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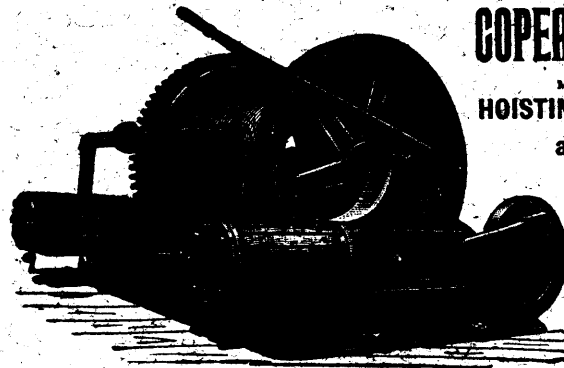
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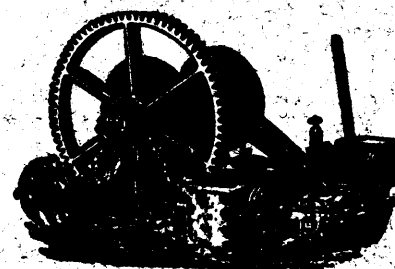
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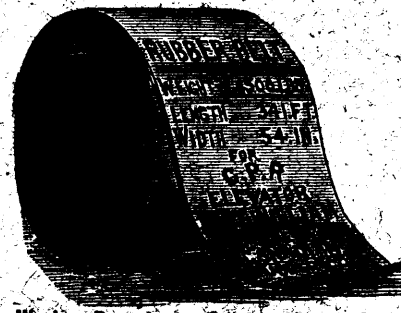
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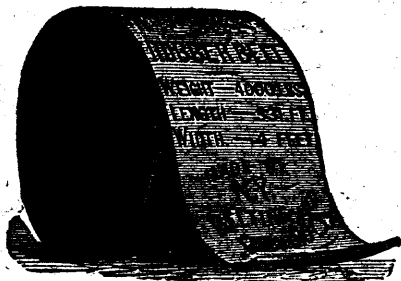
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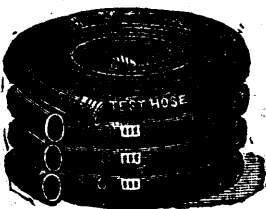
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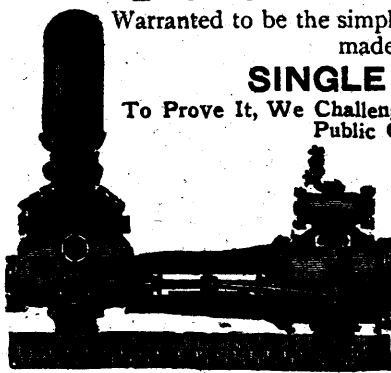
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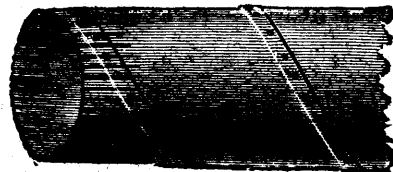
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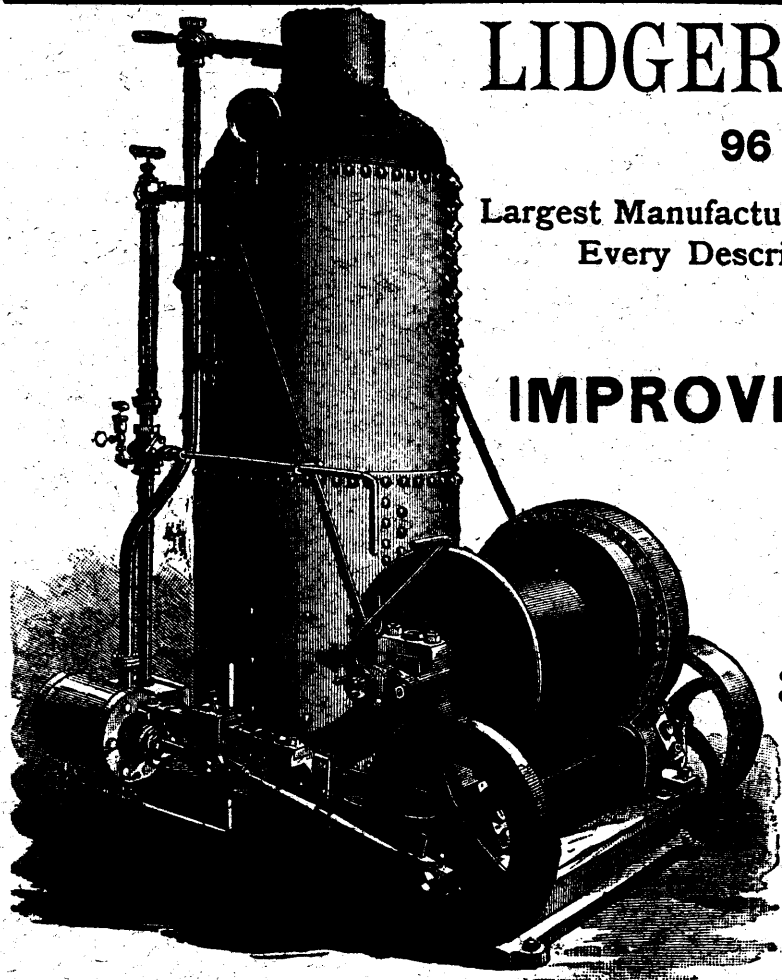
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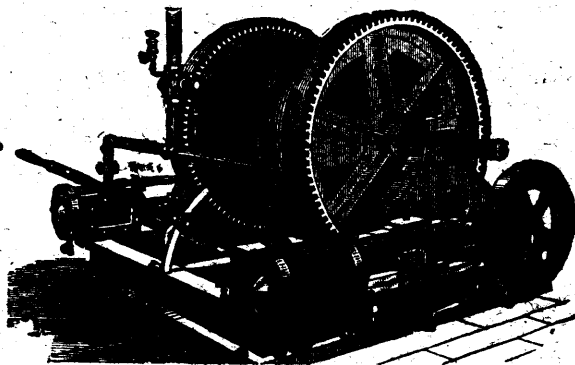
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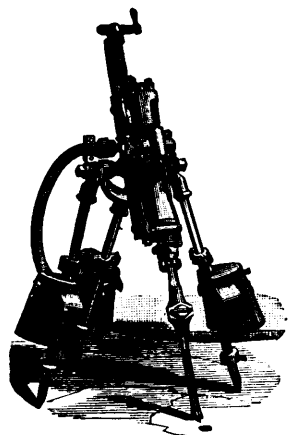
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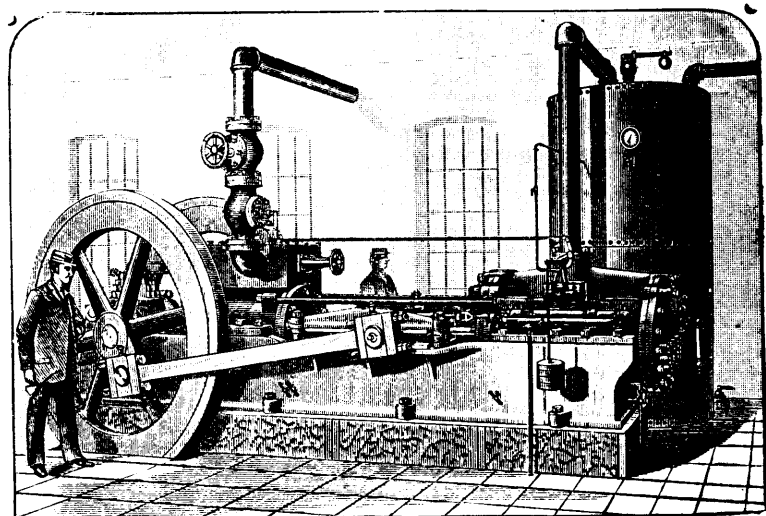


