice, "When your case is bad abuse your adversary," that I should be flattered at the personalities that garnish these comments.

Yours, etc.,

H. S. POOLE.

Stellarton, N.S., April 12th, 1894.

## Mr. J. B. Hammond and the Review.

Editor Canadian Mining Review:—

SIR,—In your last issue you publish an article commenting in a rather unusual way on the work of the Provincial Mining Association of Ontario at the annual meeting here on the 14th of February last. You do not attempt to disprove a single statement made in any of the papers you refer to, which would have been more to the point than a stormy tirade of personal abuse.

This young Association does not claim to have a world-wide fame, but it does claim to represent the mining interests of this district, which is the principal mining centre of the Province. In its membership are included the ownership of at least three-fourths of the best mining properties on the whole nickel range here, and who have, therefore, a perfect right to condemn the mining policy of the Government, as their interests are affected so disastrously by it.

Strangely enough, in another article in the same issue of your paper you denounce the Government for the unprogressive state of the mining industry in Ontario, and then slander us for doing the same thing in our own way. You must surely know that the dissatisfaction with the present mining policy of the Ontario government is not confined to this district or to a few men in it, but extends from the Ottawa River to Lake of the Woods, and includes all classes of the community. We have been struggling here for several years in trying to induce the Government by all legitimate means to adopt a more enlightened and progressive mining policy in the interests—not of the speculators and mining brokers, as you state—but of the country at large. All our efforts having been in vain, we are now going to appeal to the people of Ontario, and have no fear of the result.

Your peculiar criticisms of myself and other leading members of the Association we do not heed. But, when you charge me with having sought "to make the sale of a large and valuable mining property of the lands of the Crown as if they had been my own," and then endeavoring "to make a public grievance of my own failure to carry out a crooked deal," my personal honor is at stake. You entirely misunderstood that part of my paper. The lands referred to in that case were held by other parties—including a member of the Ontario Legislature, and who is a supporter of the Government—and I had no interest in them whatever, outside of my commission if I made a sale. I must, therefore, request you to withdraw this charge in your next issue, and to apologize for the publication of such a false and libellous statement, or I shall be obliged to take proceedings against you for criminal libel.

Yours faithfully,

JAMES B. HAMMOND.

Sudbury, Ont., April 6th, 1894.

[We comment on the above elsewhere.—EDIT.]

## Mining in the Slocan District, B.C.

Editor Canadian Mining Review:—

SIR,—The period of activity which the Slocan district has experienced during the winter has been brought to a close by the approach of spring and consequent breaking up of the Kaslo-Slocan sleigh road.

The further drop in silver to 59 cents had caused one or two mines to reduce their working staff some few weeks ago, and now all the mines have ceased producing ore for

shipment and are confining themselves to development work. Of the 12 or 15 mines which were shipping ore during the winter, the Washington was one of the first to stop producing.

This mine, the most prominent in the district for the active manner in which it has been worked, reduced its force from 50 men to 10 just about the time that silver reached 59, in the beginning of March. The Noble Five and Mountain Chief reduced their forces also about the same time, and now that ore hauling has stopped there are only about 150 men left in the hills doing development work in some 20 mines.

The business portion of Kaslo was burnt down six weeks ago, and on account of the extremely hard times has not been rebuilt, almost all the firms finding premises in other parts of the town in which to carry on their business.

Everything in the district is at its lowest ebb and times should indeed be discouraging. This district is nothing if not a mining district, and at present nothing if not a silver producer. It is dependent wholly on the silver question; not on the high or low price of silver, but on the settling of the question—even if only temporarily—in one direction or the other. As has been so often stated, this camp would be a flourishing camp with silver at 50 cents if there were no prospects of its rising much higher, but with the present confidence of a decided increase in the price within the next year or two, mine owners feel they are deliberately throwing away money in producing silver at its present value.

Neither despair nor hope show up at all prominently in the faces or conversation of the men of the district; they are determinedly and quietly confident. "The mines are all right; they can't run away," they say; "silver is all right; we have simply to wait." But there's the rub.

A good many men are here waiting for the snow to leave the hills to enable them to prospect. Besides the prospectors many men will find work on the Nakusp-Slocan Railway, upon which the rails will be laid this summer.

In one direction there certainly will be some activity, and it is already commencing. Capitalists from the States are realizing the fact that the holders of mining properties in the Slocan are in many cases very hard up—in a phenomenally hard corner—and they are taking advantage of this.

The Slocan must await patiently the settling of the silver question. When that time comes it will be in the very best shape to take full advantage of it. The mines are being opened up ready for extensive working and the necessary railway communication is being built, a sure foundation is being established which will stand the coming boom without fear of reaction.

Yours, etc.,

WAITER.

Kaslo, B.C., 19th April, 1894.

## The Walker-Carter Process at Marmora, Ont.

To the Editor of the Review:

SIR,—The bee of hard facts in Mr. Kitson's bonnet is an insect of large dimensions. Its buzz is so loud that he is deaf to any consideration of the only points which can be of interest to your readers. I will pass over the personal abuse which forms two-thirds of his letter in your last issue, and confine any further remarks to the more useful occupation of time and your space by consideration of the point at issue, namely, the successful treatment of the Marmora gold ores.

The point I take exception to is the too glowing statements brought forward in your January issue of the *Review* concerning this process as exemplified by the working results attained at Marmora last year, statements which I repeat are misleading and unwarranted. If Mr. Kitson or other interested promoters of the extension of the application of this process have any fresh facts in connection with their Marmora record to adduce, why does he not state them, instead of wasting your space by endeavoring to throw mud at me? Mr. Kitson has left me very little to reply to, and I hope he will stick to his text better next attempt.

Regarding the exit of the tailings at the Marmora mill last fall, these were pouring out of the end of a launder at the S.W. angle of the building on the verge of the river's bank, and accessible then to any one on foot; the superintendent who informs Mr. Kitson that the tailings now "run out of the mill into deep water," etc., probably found it desirable to make this improvement to their process after my visit, and thus displayed his zeal for Mr. Kitson's interests, in the same manner as when he affirmed to me that the mill was effecting a 90 per cent. "duty."

By my correspondence with Mr. F. B. Allan, reproduced by Mr. Kitson, I was endeavoring to conscientiously investigate the results attained by the Walker-Carter method at the Marmora mill, and having now completed that investigation I have formed my opinion regarding it, and am also ready to express it frankly, but I am still looking for the successful method of gold extraction for certain types of so-called refractory ores and am open to conviction only when I see the right kind of evidence and undisputed facts.

Mr. Kitson dismisses the important question of chlorination methods in a very summary manner, "everybody knows," he says, "that chlorination was tried under the best conditions at the Deloro mine, and was a decided failure." But thereby hangs a tale. Who said it was carried out there under the best conditions? If Mr. Kit-

son understands anything of the subject of which he is talking, without placing himself at the mercy of superintendents and experts, I recommend him to make a trip to the monumental Deloro property as I have done, and after he has duly seen and investigated the ore, the plant or its ruins, and the tell-tale tailings, which in this case were not carefully dumped into the river, he may get his eyes opened a little, and perhaps sympathise with this unfortunate district, which is still suffering from the moral effect of the Deloro collapse.

The cyanide treatment is demolished with equal facility by Mr. Kitson, and with apparent satisfaction to himself.

In conclusion, Mr. Kitson has failed to give to your readers the very information which I now demand, namely, the tests and results attained by the Walker-Carter process upon the mispickel ores at Marmora. We know what the process has done upon other types of ores, these have been published and discussed elsewhere, and have nothing to do with our present subject. Mr. Kitson says, "I could furnish your readers with expert opinions and tests," etc. Please give them, Mr. Kitson, although do not present others similar to that of Mr. Beckwith, which you very frankly admit "was not written for publication, but for some capitalists who desired to invest in the process!" That is just what I concluded before Mr. Kitson admitted it, and it would be interesting to know if said capitalists invested on the strength of it.

J. LAINSON WILLS.

New York City, April 25th, 1894.

## A comparison of some Systems of Machine Screening, with a description of the screens lately put down at the Foxes Bridge Colliery, Forest of Dean.

G. E. J. McMURTRIE, ASSOC. M. INST., C.E.\*

The subject of the best and most economical method of screening coal, has of late years received much additional attention. It is hardly possible to overrate the importance of this branch of Mining Engineering; as on the condition in which the coal of a colliery is despatched, its sale must largely depend.

The early form of screening coal can still be seen at work in some districts, and may be called the Hod and Rake system; the coal being tipped out of the tub down a bank, and the large raked into boxes, called Hods in the Forest of Dean, and carried by the men and thrown into the truck. This method of screening was very far from perfect, as it limited the coal to three sizes, and was very expensive, often costing 5d. per ton.

Passing the coal over stationary bars was the first improvement on this, and effected a very considerable economy and improvement in the quality of coal made, while enabling additional qualities to be made. Stationary screens are now being replaced by some system of machine screening. Of these there are several, comprising among others—

1. The Jigger Screen with lengthway motion.
2. The Jigger Screen with cross motion, or the patent Lyall Screen.
3. The Greenwell Screen, consisting of a number of endless chains travelling between stationary bars of varying widths.
4. The Chamber's Screen, as lately seen by the Members of this Society at Denaby Main Colliery.

The last consists of a number of parallel longitudinal meshed bars, carried on pins rocking in inverted steps provided in the bars, and connected to a rocking shaft at either end. A vertical and lateral movement is imparted to the bars, through rods and levers from eccentrics on a revolving shaft.

The gentle rocking motion of this screen causes very little shock to the coal, probably owing to the addition of the cast steel Tee levers D for working the bars vertically, and the cast steel levers E for working the bars laterally. It is thus a very suitable screen for a soft coal.

As seen by us it was only making two qualities of coal, and consequently all that passed through had to be further treated in a revolving riddle with varying mesh, or in some other way. It can, however, be arranged to make any number of qualities.

The accompanying drawings, for which the author is indebted to the patentee, Mr. Wm. Hy. Chambers, of Denaby, Maine, fully show this screen. Some of the special advantages claimed for it are—

- (1) Large capacity, four tons per minute being effectively separated, therefore saving bank room, distance in tramming, multiplication of screens, &c., and reducing labour.
- (2) Regular delivery on to the picking bands.
- (3) Saving of breakage, only sufficient movement being imparted, to cause the small to separate from the large and fall through the meshes.
- (4) The material is carried horizontally or at a very slight gradient, thereby saving height in bank above wagons.
- (5) The bars can be any length to suit wagons, position or picking bands, tipplers, &c., and if necessary the coal can be picked on the screen.
- (6) Any number of meshes can be used in tiers for screening into various sizes, all working from the same set of levers with adjustable throw to suit material, each tier only occupying a space of about 12 in. in height.

\* The British Society of Mining Students.

- (7) The bars can be taken out and others substituted for a different size of coal in a few minutes.
- (8) Few wearig parts, and these all removed from contact with the coal and dust.
- (9) Not liable to get out of order, and easily repaired.
- (10) It is perfectly noiseless in operation.
- (11) No vibration to cause headpain to rock.
- (12) Very little power required for driving.

The Bascoup screen, also specially devised to deal with very tender coal, has been very ably and minutely described in No. 3, Vol. XIV., by Mr. H. W. Hughes. Before describing the screens put down at the Fovea Ridge Colliery, a few notes on these different systems should be of general interest, and will show the reasons guiding us in our choice of screens.

In reading Mr. Hughes account of the Bascoup system, one cannot help feeling that the Briart Screen is a very complicated one; and while admittedly expensive in first cost, has probably a high cost of repairs. The use of longitudinal bars in place of meshes is objectionable, as it must let much long thin coal pass through, which ought to be retained in the higher priced coal, and must mean a money loss in this way. Were the bars replaced by meshes the principal complication in this screen would be eliminated, as also probably its principal advantage. Its great advantage is that it may be placed horizontally—though this is not always taken advantage of—and consequently is very suitable for low heapsteads. In the Jigger Screens put down by myself are riddles at an inclination of only 2½ inches per yard or barely 4 degrees, which is, it may be said, a very slight inclination. The bars in the Briart Screen, the inclination would probably have to be increased to this.

