

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:

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

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

THE

Canadian

MINING REVIEW



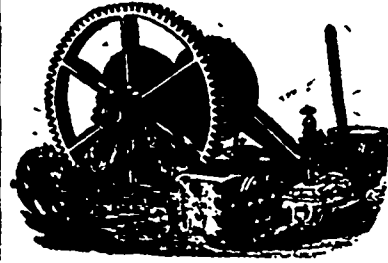
Vol. V.—No. 7. 1887.—OTTAWA, SEPTEMBER—1887. Vol. V.—No. 7.

Rock Drills, Air Compressors,



General Mining Machinery,
Wire Rope and Contractors' Supplies.
FOR CATALOGUES, ESTIMATES, &c., ADDRESS:
INGERSOLL ROCK DRILL COMPANY,
(LIMITED.)
44 Foundling Street, Montreal.

Miller Bros. & Mitchell,



MANUFACTURERS OF
Steam Rock Drills
AND
HOISTING ENGINES,
Mining & Contractors' Plant,
&c., &c.
110 TO 120 KING STREET, MONTREAL, QUE.

Hamilton Powder Co

Manufacture Mining, Blasting, Military
and Sporting

Gunpowder,

DYNAMITE, DAULIN, and the new
ECLIPSE MINING POWDER

DOMINION AGENTS FOR
*Safety Fuse, Electric Blasting
Apparatus, &c.*

OFFICE
103 St. FRANCOIS XAVIER STREET
MONTREAL.

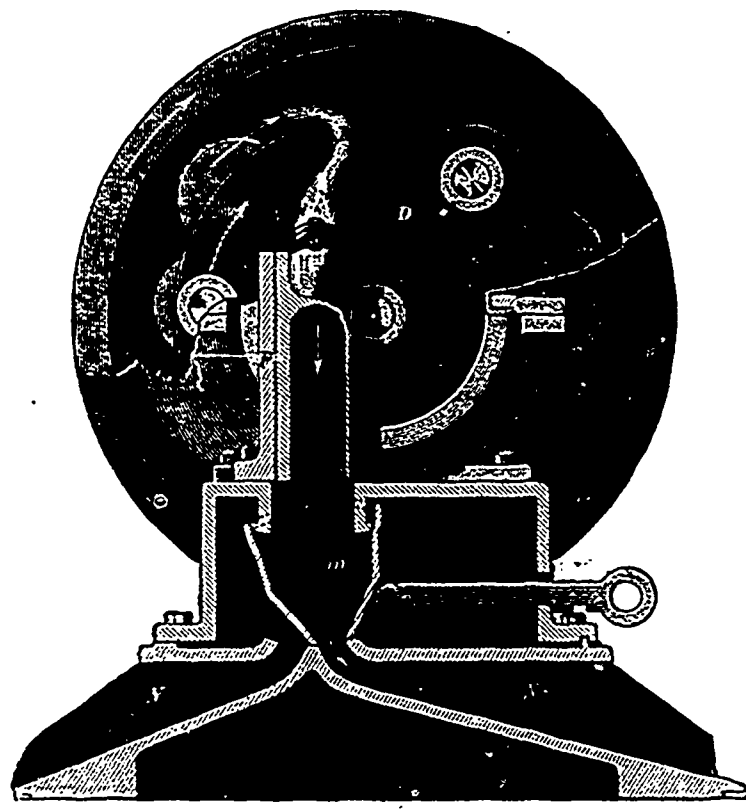
BRANCH OFFICES & MAGAZINES
at all chief distributing points
in Canada.

GEO. G. BLACKWELL,
26 Chapel Street, Liverpool.

Handles by Purchase or on Sale
MANGANESE, PHOSPHATE,
Asbestos, Antimony Ore, Mica and
all Ores, Minerals, &c.
Correspondence Solicited.

Mica, Minerals, Precious Stones

RICHARD BAKER & Co., General Produce
Brokers, 9 Mincing Lane, London, Eng.
Advances made on consignments.
Reports Gratis on New Products.
Bankers: Agra Bank, London.



THE WARING PULVERATOR
WET AND DRY TREATMENT,
FOR THE COMMINATION OF
Ores, Phosphate Rock, Cement, Paint, Minerals,
ETC., ETC.,
WATEROUS ENGINE WORKS CO. (LD.), BRANTFORD & WINNIPEG.

Stewart & Fleck, Jr.,

Manufacturers of every Description of
Mill Machinery,
Water Wheels, Steam Engines,
Boilers, Derricks, Steam
Pumps and Mining
Machinery.
Brass and Iron Casting of every
Description.
VULCAN IRON WORKS, WELLINGTON ST
OTTAWA.
T. STEWART. ALEX. FLECK, JR.

The Canada Co.

Will issue Licences to Prospect or
to work Minerals on any of
their Mining Lands and
Mineral Reservations,

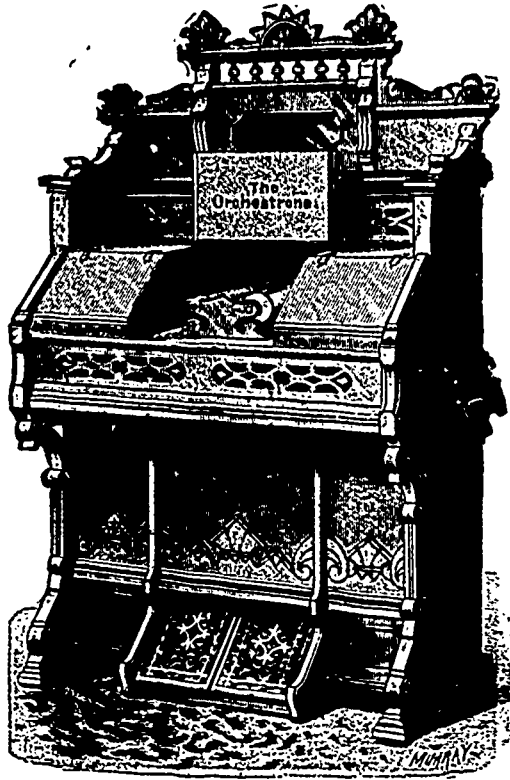
Covering nearly a
Quarter of a Million Acres

In Eastern Ontario, and principally
within the belts containing

Iron, Phosphate, Gold, Galena,
Plumbago, Mica, Marbles,
Building Stone,
and other valuable Minerals.

For list of lands and terms apply to the
Company's Mining Inspector,

H. T. STICKLAND,
PETERBORO, ONT.



STYLE 26 B, - PRICE \$115.00.

ORCHESTRONES.

STYLE 26 B,	- - - -	\$115.00
" 44 B,	- - - -	115.00
" 26 C,	- - - -	75.00
" 44 C,	- - - -	140.00
" Bijou,	- - - -	26.00
" Jubal,	- - - -	18.00

Plays all kinds of music, sacred and secular, the standard operatic overtures and selections. One of these instruments should be in every gentleman's house.

SEND FOR CATALOGUE TO

Claxton's Music Store,

DEALER IN
MUSIC AND MUSICAL INSTRUMENTS,
197 - YONGE STREET - 197
TORONTO, CANADA.

TELEPHONE 239.

THE CANADIAN MINING REVIEW

HAS BEEN

ENLARGED FROM THIS MONTH

TO

SIXTEEN PAGES.

-o-

Subscription for One Year - \$1.00



THE INTERCOLONIAL RAILWAY
OF CANADA.

THE ROYAL MAIL PASSENGER AND
FREIGHT BOATS BETWEEN CAN-
ADA AND GREAT BRITAIN

-AND THE-

Direct Route between the West and all points on the Lower St. Lawrence and Baie des Chaleurs, also New Brunswick, Nova Scotia, Prince Edward Island, Cape Breton, Newfoundland, Bermuda and Jamaica.

New and Elegant Buffet Sleeping and Day cars run on through express trains.

Passengers for Great Britain or the Continent by leaving Toronto at 2.30 a.m. train, Thursday, will join outward Mail Steamers at Halifax a.m. Saturday.

Superior Elevator, Warehouse and Dock accommodation at Halifax for shipment of grain and general merchandise.

Years of experience have proved the Intercolonial in connection with Steamship lines to and from London, Liverpool and Glasgow to Halifax, to be the quickest freight route between Canada and Great Britain.

Information as to Passenger and Freight rates can be had on application to

E. KING,
Ticket Agent,
27 Sparks Street,
Opposite the Russell, OTTAWA.

ROBT. B. MOODIE,
Western Freight and Passenger Agent,
93 Rossin House Block,
York St., Toronto.

D. POTTINGER,
Chief Superintendent,
Railway Office, Moncton, N.B.
Nov. 22nd, 1886.



Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting Agricultural Fertilizers came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.



Notice to Contractors.

SACRÉ SAINT MARIE CANAL.

CONTRACTORS intending to tender for works of construction of the Canal proposed to be formed on the Canadian side of the Saint Mary's River, are hereby informed that Tenders will be received about JANUARY next, and that the most favourable time to examine the locality will be between the present time and the early part of November next.

When plans, specifications and other documents are prepared due notice will be given. Contractors will then have an opportunity of examining them and be furnished with blank forms of tender, etc.

By order,
A. P. BRADLEY,
Secretary.

Department of Railways and Canals,
Ottawa, 24th August, 1887.



Notice to Contractors

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Colourow Work," will be received at this office until Thursday, the 6th October, for the construction of work at Colourow, Ont., in accordance with a plan and specification to be seen at the Department of Public Works, Ottawa, and at the office of the Town Trust, Colourow.

Tenders will not be considered unless made on the form supplied and signed with the actual signatures of the tenderers.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBELL,
Secretary.

Department of Public Works,
Ottawa, 9th September, 1887.



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.

SUBSCRIBE NOW

FOR

THE CANADIAN MINING REVIEW.

-o-

ONE YEAR, - - - \$1.50

NEW MAP

OF THE

OTTAWA PHOSPHATE REGION.

Copies on plain paper - - - - \$1.00
Copies on tracing linen - - - - 1.50

ON SALE AT THE

Office of the 'Mining Review'
OTTAWA, and the

George Bishop Engraving & Printing Co.
169 St. James St., Montreal.

ordinary mine after spending money in going down a few feet without result is apt to abandon what might prove a richly productive lead. The diamond drill explores at one-tenth of the above cost, and if this were generally used miners could be informed whether outlay upon a shaft would be remunerated by the production of the mineral. A company owning a diamond drill might find a good field for operation among our apatite mines, or if the miners would combine and procure a drill it would be of great service in developing the industry and in preventing unprofitable outlay.

It has been suggested that the Government, through the Geological Survey, might properly conduct some explorations with the diamond drill upon public lands where there are good shows of apatite. If persistent deposits were found, the lands could be sold or leased on royalty and an ample return of the outlay would be obtained. If the search for apatite was not productive, other discoveries might be made or information be secured that would give valuable additions to the geological knowledge of our country.

Low Grade Phosphates.

Owing to the large production by various countries of phosphates containing from fifty to seventy per cent. of phosphate of lime, it has been found difficult to sell the lower qualities of Canadian apatite at remunerative prices. On the other hand there is a scarcity of high grade phosphates, and the demand seems abundant for all that Canada can supply. Whereas the price in England for eighty per cent. Canadian phosphate is now a shilling per unit or eighty per ton, the price for seventy per cent. is only eight pence per unit or four and six-eighths per ton, a difference of eight dollars per ton. It is, therefore, imperative that the quality of the Canadian product should be raised to the highest point in order to secure the most remunerative results. In many districts the impurities associated with the apatite are chiefly micaceous, and experiment has shown that by grinding the ore and by a carefully devised system of blowing and screening a large proportion of the mica can be taken out. In this way sixty per cent. phosphate has been raised to eighty per cent., and the mica saved has gone a considerable way towards defraying the cost of the process. The mica is so freely disseminated that to cob the ore by hand would be expensive and impracticable, whereas it is readily taken out by machinery at an expense of one or two dollars a ton and a saving of perhaps ten dollars a ton is effected. It appears as though the future of our phosphate industry must tend largely in the direction of producing high grade phosphates in a pulverized form, and the consideration of the proper machinery and the establishment of mills in suitable locations are among the most important claims upon the attention of our phosphate producers.

Our Mineral Exports.