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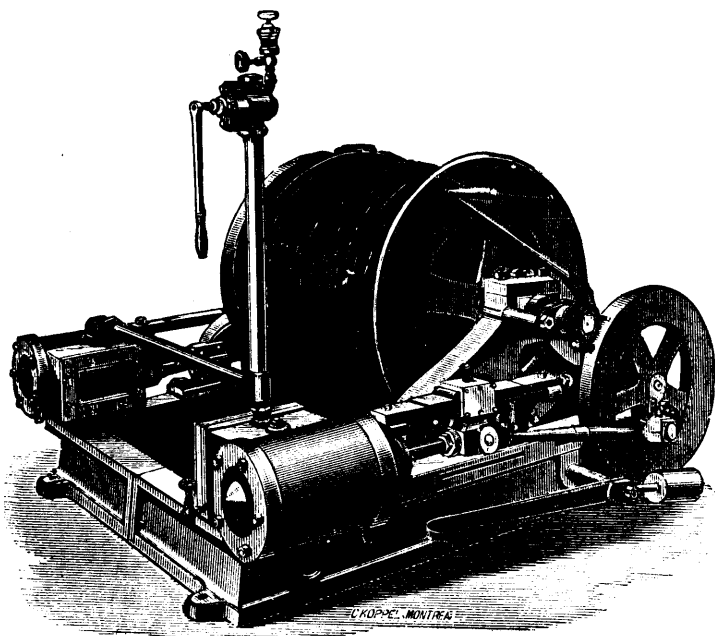