The Briart Screen appears to have this advantage over the Jigger, that on account of its two sets of bars and eccentrics, or elbows, it has double the throw of the Jigger with single eccentric, and should, and presumably does, work consequently twice the quantity. This may not, however, always take full advantage of, for were the coal leaves the screens it should be completely divided up into its different sizes, and the speed the screen is driven at has to be regulated so as to ensure this. In common with the Jigger system of screening, manual labour is diminished and all small coal removed. The cleaning bands employed are very different from what are used in this country, and are not so long, and apparently they are able to give trouble from expansion and contraction.

The loading shoot appears to be an improvement on the usual screen door or balanced shoot working on a fixed axis, and rather more than balanced with weights when empty of coal. This delivers all the coal in the centre of the truck, and does not distribute it quite so fully as the Bascoup shoot. The height the coal falls, however, which after all is most important, appears to be the same in each case.

The means adopted for weighing at Bascoup, while expensive in first cost, must be exceeding convenient and economical of labour, especially where trucks have to be loaded to a certain weight.

The simplest method of correcting this, where all the trucks have to be weighed over one machine, is to have a platform opposite the machine, upon which a certain amount of coal is kept.

This system of weighbridges also enables every truck to be tared, which is certainly generally neglected at small collieries, and sometimes at large ones: where it is done, a separate machine is kept as long as it is kept for the purpose. The yearly loss to a colliery from want of taring is often very considerable, and many, if not all complaints of short weight are due to this cause.

The Greenwell screen was fully described in No. 4 of Vol. XIII. by myself. Its great advantage is its very great simplicity, carrying with it the very smallest first cost of £100 per screen, and an almost inappreciable cost of repairs; and for four together being said to cost but £4. per ton. No other system has yet approached this. The Poynton collieries, where it is in use, largely supply nut fuel for the Stockport cotton mills, which require very careful screening, and it appears to give satisfaction in that district. All the cleaning has to be done on the small coal or slack portion of the screen, and in the case of some of this must be done in a very considerable length. As the chains travel 70 ft. per minute, or approximately at twice the usual speed of a travelling band, additional care is required to clean it; otherwise dirt must be carried into the nut coal. This can no doubt be modified to suit individual circumstances.

The weak point in this, as in all bar screens as compared with the Jigger, is, as before stated, that the sizing is not absolutely perfect, some of the pieces slipping through the bars into the wrong truck. It does not take up even the height occupied by the Briart screen, as 3 ft. plus hopper height is sufficient for it, and the screen is absolutely level. The quantity it can deal with is 50 tons per hour.

The Lysall screen appears to me to have this serious disadvantage, that in dragging the coal from the lengthways the engine drives the screen crossways, thus retaining the coal much longer on the riddle, and bringing into play a conflict of forces which must surely try a coal in any degree tender or jointy.

The fewer shakes given to a coal the better, and the flatter the riddle, the less must be the shock or blow per shake. Being a patent screen too, adds apparently a good deal to its cost.

Having taken all these things into consideration, and while admitting that the Briart screen can take a greater tonnage per hour, and that the Greenwell screen is stated to be cheaper in first cost, repairs and labor, yet take

Jigger screen with lengthway motion, associated with a proper system of picking bands, appears to combine the most perfect system of sizing the coal yet adopted, together with an excellent system of cleaning the coals, and conveying them to the different trucks. This system was consequently selected for the Fovea Ridge screens.

The Scottish Institute Report on Screening (part of Vol. XI.) is, as far as dry screening is concerned, very largely a report on the lengthway Jigger system of screening, either alone or united with travelling picking bands. Its very general adoption in all the English and Scotch coalfields, attest the value of this system of screening, modified or adapted to suit the requirements of the different seams and districts.

The accompanying drawings, which comprise sections of both the screens together with a plan of them and the picking bands, are the original drawings, and have been since somewhat altered in details.

This, however, does not affect the general arrangement. The quantity to be screened is 500 tons per day, got from five thin seams. One screen would be sufficient to deal with this, but on account of difference in the quality of the seams, it is necessary to have two screens, one screened and treated. See Jigger screens were put down and picking bands. See Plates VI. and VII.

On the first or block coal screen four qualities are made, viz. :—

- No. 5. Coal over a riddle with a mesh 4 in. square.
- No. 2. Coal over a riddle with 1½ in. square mesh.
- No. 3. Coal over a riddle with ¾ in. square mesh, and No. 4. Coal or the dead small is what passes through this last riddle.

On the second or Best Forest screen three qualities are made, viz. :—

- No. 1. Coal over a riddle with 1½ in. square mesh.
- No. 3. Coal over a riddle with ¾ in. square mesh, and No. 4. Coal what passes through this last riddle.

1. Looking at the Block screen we see that the No. 5 coal passes off the riddle, and down a stationary shoot with balanced mouth direct into the truck, as it requires very little cleaning. Chains enclosed in leather are hung across this shoot to check where necessary the speed of the coal.

2. The No. 2 coal passes off the jiggers in the opposite direction and down a short jigger shoot to a picking band, along which it is conveyed to the truck, and on which any dirt is picked off, and down a stationary shoot with balanced mouth direct into the truck, as it requires very little cleaning. Chains enclosed in leather are hung across this shoot to check where necessary the speed of the coal.

3. The No. 3 coal passes off the No. 3 riddle on to the No. 3 band, on which it is cleaned.

4. The slack passes down a stationary shoot into the truck.

If we turn now to the Best Forest Jigger we find :—

(1) The No. 1 coal passes down a stationary shoot on to the No. 1 band, on which it is very carefully cleaned. It passes off the band and down another short stationary shoot into the truck.

(2) A stationary shoot delivers the No. 3 coal into the truck.

(3) The first portion of the slack shoot of this screen had to be made to jig, as the fall into the truck from the riddle end was found insufficient to deliver the coal into the truck.

The great saving in height obtained by machine screens as compared with stationary screens, is well shown by the fact that one of the riddles is only 2½ in. per yard or barely 4 degrees, while the slack coal shoot dips 1 ft. 11 in. per yard or 33 degrees.

The inclinations of the various riddles, together with their areas, entirely depends upon the amount of coal put upon the screen at one time, and the amount of small coal in it. This has to be arranged to suit individual circumstances.

The tippler in use is Rigg's Patent tippler, with a heavy flap, retaining the coal till close down upon the screen and thus reducing breakage. The average weight of a cart of coal is 2½ cwt., which is a considerable quantity to pass down a screen at one time. In such a case it is best to pass it down a stationary shoot at least 6 ft. long before it passes over the Jigger.

The riddle on all the riddle frames, except the No. 2 riddle, which is ½ in. square iron riveted in a frame, and fastened to the jigger frame by four 6 in. x ½ in. bolts. Under every riddle is a wide sheet iron shoot, carrying all the coal that has passed through the upper riddle, to the head of the lower riddle.

The picking bands are all 44 ft. in length, the No. 1 band is 3 ft. wide, the Nos. 2 and 3 bands 2 ft. They would have been much better if they had been respectively 4 ft. and 3 ft. The plates consist of ¾ in. steel 12½ in. long. In each case the plates are riveted by means of angle iron and six ¾ in. rivets, to two endless chains consisting of steel links 2 in. deep and ½ in. wide, by 12½ in. link, connected together by strong ½ in. rivets. The steel links, in the case of the two narrow bands, form a guard on either side of the large sheet iron shoot on it.

The 3 ft. band has the steel links underneath it, and no guard on top, the m.k.'s idea being probably to save an extra drum at either end, and the accompanying extra endless chain.

When this band has to be replaced this will be altered as suggested, as while the narrow bands have given no trouble at all this has. The large rivets fastening the steel links together wear very hard against the angle iron frame, and frequently require renewal, and the plates are more liable to catch and to rip than on the other bands, which are obviously stronger to resist this. Each

band travels along the top on 2½ in. angle iron, and returns over some five 4 in. cast iron rollers. The drums are in every case hexagonal and 2 ft. diameter. The whole band is built up on a pitch pine frame 12 in. by 4 in., and in each case a pair of 1 in. screws tighten or slacken the band, by moving the delivery drum out or in.

In the thickness of the No. 3 coal allowed to travel along the No. 3 band, is strictly regulated by a board placed across the band; this forms one side of a small box arranged to hold any temporary accumulation of No. 3 coal that may take place from this.

No regulation is necessary in the case of the No. 1 or No. 2 coals.

All three bands are driven off one common shaft. This reduces the shafting and gearing required, and the consequent expenditure. So far this has not caused inconvenience, but a better arrangement might have been, to have opposite each band a small wheel on this main shaft, gearing into a second wheel on a short drum shaft on the driver end of the band, fitted with a clutch for throwing it in and out of gear.

In the Forest of Dean it is the custom to cobble or top the No. 5 and No. 1 coals off; when the trucks are nearly full and the coal lies high in the middle of the truck, the coal will not discharge itself from the delivery shoot, as this has been kept down within one foot of the top of the ten ton truck, to reduce as far as possible the fall and consequent breakage. The band has then to be frequently stopped to clean the shoot and cobble the truck.

Consequently, the use of a clutch arrangement is necessary for the No. 1 and No. 2 bands; though possibly it would be an improvement to the No. 3 band, as No. 3 coal is made on both the screens. It is clear, too, that it would not do to work the screens and stop the bands; as should this be done the coal would be delivered in a heap on the ground, and at that point, it would give no chance for examination and cleaning. This system of cobbling keeps a man in both the No. 1 and No. 5 trucks, consequently after passing off the No. 1 band, the coal has a second examination. In the case of the No. 5 coal, the coal is entirely examined in the truck itself by one man, or, if much No. 5 coal has to be made, by two men.

Two men are kept upon the No. 1 band, 2 boys on the No. 5 band, and four boys on the No. 3 band. This system of cobbling keeps a man in both the No. 1 and No. 5 trucks, consequently after passing off the No. 1 band, the coal has a second examination. In the case of the No. 5 coal, the coal is entirely examined in the truck itself by one man, or, if much No. 5 coal has to be made, by two men.

Two men are kept upon the No. 1 band, 2 boys on the No. 5 band, and four boys on the No. 3 band. This system of cobbling keeps a man in both the No. 1 and No. 5 trucks, consequently after passing off the No. 1 band, the coal has a second examination. In the case of the No. 5 coal, the coal is entirely examined in the truck itself by one man, or, if much No. 5 coal has to be made, by two men.

The engine driving both screens and bands is a single 14 in. horizontal with 2 ft. stroke, a light fly-wheel, and 3 in. steam pipes. As will be seen from the plans, a belt driven off the fly-wheel shaft drives a 3½ in. shaft, on which are the four cams of the two jigger screens. Off this shaft a second belt carrying a 2½ in. shaft, on which is a bevel wheel gearing into a 6 in. bevel wheel on the main 3½ in. driving shaft of the bands.

Both these driving belts are 6 in. Gandy Cotton belts with patent Lagrange fasteners, and have so far answered very well. They bear exposure to weather well, and do not slip even when a stream of water is running off them. The engine is driven at 60 strokes, the jiggers go 100 strokes and the bands travel 30 ft. per minute. Both jiggers are suspended from a pitch pine framing 12 in. by 4 in. by means of four 2 in. round iron rods.

All the woodwork carrying the jigger screens, bands, etc., consists of strong pitch pine balk 12 x 12 in., strongly bolted and braced together. The stroke of the cams can be varied from nothing to 6 inches, the original idea being to give a short stroke as the coal is hard, and a long stroke as the coal is soft, but this has not been necessary, however, it is a very good idea.

Heating of the cams has given so much trouble, and sev. of the original cast-iron eccentric straps have been broken owing to this. These are being replaced by wrought iron of stronger section, welded to the connecting rod instead of bolted as formerly, when the bolts occasionally gave way.

Possibly the cams are of too small a section, but most of the heating is due to dust getting between the cam and the eccentric straps, which cannot be prevented. Sometimes towards the end of a day a strap will suddenly get hot after working cool all day.