The following official figures are given by the Department of Agriculture to show the value of exports, distinguishing Canadian produce from those of other countries, for the years ending 30th June, 1884, 1885 and 1886:—

MINERAL.	1884.	
	Domestic.	Foreign.
Coal	\$1,201,172	\$157,177
Gold-bearing quartz, dust, nuggets, etc.	952,131	.....
Gypsum, crude	160,607	.....
Oils, mineral, crude and refined ..	7,546	192
Ore, antimony	4,855	.....
“ copper	214,044	.....
“ iron	66,549	.....
“ lead	5	.....
“ manganese	15,851	.....
“ silver	12,920	.....
Phosphates	453,322	.....
Plumbago .....	.....	.....
Salt	17,408	37,387
Sand and gravels	14,152	.....
Slate	11,445	.....
Stone and marble, unwrought ..	52,478	.....
Other articles	62,607	643
Total produce of the mine...	\$3,247,092	\$195,399

MINERAL.	1885.	
	Domestic.	Foreign.
Coal	\$1,468,166	\$180,046
Gold-bearing quartz, dust, nuggets, etc.	9,907	.....
Gypsum, crude	120,046	.....
Oils, mineral, crude and refined ..	27,303	548
Ore, antimony	33,700	.....
“ copper	246,230	.....
“ iron	132,074	.....
“ lead	36	.....
“ manganese	22,790	.....
“ silver	7,539	.....
Phosphates	362,288	.....
Plumbago	60	50
Salt	12,326	14,223
Sand and gravels	23,590	.....
Slate	4,642	.....
Stone and marble, unwrought ..	52,206	700
Other articles	127,534	1,366
Total produce of the mine...	\$3,639,537	\$196,933

MINERAL.	1886.	
	Domestic.	Foreign.
Coal	\$1,416,160	\$182,717
Gold-bearing quartz, dust, nuggets, etc.	1,210,864	.....
Gypsum, crude	114,736	.....
Oils, mineral, crude and refined ..	30,957	214
Ore, antimony	38,320	.....
“ copper	291,397	.....
“ iron	23,039	.....
“ lead .....	.....	.....
“ manganese	45,608	.....
“ silver	25,137	.....
Phosphates	431,951	.....
Plumbago	1,481	.....
Salt	26,749	13,204
Sand and gravels	23,195	.....
Slate	4,552	.....
Stone and marble, unwrought ..	61,950	.....
Other articles	205,051	5
Total produce of the mine...	\$3,951,147	\$196,140

From these figures it will be seen that there has been an increase in the total amount of \$310,817, the principal progress being in gold, copper, phosphates and salt. The decrease in iron, has been considerable, but under the new protective tariff this industry is now rapidly regaining ground, and there can be no doubt that much improvement will have to be recorded by next year.

We Doubt It.

It is reported that the Hon. Mr. Mowat has returned from Europe greatly impressed with the wisdom of British Mining Laws and Regulations. The Ontario Premier has en-

quired closely into this matter, and it is said that as a result of his studies the office of his Commissioner of Lands and Forests, and particularly that section of it relating to the mining portion of the community, is immediately to undergo a thorough and complete overhauling. Political wirepullers and other carpet baggers, who have grown fat at the expense of honest prospectors, are no longer to have an unjust monopoly of the cream of Ontario mining lands. Acres heretofore given away to speculators and non-residents, without restriction as to residence and development, are in future to be reserved for those who, by their experience, will best utilize them for the good of the province and of the country. Indeed, we understand that the whole rotten system of Mining Laws now existing in Ontario is to undergo an immediate change for the better. Verily, if true, this will be “tidings of comfort and joy” to those who have so long contended against a code of laws which places a legitimate and immensely profitable source of revenue at the mercy of ignorant untrained persons and unscrupulous speculators, which discourages exploration, and deprives the worthy discoverer of minerals of the just reward of his labour.

Iron and Steel Institute.

The first volume for 1887 of that valuable work, the Journal of the Iron and Steel Institute, London, England, has been received. This book is so well known and has been so often described in these columns that it requires no further mention here more than to state that the very high reputation the work has acquired in past years as an excellent compendium of knowledge bearing on the iron and steel industries is fully borne out by the present edition. Besides containing full reports of the various papers submitted to the Annual Meeting of the institute in May last, Mr. Jeans, the editor, has gathered together and arranged in a very handy manner a vast amount of useful information. We are indebted to this work for several paragraphs in our present issue, and we hope in future numbers to be able to reproduce some of the larger papers for the benefit of our readers.

The Phosphate Trade of Canada.

By H. B. Small, Ottawa.

Continued from August issue.

Dr. Sterry Hunt, who has made a persistent study of the Laurentian rocks for upwards of thirty years, says the question of the continuity of the deposits is important. Veins fitting fissures in the rocks are sometimes continuous for great lengths and to great depths, but their extent varies. Inclined beds of the material, which once were horizontal sheets inclosed in strata that have since been folded or convoluted, should be as persistent in depth as in length and when traced in the outcrop for hundreds of feet may be expected to continue downwards as far, unless a turn of the enclosing strata brings

them up again to the surface. He urges, therefore, deep mining for permanent success, and the experience of the past year proves the correctness of his theory.

Until last year the majority of the workings were superficial, consisting rather of shallow pits or large quarries. The reason for this is traceable to the fact that apatite in its crude state finds a ready sale at all times, even in small lots of five or ten tons. Consequently farmers and others opened pits and trenches for the purpose of extracting what mineral was within easy reach, and with satisfactory results, but so soon as the opening attained a depth at which work became difficult from the want of appliances for hoisting, or from the inflow of surface water, the pit was abandoned for a fresh outcrop close by, and the same process was repeated. The very abundance and value of the mineral thus led to its careless and wasteful handling, and retarded for some time its legitimate growth. With the advent of capital matters assumed a different aspect, and the old unbusinesslike system of mining which characterized the first attempts in the Ottawa district has been abandoned, and deep mining is now engaged in with great promise of abundant returns. The investment of foreign capital, and the organization of powerful companies composed of men of practical business ability and intelligence, together with the introduction of steam power and improved machinery, economy in the management of the mines and the necessity of shipping only a high grade of purity, have now placed these works on a sound and permanent basis. One American company has sunk a shaft on their property nearly 300 feet deep, passing through several deposits of pure phosphate and following the connecting vein which narrowed at certain depths to no greater thickness than a man's thumb. At the depth of 260 feet they struck an apparently unlimited deposit on which they have continued working, running drifts laterally, and turning out a very large yield of apatite of high standard. Another company (Scotch) which only commenced operations last autumn have reached a depth of 100 feet with varying success till that depth was gained, when they came on an apparently solid deposit which they are now working.

The great advantage the Buckingham mines possess is their contiguity to navigable waters, the mines in the majority of cases being situated near the River Lievres. This is a slow, sluggish stream, very deep and only at one point in its course (known as the Little Rapids) where boulders occur and a ledge of rocks crosses the channel, is any obstruction offered to navigation. This is obviated by the use of flat bottomed scows carrying the apatite, being towed to the head of the rapids by a small steamer, where they are let loose to float over it, much in the same way as cribs of timber are sent over the Ottawa "slides," or over the rapids of the Ottawa and St. Lawrence rivers. At the foot of the rapids the scows are taken in tow by

another steamer which tows them to a landing at Buckingham Village, where a short branch line of the Canadian Pacific Railway has trucks waiting alongside the river, into which the mineral is transferred, and conveyed thence direct by rail to Montreal where the cars on arrival, traversing the line of docks, run alongside the vessel which is to receive their contents. The cost of floating the mineral down the river ranges from 30 to 50 cents, according to distance, the freight by rail to Montreal cost about one dollar and twenty-five cents per ton. Ocean freight ranges from three shillings to seven and six pence sterling, although there are times when from want of freight vessels will carry the mineral as ballast free of charge. The value of the crude material in Liverpool ranges from twenty-six to twenty-eight dollars, and from these figures it is easy to see what a profit there is in prosecuting this industry. But it is only by the outlay of large capital in developing and getting operations into thorough working order that this end is attained. The first year seldom leaves any margin, owing to the heavy outlay for plant, buildings, etc. But in the case of two companies, at least, one English and the other American, it is known that after the first year's outlay a dividend of 30 per cent. was declared and paid to the shareholders.

Care has to be taken that the quality shipped is of a proper standard, and not mixed grades. The qualities are known to the trade as firsts, seconds and thirds. The best quality averages from 80 to 85 per cent. of tribassic phosphate of lime, the general run of the apatite shipped ranging from 75 to 85 per cent. The basis of value for 80 per cent. mineral is about 1s. per unit, with a rise of one-fifth of a penny for each unit. To secure an even grade, dressing is resorted to under the name of "cobbing." This is necessitated by the intrusion of mica, pyrites, pyroxene, and carbonate of lime, all useless materials which have to be got rid of, except where large masses of pure apatite have been brought to the surface. Cobbing consists of the separation by hammers and hand picking,—an easy operation owing to the softness of the apatite as compared with extraneous substances—in a building known as a cobbing house partly open at the sides. On one side of this, through or around the interior of which solid tables or stands are located, are empty tram-cars or waggons, into one of which the refuse is thrown as broken off, whilst the apatite thus cleaned is thrown into another receptacle on the other side. Boys and old men are employed at this work, which no machinery has yet been found adapted to perform, and they earn from 50 to 75 cents per day, being paid mostly by piece work. In spite of this system large quantities of the mineral are thrown aside, which, with an improved system, will yet prove of value, much in the same way as the early gold workings of California and Australia yielded rich returns when their tailings were again worked over. A process has been discovered by which its originator claims that

after grinding and pulverizing very low grade material, he can separate the disseminated apatite from impurities, and if this turns out successfully there is room for unlimited manufacture, as the best of water-power for stamping and turning machinery is available at Buckingham.

The various forms in which the apatite of the Ottawa district presents itself are in crystals, sometimes of very large dimensions, in masses varying from compact to coarse granular; in strata of a lamellar texture, and in a friable variety which is abundant, known as a sugar phosphate. The colour varies, some being greenish, often clear sea green, bluish, red, brown of different shades, yellow, white and cream colour. The reddish brown, or nearly claret colour, is the hardest and most compact of all, taking only 12 feet square to the ton, whilst the green and other colours require 16.

Having now given an idea of what apatite is, and of the Ottawa district in which it is worked, it may be well to describe some of the larger mines in that locality. The Emerald Mine, one of the earliest opened, is one of the most productive, and is worked on thoroughly scientific principles. It is situated some 9 miles from Buckingham Village, is owned by the Ottawa Phosphate Company and has changed hands several times, each succeeding purchaser paying higher prices, the last sale clearing the owners over \$50,000, before any large works such as are now carried on there were undertaken. Drifts are now in the side of the hill to the main shaft, by means of which the refuse as well as the mineral are run out on a tramway. Little Rapids Mine is a very valuable property, some 3 miles north of the previous mine. A large number of openings have been made on the property all of which have yielded very good returns. Several deep shafts have been sunk and drifting carried on at various levels in the shaft with great success. This mine is at present owned by an Ottawa resident, Mr. W. A. Allan. The North Star Mine, owned by an American company, contiguous to the previous mine, is yielding handsome returns for the outlay on it, and it is here that the deep shaft of nearly 500 feet, previously mentioned, has been sunk to test the existence of the apatite. A small show on the mineral on the surface, only some 3 inches wide, was selected for the experiment. At a depth of 100 feet this increased out to 5 feet, shrinking below that to almost imperceptible dimensions, and at a still further depth expanding till it overlaid the whole width and extent of the shaft. The Glasgow-Canadian Phosphate Company last year opened a property near the former, and have two deep shafts already sunk, besides other workings, one of which penetrates the face of the hill. The shafts evidence the good results obtained by deep mining, and the company are in a fair way of meeting with rich returns for their expenditure. All the above mentioned mines lie on the eastern bank of the Lievres. Some 8 miles further up, on the left or western bank, are to be found

the High Rock Mines. These are amongst the most extensive of all, and belong to the Phosphate of Lime Company, of London, England, under the management of Mr. Pickford. The property owned by this company covers 1,200 acres. The profits of the three years, 1882-3-4, were sufficient to cover all the outlay and to admit of a dividend of 25 per cent. on the capital stock, besides setting apart \$10,000 as a reserve. Some 25 to 30 openings have been made on the property, and the deeper the works proceed the richer is the yield. Tramways along the face of the mountain, on which these works are situated, carry the refuse to points where it is easily dumped into ravines and so away from the site of any probable future openings. The offices, and buildings for the miners accommodation, are scrupulously looked after, and the company has provided a reading-room well supplied with books, papers and periodicals for their employees use when not working. The mountain is some 1,900 feet above the sea level, and the view from it is very fine, the Laurentian hills in all directions rising one above another till lost in the blue haze of the distance, whilst at the foot of the mountain is a natural beaver meadow, fringed with trees, and nestling as it does amongst the mountains gives an air of quiet and repose in contrast to the busy scene of the works going on above it. The number of men employed by this company ranges from 100 to 150. The Union Mines, belonging to an American company which owns 2,000 acres, are about one mile distant from the High Rock Mines. The work here has been reduced to a minimum by steam hoisting power, steam drills and all the modern appliances. The original capital of this company, \$100,000, was nearly all expended in plant, road making, and shaft-sinking, yet after one year's operations a dividend of 30 per cent. was earned and divided. A tramway runs along the face of all the openings and carries off the debris and waste rock to a ravine at the extremity of which lies a lovely small lake. The escarpment which forms the wall of this ravine shows the course of numerous veins of the mineral all trending eastward and running into the mountain, and the main works are carried on by literally quarrying the hill side, and cutting it away in solid masses. Three years ago on the site of the Union Mines there was nothing but rock and unbroken forest; to-day there are numerous dwellings, substantial offices and storerooms, tramways and good roads. The number of men employed here ranges from 100 to 125.