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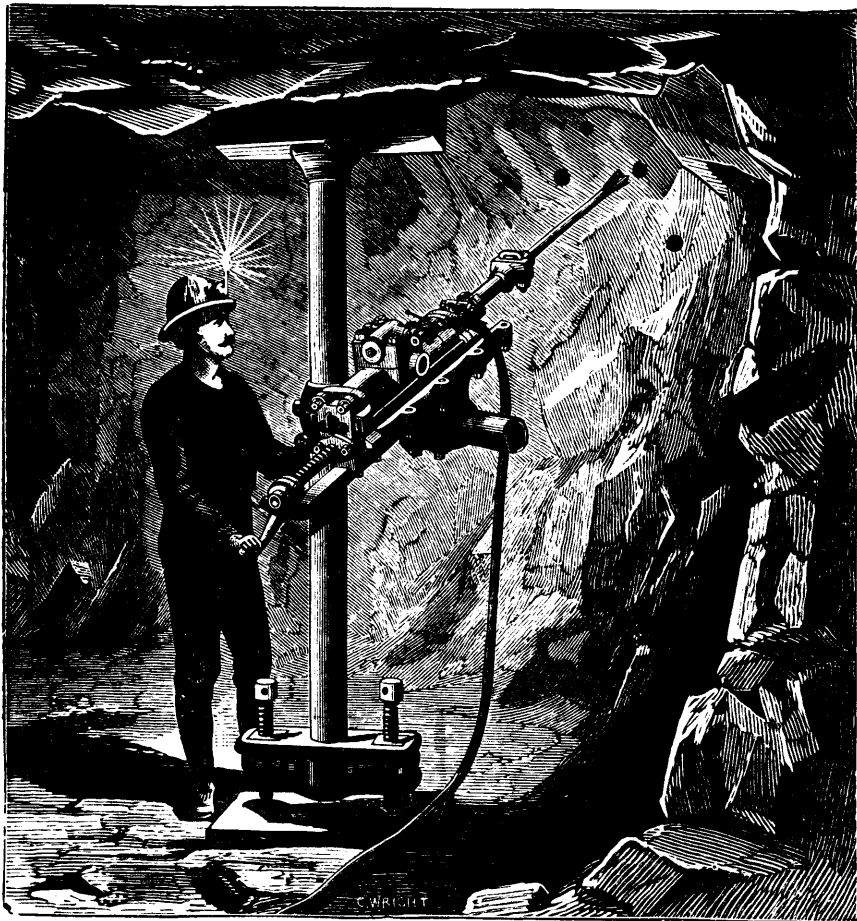
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Mining Regulations.