As the new screens had to take the place of two stationary bar screens, it was important to utilize as far as possible the old framing and shoots. This added considerably to the difficulty of putting down the new screens, and caused certain modifications which would not otherwise have been adopted.

These screens have now been working since the commencement of the year, and have so far given every satisfaction, for while the different qualities are strictly screened, every possible care is taken also to despatch the coal from stone or other impurity.

The entire absence of complaints from those trading with the colliery bears eloquent testimony to this, while the cost of screening and cleaning the coal has been reduced, and this too at a very moderate outlay.

## Ontario Mining Institute.

## Successful inauguration of a new representative mining organization in Toronto.

A large and representative gathering of gentlemen interested in the development of Ontario's mineral resources was held in the Rossin House, Toronto, on Tuesday, 10th inst. Mr. James Conmee, M. P. P., Port Arthur, was called to the chair, and Mr. G. R. Jones, elected Secretary to the meeting. Mr. B. T. A. Bell, Ottawa, being called upon, explained what had been accomplished by mining organizations in the Provinces of Quebec and New Scotland. The Chairman then asked those who were desirous of becoming members of an Ontario organization to come forward and sign the roll of membership. The following were enrolled—

Prof. Nichols, School of Mines, Kingston.  
 Prof. Miller, School of Mines, Kingston.  
 A. Blue, Director of Mines, Toronto.  
 J. W. Gibson, Bureau of Mines, Toronto.  
 W. Hamilton Merritt, A. R. S. M., Toronto.  
 B. T. A. Bell, Canadian Mining Review, Ottawa.  
 G. A. Spotswood, M. E. C., Kingston.  
 Folger Bros., Kingston.  
 J. B. Carruthers, Kingston.  
 J. M. Machar, Kingston.  
 J. Rawlin, Kingston.  
 T. Birckett, Kingston.  
 W. A. Allan, Ottawa.  
 James Conmee, M. P. P., Port Arthur.  
 J. M. Clark, Toronto.  
 Thos. Shortiss, Toronto.  
 L. A. Morrison, Toronto.  
 D. F. Burk, Port Arthur.  
 Ian Cameron, M. E. Saultbury  
 R. H. Ahm, Toronto.  
 John McKellar, Port William.  
 Peter McKellar, Port William.  
 Thomas Marks, Port Arthur.  
 Edgar J. Jarvis, Toronto.  
 Dr. Coleman, School of Practical Science, Toronto.  
 B. J. Townsend, Toronto.  
 J. W. Brown, Toronto.  
 J. F. Latimer, Toronto.  
 W. T. Newman, Toronto.  
 Edward Faye, Toronto.  
 E. S. Townsend, Toronto.  
 J. T. Laudlaw, Toronto.  
 M. J. Paterson, Wellwood.  
 T. D. Ledyard, Toronto.  
 F. A. Fenton, Toronto.  
 George T. Marks, Port Arthur.  
 J. F. Kingsmill, Toronto.  
 R. W. Frittie, Toronto.  
 And about half a dozen others.

## Electing of Officers.

It having been resolved that the organization should be named the Ontario Mining Institute, and a constitution and by laws having been drawn up, the following were elected officers for the ensuing year—

## President:

James Conmee, M. P. P., Port Arthur.

## V. P. President:

J. F. Kingsmill, Q. C., Toronto.  
 Archibald Blue, Toronto.  
 Prof. W. L. Lovison, Kingston.  
 W. Hamilton Merritt, A. R. S. M., Toronto.

## Treasurer:

J. W. Gibson, Toronto.

## Secretary:

B. T. A. Bell, Ottawa.

## Council:

Prof. Coleman, Toronto.  
 Peter McKellar, F. G. S. A., Port William.  
 Prof. Nichol, Kingston.  
 J. M. Clark, Toronto.  
 William Young, Rat Portage.  
 Ian Cameron, Saultbury.  
 T. D. Ledyard, Toronto.  
 A. W. Carstairs, M. P., Marmora.  
 Dr. Ames, Toronto.

## Amendment to the Ontario Companies Act.

The following resolution, moved by J. M. Clarke, seconded by J. F. Kingsmill, Q. C., was unanimously adopted.

Resolved: "That in the opinion of this Institute an Act should be passed at the present session of the Ontario Legislature placing beyond doubt the power of joint stock companies to issue shares at a discount, the present uncertainty on this point being especially detrimental to the mining industry."

## Motion to Incorporate.

It was moved by Judge Kingsmill, seconded by Mr. Marks and resolved: "That the Council be directed to consider the question of Incorporation, and they are hereby authorized to apply therefor, it after consultation it is thought desirable."

## A Mining Joint Stock Companies Act.

It was resolved on motion of Mr. D. F. Burk, Port Arthur, seconded by Mr. T. D. Ledyard: "That a committee comprising Messrs. Conmee, Kingsmill and Marks, together with the mover and seconder be, and are hereby appointed, to wait upon the Ontario Government forthwith, and ask that a Mining Joint Stock Companies Act be passed, providing that the only penalty attached to the non-payment of calls upon mining stock be the forfeiting of the amounts already paid upon their stock."

## Mineral Exhibits at International Fairs.

Moved by Mr. L. A. Morrison, Toronto, seconded by Mr. John McKellar, Port William: "That it is the opinion of this Institute that the mineral interests of Canada should be represented at all the great international exhibitions by one who is scientifically and practically acquainted with the great mineral resources of this Dominion." Carried.

## Government Aid to Iron and Steel Production in Ontario.

On motion of Mr. W. Hamilton Merritt, seconded by Mr. T. Shortiss, the following resolution was adopted: "That it would be in the best interests of the Province were the development of the natural mineral resources substantially assisted by the Provincial Government, particularly in the case of pig iron and steel produced in Ontario, and that also the manufacture of steel rails and nickel-steel in Canada be practically assisted by the Dominion and Provincial Governments."

## Aid to Metallurgical Treatment of Gold Ores.

The next resolution introduced occasioned a long and animated discussion, in which nearly all present took part. Here is the resolution—

Moved by Messrs. Latimer and Cooper, "That it would be desirable for the Provincial Government to encourage the development of the refractory gold ores in Ontario, and with this in view to give a prize of not less than \$10,000 for the best process of extracting gold from refractory ores—that is to say the process that will produce the largest amount of gold from a specified quantity of ore at a minimum cost and on such a scale as to be a commercial success."

Mr. B. T. A. Bell vigorously opposed the passing of this resolution, saying that the Institute should not, at its first meeting, commence by asking the Government to aid the mining industries of the country—and the resolution meant nothing else. He claimed that what the Government should do is to compel those holding mining lands to open them up and work them.

Prof. Coleman also opposed the resolution, stating that whoever did discover a better method of treating refractory ores would have his reward from the whole world provided he patented his method.

Mr. Conmee supported the motion, thinking that everything possible should be done to encourage the industry.

After a discussion lasting for about an hour the motion was lost.

It was decided to hold the next meeting in Toronto during Exhibition week, and Sept. 10th inst. was chosen. After a vote of thanks to the Chairman and acting Secretary and to Mr. Bell the meeting adjourned.

## A Deputation waits upon the Government.

On Wednesday afternoon, 11th inst., a deputation from the Institute was favoured with an interview with Sir Oliver Mowat and the Hon. A. S. Hardy. There were about twenty present. Mr. D. F. Burk and Mr. J. M. Clarke explained the operation of the Provincial Companies' Act in so far as it related to mining companies, and urged that an Act should be passed which would permit mining companies to issue shares at a discount. Mr. Burke calling attention to the beneficial mining companies legislation existing in several of the States. Mr. B. T. A. Bell directed attention to the value of diamond drilling as a means of determining the value and extent of mineral deposits, urging that the Government might with advantage in the Province, expend an appropriation of a few thousand dollars in the acquisition of a drill, and in the employment of an expert operator.

The establishment of a Metallurgical Works in connection with the School of Mines at Kingston, would also be of great service, not only to the students but to the mineral operators, many of whom had been compelled for lack of such works to ship carload lots of ores for treatment to other countries. He concluded by citing a number of figures, showing the appropriations made by other countries to aid the development of mining.

## Notes on Coal-Getting by Machinery.

By T. H. WORSWORTHY.

The increasing demand for large coal (even at a higher price) in preference to small coal; the fact that the production of coal per man employed is decreasing; the exhaustion of many of the thicker seams and consequent opening out of thinner ones; the working of seams at greater depths and increased temperatures; all tend to the substitution of machinery for hand labor.

A large number of hoisting machines have been constructed, amongst which may be mentioned the Frith pack machine; the Riggs and Meiklejohn, the Winstanley, and the Gillet and Coppley-side or wheel machines; the Hlower and Blackburn rotary bar machine; the Ingersoll sargent percussive machine; and the Jeffrey machine. These machines, with the exception of the last named, have been in use in this country for many years, and the general principles and adaptations are familiar to most mining engineers. The Jeffrey machine has been in successful use in recent years in the United States of America. It consists of a cutter-bar, 3 to 3½ ft. long, mounted on a shaft of a steel sliding frame, on the opposite end of which is fixed the electric motor or compressed air engine (the machines being adapted for either). This frame slides inside a stationary or built of two channels; the frames being connected by a rack and pinion gear. The cutter-bar is revolved by chain gearing, and is at the same time advanced by the rack and pinion into the coal, making a cut 3 to 3½ ft. wide, 5 to 6 ft. under, and one inch high. The time occupied in each case for each cut is said to be from 3 to 6 minutes.

It is not intended in this paper to enter into a comparison of the various machines, and they may be economical in one seam with a good roof and other favorable natural conditions may be both costly and dangerous under other circumstances. The paper is simply the description of the application of a machine to a particular seam, together with a statement of facts connected therewith, which it is hoped will be of some value to members who may contemplate the introduction of coal-cutting machinery.

The Middleton main or silkstone seam at Messrs. Pope & Pearson's collieries, Altofts, lies at a depth of 960 ft. from the surface. This seam has been worked at these collieries for upwards of thirty years at a depth of 1,260 ft. up to a large fault. The method of working at the lower level is by longwall with pack gates, the line of face being half end and bord. The reason for this is the presence of certain slips which run almost parallel to the bordline of the coal and extend into the overlying strata. The seam is practically level, although there are occasional undulations. The total thickness of merchantable coal is about 3 ft. 10 in., and consists of 10 in. of top hard coal and 2 ft. of gas coal, underlying which is about 10 in. of inferior coal and dirt (whitestones) containing a large quantity of iron pyrites.

On proving the seam on the higher side of the fault, it was found to be comparatively free from the above mentioned slips. The absence of these slips and a consideration of the nature of the roof and floor, the depth from the surface, etc., led to the adoption of the system of working from which will be seen that the line of face is plumb end. The main-endings are driven in pairs, 7½ and 7 feet wide respectively, with 1,950 feet between each pair. The main bords (each 9 feet wide) are driven in pairs, 1,650 ft. apart. The endings are all 7 feet wide and driven 132 ft. apart, and about 675 ft. along the covering boards. Each working face is about 1,710 ft. long, leaving a coal-pillar about 120 ft. thick next to the main endings.

When this seam was opened out, an attempt was made to hole by hand, but the cost of working was high. The hoing is now cut by machinery in the whitestones immediately below the good coal, the remaining portion of the inferior coal and dirt being removed after the good coal is got.