There are numerous smaller mines being worked all through the apatite district, especially in Templeton, where both Canadian and American capitalists are interested, and new mines are continually being opened. The description given of the mines above mentioned, however, shows sufficiently the magnitude of the various enterprises.

The following table of shipments, each calendar year respectively, from Montreal, of crude

Canadian apatite to be used in the manufacture of superphosphate abroad, gives a fair idea of the yield of the mines of the Ottawa district, as the greater portion of it is derived from them, the Kingston district only furnishing a small yearly amount.

1880.....	7,500 tons.
1881.....	10,307 "
1882.....	15,556 "
1883.....	17,160 "
1884.....	20,461 "
1885.....	24,876 "
1886.....	19,345 "

The question may naturally arise why such a commodity should be sent abroad to be manufactured when apparently it could be treated here and shipped in a condition ready for use, thus adding to our own industries. The reason for this, however, becomes obvious when we ascertain that the pyrites, out of which the acid for dissolving the apatite is not found in quantities sufficient to supply works on any scale within any reasonable distance of the mines. The cost of transport of pyrites would probably exceed the freight of the crude mineral to Europe, where, from the numerous chemical works existing, acid can be purchased far cheaper than it could be made here. Again our Canadian Apatite enters largely into competition with a lower grade phosphate from other quarters in the superphosphate works across the Atlantic. When a demand shall have arisen amongst our own farmers to compensate by the use of phosphatic fertilizers the soil for the loss it undergoes by the constant removal of crops, especially in districts where cattle raising is not largely carried on, superphosphate works may be started with a show of success, in spite of all difficulties. In his Report for 1883 the Minister of Agriculture remarks:—"experience goes to prove that for the production of cereals of every description as well as for the strengthening and renewal of worn-out lands, no available fertilizer is known that can produce such beneficial results as phosphate when subjected to a chemical process."

A curious feature in the apatite trade of Canada is that, although a very large amount of American capital is invested in our mines, almost the whole of their product finds its way to Great Britain, and that a large amount both of crude and manufactured phosphate is exported thence to the United States. There is every reason to believe that both these articles are Canadian produce reshipped, and the explanation given for this by Mr. Torrance, late of the Geological Survey staff, is that it is simply due to the conservatism of trade, as American dealers were in the habit of importing from Britain long before our Canadian deposits were worked, no efforts have since then been made to direct from here into fresh channels a trade which was commenced with the English market by men more familiar with that than with the American.

A wealthy American company has this year commenced operations at the junction of the

Lievres and Ottawa Rivers for grinding and pulverizing crude phosphate, either for acid treatment or for use in the pulverized state. These works are capable of grinding 50 tons per day, and an idea of the fineness of the work done may be formed from the fact that the powder has to pass through an 80 mesh bolt and blowers for separating the mica, leaving only a phenomenal quantity of that worthless and troublesome ingredient. The company have made arrangements by which the ground article can be delivered at cities along the south shore of Lake Erie, where all they can manufacture has been contracted for at a rate of freight of \$1.40 per ton. Hitherto those cities have been using South Carolina phosphate, the freight of which amounted before delivery there to nearly \$4.00 per ton.

In conclusion, Canadians are an agricultural class of people. The essentials for starting Canada's growth are force and material. The climate affords the forces, light, warmth and water; the material, lime, potash, ammonia and phosphate are at its very doors; and with these there is no reason why it should not be one of the most productive countries of the world, if it only uses in a rational manner the means which nature has provided for it.

Mining Developments on the North-western Pacific Coast, and their Wider Bearing.

By Amos Bowman, M.E.*

In the last two years I have had an opportunity to study the conditions of gold mining in the far northwest of the Pacific Coast—in Cariboo district, British Columbia. That country joins Alaska in lat. 55°; and Cariboo district in lat. 53° to 54°, is three hundred miles north of the forty-ninth parallel. Having previously studied the auriferous deep gravels of California in lat. 38° (in connection with the California Geological Survey, in 1870-71), I am able to contribute a few facts, and comparisons having a wider and more general bearing. My last work in Cariboo district is in continuation of explorations geographical and geological, performed in 1876 and in 1882-3-4, for the Geological Survey of Canada, during which I have seen a large part of the Cordilleran plateau between the 39th and 54th parallels of latitude. The recent work in Cariboo was contributed to jointly by the Dominion and the Provincial Government of British Columbia, and carried out under the direction of Dr. Selwyn.

Before entering the gold region of the plateau proper, in British Columbia, I wish to say a few words in regard to coal and iron—the majority of our members, perhaps, being coal and iron men, connected with large enterprises in those lines, and naturally more interested in them. We have ocular proof in Scranton that coal and iron are elements which bring about solid and permanent developments. This well-built brick and stone city, with its population of 80,000 souls, has grown, we are told, in twenty-five years out of the underlying coal and adjacent iron. Unlimited industries, and the wealth and power of states, can grow out of coal and iron. We of the west are willing to admit that coal and iron, as collateral branches of the mining industry, are quite legitimate.

But we claim that the distribution and the

mining of the precious metals are important and significant in a wider sense. This industry has determined for the United States, and for Canada as well, the lines of immigration and national development. It wrought, in a period of twenty or thirty years, the permanent conquest by the Anglo-Teutonic races of the entire north Pacific coast, along with the dominion of the Pacific ocean. It lifted Australia from the condition of an antipodean colony and made it an empire. It is doing the same work in temperate South Africa. It may do a similar work in temperate South America. Mining of the precious metals accomplishes in the briefest space of history that which leaves its permanent mark on the course of events for a thousand years. It has built our transcontinental railways, and it is precious metal mining that will make the Canadian Pacific Railway and its projected branches a profitable investment.

COAL AND IRON.

The Pacific coast in general, and the northwest coast in particular, is not lacking either in quantity, quality, or general abundance of coal and iron. It is true that our Carboniferous rocks were not deposited under coal-making conditions, and that Monte Diablo has yielded only an inferior coal. From these facts, with limited knowledge, the impression has gone forth that among the recently extinct and still active volcanoes of the western coast there can be no coal found worth mentioning. I do not consider that I am making any extravagant statement when I say that in British Columbia and on Puget Sound, in adjacent United States territory, we have a repetition of Pennsylvania, in our deposits of coal and iron.

Some mining engineers have called the coals "lignites," because they are not carboniferous coals; but they are genuine bituminous coals, and of first-rate quality.

We have coking coals, too; veins that make different qualities of coke. A coking coal has been mined for twenty years at Nanaimo, Vancouver's Island, and largely used for making gas in San Francisco and Portland. The coke from the retorts is well known in San Francisco. Coking coal exists on the Puyallup, and on Skagit river, in Washington territory, and probably in many other places. When coking coal shall be wanted in that country for smelting iron or reducing the precious metals, it will be forthcoming. The conditions of the country have not called for it, nor for a knowledge of it. The railways have only recently reached that far north and west.†

Anthracite and semi-anthracite have been reported from many different localities. I have seen specimens from Nisqually River, Washington Territory, and Queen Charlotte Island, British Columbia, and coals ranging from anthracite to semi-anthracite from half a dozen other localities. Bow River on the eastern flank of the Rocky Mountain range, yields a good anthracite.

In 1874 I was commissioned by the officers of the Central Pacific Railway Company, in California, to investigate the coal deposits adjacent to their lines in that State, and I was much impressed by two leading facts which were developed. The first appeared in analyses of the Pacific Coast coals in comparison with eastern coals. These analyses, which I tabulated on what I thought a large enough scale, in the number of localities represented, to establish the point, showed that the difference between what were commonly called "lignites" and the bituminous coals and anthracites, of the West and East, resolved itself simply into the

varying quantities of hydrogen which had entered into combination, owing to surrounding circumstances; and that it had very little to do with the age of the formation. Consequently, the application of the term "lignite" generally to western coals was a misnomer. We have also, however, the technical lignites, including the regular Bohemian brown coal. The second point noted was the very wide distribution of the lignites and coals of the Tertiary and Cretaceous formations in that State, wherever these formations extended; from which I drew the conclusion that by no means enough was known from actual development, at that time, regarding the presence of workable coal-veins in California to justify any sweeping condemnation of the whole as insignificant in quantity and inferior in quality. In this I differed from the opinions of others expressed, and current at the time.

I had seen enough to satisfy me that the conditions favourable to coal-making existed in localities wide apart, and at two different horizons, in the Tertiary and Cretaceous periods; for instance, at Monte Diablo and on Pitt River, in Shasta County, in rocks of the upper Cretaceous, and at Ione and Lincoln in middle Tertiary. Indeed, putting that together with subsequent developments, and with what I have myself seen, up and down the coast, and in localities all over the plateau of the cordillera in the latitudes mentioned, I cannot better describe the fact than by saying: "The process of coal-making in one or the other of these periods, although in disconnected basins, was almost universal." Along both shores of the island sea connecting with the North Pacific Ocean at Fuca and Johnston Straits, lies the coal-basin of the North West Coast already mentioned, in extent more than twice the width of the State of Pennsylvania—in the number and size of its veins the equal of anything I know of in the world. Iron is smelted in Oregon, Washington Territory, and in California; and many heavy iron deposits are known, but are of little present value, for the same reason as that which delays the development of our coking coal-veins.

The Cordilleran Plateau.—Without entering into further details on this subject, however interesting, I will, before passing from the coals to the precious metals of the Pacific Coast, briefly define and describe the plateau of the cordillera, to which I have several times referred. Its physical characteristics and its geological history are as important in connection with the coal-forming conditions of the two periods mentioned, as they are in the understanding of our precious-metal zone.

It was in 1858, beginning with the "Fraser River excitement," that the gold-hunting army of explorers began to turn backward from California to the eastward and northward, and so commenced the closer investigation of the cordilleran region. Very nearly simultaneously, between 1858 and 1861, or in general terms about ten years after the first movement to California, the solitudes of Puget Sound, of the Fraser River canons, of the eastern Sierra Nevada, of the Blue Mountains in Oregon, of Cariboo, and of the Rocky Mountains in general, from north to south, were broken by exploring or revisiting bands of prospectors. It was in 1861 that I joined this exploring army. I found out gradually that the mountainous region in question was neither a great basin, nor an irregular mass of mountains, but one great double range of broken chains, having a wide and general-level plateau between them, like two flanges on a wheel; that the plateau was characteristic, and an essential

part of the whole; and that it extended persistently with its accompaniments, and, as it seemed, indefinitely to the northward and southward.

As a whole, this great physical feature of the continent which has proved of so much importance to the precious-metal miner, appeared to be unrecognized; at least, it had no name until 1873, when I ventured, in a paper published in California, to call it (following recognized principles of nomenclature) the plateau of the cordillera, or briefly the cordilleran plateau. The term was precisely descriptive, and it has entered, I may observe, into some of the standard works on physical geography.