The following summary of the principal provisions of the General Mining Act of the Province of Ontario is published for the information of those interested in mining matters in the Algoma District, and that part of the Nipissing District north of the Mattawan River, Lake Nipissing and French River.

Any person or persons may explore for mines or minerals on any Crown Lands surveyed or unsurveyed, not marked or stake out or occupied.

The price of all lands sold as mining locations or as lots in surveyed townships is two dollars per acre cash, the pine timber being reserved to the Crown. Patentees or those claiming under them may cut and use such trees as may be necessary for building, fencing or fuel, or for any other purpose essential to the working of mines.

Mining locations in unsurveyed territory shall be rectangular in shape, and the bearings of the outlines thereof shall be due north and south, and due east and west astronomically, and such locations shall be one of the following dimensions, viz: eighty chains in length by forty chains in width, containing 320 acres, or forty chains square, containing 160 acres, or forty chains in length by twenty chains in width, containing 80 acres.

All such locations must be surveyed by a Provincial Land Surveyor, and be connected with some known point or boundary at the cost of the applicant, who must file with application surveyor's plan, field notes and description of location applied for.

In all patents for mining locations a reservation of five per cent. of the acreage is made for roads.

Lands patented under the Mining Act are free from all royalties or duties in respect to any ores or minerals thereon, and no reservation or exception of any mineral is made in the patents.

Lands situated south of the Mattawan River, Lake Nipissing and French River are sold under the Mining Act at one dollar per acre cash.

Affidavits showing no adverse occupation, improvement or claim should accompany applications to purchase.

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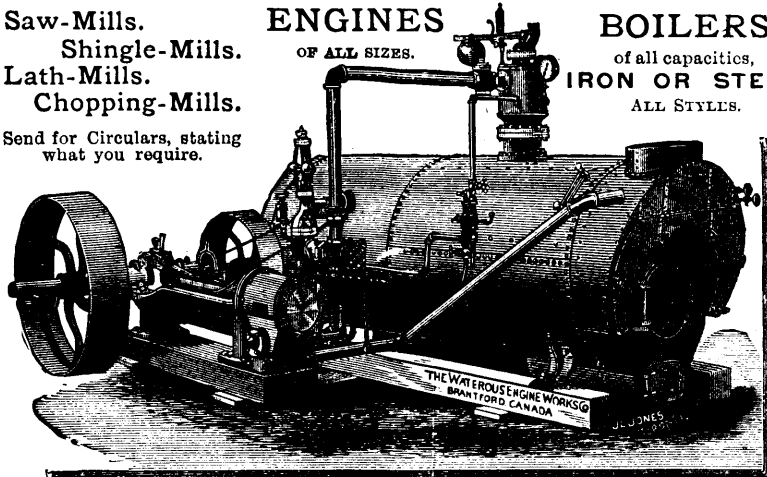
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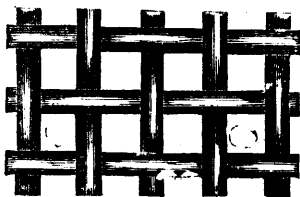
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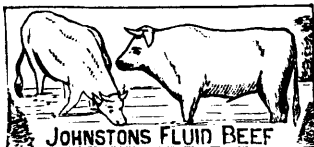
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ALEXANDER CAMPBELL,
Annapolis Royal, N.S.