*Description of the Coal Cutting Machine*—The coal cutting machines are made by the Yorkshire Engine Co. (see Trans. Inst., Vol. 1, page 138, plate III). The first machine supplied was made from an old pattern, and undercut to a depth of 3 to 3½ feet, with a height of 3½ inches. This cut did not give sufficient leverage to break off the coal, besides which, to allow for a curve round the props had to be cut in the coal. Mr. Garforth then suggested that a wheel should be added to undercut to a depth of 4 to 4½ feet. This was then tried with a cut 3½ inches in height, and it was found that the coal often settled down on to the dirt before it could be filled out, thus entailing a considerable amount of extra work. The height of the cut was consequently increased to 4½ inches. Experience has proved that the improved machines work more efficiently at a greater height of cut, as there is more room for the wheel. The cutting wheel is 68 inches in diameter, and undercuts to a depth of 4 to 4½ feet, with a cut 4½ inches high, which, it is believed, is the greatest depth and height which has yet been done by a disc machine. The cutter wheel is carried by a strong cast steel triangular shaped bracket with phosphor bronze bearings. This is attached by T headed bolts and set screws to a strong cast steel frame carried on three adjustable wheels, two being placed in front of the machine and one behind. On this frame are fixed the engines, second motion shaft and feed drum. There are two cylinders, each 9 inches in diameter and 9 inches stroke, fitted with reversing gear. The second motion shaft is driven by wheel gearing in the reduced

proportion of 3 to 1. A small bevel wheel on the end of this shaft is geared into a rack near the periphery of the cutting wheel, the entire being in the proportion of 8 to 1. The engines thus make 24 revolutions to 1 of the cutting wheel. The cutters are fixed into pockets on the periphery of the wheel, and are each held in position by a pin and set screw. Three sizes of cutters are used, one single and two double, the latter being 3 and 4½ inches wide respectively.

As a result of a deeper cut, the number of shots used to detach the coal has been reduced about one-half; the breaks are further apart, thus allowing the props to be set between them and the face, and this, together with the fact that a greater weight of coal is undercut for each time the machine is removed, has considerably reduced the cost. The machine is drawn along the face by means of a steel rope passing round a pulley block several feet in advance, and attached at one end to the bridle in front of the machine, the other end being wound round a small drum which is actuated by ratchet gear worked by a small crank on the end of the crank shaft. By using two pawls and having three points of attachment for the connecting rod, the feed can be regulated ¼ tooth to 2 teeth per revolution of the engine.

The road for the machine consists of three pairs of flat bottomed rails each 15 feet long, weighing 28 pounds per yard, laid on special sleepers and spragged against the props. The joint sleeper was made in the colliery shops and is the best which has yet been tried, the rail ends sliding into a small chair and being held in position by a pin. It will be noticed that there are 4 pin holes in each end of the sleep rail, and the other ends of the rails are used, the road may be laid on a slight curve, which is of considerable advantage in straightening the road, should it by accident be moved out of line. The pulley block is attached by a hook to a D-link riveted to a 28 lbs. rail, which is set as a prop, at an angle of about 20 degrees from the vertical.

The difficulty was at first experienced owing to the cutting wheel dragging, but this was overcome by balancing the machine, the gear side of the machine being kept 1 inch higher at the back and the front end being ½ inch higher at the face than the front gear side wheel.

The machine is worked by two workmen, one in front to set any necessary timber and lay the road, the other, who in a change of the machine, takes up the rails, clears away the debris from the machine and puts in the props. In addition to these two workmen there is an official, Mr. W. Bayton, who superintends the machines and work connected therewith, to whose exertions the success of the working of the coal cutting machines in this seam is largely due.

The rails may be passed forward under the machine whilst it is in motion, but it is found advantageous to stop the engine when this is being done, as it gives an opportunity of observing the road, which is of a brittle nature, and the weight comes on suddenly.

With two men and under favorable conditions of roof, etc., the machine will cut a length of 180 feet in one shift of 4 hours, but an extra man is sent to assist in removing the debris, the length can be cut in the average for some time past, including removals of the machine and taking off pipes, is 135 feet per shift of 8 hours.

On reaching the end of the face the wheel is detached and loaded on a special trolley, the machine being placed on another. They can then be taken along the ordinary road to the other end of the face. By using the small drum on the machine, and a winding in loading-up the machine, two men can load, take it 3,000 feet and get it ready for work in about 6 hours.

The coal-cutting machine is worked by compressed air. The compressors placed on the surface are on the wet principle, and consist of two air cylinders 20½ inches in diameter, with water towers placed behind the steam cylinders, which are 24 inches in diameter and 5½ feet stroke. The air pressure at the surface is 45 to 50 lbs. per square inch. The pressure at the machines varies from 40 to 50 lbs. per square inch. The air compressing engines work continuously for haulage purposes during the morning shift, and for working the pumping engines and coal-cutting machines during the afternoon and night.

The compressors are taken down the pit and along roads through 5,700 feet of 8 inches, and 2,600 feet of 6 inch pipes, and 4 inches pipes are used along the main-roads. A receiver is placed about the centre of each board. Wrought iron pipes are laid up every alternate ending, 2½ inches pipes being used for one-third of the length, and 2 inches pipes for the remaining distance, so that the coal-cutting machine is sometimes worked at a distance of 1,000 feet from the surface. Flexible hose-pipes (5 ply) is used from the end of the 2 inches pipe to the coal cutting machine. Valves and taps are placed at various points to reduce leakage.

**Filling out the Coal.**—After the coal is under-cut, it has been the custom to employ workmen to remove the small coal made by the machine, and throw it into the goaf. Two men are employed on each side of each ending, to get down and fill the coal, to get up and pack the dirt and the timbering.

With the exception of the first fall after a heavy weight the greater part of the coal can usually be got down with bars and wedges. If this is not possible, it is detached by under powder. Where shots are necessary, the holes are put in by machine, the diameter being 38 lbs., the maximum length being, 6 feet. The time occupied in setting the machine and drilling a hole 4½ feet deep is about 7 minutes.

By the increased depth of cut the number of shots has been reduced in a face 1,710 feet long from 30 to 12 per

day. It is hoped by still further increasing the depth of cut to 5 feet to entirely dispense with blasting. A machine with a cutting-wheel, 6 feet 1 inch in diameter, designed from the experience gained in this seam, has recently been started with this object, and the results will be communicated to the members at a later meeting.

The best results are obtained when the holing is done as early as possible after the last fall has been removed, as this relieves the pressure on the face of the coal, and by getting the full advantage of the weight the main breaks are regularly formed near the back of the huling.

**Timbering and Packing.**—Packs are built 9 ft. wide, with wastes between 24 ft. wide. Care is taken that these packs are well built and tight up to the roof. Two chocks are placed in each waste and at each gate end, and are moved forward alternately, thus always keeping one on each side of the main break.

Props are set 4 ft. apart and 4½ ft. between the rows, there being always two rows. Bars are set from the props into the coal 8 ft. apart or oftener if required.

**Con'tinon.**—The advantages obtained by the use of the coal-cutting machine will vary in different seams, one amongst others being the reduction in the number of men employed. In this case it was found that 120 men could do the same amount of work as that done by 175 men working by the old method.

#### Notes on Blasting in Coal Mines.

By H. H. DODD, F.R.S.E.

With the enormous strides made of recent years in scientific inventions has come, at the same time, an outcry for the safer working of all branches of industry. The voice of the public has found expression in various legislative enactments, which it would be superfluous to mention in this paper as it is confined more particularly to blasting in coal mines.

With the greater depths at which some pits are now worked the dangers of explosion increase, and most modern appliances, such as safety-lamps, ventilating fans, safety explosives or contrivances for rendering them safe, have been introduced in order to minimize these risks. Up to a certain point it was supposed that the danger of explosions arose solely from fire damp, but for many years some mining engineers have recognized that the mixture of coal dust with fire-damp was responsible for the extension and violent destructive effects of some great colliery explosions. In more recent years the theory has been advanced that coal dust alone, without any mixture of fire-damp, is capable of causing a most disastrous explosion.

One of the greatest exponents of this theory is Mr. Henry Hall, H. M. Inspector of Mines, who for the past two years has been carrying out experiments on a large scale, in a disused shaft. The results of these experiments, so far as they have yet been published, seem to prove that the flame produced by a blown-out gunpowder shot may cause an explosion of coal dust in the entire absence of fire-damp. Many of the reports of the Commission on Explosions from Coal Dust in Mines have been collected information, and their final report, when published, cannot fail to throw much new light on this most important subject. The attention of practical mining men having been called to a danger not fully recognized hitherto, a number of methods have been proposed for rendering the dust less dangerous by watering it down.

As blasting is essential for many of the great explosives, it will be well to consider some of the types of explosives used for this purpose.

Chief amongst these comes, of course, gunpowder, both in the loose and compressed form. As an explosive for getting coal, gunpowder will still hold its own for efficiency against high explosives, but the great dangers arising from its use are being gradually appreciated, and H. M. Inspectors of Mines, in their last annual reports, almost unanimously agree that the time has come for the absolute prohibition of the use, in fiery and dusty mines, of gunpowder and dangerous dynamic compound, especially as there are now in the market other explosives which are relatively very much safer, more particularly when detonated by a fuse.

In France the mining authorities are more advanced on that subject than in this country, inasmuch as their Ministry of Public Works issued a decree dated August 1st, 1890 (see Trans. Fed. Inst., vol. II, Appendix, page 161), prohibiting the use of blasting powder in any fiery mine or in any dusty mine whose dusts are inflammable. The assigned reason for this being that—

In consequence of the experiments carried out under the superintendence of the Explosive Substances Commission it has been found possible to procure for use in mines, explosives which, although not capable of giving absolute security which one can hardly hope to obtain from these materials, permit the attainment of a degree of safety which was hitherto deemed unapproachable. (*Ibid.*, page 159.)

Dynamic, gelignite and other forms of gelatine explosives, when used here, are as dangerous in the case of a blown-out shot as gunpowder, hence various contrivances have been suggested for reducing the temperature and quenching the flame given off at the moment of detonation. Chief amongst these contrivances is the Settle water cartage, for this has been found to be comparatively safe, but its main defect is that to insure safety two separate elements are necessary, viz., the explosive and the bag containing the water. It can be easily understood that without the greatest care is taken the

element of safety may be wanting, at the time the charge is fired; either the water has been omitted entirely, as happened in the case in the explosion which took place at Apedale colliery on April 2nd, 1891, whereby ten lives were lost or it may have leaked away because the water lag was burst or pierced while charging. Besides the above-named defects there is the necessity for drilling extra large holes and carrying a pail of water to fill the bags.

We now come to the more modern explosives: these are known as dual explosives, having nitrate of ammonium for their base. The decree of the French Minister of Public Works, previously referred to, permits the use of four different classes of mixture attaining "to a degree of safety which was hitherto deemed unapproachable."

The first, second and third mixtures are respectively dynamic No. 1, blasting gelatine, and gun-cotton, each mixed with nitrate of ammonium, whilst the fourth is a mixture of dinitro-benzole and nitrate of ammonium. (*Ibid.*, page 160.)

As regards the first named mixtures the Home Office authorities refuse to license explosives of this kind, and report thereon as follows:—

It will be noticed that in the addition of various ammonium salts to dinitro-benzole has been mentioned, the addition of ammonium salt, other than the carbonate, to explosives containing gun-cotton or nitro-glycerine, has always been reported against. The reason is this: all ammonium salts, especially when exposed alternately to moist and dry air at slightly elevated temperatures, lose traces of ammonia and become acid. Now, nitro-compounds being highly sensitive to acids, the presence of traces of acid, and under such circumstances show no tendency to spontaneous decomposition which might lead to ignition or explosion. Nitro compounds like gun-cotton and nitro-glycerine (more strictly speaking, nitric ethers), on the other hand, are seriously affected by traces even of acids, especially strong mineral acids, and decomposition once started goes on almost invariably to total decomposition, which is either in the form of ignition or explosion. Hence ammonium salts exert no dangerous action on true nitro compounds, but may fatally affect the stability of nitric ethers, like gun-cotton and nitro-glycerine. (See Report of H. M. Inspectors of Explosives, 1890, page 19.)

The above extract, although bearing purely on the chemical aspect of the mixtures here referred to, is interesting inasmuch as it shows that the presence of ammonium salts of dinitro-benzole and similar compounds with nitrate of ammonium, available for producing an authorized safety explosive of this class in the United Kingdom.

Before proceeding, the author would like to name certain other regulations in the French decree, which have an important bearing on the use of safety explosives.

The workmen employed in the use of explosives are other than detonating explosives complying with the following conditions: 1st. The products of their detonation should not contain any combustible matter, such as hydrogen, carbon monoxide, solid carbon, etc. 2nd. Their temperature of detonation . . . should not exceed 1,900 degs. C. for explosives used in stonework, not over 1,500 degs. C. for those employed in coal getting.