You will find in examining it on a globe that it extends not only from the southern end of South America to the northwestern end of Alaska, but that it continues in a direct line (scarcely recognizable on the map, on account of the difficulties of projection) across the Asiatic continent by way of the Yablonai, Altai, and western Tibetan ranges. Continuing in the same line, we find the plateaus of Persia and Arabia, and then the mountains of Abyssinia extending along the northeastern coast of Africa down to the Cape of Good Hope, forming the sea-margin of the African continental plateau. Branching or correlative plateau-ranges extend across Africa to the mountains of the Guinea; and across Europe by way of the Caucasus and the Alps to Spain; but keeping our main feature in view, we have little difficulty in recognizing it as one and the same orographic feature, which, having made America long, makes the Old World broad. I hope I am not travelling too far afield, in attempting to describe the principal characteristics of the cordillera, but so far, I think, we have solid footing, viz., that wherever seen in the direct line of continuation, the most remarkable feature of the mountain ranges in the world, is marked by its characteristic intermediate plateau; and by this token we may know it. Not the least noteworthy feature of the chain of plateaus I have been describing, is the fact that it divides that hemisphere which is nearly all land, from the other hemisphere which is nearly all water.‡

It is quite beyond my range to speculate concerning the causes of this feature, but it is not irrelevant (having found it so far-reaching), to ask the question, whether or not the causes were cosmical?—an inquiry involving glacial theories not entirely disconnected from problems of placer-mining.

Having looked at the plateau chain at large, we are prepared to consider what it is in detail, and in what respects this knowledge concerns the miner.

In alluding to the coal, I did not mention in so many words that the coal-forming conditions which existed from middle Cretaceous to middle Tertiary time, extended along the Pacific coast for thousands of miles upon the flanks of this line of plateaus. Its accompanying shore-sediments enter fiords of the Cretaceous period now far inland; formerly at sea-level, now presenting cliffs of pebble conglomerate six thousand feet above it, and along the eastern as well as the western flanks; while those of the Tertiary period, independently of the Cretaceous, lie in the positions of lake-basins covering scatteringly almost the entire plateau of the cordillera, at least in the north.

Rising of the Plateau.—A remarkable thing happened about the time our first Pacific coast coal was forming. It was nothing less than the first rising upward of this plateau of the cordillera. Its geological history, however

simple, has grown upon this very slowly. Geologists had to investigate it piecemeal, before they could put their observations together. And so it is all along the line.

To be continued.

The Canadian Iron Trade.

In a paper read before the recent gathering of the American Institute of Mining Engineers, at Duluth, Mr. J. H. Bartlett, M. E., of Montreal, said: There are two reasons which make the present time an appropriate one to direct attention to the field offered for enterprise in this direction, the first being the very favourable reports of the experts who examined and reported on the Canadian exhibit of minerals, particularly coal and iron, at the Colonial and Indian Exhibition, held in London, England, last year; the second and more important reason being the recent changes in the Canadian customs tariff inaugurated in May last. The tariff is now generally two-thirds of the American tariff, in addition to which the government, in order to encourage the manufacture of iron, grants a bounty upon pig iron made in Canada out of Canadian ore. In a paper presented to the Institute at the Halifax meeting, the writer gave a review of the various attempts to manufacture iron in Canada. The facts then presented were not such as to offer much encouragement to anyone to embark in similar enterprises under the conditions then existing, but, happily, these conditions are now changed and an early development may be anticipated. It will be remembered that the various provinces now forming the Dominion of Canada were only confederated in 1867, previously they were all separate and distinct colonies, each with its own fiscal tariff, and having only their own small market. Even after confederation the customs tariff was simply a revenue, not a protective tariff, until the year 1879 when the first effort was made in this direction, and an import duty of \$2.00 per ton was imposed on pig iron, whilst previously it had always been admitted free of duty, but the iron section of the tariff was very incomplete. As Canadian iron workers wages are regulated by Pittsburg wages, it is impossible to compete with Belgian, German and English manufacturers whose wages are on a much lower scale, unless sufficient protection is afforded. With one single exception all the attempts to manufacture iron in Canada have been with the use of charcoal as a fuel, and many of the attempts were made early in the century, and the operations were of very small dimensions. The only furnaces which have been successful have used bog iron ore and have made only a few tons of iron per day. A great bar to the trade has been a want of information regarding the extent of the market to be supplied. This difficulty has been to some extent removed, the writer having collected and tabulated the statistics of the Canadian iron trade for all the years since confederation, so that it is now possible to see what has been required in the past and to estimate what will be necessary in the future. For a young though large country with a small population, the amount of iron and steel consumed in Canada is remarkable. In the year 1878 a greater money value of iron and steel was imported into Canada than into the United States; and not making any iron of our own, the value of our consumption and imported iron and steel, per capita of the population, is always many times as much as the value of the imports per capita into the United States. The total balance of trade against

Canada up to the year 1886 was \$381,000,000. The total value of the imports of iron and steel during that period was \$253,250,000, from which it may be assumed that the balance of trade would have been in our favour had we made our own iron. The average annual value of our iron importations is about fourteen million dollars. The average weight of the rougher descriptions of iron and steel such as pigs, bars, plates, sheets, rails, etc., being about 250,000 tons in addition to which the weight in the imports of castings and forgings, hardware and manufactures, machinery and engines, etc., is very considerable. In almost every province iron ore is found in abundance and the provinces which have not coal have an abundance of timber fit for making charcoal. We possess the only deposits of coal on both the Atlantic and Pacific shores and in both Vancouver island and Cape Breton the coal seams run out under the ocean. In both these provinces of British Columbia and Nova Scotia, nature has been prodigal with deposits of various descriptions of iron ore of very good quality, and with plenty of flux all in the immediate vicinity of the coal fields. San Francisco is largely supplied with Namaino coal, and the blast furnaces in Oregon get most of their iron ore from Texada island in British Columbia. The eastern cities of Portland and Boston are supplied with some of their coal from Nova Scotia, and it would appear possible also to supply iron ore to eastern furnaces from that province. In New Brunswick both coal and iron are found. In both Ontario and Quebec there are immense deposits of the finest quality of iron ores and an unlimited supply of charcoal timber. In Manitoba there is iron ore and they have about 15,000 square miles underlaid with coal. In the North West provinces, the great future wheat producing country of the continent, there are deposits of iron ore reported, but the country is so vast that no special explorations have been made for it. They are, however, working a large deposit of anthracite coal at Anthracite, N. W. T., of a quality which compares favourably with the best from Pennsylvania, and there are 500 square miles of this section. The climate of this country is cold, but there are 50,000 square miles of it underlaid with coal of good quality and it is easily reached and worked, seams estimated to yield from five to nine million tons per square mile.

MISCELLANEOUS PARAGRAPHS.

Iron Ore in Nova Scotia.—Mr. E. Gilpin, in his *Report of the Mines of Nova Scotia*, reports the discovery of iron ore at Grand Lake, Hulyan County, and in the Long Island district, Cape Breton County. Here the outcrop of the deposits of red hematite was opened. The ore was found to be of excellent quality and as much as ten feet in thickness. The deposits are situated very favourably on the side of a high hill and only a few yards from deep water.

A Remarkable Water Wheel.—The water-wheel that runs the works of the Sagadahoc Fertilizer Company, at Bowdoinham, Me., is probably the only one of its kind in existence. It is 27 feet in diameter, with a foot of its rim out of water at high tide. The spokes are wide and set diagonally, like the vanes of a

windmill. It turns eighteen hours of the day by tide power, running one way with the flow, the other with the ebb. With one foot fall of the tide, this wheel gives about fifty horsepower. It has been in use since 1691.

Relation of Coal-Dust to Mine Explosions.—Mr. Arthur Watts, Bede College, Durham, referring to a former letter to *Nature* in which he suggests that keeping the ventilating air current saturated with aqueous vapour might prove the most effective way of rendering the dust in coal mines innocuous, has, he says, been since shewn to be practicable in a South Wales colliery. Since then he has considerably extended his research, with results that confirm the conviction expressed in his letter, that many of the most disastrous colliery explosions during the last seven years in the northern portion of England have been practically dust explosions, and, therefore, preventable; that the rough method of watering the floors only, or the floors and sides, of the mines is delusive, since it leaves the most dangerous dust undisturbed, the upper and flocculent dust; and last, that probably the reasons why dust in dry pits does not explode more frequently are now within grasp. To this latter conclusion he writes:—"That every firing of a shot that is accompanied by flame in a dry pit does not produce an explosion is well known; that *sometimes* such firing of a shot *does* is unhappily also well known. That the local presence of gas, even in small amount, is sometimes the reason of this is universally acknowledged. That the amount and condition of the dust present (even in the practical absence of gas) is at other times the reason is now believed by many. Setting aside the *amount* of dust, which every one will allow must be an essential factor, and also the varying energy which the shot, blown out or not, develops, let us look at the other conditions. The temperature and hygroscopic state of the air current is one most important factor, and consequently the concomitant temperature and hygroscopic state of the dust traversed by such current. Beyond this, the *degree of fineness* and the *constituents* of the dust will have much to say in the matter. The finer the particles the more readily will they ignite, and more completely will they place their substance under the influences present. Thus ordinary screen coal dust will not ignite when a common match is lighted and applied to it, but it will when finely pounded in a mortar. Now the dust resting on the baulks and upper portions generally of the ways will invariably so light and burn when dry, although the constituents vary greatly in different pits and in different seams of the same pit. What are the ordinary *constituents* of coal dust? Two, perhaps three, important substances, and others unimportant; important, as being inflammable in varying degrees; unimportant, either from their inflammability or from their excessively small amount. The three important are mother of coal or *dant*; *coal*, and certain coloured bodies, probably *spores*. The unimportant are shale or other stone dust, iron pyrites, lime flakes and incidentals, as animal and vegetable matters, and the results of the wear and tear of the haulage and winning apparatus, &c. Dismiss these last, as only one needs attention, the shale; and that special, not general. *Dant* lights most readily; the red end of a used match is often sufficient to fire it, and their burns itself out whether resting on wood or on stone. Burned in a retort it loses little weight, and the fumes it gives off will not ignite. Now this *dant* is largely present in upper and

flocculent dust, reaching in some specimens even 70 or 80 per cent. Dant clearly, therefore, is not itself dangerously explosive, yet it is admirably fitted to act the part that tinder use to do, when it handed on the spark from the flint and steel to the old fashioned brimstone match. Coal forms a considerable part of all upper and flocculent dust, and constitutes the great mass of the bottom dust along intake haulage roads. Coal dust (got as free from dant as possible) when pounded very fine ignites with some difficulty, burns at first somewhat fiercely and with considerable smoke, but generally goes out leaving a portion of the heap unburned. Placed on an iron plate, and burned by heating the plate, it threw off scintillations, its fumes readily took fire, and forty grains of dust were reduced to one grain of ash. In a report it gave off first much smoke which would not light; soon, however, the smoke lessened, when its fumes lit and burned with a long bright flame. Such coal dust is manifestly capable of producing an explosion. Under favourable conditions it can produce a considerable amount of illuminating coal-gas, whose presence would convert the air current into an explosive mixture. Therefore, adopting the former simile, as the dust is the *tinder*, so this coal is the *sulphur match*, as the shot flame or other initial cause is the *spark* struck from the flint and steel.

The Cost of Boring Petroleum Wells.

—Mr. C. D. Wilder, of Chicago, in a recent report on the natural gas and petroleum deposits of the United States, gives the following as the cost of boring petroleum wells in the neighbourhood of Lima, Ohio:—

Outfit, consisting of lumber for sills and braces, used in derrick works and for wheels.....	\$375
Engine, boiler and fittings.....	750
Total.....	\$1,125

The cost of putting down the well is, on the average, about one dollar per foot, there being a large amount of shale, slate and sandstone, and but little sandstone present. Even in an untried country, wells may be bored at a contract cost of \$2 per foot, for any depth without reference to the nature of the rock.

British Mineral Production.—From the annual reports of the Inspectors of Mines to Her Majesty's Secretary of State, just issued, we learn that the total quantity of minerals produced throughout the various districts of the United Kingdom, during the past year, was 170,006,959 tons, of which 157,511,482 were coal and 8,862,648 ironstone, the rest being fire-clay, oil shale and other minerals, being a total decrease of 3,217,001 tons compared with the preceding year, the decrease of coal being 1,832,936, and of ironstone 1,245,964 tons; 210,665 tons of mineral were wrought for every fatal accident, and 178,391 tons for every death, as compared with 214,651 and 150,620 tons respectively in the preceding year.