Handling Rock.—A cubic yard of hard rock in place or before being blasted will weigh about 1.8 tons, or 150 lbs. per cubic foot, if sandstone or conglomerate; if good compact granite, gneiss, limestone or marble, 168 lbs. per cubic foot, or 2.0 tons per cubic yard. A cubic yard of any of these in the solid will, when broken up by blasting, for removal by wheelbarrows or cars, increase 0.8 or ¾ in bulk, whereas average earth, when loosened, increases to but about 1.2 or 1½ of its original bulk, when in place; although after being made into embankment it eventually sinks into less than its original bulk. In estimating for earth, it is assumed that ¼ of a cubic yard in place is a fair load for a wheelbarrow. Such a cubic yard will weigh on an average 2,430 lbs., or 1.09 tons. Therefore 2¼ or 174 lbs., or 2.31 cubic feet is the weight of a barrow load. Assuming that a barrow of loose rock should weigh about the same as one of earth, we may take it at ¼ of a cubic yard, which equals 4¼ or 177 lbs. or 2 cubic feet of loose rock. The quarrying of average hard rock requires from ¼ lb. to ½ lb. of powder per cubic yard in place. But the nature of the rock, the position of the strata, etc., etc., may increase it to ½ lb. or more. Soft rock frequently requires more powder than hard. A good churn drill will drill from 8 to 12 feet in depth, of holes averaging 2½ feet deep and two inches in diameter, per day, in average hard rock, at from 12 to 18 cts. per foot. A cart load of rock may be taken at ⅓ of a cubic yard in place. This will weigh, on an average, 851 lbs., or but 41 pounds more than a cart load of average soil.

Quartz as an Insulator.—At the Physical Society, recently, in London, Mr. C. V. Boys read a paper on the insulating properties of quartz, which, it appears, are far higher than those of glass, while the former material has the enormous advantage of being practically non-hygroscopic. Since, moreover, the quartz, when once it has been melted, can be worked very much more easily than glass, this discovery of Mr. Boys ought to prove of great value in the construction of electrostatic instruments. Mr. Boys stated that even if the quartz was dipped into ammonia, or boiled in a solution of potash, it only required washing with water to completely restore its insulating properties, and when it was raised to a red heat these properties were recovered on cooling. Some quartz, which the author kept for a considerable time in fused potash, did lose its insulating properties to a certain extent, as was to be expected; but even after this treatment the quartz remained a better insulator than glass.

Removal of Ice in a Down Cast Shaft.

—The ventilating machine used in the coal mines at Zanckerode, in Saxony, send down about 80 cubic metres of air a minute, which, in winter, forms masses of ice near the foot of the shaft. Until recently this formation was removed by the night force with a pick-axe. This was not only a dangerous task but one that presented great difficulty on account of the solid character of the walls of the shafts. Efforts were made to introduce jets of steam, but these only increased the deposits of ice already formed. Recently it was decided to attempt a new system consisting of a number of heated tubes, 70 millimeters in diameter, constructed in such a way as to contain a mixture of steam and air. This method proved a perfect success and the formation of ice was stopped.

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The Canadian Mining Review

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

OFFICES:

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The White's Asbestos Company.

We hear a good deal of unfavourable comment upon the prospectus of the White's Asbestos Company, a brief summary of which was published in our last issue. Like many other ventures now upon the market the price asked for these undeveloped lots seems to us excessive, while the estimates of production and profit cannot be regarded by those conversant with the industry, and the location of this property, other than extremely visionary. As a matter of information we are curious to know what are "the mines in the immediate neighbourhood of the property which yield an average production of 350 tons per annum," and also upon what grounds Mr. Lucius Boyd bases his estimate of an annual output from each of these South Garthby lots "of not less than 350 tons." If this gentleman will put on his spectacles and look carefully at the map of the asbestos region he will be surprised to find how many miles really intervene between his property and the Thetford and other producing mines.

It is the custom, nowadays, of vendors of asbestos lands and quarries to lay a great deal of stress upon the very high figures which are now realized for "Firsts," and the profits of the Bell's, and similar successful concerns, are strongly emphasized in their prospectuses as an inducement for investment. It is high time that this fallacy was exploded. A comparison of the statistics of the annual production of Canadian asbestos will show that "Firsts" hardly form one-fourth part of the general output, while "Thirds," which at present it hardly pays to work, constitute at least one-half. It would be well, therefore, if promoters would, in their statements to the public, give more prominence to the necessary production of "Seconds" and "Thirds," instead of basing their estimates of profit entirely upon an output of First quality as at present. It is also worthy of note, that while the Serpentine area, so far as explored, is extensive, it contains large sections which are utterly barren and worthless for asbestos producing purposes. Investors will find it to their profit to look carefully and cautiously at many of the schemes now upon the market.