The stemming of the explosive should be carefully made with plastic matter, so as to avoid blown-out shots; the length should not be less than 8 inches for the first 1,543 grains of charge, with the addition of 2 inches for each 1,543 grains additional, and should at all times exceed 20 inches.

The detonation of the cartridge should be caused by a detonator strong enough to ensure the detonation of the explosive even when unconfined. (See Trans. Fed. Inst., vol. II, Appendix, page 162.)

The author will now consider a safety explosive of the fourth type officially recommended in France, which, as explained before, consists of a mixture of dinitro-benzole and nitrate of ammonium, and is the only one of the four types recommended which can at present be legally manufactured in the United Kingdom. As an example of this type, the author will describe roborite for the following reasons: (a) because it was the first of this type of explosive manufactured in England, and is now very extensively used, and (b) because this explosive has been the subject of several scientific and impartial investigations, and its nature is now known about its properties than of any similar explosive.

Roborite was invented by Dr. Carl Roth, of Berlin, in 1886, and was patented and its use authorized by the Home Office in this country in 1887. A factory was erected for the manufacture of the explosive in the same year, was fully licensed by the Home Office in May, 1888, and started the manufacture and sale of roborite at once. Roborite consists of an intimate mixture of chloro-dinitro-benzole and nitrate of ammonium. The chlorine is intended as an additional flame quenching gas. The explosive is put into waterproof cartridges to suit all requirements, and the sizes range from ¾ to 1¼ inches in diameter, and weights vary from 1 to 16 ounces.

As might be supposed, the introduction of a new explosive (although mining and the public had been long clamouring for a safer explosive than powder or dynamite), was not all that was required to ensure its success. Colliery managers before introducing it into their mines put it to many severe tests, and an apparatus was erected near Wigan to produce the effect of a blown out shot into an artificial mixture of fire damp. The results of these tests are recorded in a paper by Mr. Jas. Hillyard, see Trans. Manchester Coal. Soc., 1889, vol. xx., page 92). These tests were made at night, and seven shots of roborite tamped with fired to 7 inches of clay, and sometimes coal dust, were fired into the fire damp without igniting it. In looking through the details of

these experiments, such remarks as the following are appended to each test:—

Gas not ignited; no flame or spark seen; gave a light but no flame, etc. The author would call the particular attention of the members to the latter remark, as some experiments with roburite were made at the Bent colliery before a committee of the Mining Institute of Scotland in 1888 (see Trans. Min. Inst. Scotland, vol. x., page 132), and a blown-out shot was purposely produced when a light was seen. Whereas experiments have been made when fire damp was known to be present, and a light was seen, but was not followed by an explosion of the fire-damp, it seems to the author that the light is not due to a true flame, but to the reflection of a halo of light formed at the moment the detonating wave is started, and that this is incapable of igniting an explosive mixture of gases. That this is true may be proved by taking a cartridge one-half filled with gunpowder and the other half filled with roburite placed directly on the top. On suspending the cartridge and detonating the roburite, the gunpowder does not become ignited, but is scattered about by the force of the explosion.

We have seen from the extracts already quoted from the French decree that the conditions specified for a safety explosive are that the calculated temperature of explosion must be below a certain temperature. From this it would appear that even although a flame should be seen, if such flame were below the given temperature, still no ignition of fire damp would follow. Another point, too, in the French report is that the duration of the temperature has an important bearing on the subject, and even although hot enough to ignite gas, would not do so if not long enough in contact with it. The writer has been told that it is possible to ignite fire damp with heated gases which give no visible appearance of heat.

Much has been said about the fumes of roburite, and at several places the workmen raised objections to the use of the explosive on that account, although from more recent experience there can be no doubt that prejudice in favour of blasting powder was at the bottom of these complaints.

The question of fumes has been investigated by two separate scientific committees—the first in Lancashire in 1889, the members of this committee being Dr. N. Hannah, Dr. C. J. Mouncey, and Prof. Harold Dixon, of Owens College, Manchester; (see Trans. Manchester Geol. Soc., 1889, vol. XX., page 329) the second committee, appointed in 1889, by the Durham Coal Owners' and Miners' Associations, with Mr. T. Bell, H.M., Inspector of Mines, as chairman, and Prof. Bedson and Drs. Drummond and Hume as professional advisers. (See Trans. Fed. Inst., vol. II., page 368). Both of these committees arrived at practically the same conclusions, viz.: that the fumes of roburite were not more injurious to health than those of gun-powder. The report of the Durham committee, moreover, called attention to the fact that the fuze was responsible for some of the deleterious fumes, and many members will no doubt have noticed the difference in the quantity of smoke between a roburite shot fired by fuze, and one fired by electricity.

As to the efficiency of roburite in mines, it may be stated, that by the kind permission of the owners and managers, trials have been made of roburite in about fifteen of the coal mines in Lanarkshire, as well as at the shale mines at Broxburn and Pumphreston, in West Lothian, and in all cases with marked success.

The question of safe method for igniting the detonator in firing a safety explosive is a very important matter. It appears on the face of it absurd to fire a safety explosive by fuze, which is practically the same as a naked light, as the spit of the fuze will easily ignite gas, and indeed has been known to do so on many occasions, and moreover, the tape fuze gives off noxious fumes.

The Bickford shot ignitors were introduced to make firing by fuze safer, as the first spit of the fuze takes place in the tin cap which contains the igniting composition. Still, even supposing that this contrivance is otherwise efficient, is there no risk of the smouldering fuze being projected when the shot is fired? The writer believes it to be a fact that this does take place, and that the fuze may brighten up in its flight and be a source of danger.

Another method suggested in Austria, but not to the author's knowledge used in the United Kingdom, is the Lauer frictional detonator. By this method of firing, an action somewhat similar to that used in the Christmas cracker produces the explosion, only the operator stands at a distance and pulls a string. (See Trans. Fed. Inst., vol. II. Appendix page 153).

Firing the charges by electricity is, the author thinks, admitted on all hands to be the safest, and besides the other advantages it possesses, a very important one is that shots cannot hang fire as is sometimes the case when using fuze, and there is less smoke.

There are two distinct types of electric fuses used to produce an electric detonator, viz., high and low tension. In the former case the priming composition is ignited by a spark, in the latter the heating of a hair-like platinum bridge by the resistance offered to the passage of the electric current ignites the composition which fires the detonator. The high-tension fuze is best known to mining engineers, but the low-tension fuze is now coming into more extended use. (Ibid., vol. ii. p. 553). Some authorities advocate the latter, because it can be tested by galvanometer, whereas the high-tension fuze cannot. This facility of testing would certainly be of great advantage in firing a large blast, where a number of charges had to be fired simultaneously, but in colliery work where only single shots are fired as a rule, the author thinks that either class of fuze is equally good.

In order to secure the best results from electric blasting too much attention cannot be paid to the electric appli-

ances. The exploders should have a good surplus of power, so as to minimize the risks of a miss-shot, and should be kept in good condition. The cable should also be good and, in case of a miss-shot, should be overhauled to see whether either of the wires has been broken or short circuited. In making the connections the wires should be clean, so as to obtain good metallic contact, and should be twisted firmly together. If proper care be taken, the writer believes that there would be fewer failing shots with electricity than with fuze.

All high or detonating explosives are fired by a detonator, some explosives are more sensitive than others, hence they require different powers of detonator to fire them efficiently. It is a waste of energy to use a detonator very much stronger than is necessary to start the detonation of the explosive, but it is far better to err on this side than to attempt to use with an inert explosive a detonator intended for a sensitive explosive. Thus, while a roburite detonator could be used to fire dynamite efficiently, a dynamite detonator would probably only scatter the roburite without detonating it. The French Government recognized the importance of this point in the regulations issued for the use of safety explosives in lieu of blasting powder when they said:—

"The detonation of the cartridge should be caused by a detonator strong enough to assure the detonation of the explosive, even when unconfined." (See Trans. Fed. Inst., vol. ii., Appendix, p. 162.)

The author desires to lay special stress upon this matter as to his knowledge many complaints as to miss-fires of some of the more inert explosives have certainly been due to the use of too weak detonators.

## Iron Exhibits.

### Fine Display of Canadian Iron Ores and Manufactures in the House of Commons Ottawa.

During the recent budget speech of the Hon. G. E. Foster, Minister of Finance, and the subsequent debate on the new Canadian tariff, the REVIEW, acting for the various companies interested, had a fine display of the products of our iron mines and the various iron and steel establishments of the country. The exhibit, which was tastefully displayed in the main entrance to the House of Commons, was a great attraction to the crowds of people who daily and nightly thronged the House. Our engraving shows a section of the exhibit. The following is a list of the exhibits which were on view:—

*Canadian Iron Furnace Co., Ltd.*—(a) Bog ore, heavy vein; (b) bog ore, lumpy; (c) bog ore, fine shell; (d) bog ore, fine gravelly; (e) hard ore, St. Jerome; (f) lake ore, heavy sheets; (g) lake ore, cakes; (h) lake ore, lumps; (i) lake ore, fine, deep dredging; (j) lake ore, shore ore.

*Montreal Car Wheel Co.*—Sections of chilled car wheels made from "C.I.F." Three Rivers charcoal iron.

*New Glasgow Iron, Coal and Railway Co., Ltd.*—(a) Iron ore, brown hematite, from East river mines; (b) red hematite; (c) East river specular; (d) Guysborough county specular; (e) Brown limonite; (f) limestone; (g) Iron ore, brown hematite, from East river mines; (h) Manganese; (i) unwashed coal; (j) washed coal; (k) coke.

*Nova Scotia Steel and Forge Co., Ltd.*—Large collection of samples of Canadian steel made from Canadian ore and fuel by Siemens-Martin open hearth, including steel bars, shapes, angles, shafting, etc.

*Londonderry Iron Co., Ltd.*—Case of samples of coke pig iron (Siemen's brand) and fine collections of ores and fluxes.

*Cockshutt Plow Co., Bradford.*—Fine specimen of plow manufactured from Canadian steel.

## Mica Deposits of the Ottawa District.

By TR. R. W. ELLS, OTTAWA.\*

*Occurrence of Apatite and Mica.*—It has been already pointed out in a previous paper that the deposits of apatite are confined entirely to the pyroxene dikes of this system, and that the mineral occurs for the most part near the contact of these dykes with the gneiss or near the intersection of cross-dykes of intrusive dolerite or felspar. The occurrence of mica in these rocks presents almost identically similar conditions to the apatite as regards its presence in workable quantity, but differs in this respect, that while the apatite is found exclusively in pyroxenic rocks, the mica is often associated with other kinds of intrusives. It is, however, more particularly found in two varieties, namely, the pyroxene which varies greatly in color and hardness, and in a coarse admixture of clear quartz and grayish felspar, which is generally styled a pegmatite, and which contains also crystals of tourmaline, garnet, etcetera. This quartz-felspar rock differs, however, very greatly from the usual varieties of pegmatite found in the Laurentian, which is usually very much finer-grained, and occurs generally as veins intersecting the gneiss as one approaches the great masses of anorthosite or gabbro. The quartz-felspar those of pyroxene, frequently cut the gneiss along the line of strike of dikes, like the latter, but its intrusive character is clearly evidenced in most cases by the sending off of spurs into the mass of the gneiss in contact, as well as

by the fact that it frequently cuts directly across the gneiss and intersects the pyroxene as well, thus showing it to be a later intrusion. Inclusions of the grayish or reddish gneiss which is penetrated by these rock are also frequently found caught in the mass, both of the pyroxene and felspar, and furnish further evidence of the intrusive character of these rocks. In some places the presence of three distinctly intrusive dykes is recognized in the same opening, the oldest being the pyroxene, the second cutting the pyroxene, is a quartz-felspar, and the third is a black trappean rock.