Canada Called to Account.—Canada has been called to account by the Mother Country for her temerity in seeking by higher import duties to build up an iron and steel industry worthy of the name. English iron and steel manufacturers, alarmed at so radical a change, asked the Colonial Secretary for information on the subject. Canada's answer, in the form of a report of a committee of the Privy Council of the Dominion, is direct and to the point. In-

deed, so direct and pointed is it that the *Colliery Guardian* is led to exclaim that "if there were any doubt before, no doubt can be any longer entertained that Canada is resolved upon having her own iron and steel industries." Well, it does have that appearance, truly. And what, we may ask, is the objection to that? The Privy Council declare that Canada possesses in an advantageous position abundance of iron ore, fuel and all the requisites for the manufacturing of iron and steel, and that she is "compelled in self-defence, as against America, to adopt a tariff policy in some measure approximating that to the United States in order to protect domestic industries and to develop the natural resources of the Dominion." She also pleads that in the steps taken by the Canadian Parliament to foster the manufacture of iron and steel and to place the industry on a firm foundation at the outset, "Canada is but following the methods adopted by Great Britain, France, Belgium, Germany, the United States, and other countries which have succeeded in promoting this great industry." This is certainly a cogent argument, however idly it may fall upon the ears of Free Trade Great Britain, and we cannot but admire the pluck of the younger country in taking a stand so much at variance with the generally recognized sentiment in England and at the same time so in accord with the experience of the United States in respect to industrial growth.—*Iron Trade Review.*

Application of Electricity to Mining Operations.

—There are several advantages inherent to electric method of transmitting power which render it very suitable for mining operations. With the view of contributing to a greater familiarity with electrical methods among those engaged in superintending mining operations, Mr. F. J. Rowan, in the *Transactions of the Mining Institute of Scotland*, has compiled a very complete record of the various installations which have been actually carried out. The following are the instances quoted of electrical transmission of power in mines:—(1) Pumping in Trefalgar Collieries, and at Thallern Colliery. (2) Winding, at Trefalgar, at Thibaut shaft, St. Etienne, at Péronnière Colliery, and at the Blanzly collieries. Haulage at Zankerode Colliery, and at Beuthen. (4) Ventillation at Zankerode Colliery, at Trefalgar, and St. Claude, near Blanzly. Other application illustrating generally the electrical transmission of power are referred to, and comparisons between the various systems of transmitting power are instituted. These comparisons show that electrical methods have no cause to fear competition either as regards cost or efficiency. The longer the distance and the greater the amount of power to be transmitted, the more favourably does electrical transmission compare with other systems; but for this reason it has had a worse chance in early attempts than it would have had if its efficiency were greater on a small scale of distance and power.

Discovery of Semi-Anthracite Coal in British Columbia.

—A large deposit of Semi-Anthracite Coal is reported to have been made at Martin's Creek in the Kootenay District, B.C. It is described as follows:—If the reader imagines himself walking from west to east along the trail which follows the course of the creek, he will have the steep rounded hill immediately to his left with the well defined strata of yellowish grey sandstone dipping towards him at an angle of

thirty degrees. The first coal seam which he will come to, and which is almost on the trail, is the "Peter Seam." This has been opened up by driving in a tunnel for thirty feet and then laying bare the hanging and foot walls. It shows fourteen feet of pure coal, without a sign of shale or dirt. The hanging wall is grey sandstone, the foot wall a dark shale. A short way up the hill is No. 1 seam, on which the face has been cleared away to show the walls. Here there are three feet of pure coal, lying on four feet of coal with a little shale mixed with it. Not many feet above this is No. 2 seam, on which the face has been opened so as to show the walls. Here there are five feet of pure coal lying on two feet of coal with a slight mixture of shale. About fifty feet above this is No. 3 seam, on which the face has been opened as before, and here we have five feet of good coal, mixed with a little shale here and there. Not many feet above this is No. 4 seam, showing seven feet, of which five are pure coal and the remainder coal and shale. We now descend to the trail again, and here directly on the trail itself we have the "Jubilee seam." On this a tunnel has been run in for fifty-five feet and then the walls exposed. It shows thirty feet of clean, pure coal, without a sign of shale or dirt, and below this, five feet of coal and shale mixed. About eighty feet below the "Jubilee" is another seam, showing nine and a half feet of coal. About fifty feet below this is the "William seam," which is now being laid open, and which twelve feet of coal shows above the foot wall and the ranging wall has yet to be reached. All these seams have been found within a distance of 700 yards and within a period of two months, so that it is not too much to expect that more seams will yet be discovered. The course and dip of all the seams are the same, and the strata is remarkably regular and well defined. There is no appearance of a "fault" for many miles around. In all the seams the walls are similar and the coal has the same appearance to the eye. It may be described as being very black and shining, with a brilliant resinous appearance; does not soil the fingers; brittle, but becomes harder as depth is reached; powder jet black; hardly acted upon by nitric acid; no appearance of sulphur; burns with a bright clear glow and little smoke, and leaves very little ash; has been used for pointing and tempering the "picks" with excellent effect.

Stamps and Stamps.—As an illustration of the difference between stamps and stamps, for the benefit of inexperienced investors in mining properties, the following official statements of the work of the El Callao Gold Mining Company, of Venezuela, may be of interest: The company has two mills of 60-stamps each, one built by a good firm of engineers but inexperienced in mining machinery, the other supplied by Messrs. Fraser & Chalmers, of Chicago, representing the best modern designs and workmanship. Both mills are run under one management, and the old mill has been much improved over its original condition. Old 60-stamps crushed 31,770 tons in 48½ weeks; cost, 24.60 francs a ton. New 60-stamps crushed 29,000 tons in 25 weeks; cost, 8.60 francs a ton. New 60-stamps will probably crush 60,000 tons in 51 weeks. The rock is hard gold quartz, and the above figures will show one of the little, unsuspected aids to success in mining investments, which prove that there is a difference even in stamp mills, and that economy in first purchase of machinery is not necessarily a good policy.—*E. and M. Journal.*

Journalistic "Rot."—In a voluminous issue of 21st August the *Globe-Democrat* stuffs its readers with the following rubbish under the head lines:—

A LIFE OF ROMANCE.

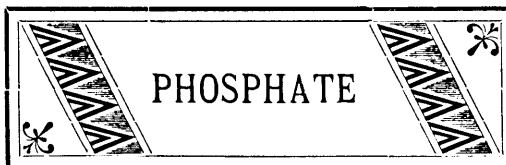
A Successful Miner who has had his Share of Adventure.

Once the Owner of the Comstock Lode.—A Quarter of a Century's Experience in Mexico, &c.

Including the portrait of the hero whose adventures we are told "almost suggest the great improbabilities of Mr. H. Rider Haggard." This romance fills three columns, of which more than two-thirds constitute, as it were, the vestibule leading to the miraculous discovery of the chief of "lost mines of Mexico," the "Realto," in the heart of the mountains of Sonora, 140 miles from the nearest railroad, worth "untold millions" as shown, we are told, by the remains there found, "ranged in a semi-circle about a clear and powerful spring which burst from living rock * * * of seventy *arastras*, the circular pit used in primitive times for the crushing of ores." And at the mines upon the cone of a mountain reached by a roadway "hewn out of the solid rock that must have cost \$20,000," were found "two enormous chambers cut out of the rock, in the quartz floors of which shafts were sunk," but these were found so "choked with drift and vegetation" that the discoverer says he had no means of exploring them; nor was any dump pile to be found. Neither does it appear that any ore was seen—or any other evidences of a mine, we repeat, than some chambers cut in the quartz, several unexplorable shafts and a semi-circle of seventy *arastra* beds. Merely upon such meagre indications, the hero of this story rushed to Gerichi and there officially announced and located the mine, and a week later was on his way to the United States, in some part of which he found a shoal of fat gudgeons out of which to form a stock company with a capital of \$3,000,000 and with a view, ultimately, out of their spare capital, to build a short railroad of only 140 miles over the mountains and barancas of Sonora. Such a cheap trifle as a 50-stamp mill with a plant of other reduction appliances, including smelting works, are to be taken out and set up at once and Mr. Power, the fortunate discoverer, left St. Louis for the Realto mine, we are further told, on the 20th August, to superintend these works, after which, we presume, he will pay some attention to the lesser detail of ascertaining whether any ore of any description is to be found: or, in other words, whether there is a mine there to be worked.

Prospecting.—When one is prospecting for quartz, writes Mr. G. C. Swallow, he wants a good eye for the indications in the rocks and for the fragments of quartz lying on the foot hills and mountain sides as he travels over them. A stray piece of good looking quartz will challenge his attention as a fragment from some lode. When such a fragment is found, the first question is, "where did it come from?" Is it water-worn and rounded, or angular with sharp corners? If water-worn or rounded it has traveled by stream or glacier, and the prospector must seek its lode above on the line of such stream or glacier. Ores have thus been traced to their source for hundreds of miles. But for gold and silver quartz in these mountains, the source of these stray specimens must be sought at the gulches on which they are

found. If the specimen has not been worn and rounded and has sharp angles, it has not traveled far from its lode, which must be sought above in the mountain side. It may be traced by following a line of like specimens up to their source. Where the line of specimens ceases, the prospector may expect to find the vein, by the croppings or other indication of the lode. If the rock is bare this part of the work is soon done; but if covered up, it must be cleaned off by sinking a shaft and following the indications, or fragments of quartz. When the lode is found, the work of the prospector is finished and the development begins. Such a discovery is called a "prospect," and the holes dug to discover it are called "prospect holes," or "prospect shafts." Prospecting for placer gold is generally more laborious; but it keeps the prospector more stationary. When he finds a gulch that suits his notions, he sinks shafts to bed rock and tests the gravel as he goes down by washing and panning it. Experience in mining and a knowledge of glaciers are most useful in prospecting a gulch and its benches or "bars" as the miners call them. It is generally very easy to prospect a "bar," but there is great difficulty in prospecting a gulch or valley where the water is abundant. There are many gulches where there is every reason to believe the gravel on bed-rock is very rich; but the bed-rock water is so abundant those gravels cannot be easily reached and prospected. To remove this water and enable the prospector to test the gravel and bed-rock, is often very expensive, as many of our miners can testify from hard experience. Expensive hydraulic machinery is sometimes necessary to remove the water. Streams and even considerable rivers are at times turned from their channels for the purpose of working the gravel and sands in their beds.



The following shipments of Canadian ore have been made from Montreal from 10th August to 3rd September, 1887:—

Date.	Shippers.	Ship.	Destination.	Tons.
Aug. 10	Lomer, Rohr & Co.	s.s. Navarro...	London	107
" 10	Wilson & Green..	do ..	do ..	235
" 10	Anglo American Phosphate Co.	do ..	do ..	150
" 10	Lomer, Rohr & Co.	s.s. Alcides...	Glasgow..	187
" 11	" ..	s.s. Berbice...	Liverpool.	120
" 12	" ..	s.s. Sootland...	London...	292
" 18	" ..	s.s. Avlona...	do ..	90
" 20	Wilson & Green..	s.s. Oxenholme	Liverpool..	704
" 22	Lomer, Rohr & Co.	s.s. Gallego...	do ..	361
" 22	R. C. Adams	do ..	do ..	133
" 22	Gillespie Paterson	do ..	do ..	147
" 24	Lomer, Rohr & Co.	s.s. Cythia...	Glasgow..	223
" 24	" ..	bar. J. Remich	Greenock..	156
" 31	" ..	s.s. Toronto...	Liverpool..	226
Sept. 3	" ..	s.s. Wash. City	London...	235
" 3	Wilson & Green..	do ..	do ..	250
			Total....	3,645

It is thought that the output from the High Rock Mine for this month will be in the vicinity of 540 tons, the greater portion of this having been mined from the large show in pit No 11, which still holds out as good as ever. The company has over 2,000 tons of first-class ore ready for shipment, but on account of the very low state of the river at present the management are unable to get their ore over the Little Rapids. Mr. Pickford, sr., with a gang of men constructed a dam at the right chute

in the hope of raising the water on the left bank which would allow their scows to get over. Their labours were, however, rendered futile by the logs from the drive which destroyed the dam, and it now looks as if the company will have to wait for rain.

The low water is also hindering the output from the North Star Mine.

There is nothing to report from the Union Mines. Work is being conducted smoothly, and the output for the month promises to be fully up to the average.