The Nature and Origin of Deposits of Phosphate of Lime.

We have before us a Bulletin of great interest to all those in any way interested in phosphate mining, and the uses of phosphate as an agricultural fertilizer. Wheat contains eight

tenths per cent. of phosphoric acid, or about 16 lbs. to the ton, and a very little calculation will show the enormous amount of this actually carried away annually from our land in the large quantity of grain shipped every year from the port of Montreal. The most available source of resupplying this plant food to the soil are concentrated natural deposits, such as Canadian apatite when chemically treated, or in the crude finely pulverized condition. The immediate results from the latter are now a question to be solved by experiment, but whatever conclusion is arrived at, apatite itself is an acknowledged necessity, and that in yearly increasing quantity, which must give an impetus to the phosphate trade.

In the introduction on page 9 of the above Bulletin, by Prof. N. S. Shaler, Boston, the geographical history of phosphate deposits receive considerable attention, and in the main portion of the publication the article on their nature and origin by Dr. R. A. F. Penrose, contains material that will throw much light on the subject generally, and especially on our Canadian phosphate areas. In fact it contains a concise history of really all the known workable deposits in Canada, and copious notes on the same. Dr. Penrose, who is now State Geologist at Austin, Texas, was for several years connected with the Anglo-Canadian Phosphate Company, at Perth, and these investigations were made entirely at his own expense.

We know of no other publication which more clearly describes the whole phosphate country, and all other sources of supply are equally well set forth. The work is, moreover, illustrated with numerous diagrams, showing the veins, pockets and distribution generally in various pits or mines now being worked. Tables of analysis will be found at the end, showing the qualities of ground, and the phosphates of the various countries as analysed are reported in tabular form with their component concomitants. We strongly recommend the perusal of this Bulletin to our readers, and regret that want of space will not allow us to quote in detail from its pages.

It should be mentioned that this report, although designed as a memoir of the U. S. Geological Survey, was used in manuscript form by Dr. Penrose as his thesis for the degree of Doctor of Philosophy at Harvard University.

The Frontenac Mineral Country.

We have been favoured with the full text of an admirable paper by Mr. J. Bawden, read before a recent meeting of the Kingston Board of Trade. Mr. Bawden describes at some length and in an able and interesting manner the various mines and the mineral wealth which form a characteristic feature of the country. In the opening of the paper reference is made to the phosphates of the Township of Longhoro, and to the mines in operation at Bobb's Lake and other sections of the county. It is pointed out with a great deal

of truth that much could be done to further the development of this wealth by macadamizing and improving the country roads, and by the abolition of the tolls on the Perth road over which the greater portion of the mineral has to be hauled. We are glad to see that steps have since been taken to urge the necessity of having these improvements carried out. The mica, plumbago, and the extensive iron deposits are fully described, particular emphasis being laid upon the losses which have been incurred by the ignorant and unsystematic methods of working hitherto pursued by some of the miners. It is pointed out that not only has no attempt been made to call in the aid of scientific and practical engineers in guiding the operations of the diamond drill, but it is the fact that the very cores which have been raised from depths varying from 50 to 300 feet, and which would give evidence of some value, have been scattered indiscriminately among the rocks. Mr. Bawden commends the process of treating iron ores generally adopted in Sweden, whose prominent excellence in this industry is due to the careful preparation of the ore for the furnace, to the purifying influences of charcoal fuel, and to the skill of thoroughly trained and competent engineers. An excellent paper concludes with the following suggestions:

"The rapid destruction of the forest in the Northwestern States should be an incentive to the protection of our own when we see it is the fact that charcoal iron and steel made from charcoal iron heads the price lists the world over. Notwithstanding all the advance of the past ten years no branch of iron and steel manufacturing industry is to-day in a more flourishing condition than that which lives by forest fuel, and it is of the very nature of things that while this fuel is obtainable its greater cost will be fully repaid by the higher price obtained for the iron and steel produced by its aid. The very best service which can be done to the northern settlements of Frontenac is to make the existing forest yield a supply of fuel which at the furnace mouth will be transmitted into one hundred dollars cash by the produce of every acre of woodland.