It has been stated by some writers that the apatite and mica occur in the Laurentian limestone, as well as in the gneiss and pyroxene. This view has doubtless arisen from an imperfect study of both the limestones and pyroxene, the latter in the earlier stage of the investigations on these rocks being regarded as a peculiar variety of the sedimentary gneiss formation, as already pointed out, while concerning the former it is found that in many of the pyroxene dykes, more particularly near their contact with the grayish gneiss, an irregular development of calcite, generally of pink color, occurs, which by the miners is styled a limestone, and has thence been confounded with the distinctly different limestone formation which forms the upper portion of the Laurentian system. In no case can this calcite, in which very frequently the mica crystals, as well as crystals of apatite, are disseminated, be regarded as a member of the sedimentary or stratified Laurentian series, but is always found as an irregular, generally pockety, mass in the intrusive pyroxene.

*Mica-Apatite Horizon.*—The horizon of these deposits, both of mica and apatite, can now be clearly defined. They are for the most part confined to the series of gneisses which constitute the upper portion of the Laurentian silicious rocks and which underlie the limestone proper. These gneisses are generally of some shade of grey, with reddish grey, reddish and hornblende bands, some of which are garnetiferous, and nearly all of which contain a large percentage of silica in the form of quartz. These beds, as already pointed out, graduate upward by regular passage through the interstratification of calcareous layers into the massive crystalline limestone formation. In the Buckingham and Templeton areas apatite and mica are rarely found in dikes cutting calcareous strata, but in the Gatineau area several localities are known where large dykes of pyroxene in limestone carry mica in workable quantity.

Mica deposits generally occur in the form of crystals, some of which reach an enormous size, instances being lately reported of single crystals measuring nearly eight feet across the face. These crystals sometimes occur in the pyroxene in pockety masses distinct from each other, or in somewhat irregular deposits near the contact of the enclosing pyroxene and the gneiss adjacent or as scattered crystals through the mass of the dike itself, but generally near the contact. In many cases of pyroxene dikes where the mica occurs as a contact deposit near the gneiss it is found associated with masses of pink calcite, some of which are but of small extent, while others have a thickness of several feet and are traceable for some yards. The mica found in the calcite is, as a rule, in well formed crystals disseminated through the mass and often associated with well terminated crystals of apatite. In some cases the latter penetrate the former, while frequently inclusions of calcite or apatite are found in the centre of the mica crystal. Of the mica found in the mass of the pyroxene it may be said that the crystalline structure is rarely perfect.

*Mode of Occurrence of the Micas.*—From recent observations it may be stated that the merchantable mica of the district occur under six principal conditions, thus:—

1. In pyroxene intrusive rocks which either cut directly across the strike of greyish or other colored gneisses or are intruded along the line of stratification. Some of these deposits have been worked downward along the contact with the gneiss, where the mica is most generally found, for 250 feet, as at the Lake Girard mine, and irregular masses of pink calcite are abundant. In certain places apatite crystals occur associated with the mica, but at other times these are apparently wanting. As in the case of apatite deposits, mica occurring in this condition would apparently be found at almost any workable depth.

2. In pyroxene rocks near the contact of cross-dikes of diorite or felspar, the action of which on the pyroxene has led to the formation of both mica and apatite. Numerous instances of this mode of occurrence are found, both in the mines of apatite and mica, the deposits of the latter in certain areas being quite extensive and the crystals of large size.

3. In pyroxene rock itself, distinct from the contact with the gneiss. In these cases the mica crystals, often of large size, but frequently crushed or broken, apparently follow certain lines of faults or fracture. Some of these deposits can be traced for several yards, but for the most part are pockety. Some of these pyroxene masses are very extensive, as in the case of the Cascade mine on the Gatineau river and elsewhere in the vicinity. In these cases calcite is rarely seen and apatite is almost entirely absent. When cut by cross-dikes conditions for the occurrence of mica or apatite should be very favorable.

4. Dikes of pyroxene, often large, cutting limestone through which subsequent dikes of diorite or felspar have intruded, as in Hincks township. The crystals occurring in the pyroxene near to the felspar dikes are often of large size and of dark color, resembling in this respect a biotite mica.

The mica found under the conditions stated above in one, two, three and four is all amber-colored and of the variety known as phlogopite or magnesia mica.

\* Paper read before the Geological Society of America.

† Canadian Mining Review, Ottawa, March, 1893.





at 59 degrees Fahr. To increase the visibility of the caps chloride of copper may be dissolved in the alcohol with a little hydrochloric acid to maintain it in solution. The proportion recommended is about 17 drops of a saturated solution of crystallized chloride of copper in concentrated hydrochloric acid per pint of alcohol; this gives the alcohol flame a green tinge. In this way caps may be seen from 2 to 25 per cent. of fire-damp. They are easily seen with a 5 cent. or more.

The proper methods of regulating the alcohol flame and the appearance of the caps are minutely described.

### Diamond Drilling in South Africa.

Mr. R. A. S. Redmayne, (*Journal British Society of Mining Students*), contributes a readable paper containing much valuable matter on this subject. The price of boring by diamond drills is, to a great extent, dependent on the price of carbides. In 1889 Klaberly bore cost Natal 7s. 10s. per carat, in July 1890, they had risen to 60s. per carat. During the year 1891-2, in Natal, four of these drills (three hand and one steam drill) bored 5,621 feet, (the steam drill bored 1,942 feet 2 inches of this depth at a cost of £773 6s. 5d., or 7s. 11½d. per foot), at a cost of 5s. 6d. per foot, which amount would be slightly increased, if an allowance was made for the percentage representing the usual depression per foot. This cost compares favourably with that of boring in other parts of the world. In one of the Australian Colonies, the cost of boring was (as per the annual reports of the Mines Department): In 1884, 11 drills bored 9,864 feet at a cost of 12s. 10d. per ft.; in 1885, 12 drills bored 11,325 feet at a cost 19s. 1d. per ft.; in 1886, 10 drills bored 6,539 feet at a cost of 14s. 11½d. per ft.; in 1887, 5 drills bored 1,111 feet at a cost of 25s. 10d. per ft. The loss diamonds during the year 1890-91 (Mines Department of Natal) was only 43d. per foot, which is highly satisfactory when the large amount of diorite passed through is taken into consideration. A drilling in the Transvaal bored 3,744 feet. (2 steam or hand drilling) at a cost of 13s. 4d. per foot *in diamonds alone*, and a single hole bored by the same company cost £1 13s. 7d. per foot. The nature of the strata drilled through, however, was very different from that of the coal measures, being quartzites, hard quartz conglomerates, and hard sandstones; the conglomerates would prove especially destructive to the diamonds. During the year 1891-2 the Natal Mines Department bored a total depth of 6,171 ft. 1 in. at a cost of 5s. 2d. per foot of diamonds; this was, however, greater than in the previous year, amounting to 7d. per foot drilled.

**The Mining Press and Bret Harte.**—The February *Issue* contains an amusing sketch by Bret Harte of the reception of his first book from which we quote: A well-known mining weekly, which I here poetically veiled under the title of the *Red Dog Jay Hawk*, was first to swoop down upon the tunnel and prospecting quarry. At the contrary-end of the tunnel and contemplating criticism, it may be interesting to recall the direct style of the Californian "sixties." "The hogwash and 'purr' stuff laded out from the slop-bucket of Messrs. — & Co., of 'Frisco, by some long-earred Eastern apprentice, and called 'A Compilation of Californian Verse,' might be passed over, so far as criticism goes. A club in the hands of any able-bodied citizen of San Francisco, or a stevedore ticket to the Bay, cheerfully contributed from this office, would be sufficient. But when an unreported greenhorn dares to call his flapping mixture 'Californian,' it is an insult to the state that has produced the gifted 'Yellow Hammer,' whose lofty flights have from time to time dazzled our readers in the columns of the *Jay Hawk*. That this complaisant editorial jackass, browsing among the docks and shingles which he has served up in this volume, should make no allusion to California's greatest bard, is rather a confession of his idiocy than a slur upon the genius of our esteemed contributor. We doubt if a more feeble collection of drivel could have been made, even if taken exclusively from the editor's own verses, which we note he has by an equal editorial incompetency, left out of the volume." The *Western Hill Quartz Crusher* related the simple directness with more fancy. "We don't know why Messrs. — & Co. send us, under the title of 'Selections of Californian Poetry,' a quantity of slumgullion which really belongs to the slices of a placer mining camp, or the ditches of the rural districts. We have sometimes been compelled to run a lot of tailings through our stamps, but never of the green of the examples offered, which, if they should be, would average about 23½ cents per ton. We have, however, come across a single specimen of pure gold evidently overlooked by the serene ass who has compiled this volume. We copy it with pleasure, as it has already shone in the 'Poet's Corner' of the *Crusher* as the gifted effusion of the talented manager of the Excelsior Mill, otherwise known to our delighted readers as 'Outcrop.'"

**Nickel Steel Guns in Germany.** (*Eng. and Min. Journal*).—Two ¾-inch shells, each loaded with 6 oz. of picric acid, were placed, one in a gun of ordinary Krupp steel, the other in a gun of nickel steel 12 inches from the muzzle, and exploded. The muzzle of the ordinary steel gun was broken to a number of pieces, but the only effect on the nickel steel gun was a local enlargement of about ¼ inch in the bore.

## Placer Mining on the Fraser, B.C.

### Activity Fast Assuming Control in the Old Time Placer Camps.

M. H. Gibbs, a former Colorado miner but who for the past few years has been prospecting in the country which recognizes Spokane as its central city, has recently returned from Yale, B. C., where he spent the winter doing a little placer mining and picking up information. Mr. Gibbs says that the gold fever has struck our northern neighbors and there is more activity along the Fraser river and its tributaries than there has been since the "golden days of the Cariboo." The industry, however, has assumed a different form from that practiced in the early days when the rocker, pan and sluice constituted the method of gold saving, although there can still be seen at various points along the rivers, small squads of men panning, rocking, and sluicing; the returns are, however, small and the lots are one after another being deserted by these stalwart pioneers to give place to more modern devices.

**Dredging.**—For 500 miles, from Hope to Quesnel on the Fraser, the ground has been leased and is being worked or preparations are being made to work it. There are now in operation or building not less than a dozen dredging machines, owned by men of means who have leased large tracts of ground, or more properly speaking water, (for the dredges are all built on the centrifugal principle) with a view of working it this season and thereafter so long as it will pay.

Between Hope and Yale Messrs. Bell, McCaskell & Shehan have a dredge, the largest on the river, and a strongly constructed boat with a centrifugal pump to suck the Fraser river and its tributaries from the bed of the river which with the water, passes through a receptacle charged with quicksilver which catches the gold and allows the debris and other minerals to pass out. As is the case with all other dredges, nothing is attempted on the banks or above the water-line.

At Boston Bar, which is about 25 miles above Yale, another dredge is being worked. The principle is the same as the one below but the capacity is less.

At Kanaka Bar, 35 miles from Yale or about 10 miles above Boston Bar, another strong company is operating with a channel dredge. At Lyton and again near Ashcroft, dredges are working or in course of construction. What the cost of construction or of operation, the capacity or per centage of the output is, is not known. It is well known only to the operators themselves; it is to be presumed, however, that the results are satisfactory as several more barges are contemplated at other points along the Fraser.

**Hydraulics.**—There are several hydraulic companies working or preparing to begin on numerous tributaries of the Fraser. On the Lillooet, Bridge river, and Cayuse creeks, tributaries of the Fraser, where the Lonsdale company is putting in nine miles of iron pipe. There is considerable work also going on at Wilson creek and Willow river. The distances of these streams from railroad connections are: from Ashcroft to Quesnel, 185 miles; to Horseshoe creek, 150 miles; to Wilson creek, 285 miles; and to Willow river 300 miles. Although the distances named may not be quite correct they are nearly so.

Barkerville, at one time a live town where flour and bacon was worth almost its weight in gold, and the rendezvous and trading point of the miners of the entire Cariboo country, is assuming some of its former activity. This little frontier post is on the 53rd parallel, is on the Cariboo trail and on the route of the Cariboo railroad which leaves the Canadian Pacific at Ashcroft. The distance from Ashcroft by air line is in the neighborhood of 150 miles but the routes traveled are much longer. The distance from Vancouver is 200 miles farther than from Ashcroft.

Miners are going into the country already in limited numbers, and it is expected that there will be an increase in the near future. There are many of the smaller streams which empty into the upper Fraser, which have never been mined systematically. The seasons are somewhat shorter than along the lower river and in the days when no ground was worked unless it paid very high wages large tracts of good ground were entirely overlooked.