The new opening made in the beginning of the month on the south side of lot 6, at the Little Rapids property, promises to be one of the best of the many fine shows on the property. The superintendent is about to place a boiler and engine at the new opening in order to assist in the workings. An air pipe will also be run in from the Air Receiver in order to work the drills. The shipments for the month amounted to 180 tons of high grade ore.

Three shipments of ore from these mines during the present season have averaged 84.66—a highly satisfactory result. This is the best average we have yet heard of from a three shipment lot.

Mr. Jas. White, of the Geological Survey, who was injured in the tram-car accident last month at Little Rapids mines is progressing satisfactorily. He is still at the Protestant Hospital, Ottawa, under the care of Dr. Horsey, who has set the broken limb in Plaster of Paris. Mr. White hopes to be able to be removed to his private quarters in the course of a day or two. The *Review* man has now fully recovered and has resumed work.

Captain Henwood, the Superintendent of the Emerald Mine, has been the lucky finder of what promises to be an unusually fine show, for during the past month a fine vein of ore, thirty-four feet in length and four feet in width, has been uncovered. In colour it is a very light green and somewhat different to any of the ore hitherto found on the property. The output for August was 600 tons.

We are informed that work has at last commenced on the new lock and dam at Little Rapids. Such an improvement is very badly wanted, particularly at present when the water is so low that the miners are prevented from shipping their ore down the river.

English prices for high grade phosphate are firm, upwards of 1,000 tons having lately been sold at 1s. for 80 per cent. with $\frac{1}{2}$ d. per unit rise. Freights are about 6s. to Liverpool and 8s. to London.

There is nothing new to report from the mines of the Anglo Canadian Company at Otty Lake. The Du Lievre mills, at Buckingham, are grinding some of their phosphate, and succeed in taking out a good deal of mica by their bolting process.

At Blackburn's mine there is a large quantity of ore in sight. The management are making extensive preparations in timbering to secure further economy in working.

Interesting Statistics.

The following figures show the mineral exports, domestic and foreign, from 1868 to 1886:—

1868.....	\$1,440,857	1878.....	\$2,816,347
1869.....	2,093,502	1879.....	3,082,900
1870.....	2,487,039	1880.....	2,877,351
1871.....	3,221,461	1881.....	2,767,829
1872.....	5,326,219	1882.....	3,013,573
1873.....	6,471,162	1883.....	2,970,886
1874.....	3,977,216	1884.....	3,247,092
1875.....	3,878,050	1885.....	3,639,537
1876.....	3,731,827	1887.....	3,851,147
1877.....	3,644,040		

MINING NOTES.

Nova Scotia.

According to official report the following is a comparative statement of the production of coal, iron ore and manganese ore during the Province for the years 1885 and 1886:—

	1885.	1886.
Coal.....	1,352,205	1,502,614
Coke made.....	30,135	31,601
Iron ore.....	48,129	44,388
Manganese ore.....	353	427

At Bridgewater Messrs. Ramey, Mulock & Co., who have two properties containing one hundred acres, on which they have been working for some months past, have opened up two large gold-bearing leads, measuring 5½ feet and 2½ feet respectively. At least three other leads not yet developed run across the property. These properties situated as they are, right beside a main highway, only two and a half miles from Bridgewater, and with a large water-power not half a mile distant, are evidently very valuable.

New Brunswick.

The interest in manganese mining is still on the increase, and steps are now in progress looking to the final sale of the Stockton Gold Mine on Smith's Creek road, at a handsome figure.

In the Dutch Valley, on what is known as the Glebe property, Mr. W. N. Gould is making an excellent showing, and the manganese is of a very superior quality. Shipments from the property will soon be made. The owners are well satisfied with the expenditure they have made in this locality.

Major Markham, of the Markhamville Manganese Mines, still continues to ship large lots of this material to the United States and English markets. The Major is well-known in mining circles, and takes a deep interest in all mining matters of a satisfactory nature.

Dr. A. H. Chandler, of Dorchester, N.B., in connection with some friends, is making very satisfactory developments on a gold property at Renfrew. The specimens they have on exhibition are certainly of a very valuable nature, and bid fair for the opening of a remunerative mine.

A preliminary examination of the silver and lead mine at Elm Tree, in Gloucester County, N.B., has recently been made, with a view of placing it into the hands of capitalists. The chances are that this property may yet pan out in good shape.

The work on the New Ireland Copper and Silver Mine in Alberta County is still continuing. An examination of the property has recently been made by a competent expert connected with one of the prominent gold mines in Nova Scotia. The prospects are, it is said, good for a sale being affected.

A Mr. McLean, of Charlotte County, has lately acquired and partially developed a large body of iron pyrites in that County, said to be suitable for the manufacture of sulphuric acid. If this be correct, Mr. McLean should not have much difficulty in disposing of the same at a good figure.—*Critic.*

Quebec.

Operations at the Asbestos mine, have been steadily carried on since our last, and the output will exceed previous years. Nearly all the output is contracted for and prices remain firm. Prices on No. 1 range from \$75 to \$80 per ton at mines.

Reports of a highly satisfactory nature continued to reach us from British and Canadian Mica and Mining Company's mines near Buckingham. Three new veins have been opened since our last issue, and these are yielding an unlimited quantity of mica of perfect transparency. One great advantage in working these valuable mines is found in the fact that all labour is carried on within the solid walls formed by the rocks, so that work is prosecuted day or night, winter or summer, with about equal advantage. Nor is there any hindrance from rain or snow, nor yet from surface drainage. Winter and summer the mine is dry. Another great economy is found in the fact that there is no heavy hauling, two horses doing all the work necessary. Mr. Key, an American miner of great experience in mica mining in the United States, has been appointed superintendent of the mines. Mr. Von Rehn, the manager, reports that his office is kept unusually busy just now filling large fall orders for home and foreign consumers.

Mr. Edward Wright has just returned from a visit to his silver mine on the Temiscamingue. A rich vein of ore has been struck and 300 tons mined. Smelting works have been erected and will shortly be in operation.

Ontario.

The annual general meeting of the shareholders of the Austin Mining company (limited) will be held at the office of the company, Ottawa, on Tuesday afternoon, 27th instant.

The work at the Bristol Iron Mines for the past month is only preparatory to a large output, and so far the work is done with a small force, pending the finishing of two of the Taylor-Langdon calcining furnaces, which are expected to be completed in six weeks, but the work of mining is nevertheless most satisfactory, for about 2,000 tons have been taken out presenting a splendid lot of ore. At present, besides sinking the shaft, three drifts are being opened out down the shaft, at a distance from each other of about 16 or 20 feet, and all through a mass of solid ore on each side. The new air compressor does its work most efficiently. Mr. Anderson, an expert from W. J. Taylor's Ore Calcining & Smelting establishment, Chester, New Jersey, is at present superintending the erection of the two furnaces, which, when completed, will roast from 80 to 90 tons per day of ore, and at a cost of not over 50 cents per ton. Mr. Anderson is surprised at seeing the quantity of ore exposed, and when it is treated

in the furnaces he is erecting will leave it a very rich ore for Bessemer steel. The ore is very easily worked with drills, as it is soft and friable. Mr. Barlow, of the Geological Survey, has recently been doing work for his department about the vicinity of the mines, and Mr. Obalski, the Quebec Government Mining Engineer, has also paid the mine a visit and proposes returning again shortly. The Bristol Mining Company propose shipping about 10,000 tons during the coming winter to Prescott or Brockville, to be forwarded to market early in spring. From 5,000 to 6,000 tons of ore are now at the pit's mouth.

This company with a capital of \$200,000 has made application to Parliament for Letters Patent of Incorporation.

Port Arthur District.

Rich ore is being taken out of the Rabbit Mountain Mine at a depth of 270 feet.

Some very rich specimens have recently been taken from the Ottawa Mining Company's location. There are no less than three veins of ample dimensions showing both native and sulphide of silver. The superficial developments so far show numerous veins well situated for mining purposes.

At the Atvic Lake Mines, the property of Mr. W. A. Allan, Ottawa, a well defined vein of ore is now clearly shewn. In No. 1 shaft, which has already been sunk to a depth of over 20 feet, an assay has given 511 ounces to the ton. No. 2 shaft, three-quarters of a mile from No. 1, shews a vein carrying silver ore and native silver. There is every inclination that this will turn out a very valuable property. Silver and iron prevail throughout the entire district.

The Corporation of Port Arthur has decided to exempt from taxation a sampling mill for testing ore to be erected shortly by capitalists interested in the district.

The total value of the products of the Beaver Mine for the past two and a half months, in smelting ore and concentrates from the mill, is \$93,000. This may be relied on as being authentic.

Mr. F. A. Keefer's mining office, is daily visited by large numbers of tourists from the United States and various parts of the Dominion. Here can be seen substantial evidences of the value of the mines and mineral locations of the country, and files of local papers and mining journals with articles of interest on the resources of the district.

During the past month the mines were visited by Dr. Selwyn, Director of the Geological Survey of Canada. At this time when so much attention is being directed to the vast mineral wealth of this neighbourhood, the opinion of so eminent authority cannot fail to be of much interest to our readers; we have, therefore, no hesitation in reproducing the following excerpt from a letter written by him to Mr. T. A. Keefer, of Port Arthur:—

"As you are aware I had visited this district on two previous occasions, the last being in the autumn of 1885, when I was at the Silver Mountain mine. At that time there was not much being done and the veins had not been opened sufficiently to afford any opportunity to ascertain their true character, and I hesitated then to

say more than that the vein matter looked exceedingly promising. Now, however, I have no hesitation in expressing my conviction that this region is traversed by a great series of true fissure veins, of most promising appearance and many of which will most certainly prove of immense and permanent value.

"The features of the veins are especially well illustrated in the workings of the Beaver, the Rabbit Mountain and the Porcupine mines; but there seems no reason whatever why the numerous parallel veins which occur under precisely similar conditions, but on which at present only small openings have been made, should not develop into mines as rich as those above named and now being successfully worked. The 'New Porcupine,' the 'Silver Creek,' the 'Elgin,' and the 'Little Pig' all present most promising indications, and there are doubtless many more yet to be discovered in the large area in the district as yet almost unexplored and covered with forest and deep soil. In any case sufficient is now known to warrant the assertion that this region presents all the natural conditions for the development of an immensely valuable and extensive mining industry awaiting only the application of well directed energy and enterprise in order to secure results exceeding perhaps the most sanguine anticipations.

"As regards the ores of the mines above named and now being worked, their richness is such that it does not require to be demonstrated by assays, but the recent critical examination of the Porcupine mine ore by Mr. Brady may be referred to as particularly satisfactory, because it conclusively shows that the silver is distributed in all parts of the vein. Mr. Brady, I understand, broke samples indiscriminately from seven different places covering the length of the vein, and these separately assayed gave from 6 ozs. to 600 ozs. to the ton, and an average of the whole of 155 ozs. per ton.

"The softness of the country rock—a flat bedded, black argillite—and the generally well defined walls of the veins, make the cost of extraction comparatively small, a feature the importance of which is only fully recognized when the 'lead ground' or 'pinches,' incidental to all mineral veins, have to be traversed."

The mineral exhibit sent from the Port Arthur District to the Toronto Exhibition included iron, lead, gold, silver, copper ores, sandstone and marble; and of these the quality has proved to be of an excellent character. In common with other Canadian iron ores, the Algoma is said to be better for the making of the finer classes of iron and for the manufacture of steel than those of the American mines. Some of the samples shown assayed 68 per cent. and were remarkably free from titanium. Among the copper ore exhibits was one from the Sudbury mines, which are said to be among the richest in the world. The lead ores from Mr. Duncan McEicham's location at Black Bay were exceedingly rich and carried \$20 in silver to the ton of melted ore. There were five nuggets of silver from the famous Beaver mine weighing 700 lbs., and assayed to value nearly \$2,000. One piece alone weighed 265 lbs., having a value of \$262.50. These, with other specimens from Rabbit Mountain and the Silver Mountain mines, made the largest and most valuable display of silver ore ever shown in Canada. The gold ore specimens from the Lake of the Woods country in the vicinity of Rat Portage, were said to carry a large per centage of silver. Specimens of brown sandstone and marble from Nepigon, near Port Arthur, were to be seen in the rough, dressed and polished states. The sandstone shows qualities of a high order under the most severe tests, and is claimed to be, for building purposes, superior to anything on the continent. It is to be found in seemingly inexhaustible quantities. The marble admits of a high polish, and one of the beds is said to be a mile and a-half long and thirty feet deep. The excellence of the exhibit was very much admired.