Another matter of policy I urge you to press upon the government is the withdrawal of all crown land from sale pending the examination proposed. At its conclusion the government will have much valuable information to guide its future policy. A portion of the territory examined might be put up at auction to the highest bidder and good prices obtained for it. Other portions might be granted free on condition that the grantees shall establish furnaces, chemical works or other branches of mining manufacture. In either case the country will be richer by such a policy than by selling mineral land as at present for \$1 an acre—a policy which affords a premium upon speculative holding and is a bar to enterprise.

These suggestions, we are glad to see, have been made the subject of a Memorial to be submitted by the Board of Trade to the Ontario Government.

Canadian Mineral Production in 1888.

The preliminary statistical summary of the mineral production of the Dominion annually published by the Geological Survey has been issued, and is reproduced here for the benefit of our readers. A comparison with the returns of previous years will show that satisfactory progress has been made. The total estimated production is quoted to have been about \$16,500,000, or an increase over the previous year of \$1,500,000, and \$5,970,639 more than in 1886. Of course this statement is still incomplete, and

is subject to revision; when full returns have been made we are confident that it will be found that the progress has been even more marked than the summary indicates. The following are the figures which have this year been collected and compiled by Mr. H. P. Brumell:

Name of Product.	Quantity (a).	Value (b).
Antimony ore (exports) tons.	352	\$6,894
Arsenic..... "	30	1,200
Asbestos (c)..... "	4,404	255,007
*Bricks..... thousands.	165,265	1,033,721
*Building stone..... c.yd.	387,164	561,197
Cement..... bbls.	50,668	35,593
*Charcoal..... bush.	233,648	15,703
Coal..... tons.	2,658,134	5,259,832
Coke (d)..... "	45,373	134,181
Copper (e)..... lbs.	5,562,864	667,543
*Fertilizers..... tons.	548	21,600
*Glass..... "		150,000
Gold (f)..... ozs.	58,957	1,058,610
Granite..... tons.	19,172	63,846
Graphite..... "	150	1,200
Grindstones..... "	4,936	42,159
Gypsum (g)..... "	175,887	179,393
*Iron (h)..... "	40,962	1,442,974
Iron ore..... "	44,410	139,393
Lead (fine, contained in ore)..... lbs.	674,500	27,472
*Lime..... bush.	2,213,464	339,541
Limestone for iron flux..... tons.	15,577	14,742
Manganese ore (i)..... "	1,782	47,243
*Marble and Serpentine..... "	215	3,110
Mica..... lbs.	29,025	30,207
Mineral Paints..... gals.	1,497	11,750
Mineral Water..... tons.	124,850	11,456
Miscellaneous clay products..... "		359,370
Petroleum (j)..... bbls.	695,200	716,057
Phosphate (r)..... tons.	22,485	242,285
Pig Iron..... "	18,191	226,443
Platinum..... ozs.	1,200	4,800
Pyrites..... tons.	51,764	232,938
Salt..... "	44,581	143,804
Sand and gravel (exports)..... "	260,929	38,398
Silver (l)..... "		368,396
Slate..... tons.	5,314	90,689
Soapstone..... "	140	280
Steel..... "	9,508	470,819
Sulphuric acid..... lbs.	7,143,210	97,755
*Tiles..... thousands.	7,518	114,057
Whiting..... tons.	200	240
Estimated value of mineral products not returned (principally rolled iron and glass).....		1,847,102
Total.....		\$16,500,000