Eastern district which is immediately west of the Cariboo, extends westwardly to the Alaskan boundary line and the Pacific coast, has produced considerable gold but the greater portion of the territory embraced within its limits is entirely unexplored, and may or may not be rich in gold treasure. It is reasonable to suppose, however, that there is a large and rich gold field covering a greater or less portion of it, for so far as explored from the Cariboo side from the coast and from the south, together with the evidence of rich placers along the Yukon, some of the sources of which rise in this great unexplored territory, it can scarcely cease at the imaginary line of its boundary or at the limit of its explored district. In fact the recent surveys made by the Canadian Geological Engineers along the Yukon and MacKenzie rivers, and the fact that the gold was found at several points and in paying quantities. That prospecting in this far northern and isolated region, which is devoid of roads or trails, will be laborious and dangerous, will not deter the prospector but will add new zest to the task which he lays out for himself. The gold output in British Columbia no doubt will be greatly augmented during the next few years.

## CANADIAN COMPANIES.

**Bell's Asbestos Company, Limited.**—Dividend for year 1893, 5 per cent. Net profit, £4,683, exclusive of £3,048 brought forward. Only 1,731 left to carry to new year, so whole dividend not earned last year. Reserve fund £55,000, a mere book entry, as "goodwill," patents, etc., stand for £69,102, and no attempt is made to write this off. Company is owing £61,300 on mortgage debentures and its property in Southwark Street is mortgaged for £25,167. The financial position is thus precarious. A most meagre report accompanies the balance sheet.—*Investor's Review*.

**Marmora Mining and Milling Co. (Ltd.)**—Applying for Ontario charter. Authorized capital, \$24,000, in shares of \$10. Directors: John Parry, George E. Keith, James Murray, and Robert Rae. Head Office: Toronto. Operations to be carried on in the counties of Peterborough, Hastings, Addington, Frontenac, Lanark and Kennebec, Ont.

**Otterville Brick and Tile Manufacturing Co. (Ltd.)**—Incorporated 11th April, 1894. Capital, \$5,000, in shares of \$25. Directors, A. B. Moore, C. B. Purves, J. Wyatt, Samson Simley, T. J. Pennington and Robert Paxton, all of Otterville, Oxford County, Ontario.

**Ledyard Gold Mines (Ltd.)**—Capital, \$100,000, in shares of \$10.00. Head office: 56 Colborne Street, Toronto. Directors: T. D. Ledyard, T. H. Yeomans, Chas. Henderson, and E. D. Ledyard. Operations are being carried on in the township of Belmont, Ontario.

**Strathroy Petroleum Co. (Ltd.)**—Capital, \$90,000, in shares of \$100. Directors: G. A. McGillivray, W. B. Lindsay, Chas. Grist. Head office: Strathroy, Ontario. Operations to be carried on in the counties of Lambton and Middlesex and elsewhere in Ontario."

**Stevenson Gold and Platinum Hydraulic Mining Co. (Ltd.)**—Formed to acquire and work placer mining claims, etc. on the banks of Granite Creek, Yale district, B. C. Authorized capital, \$1,000,000, in shares of \$100. Directors: Robt. Stevenson, J. H. Thain, W. Lovitt Hogg. Head office: Vancouver, B. C.

**Canadian North-West Mining Co. (Ltd.)**—Registered 31st March, 94 under the Foreign Companies Act, B. C. Head office: Helena, Montana. Capital, \$2,000,000, in shares of \$5.00. Formed to operate mines in B. C.

**Bear Lake Consolidated Mining Co. (Ltd.)** is applying for charter, under the B. C. Companies Act, to acquire and work the Snowshoe mineral claim, situated in the Stocan mining district, West Kootenay division, British Columbia. Capital, \$500,000, in shares of \$5.00. Head office: Victoria. Directors: George Riley, Gustav Leiser, and Gordon Hunter.

## MINING NOTES.

(FROM OUR OWN CORRESPONDENTS.)

### Nova Scotia.

#### Caribou District.

The Dixon property has well under way the new mill and hoisting works now being erected by the management. It is to be regretted that the mill plant is not of the approved modern pattern, but it is being solidly built and will be a great advantage to the district.

The Burgess-Neilly group of mines will be outfitted this spring, and work pushed to bring them as rapidly as possible into the ranks of the producers.

#### Sherbrooke District.

The old mines at Goldenville remain very quiet, little or nothing is doing. During the winter an effort was made to sell some of the small holdings, but prices asked were too high to ensure sales.

At Cochrane Hill mines, which belong to the group of Burgess-Neilly mines, so-called, preparations are being made for the equipment of the property with a large plant for mining and milling work. A contract has been let to the Truro Foundry and Machine Co. for the erection of a 20-stamp mill of that company's best design, and the plans have been prepared. A power drilling plant has been purchased, and plans are ready for a hoisting and pumping gear.

**The Canadian Mining Manual, 1894.**—The fourth edition of this useful reference book has been issued.

**Stormont.**

At Country Harbor the Antigonish and Country Harbor properties are steadily pursuing the even tenor of their way, and prospects were never brighter.

At Isaac's Harbor the management of the Richardson Co. has nearly perfected extensive plans for the improvement of the plant now on the mine, and for an increase in the milling capacity.

At the Crow's Nest mine work is being prosecuted by the parties who have an option on the property, and developments are awaited with interest.

**Darrs Hill.**

Work at the Dufferin mine was practically suspended on the first of this month. Several experts and promoters have recently visited the mine, and rumor hath it that the property will soon change hands.

**Killag.**

The foreman reports all the headings of the Old Provincial Co. in good rock, and that there is now no question but that the lode worked is the "Stuart" lode so-called. This property is being opened up with a view to showing fully its resources and capabilities.

**Renfrew.**

The work done by the Pictou company in this district is creating considerable excitement. Rock taken from near the boundary of the Empress or North property has shown some remarkably fine specimens of coarse or nugget gold, and the company is pushing work on that section.

The Turnbull mill has been put in order and is now crushing quartz.

The Free Claim property remains idle.

**Montagu.**

This district remains quiet, but a good deal of fine work is doing.

Mr. W. R. Thomas has bought the plant of drills and air compressor ordered originally for the East Waverley Tunnel but never used there, and has introduced power drills in the stopes of the De Wolfe lode.

Mr. Thomas has also thoroughly re-timbered and systematized the work at the Symon-Kaye mine, formerly managed, in name, by Alfred Woodhouse. Under Mr. Thomas the mine has been made practically safe to work in, and a proper system of underground work introduced.

**Utilization of Peat in Iron Smelting.**—It has long been regarded as probable that the many acres of peat to be found on the moors at Dartmoor can be utilized in a manner that will make it available as a fuel for iron smelting purposes. The first attempt at this novel procedure was made some 2 years ago, when machinery was erected near Bridesdove by the Dartmoor Peat and Iron Smelting Company, Limited, which also acquired the right of working 2 square miles of peat deposit. Several difficulties, however, were found to exist in bringing the peat to the combustible condition which has been bespoken for it. Nothing daunted, however, the company has now erected a plant at Bridesdove in order to practically test an invention of Mr. J. D. Brunton, C.E., of London. In order to witness the new system in operation, the directors and others, including members of the press, were recently invited. From what was fully explained at the time, we learn that peat, when first removed, is practically full of moisture, but by Mr. Brunton's arrangement he proposes that the drying of this shall be by means of evaporation. The peat is first of all delivered by means of a revolving band into a hopper, from whence it is pressed through a perforated iron plate, by which the fibres are destroyed and entirely macerated, bringing the peat to a condition of soft mud or clay. By means of revolving bands this substance is then carried to moulding machines, where it is shaped into bricks, and afterwards delivered automatically into a drier, by which means the moisture is evaporated. During these processes, however, the bricks shrink in bulk so much as to lose something like six-sevenths of their weight, by which the fibres are broken, and when properly prepared, will be found superior to coal for the purpose of iron-smelting. A considerable quantity is now in course of manufacture for the purpose of forwarding it to Birmingham, where it will undergo severe tests in the blast furnaces. In the event of these experiments turning out a success, blast furnaces will be erected at Dartmoor, and the many thousands of tons of iron ore now being taken from the works in Cornwall and Devonshire will be smelted there, thus saving the present heavy costs in trans-shipment to the Midlands.

**The Destruction of Blast Furnace Linings.**—F. W. Lürmann, (*Stahl und Eisen*, vol. xii., pp. 336-338) discusses the question of the lining of blast furnaces. This lining is worn away owing to one or other of the following causes:—(1.) Actual wear produced by contact with the

descending charge; (2.) By the action of the constituents of the blast furnace gases, especially of cyanogen or of its salts; (3.) By the action of sodium chloride contained in the coke; (4.) By flaking owing to the deposition of carbon from carbonic anhydride, caused by the iron particles formed from the iron pyrites existing within the material forming the lining. The first of these only accounts to a slight extent for the wear actually observed, and although the action of the cyanogen or volatile alkaline cyanides is likely to account for a considerable portion of the destruction, yet this still requires experimental proof. The water used for cooling purposes takes up large quantities of cyanides from the walls of blast furnaces, and fused cyanides may even be occasionally observed to drop away from such walls. The third source of wear, the salt present in the coke, is undoubtedly an important cause. Coke-ovens are frequently rapidly destroyed by the salt present in the coal coked, the quantity of this salt having in one case, to which the author refers, reached as much as 48½ lbs. in the charge of six tons of coal. An examination of this coke recently charged into a blast furnace showed it to contain 0.062 per cent of sodium sulphate and 0.119 per cent. of sodium chloride, or for 100-tons of coke nearly 140 lbs. of the former and over 260 lbs. of the latter; and quantities such as these charged daily into a blast furnace would soon exert a marked destructive action on the lining. The fourth cause of wear is a most important one when, as is nearly always the case, the fire-resisting material used in the manufacture of the furnace lining contains iron sulphides. These lead to the formation of metallic iron, which in turn causes the deposition of carbon within the masonry, which then splits away and is destroyed. The author recommends the use of carbon bricks.

K. Sorge (*ibid*) questions whether the lining of blast furnaces should be of fire-resisting brick work. He concludes that this is not necessary, and that instead of such a mass of brickwork as is usually employed, a sufficiently strong iron casing well cooled with water is all that is really necessary.

**What is a Living Wage?**—Writing in the February number of the *National Review*, Mr. Hugh Bell discusses a couple of very pertinent questions. "What is a living wage?" he asks, and "Out of what fund it is to be paid?" With regard to the first, he says a living wage "is at least as much as is now paid, and as much more as by hook or by crook—by strike or by legislation—can be screwed out of a body of men who, it would seem, only require to be sufficiently pressed to be able to pay anything which may be demanded of them." In dealing with the second query, Mr. Bell gives a variety of figures connected with the iron trade in North Yorkshire, Eng., and utilizes them very effectively to show that capital can bear no further strain. In view of this fact, he is driven to the conclusion that higher wages will mean fewer men in employment, and that the laborers are sadly deluding themselves if they think the effects of competition can be avoided by legislation. For the rest, Mr. Bell's forecast is far from hopeful. "I foresee," he says, "a time of great suffering—with a very uncertain issue—both for those who are engaged in providing wages for the artisans of the country and for the artisans themselves."

**Effect of Flux upon Iron.**—In an address delivered before the Philadelphia Foundryman's Association on the fluxing of iron in cupolas, Dr. Edward Kirk stated that many of the lime stones and mineral substances employed as cupola fluxes contain more or less freely divided oxides, silicates, etc., in combination with earthy materials. The flux is often reduced in a cupola and its component parts separated and in minute quantities they alloy with the iron and injure its quality. The conjoined effect upon iron of these diffused oxides, silicates, etc., liberated in a cupola from their native elements in fluxes, is to prevent the metal running clean in the mold or making sharp round castings, and the tensile and transverse strength is frequently impaired by them. When the oxides, silicates, etc., are not separated in the cupola from their native elements, they do not impair the quality of the metal, nor do they improve it. The tendency of the cupola furnace is to clog and bridge over the tuyeres and concentrate the blast upon the iron through a small opening in the centre and injure its quality. By the free use of limestone we prevent this, bringing and keep the furnace working open and free we avoid injuring the iron in melting by the concentration of a strong blast upon it. The effect, therefore, of limestone in a cupola is not to improve the quality of iron but to prevent its deterioration in melting.