Manitoba and North-West Territories.

The property owned by the Saskatchewan Coal Mining & Transportation Company will be sold at Winnipeg by public auction on 27th

inst. It is situated at Stair Station on the line of the Canadian Pacific Railway, about eight miles west of Medicine Hat. The title to the land is under grant from the Crown direct to the company, and the land itself is sold subject to a mortgage for \$3,200, payable at any time before the 1st day of June, 1888, with interest at 7 per cent. half-yearly in the meantime. There is no incumbrance on the houses or other property. The Saskatchewan soft coal is well and favourably known in the Province of Manitoba and the North-West Territories, and a very large quantity has been taken from this mine since it was opened. The terms and conditions are 20 per cent. on the day of sale, and the balance within thirty days.

Mr. McLeod Stewart, Mayor of Ottawa and one of the proprietors of the Anthracite Mine at the Rockies, in a conversation with a representative of the Review, stated that at present there were 150 men employed in the mines, and from 150 to 175 tons of coal were being turned out daily. Some delay had occurred in laying the iron rails into the different chambers of the mine, but as soon as this work was completed the company would be in a position to turn out up to 500 tons a day; in fact the capacity for producing would be almost unlimited and fully equal to any demand. No. 1 seam is 9 feet wide, 7 feet of which is solid coal. No. 2 seam, which is a six foot lead, is increasing both in width and quality of coal as the miners penetrate. Already it has been pursued 500 feet at an angle of 32 degrees. Forty-five car loads of coal are now at Port Moody awaiting shipment to San Francisco in boats. Mr. Stewart says the company will probably be able to sell on the American Pacific Coast at \$11 a ton, which is two or three dollars cheaper than American coal has been sold there for. The price has been known to be as high as \$20 a ton. As to what the people of San Francisco think of the coal, Mr. Stewart exhibited the following certificate of G. A. Luckhardt, one of the best known experts along the coast: "Upon examination and special quantitative analysis of your coal marked 'Canadian Anthracite Coal Company,' from Anthracite, N.W.T., Canada, I find that the coal is what is termed a free burning Anthracite coal, averaging with Pennsylvania coal. It is a good steam coal, and excellent for house and domestic purposes, containing a little sulphur." Mr. Stewart said that while west the Hon. Thomas White had visited the mine and expressed the greatest surprise and satisfaction at the results being obtained. He had no conception the mines were so extensive, and the general outlook so good. Mr. Stewart further stated that an extensive boarding house had been erected at the mine, and that he had just shipped a large quantity of furniture from Winnipeg for fitting it up. Mr. Inglis, the former Stewart of the Rideau Club, Ottawa, has been appointed manager of the boarding house. Engines and revolving screens have been ordered and will be soon in position. Mr. R. C. Luther, of Pottsville, Pa., is Consulting Engineer.

A contract has been closed with the C. P. R. company to deliver at Vancouver for the San Francisco market 1,800 tons of the Canada Anthracite Company's coal. This is regarded as the inaugural shipment to that city—others will follow in rapid succession. It is believed that a regular fleet of colliers will be established between Vancouver or Port Moody (for it is on the boards to make Port Moody the headquarters of the shipping trade) and San

Francisco and other coast cities and towns. A thorough test has been made of this coal at the request of the Government of the Dominion, and it has been found to equal many of the best and most popular brands of the Pennsylvania article. Special transportation rates have been agreed upon by both the railway and the owners of the mines at Banff.

British Columbia.

Work at the Island Mountain Mine, Barkerville, is progressing quickly. The framework for the mill has been completed at the mine, the ledge has improved greatly, and the outlook is reported cheering.

"We are pleased," writes the *Colonist*, "to learn from Big Bend that three contiguous mineral claims in that promising locality are to be thoroughly tested. The locators of these claims have entered into an agreement with some well-known capitalists by which these latter undertake to sink shafts, etc., at their sole cost for eighty days; if the result of this test should be satisfactory they will pay \$4,000 in cash and develop the mine, at their own charge, by mill and appliances; they will then be entitled to three-fifths of the property, with the option of buying the locators' remaining two-fifths for the sum of \$20,000 at any time before the 31st December, 1888. This appears to us to be an excellent arrangement and we trust it will result in the development of a highly remunerative claim."

The same authority has been informed of an extraordinary gold-bearing lode at Albert Canyon, a C.P.R. station on the Illecillewaet. The locator declares that it has a width of *twelve hundred feet*, and that he has had assays made giving \$15, \$16 and \$20 a ton. The pieces were in all probability picked; if the ledge will yield on an average anything like these results, the location, on account of its position on the C.P.R., will become of enormous value.

A correspondent who has lately visited the recent find of Semi-Anthracite coal in Kootenay District, referred to in another column, writes:—

"I found very good work has been done here and the results are agreeably surprising. On one seam they are in fifty-five feet, with a shaft sunk from the hanging to the foot wall, a distance of thirty-five feet. Of this there are thirty feet of solid coal without a flaw in it. Then comes a bed of five feet of coal and shale mixed. Another seam near the former has twelve feet of solid pure coal. All these seams are superposed, one above the other, at distances varying from a hundred to forty feet apart. They are all opened up, showing the hanging and foot wall. The coal appears to be much of the same quality throughout. It is of a bright black and shining appearance, hardly soils the fingers when touched and makes a brilliant clear fire, with a smoke more like wool than ordinary coal. Near the surface it is very brittle, but becomes harder further into the seam. No signs of sulphur can be detected. It is used here for the hardening of the picks and answers the purpose admirably. It lies between sandstone walls, and there are strata of clay and ironstone. These are very regular for miles around and look as though they had been ruled with lines. All now depends on the quality of the coal, there is no doubt about the quantity."

The *Colonist* understands that it is the intention of the East Wellington Coal Company to at once commence the sinking of a second shaft on their coal property at East Wellington. The second shaft will be sunk further up the valley than the present shaft, and nearer the South Wellington colliery. A line is being surveyed to connect the new shaft with the present line of railway.

The diamond drill of the Vancouver Coal Company, in charge of Mr. John Hamilton, is making very good progress. It is now down about 360 feet, and is still going down.

In the Big Bend district the placer mining on McCullough, French, Smith and Cairnes creeks had been seriously retarded by the unusually high water, but the o'lock now is better than ever, and the resumption of work on a large scale in the French Creek Tunnel Company's claim, now controlled by Montreal, Toronto and New York capitalists, has done much to restore confidence on that creek. The tail-race was cleaned up last week and showed very satisfactory results. Referring again to the development of quartz ledges nothing can be done to good advantage until a good waggon road is built from the steamboat landing to the mouth of French creek, about

twenty-two miles, and a vessel put on the river.

On Wild Horse creek eighty-five Chinamen are at work. A Chinese company purchased the mining ditch for five or six thousand dollars from white men, and are now taking out \$10 per day to the man.

At Perry creek, twenty miles from Cran book, a company of enterprising men are endeavouring to master the obstacles to successful mining on that creek. The quicksands and slum have heretofore prevented bed-rock being reached, but it is thought that the present means adopted will overcome this.—*Colonist*.

The Perry Creek Gold Mining Company has been incorporated to work a highly auriferous bed in the vicinity of Perry Creek, Kootenay

District. The gravel of the shaft now being sunk contains everywhere course gold. A space of four feet square has yielded \$90 in course gold.

**VALUABLE
Farm Lands for Sale
IN MANITOBA.**

2560 Acres of Splendid Prairie Farm Lands, Class 1.

The Manitoba and Northwestern Railway runs through the district in which these lands are situated.

Section 3	14	23	640 Acres.
" 15	14	23	640 "
" 17	14	23	640 "
" 19	14	23	640 "

Title direct from the Crown. Well settled districts surround these lands and good roads to them. Terms of payment reasonable.

APPLY THIS OFFICE.

*A paper read before the American Institute of Mining Engineers, at Scranton, February, 1887.

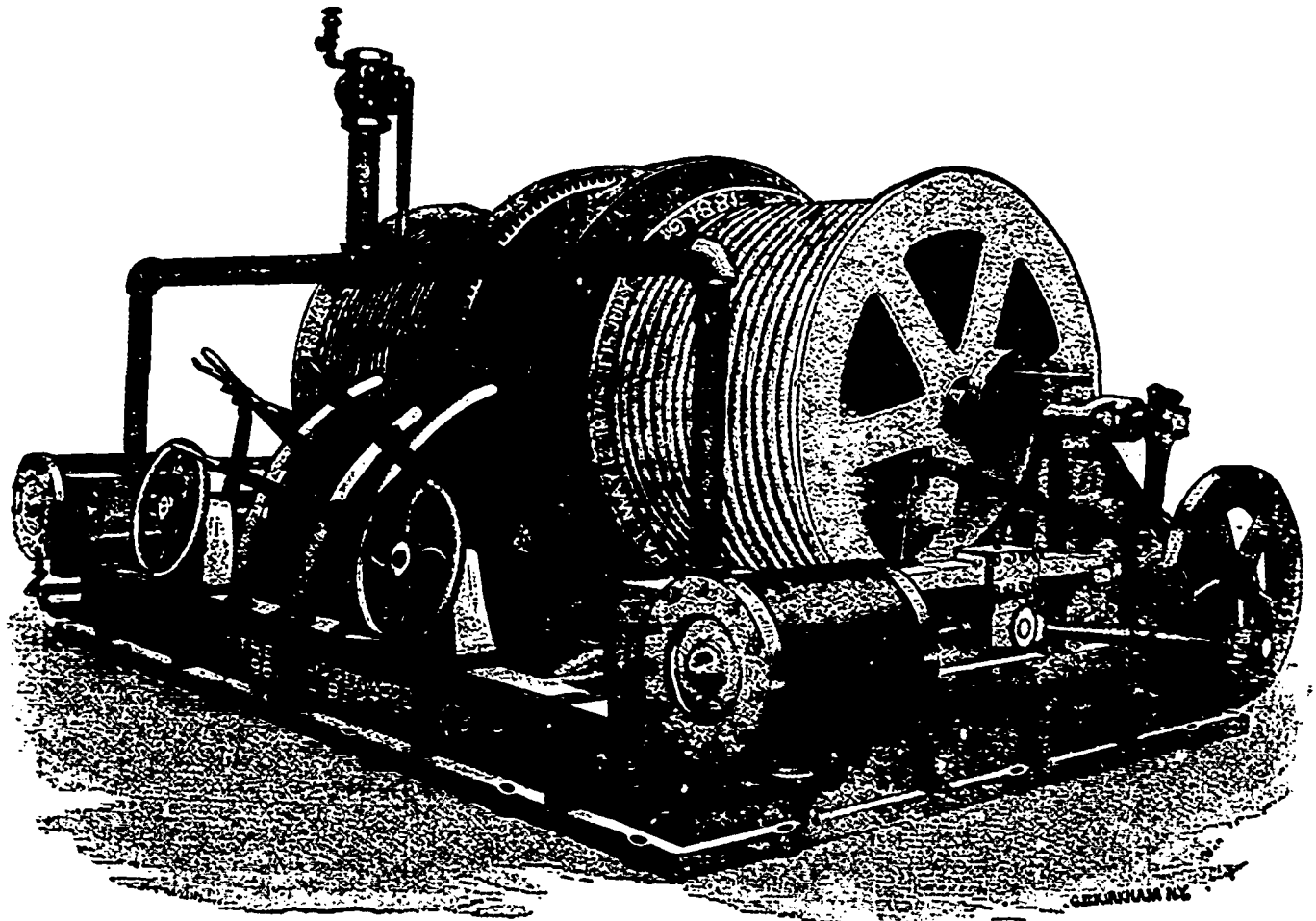
†Some coke recently obtained from the inner and older veins, lying nearest to the Cascade mountains, has

a firmness and hardness equal to that of Connelsville. My authority for this is Mr. Williamson, of Seattle—an old and experienced foundryman, who has for many years used Connelsville coke, for smelting iron.

‡Taking the cordilleran axis for our guide, the dividing line passes at its greatest northing near Behring Straits, within 23 degrees of the pole.

Lidgerwood Manufacturing Company's Hoisting Engine.