**Petrolia's Shipments for 2 Years.**

We give below the shipments of petroleum from Petrolia, Ont., for each month of the two past years and the totals for the same:

	Crude	Refd.	Crude	Crude	Refd.	Crude
	Equiv.	Equiv.	Equiv.	Equiv.	Equiv.	Equiv.
January.....	12,441	24,751	70,913	23,671	28,834	95,756
February.....	44,577	18,073	29,759	22,005	19,807	77,070
March.....	16,370	19,469	25,917	17,861	23,405	73,992
April.....	19,542	15,145	31,794	18,311	16,653	76,659
May.....	15,045	8,865	16,897	19,031	10,470	67,271
June.....	15,225	17,510	28,000	16,023	16,783	68,085
July.....	15,225	20,520	28,000	15,845	19,513	74,144
August.....	15,370	28,077	33,364	27,511	28,860	84,661
September.....	17,204	39,376	17,605	19,109	35,957	109,027
October.....	20,517	44,010	23,044	22,547	24,472	112,072
November.....	31,787	39,995	29,290	36,455	39,766	128,270
December.....	19,011	30,383	95,168	25,085	39,354	100,570
	290,409	308,910	2,007,771	244,763	275,572	7,066,155

**The Use of Fluor-Spar in the Metallurgy of Iron.**—Dr. Foehr (*Chemiker Zeitung*) discusses the possible use, on a large scale, in the future, of fluor-spar in the metallurgy of iron. Its use as a solvent and fuel-saving ingredient is most marked, and in the manufacture of ferro-silicon its use is almost a necessity. Similarly, in the manufacture of ferro-manganese and spiegeleisen, it tends greatly to increase the ease of the reduction.

**PORTABLE DIAMOND DRILL FOR SALE.**

FOR SALE—One Diamond Portable Drill; used only three months; bought from Fraser & Chalmers; all attachments complete.

BOX 385, MONTREAL

M. E. HARRINGTON. L. W. HARRINGTON

**CONTRACTORS FOR DIAMOND DRILL WORK.**

PROSPECTING MINERAL LANDS A SPECIALTY.

Twenty-seven years in the business and over thirty miles of Drilling completed.

ADDRESS either

M. E. HARRINGTON & SON:  
ISHPEMING, Marquette Co., Mich.  
MANSFIELD, Bristol Co., Mass.



**STAMPS!**

**PRITCHARD & ANDREWS,**  
173 & 175 SPARKS STREET.

**GENERAL ENGRAVERS, Rubber Stamp Manufacturers, SCALE MAKERS AND BRASS WORKERS.**

**Brands, Steel Stamps, Time Checks and Tags.**

**Stencils and Ink, Scales and Weights.**

**RUBBER STAMPS FOR OFFICE WORK.**

1894. THE 1894.

# Canadian Mining Manual

AND MINING COMPANIES DIRECTORY.

BY B. T. A. BELL,

*Editor of THE CANADIAN MINING REVIEW, Secretary GENERAL MINING ASSOCIATION OF QUEBEC,*

*Honorary Secretary MINING SOCIETY OF NOVA SCOTIA.*

600 Pages. = FOURTH EDITION. = 600 Pages.

## NOW READY!

FULL DETAILS of the Mining Laws of the Provinces as amended to date. A complete series of Articles on the prominent Canadian Mining Industries, together with the fullest information respecting the History, Organization, Capital, Dividends, Plant and production of the Mineral operations of the Dominion of Canada and Newfoundland.

Endorsed by the Mining Men of the Country.

"It is the most valuable new departure since the formation of the Mining Association in the Provinces that I am aware of."—H. S. POOLE, M.A., F.G.S., General Manager, Acadia Coal Co.

"Is of very great service, not only to those directly interested in mining, but to business men throughout the Dominion."—MR. R. G. LECKIE, M.E., General Manager, Londonderry Iron Co.

"It is the only book of the kind which affords any reliable knowledge from a business point of view."—MR. L. A. KLEIN, American Asbestos Co.

"The information which it gives to persons interested in the mining industries of the country is of much value."—MR. A. BLUP, Director of Mines, Toronto.

"No doubt of great service."—MR. J. ORALSKI, Inspector of Mines, Quebec.

"Found very convenient in our office, and is frequently referred to."—DR. E. GILPIN, Deputy Commissioner of Mines, Halifax.

"Its compilation of valuable facts makes it invaluable."—MR. GEORGE STUART, Truro Gold Co., Truro, N.S.

"The very thing I want."—COL. W. R. WALLACE, Ophit Gold Mining Co.

"There is cited together so much accurate information, condensed into so clear, concise and readable form, that any one desiring to do business in any way connected with Canadian mining, will find these necessary facts ready to hand."—MR. J. B. SMITH, British Phosphate Co.

"A work of great practical utility."—DR. STEPHEN EMMENS, Emmens Metal Co., Youngwood, Pa.

"Is an admirable production, and will prove a standard work of reference."—MR. G. E. DRUMMOND, Canada Iron Furnace Co., Ltd.

"The most useful book in our office."—INGERSOLL ROCK DRILL CO. OF CANADA.

"Worth ten times the amount."—JAMES MACRETH & Co., New York.

"I have expressed my opinion before, but I may now add that the recent issue seems to me to be the perfection of a work of the kind."—MR. JOHN RUTHERFORD, late Inspector of Mines for Nova Scotia.

"I recommend a copy of it to every person contemplating investment in our Canadian mining industry."—MR. T. R. GUE, Acadia Powder Co., Halifax.

Address: THE PUBLISHER, 17 Victoria Chambers, OTTAWA.

PRICE THREE DOLLARS.

# Ontario's Great Mineral Fields

**100,000 SQUARE MILES.**

**P**ROSPECTORS, Miners and Capitalists are invited to the great Mineral Field of Ontario, in Canada, the most promising ground on the continent for exploration and investment.

The Province of Ontario has a mineral-bearing field 1,000 miles in length, by 100 miles in breadth. Only a small portion of the territory has been explored.

<b>NICKEL,</b>	<b>IRON,</b>	<b>ANTIMONY,</b>	<b>APATITE,</b>
<b>MICA,</b>	<b>COPPER,</b>	<b>GOLD,</b>	<b>GALENA,</b>
<b>ACTINOLITE,</b>	<b>TALC,</b>	<b>COBALT,</b>	<b>SILVER,</b>
<b>ZINC,</b>	<b>ASBESTOS,</b>	<b>PLUMBAGO,</b>	<b>ETC.</b>

Thousands of square miles of virgin ground for the prospector in the mineral bearing formations, more easily reached by lake or railway than any other mineral district of the continent.

Important Discoveries made every Season! Careful and Intelligent Exploration Amply Rewarded!!

The Attention of Miners and Capitalists in America and Europe is invited.

Mineral Lands are sold by the Government at \$2 to \$3.50 per acre, or leased with right of purchase at from 60 cents to \$1 per acre first year, and 15 to 25 cents for subsequent years. The first year's rental allowed as part of the purchase money.

The NICKEL and COPPER mines at Sudbury prove the ore rich and persistent, shafted to 750 feet in depth, and richest in the lower levels.

Report on Mineral Resources of Ontario, with geological map of the Province (580 p.)

Report of Bureau of Mines, with geological map of the Nickel District (253 p.)

And the Mines Act, 1892, furnished free on application.

FOR FURTHER INFORMATION ADDRESS:

**A. S. HARDY, OR ARCH. BLUE,**

Commissioner of Crown Lands.

Director Bureau of Mines, Toronto, Ont.



## PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

## PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

### GOLD AND SILVER.

Under the provisions of chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at \$2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills who are required to pay

Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at \$19 an ounce, and on smelted gold valued at \$18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

### MINES OTHER THAN GOLD AND SILVER.

Licenses to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly either by arrangement with the owner or by arbitration all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones; five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

**THE HON. C. E. CHURCH,**

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

---

---

# DRUMMOND, McCALL & COMPANY.

---

**IRON, STEEL & GENERAL METAL MERCHANTS.**

---

OFFICE: New York Life Building, - MONTREAL, QUE.

---

---

CANADA IRON FURNACE COMPANY, Limited,

— MANUFACTURERS OF —

**CHARCOAL PIG IRON**

(From the Famous Ores of the Three Rivers District.)

---

Offices: NEW YORK LIFE BUILDING, MONTREAL, QUE.

---

GEORGE E. DRUMMOND, - Managing Director.

---

Plants at RADNOR FORGES, QUE., GRANDES PILES, QUE., LAC-A-LA-TORTUE, QUE., THREE RIVERS, QUE., LA PECHE, QUE.

---

---

**MONTREAL CAR WHEEL COMPANY**

..... MANUFACTURERS OF.....

**RAILROAD CAR WHEELS**

---

**STREET CAR & LUMBER TRUCK WHEELS A SPECIALTY**

---

Works: LACHINE, QUE. Offices: NEW YORK LIFE BUILDING, MONTREAL.

---

THOMAS J. DRUMMOND, - - GENERAL MANAGER.

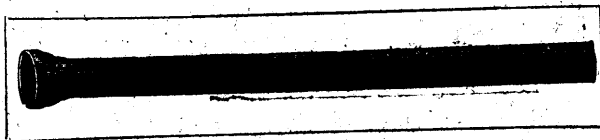
---

---

**DRUMMOND, McCALL PIPE FOUNDRY CO. Ltd.**

..... MANUFACTURERS OF.....

Cast Iron Pipes



Special Castings, &c.

WORKS: LACHINE, QUEBEC.

---

OFFICES: NEW YORK LIFE BUILDING, MONTREAL.

---

LUDLOW HYDRANTS, VALVES, &c., ALWAYS ON HAND.

# THE DOMINION WIRE ROPE COMPANY, LTD.

MONTREAL

Manufacturers of LANG'S PATENT WIRE ROPE.

FOR

TRANSMISSION AND COLLIERY PURPOSES.

SOLE CANADIAN AGENTS for the

WHEN NEW

SOLE CANADIAN AGENTS for the

CELEBRATED



CELEBRATED

MILLER & HARRIS-MILLER

WHEN WORN

"BLEICHERT"

CABLEWAYS.



TRAMWAYS.

Also Ropes for Hoisting, Mining, Elevators, Ship's Rigging and Guys, Etc., Etc.

Send for Catalogue and Estimates to P.O. Box 1942

## 15 YORK STREET, DOTY ENGINEERING WORKS, TORONTO, CANADA

HAVE FOR SALE THE FOLLOWING MINING MACHINERY

One Steam Driven Air Compressor, 16in. air by 24in. stroke, Rand Make

One Steam Driven Air Compressor, 8in. air by 10in. stroke, Rand Make

3 Rand Rock Drills with Columns and Arms

One Air Receiver

One No. 8 Pulsometer, used but short time; in good condition; prices upon application

Also Hoisting Engines, Double and Single Drums, Coal Conveyors and General Machinery

# Dominion Coal Company, Limited.

Owners of the Victoria, International, Caledonia Reserve, Gowrie, Little  
Glace Bay, Bridgeport and Gardner Collieries.

OFFERS FOR SALE

## STEAM, GAS and DOMESTIC COALS of HIGHEST QUALITY

Carefully prepared for Market by improved appliances, either F.O.B. or Delivered.

It is also prepared to enter into Contracts with Consumers covering a term of  
years. Its facilities for supplying Bunker Coals with promptness is unequalled.

APPLICATION FOR PRICES, ETC., TO BE MADE TO

J. S. McLENNAN, Treasurer, 95 Milk St., BOSTON, MASS.

DAVID McKEEN, Resident Manager,  
Glace Bay, Cape Breton.

M. R. MORROW,  
50 Bedford Row, Halifax.

KINGMAN BROWN & CO., Custom House Square, Montreal