We present on this page an engraving of the Double Cylinder Reversible Link Motion Double Friction Drum and Brake Hoisting Engine, manufactured by the Lidgerwood Manufacturing Company, whose works are at Brooklyn, N.Y., and Offices and Salesrooms at 95 Liberty Street, New York. This is but one of the many styles of hoisting engines, for mining purposes, manufactured by this company, and is specially recommended for use in connection with the tail rope system, double track inclines or double compartment shafts. Both drums are loose on the drum shafts and are entirely independent of each other in operation. They may be thrown in and out of gear with the engines in motion, either separately or together, or one drum may be lowering while the other is hoisting; or both drums may be thrown into gear and the engine used as a regular reversible engine, one load being hoisted while the empty cage is being lowered.



LIDGERWOOD MANUFACTURING CO'S IMPROVED HOISTING ENGINE.

The obvious advantage of this style of engine for the tail rope system is evident, for as one drum being thrown into gear winds up the main rope, the other drum being out of gear and loose on the shaft pays out the tail rope; while, by reversing the engine, the tail rope is wound up and the main rope paid out. This is done with the minimum of friction and wear on the engines. The same independence of drum action is also very desirable at times on inclines or in mine shafts, under either of which conditions the engines will work with perfect satisfaction. In general design the engine is solid and compact, and is intended for high speed and large hoisting duty. The patent friction drums are of large diameter and spirally grooved for wire rope. They are simple, durable and effective. These engines are fitted with powerful band brakes on each drum, which are applied preferably by hand wheel and screw, or by the ordinary foot lever, if so desired.

The Canadian Anthracite Coal Co.

LIMITED.

Miners & Shippers of Coal.

McLEOD STEWART, Prest., J. G. THORP, Vice-Prest.
 OTTAWA, CANADA. EAU CLAIRE, WIS.
 A. PUGH, General Manager, W. B. SCARTH, Secretary,
 ST. PAUL, MINN. WINNIPEG, MAN.
 O. H. INGRAM, Treasurer,
 EAU CLAIRE, WIS.

Mines at Anthracite,
 N. W. T., CANADA. v-1-1y

McINTYRE, LEWIS & CODE,
 Barristers, Solicitors & Notaries Public.

Conveyancing of Properties and Mineral Rights.

OFFICES: - - - UNION CHAMBERS, OTTAWA.
 (Adjoining Canadian Mining Review Office.)

ALEX. F. McINTYRE. | TRAVERS LEWIS. | R. G. CODE

WOLFF & COTTON,

Provincial Land Surveyors,

ONTARIO AND QUEBEC.

OFFICE:—52 ELGIN STREET, OTTAWA.

(Opposite Russell House.)

WM. HAMILTON MERRITT, F.G.S.

Associate Royal School of Mines, &c.,

Mining Engineer and Metallurgist,

Will report on Mines and Mineral Properties.

ADDRESS:

15 TORONTO ST., TORONTO, ONT.

BUTLER, BREED & CO.,

129 STATE STREET,

BOSTON, MASS., U.S.A.

COMMISSION MERCHANTS,

FOR THE SALE OF

CANADIAN PRODUCTS & MINERALS.

JAMES HOPE & CO.,

BOOKSELLERS,

Stationers, Bookbinders and Printers,

OTTAWA.

FOR SALE.

VALUABLE

Copper Mining Properties

— IN THE —

Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
- 2nd. Sherbrooke Mine, part Lots 12 and 13,
 R. 7 Township of Ascot..... 329 "
- 3rd. Belvidere Mine, part Lots 9 and 10, R.
 9 and 10, R. 8 Ascot 292 "
- 4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within 1½ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only 2½ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Caruncle Hill Mine, Lots 2 and 3 R. 14, and
 2, 3, 4 R. 15, 718 acres. Same class of ore as is found
 in the Ascot properties above described, but yielding a
 higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, ¼ Lot 25 R. 12, 50 acres, with
 dwelling houses, smith's shop, ore sheds and office, large
 winding and pumping steam engine, with boiler, winding
 and pumping gear, and about forty fathoms Cornish lift-
 ing pumps complete, railway tracks, ladders, etc., situated
 three miles from Grand Trunk Railway. A consider-
 able amount of mining work has been done at this mine.
 A well defined vein richly charged with vitreous purple
 and yellow sulphurets of copper traverse the entire
 length of the property, five feet in thickness, yielding 8
 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This prop-
 erty for the most part is unexplored, but copper is found
 on the greater part of the property. On one of the lots
 a vein about twenty feet in width has been found.
 Samples of the ore have yielded as much as 22 per cent.
 of copper, being also rich in sulphur. Other samples of
 pyrites from the same property, free from copper, have
 yielded as high as 48 per cent. of sulphur. The only
 drawback to this property is in its distance from the
 railway, it being about four miles from Garthby Station,
 Quebec Central Railway. A new line is chartered,
 however, which, when built, will run directly through
 the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler,
 pumps and appliances. Within three years after this
 mine was first opened it produced nearly \$500,000
 worth of copper. It is situated about half a mile distant
 from the stations of the Grand Trunk and South Eastern
 Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
- 10th. Bolton Mine, two miles from Eastman Station,
 Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

WM. FARWELL,

SHERBROOKE, P.Q.,

CANADA.

PEERLESS OILS

FOR MINERS' USE ARE UNEQUALLED.

"PEERLESS CYLINDER OILS!"

"610 CYLINDER OILS!"

"PEERLESS ENGINE OILS!"

WE! "ELDORADO ENGINE OILS!"

LEAD! "PEERLESS MACHINERY OIL!"

OTHERS! "PEERLESS SHAFT & BOX GREASE!"

FOLLOW US! "COTTON WASTE, ALL KINDS!"

TRY A SAMPLE! "SAFETY OIL TANKS!"

WILL SEND FREE! "MINERS LAMP OILS!"

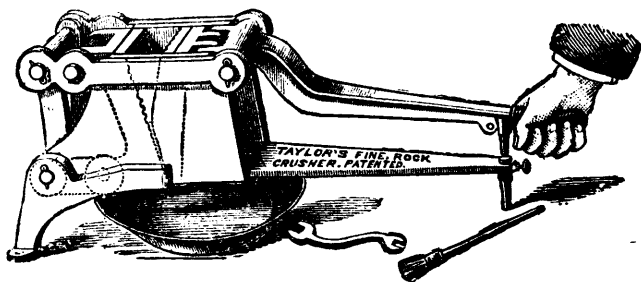
TO ANY ADDRESS! "DRILL OILS!"

Telephone or Write

THE SAMUEL ROGERS OIL CO'Y,

RUSSELL BLOCK, OTTAWA,

N.B.—"Sole Manufacturers of the above brands."



TAYLOR'S LABORATORY ROCK CRUSHER.

The Assayers and Chemists' Friend.

PRICE COMPLETE, - - - - - \$25.00.

Manufactured and sold by

NEW YORK METALLURGICAL WORKS,

E. N. RIOTTE, MANAGER.



Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

LIDGERWOOD'S HOISTING ENGINES.

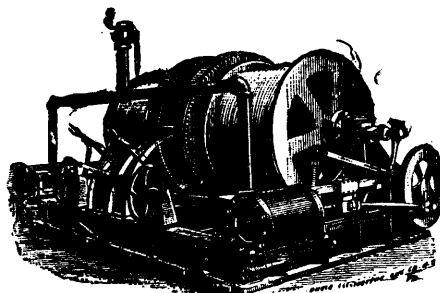
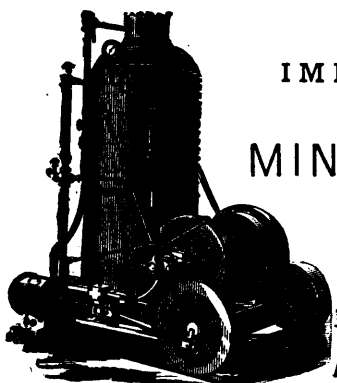
—ALSO—

IMPROVED BOILERS,
SPECIALLY ADAPTED FOR
MINING PURPOSES.

CONTRACTORS,

Electric Lighting, Pile Driving, Dock Building
Excavating, &c., ALL SIZES.

New catalogues now ready.



Double Drum Friction Mine Hoist.

Lidgerwood Manufacturing Co. 96 Liberty St. New York.

FOR SALE
GROUND MICA.

Ten Tons Finely Ground
PURE WHITE
MUSCOVITE MICA.

APPLY AT OFFICE

CANADIAN MINING REVIEW.

A. R. WILLIAMS,

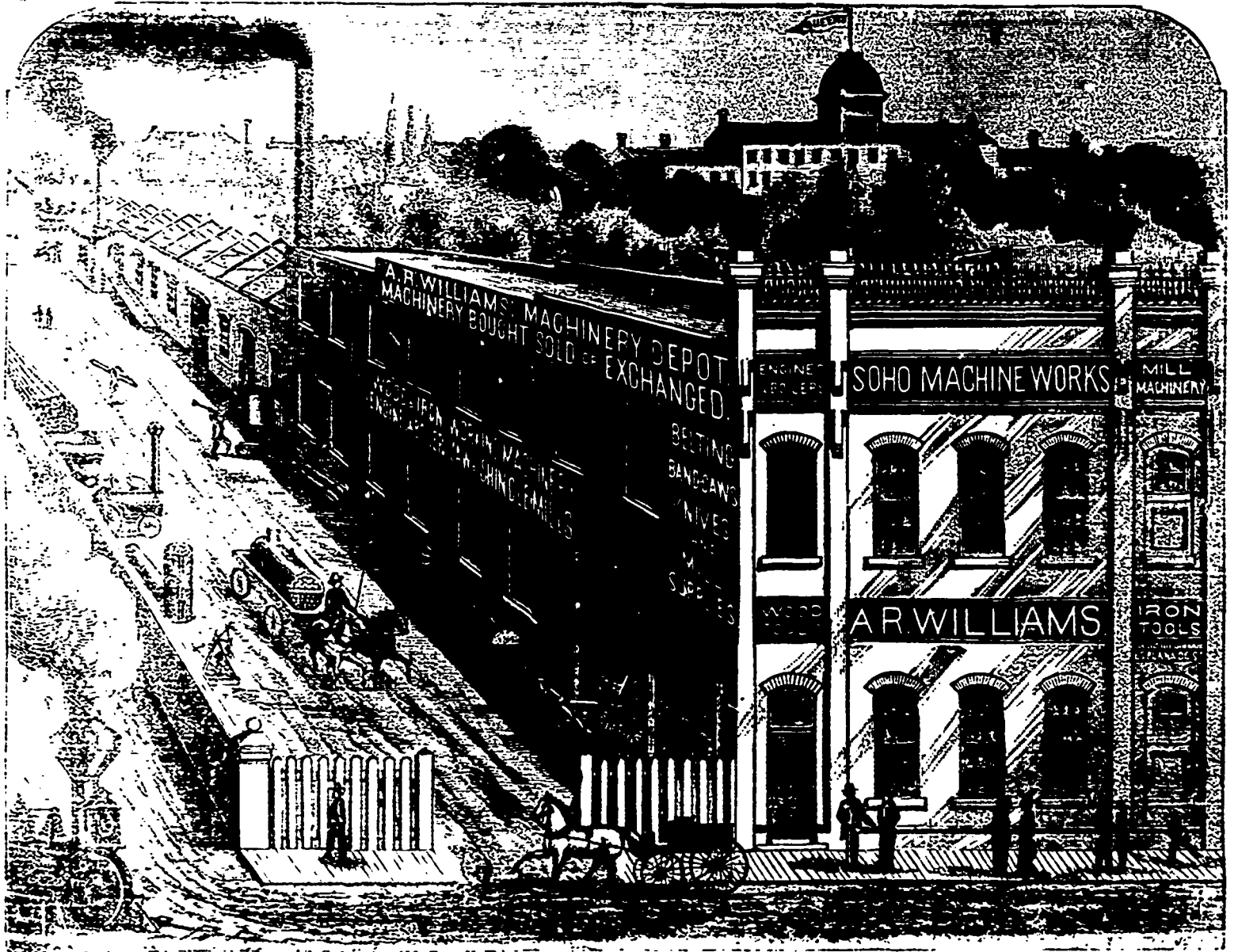
DEALER IN

Engines, Boilers, Derricks, Steam Pumps and Mining Outfits,

WOODWORKING & IRONWORKING

MACHINERY,

AND GENERAL SUPPLIES.



SOHO MACHINE WORKS,

ESPLANADE STREET (NEAR UNION STATION),

TORONTO, ONTARIO, CANADA.