(a) Quantity marketed, except when otherwise specified. The tons are of 2,000 lbs.
 (b) Market value, less charges of transport from point of production.
 (c) There was no production from Ontario this year, but there was an increase of 185 tons from the mines of the Eastern Townships.
 (d) Oven coke; all the production of N. S.
 (e) Copper contents of Capelton ores at 12 cts. per lb. at the mine.
 (f) Nova Scotia gold is calculated at \$19.50 per oz., and that from British Columbia at \$17.00.
 (g) Production of New Brunswick and Ontario, plus Nova Scotia exports.
 (h) This includes four rolling mills, one forge and the London-derry Iron Works returns have not yet been received from six similar works, thus rendering this statement very incomplete. The total manufactures of iron will, however, be much larger than those of last year.
 (i) New Brunswick production plus Nova Scotia exports.
 (j) These figures are calculated from the inspection returns at 100 galls. crude for 38 galls. refined oil, and are computed at \$1.02 per bbl. of 35 Imp. galls. The barrel of refined oil inspected was assumed to be 42 Imp. galls.
 (k) Direct returns. The production is divided as follows:—
 Ottawa County mines..... 20,356 tons.
 Ontario mines..... 2,089 "

Total..... 22,485
 The exports as per Customs Department returns were 18,776 tons valued at \$98,609.
 (l) Exports plus silver contained in Capelton ores.
 *Some returns yet to be received.

The Largest Crane in the World—At the Chatham dockyard there has been a test by the Admiralty of the largest and most powerful crane ever made. The weight lifted was 240 tons, and the range or radius of the crane is 75 feet 3 inches, and its height is 125 feet.

The Late Hon. Robert Dunsmuir.

General sorrow and regret has been caused by the sudden demise of the Hon. Robert Dunsmuir, president of the Council of British Columbia and owner of the Wellington and other extensive collieries in that province. He was born in Hurlford, Ayrshire, Scotland, in August, 1826, and was therefore in his 63rd year. He was the son of Mr. James Dunsmuir, a proprietor of coal mines in that locality, but being early left an orphan was brought up by his uncle, Mr. Boyd Gilmour, with whom he came to British Columbia in 1851. Mr. Gilmour was employed by the Hudson's Bay Company to prospect and open up mines for them on Vancouver Island, which resulted in the discovery of the collieries now owned and operated by the Vancouver Coal Company (Limited). On Mr. Gilmour's return to Scotland in 1853, Mr. Dunsmuir was left sole manager of the mines and continued to fill that position for many years to the satisfaction of the company. In 1865 he was induced to accept the management of the Hanwood coal mines, in the same locality, but as they did not turn out satisfactorily Mr. Dunsmuir shortly afterwards resigned and went prospecting on his own account. After spending some five years at this work he was at length rewarded by the discovery of the now celebrated Wellington collieries, from the judicious management of which he laid the foundation of the great wealth of which he was possessed when death put an end to his useful career. Mr. Dunsmuir was also the original promoter, as well as manager and principal owner, of the Vancouver Island Railway. At the time of his death he was engaged in opening up the valuable Union collieries in the Comox Valley, about 65 miles to the north of the Wellington mines. In connection with the above, Mr. Dunsmuir gave employment to nearly 2,000 men, and was also owner of a fleet of sailing vessels and steamships, representing many thousands of tonnage for the coal carrying business, for which his principal markets were San Francisco, Wilmington, the Sandwich Islands and China. Mr. Dunsmuir was elected to the Local Legislature for Nanaimo in 1882, and has held the seat for this constituency ever since. He was a man of great enterprise and business capacity, and combined with an iron will and indomitable determination and perseverance a most kindly and charitable disposition. His death has created a void in British Columbia which it will be very difficult to fill.

A Useful Handbook.—We have received from the Rand Drill Co., 23 Park Place, New York, a copy of their catalogue for 1889. This volume consists of some 200 pages profusely illustrated with the latest and most approved designs in drills, air compressors, air receivers, pumps and mine machinery and supplies of every description. It also contains a large amount of useful information pertaining to the drilling and excavating of ore and rock, and is well worthy of the perusal of all our readers.

LETTERS TO THE EDITOR.

Facts and Mineral Development.

The Editor

THE CANADIAN MINING REVIEW:

SIR—I feel sure that everyone who is interested in the legitimate development of our mineral wealth has read the first article in your April issue (viz., "Our Libel Suit") with much pleasure. We have long needed some independent mining organ which was strong and popular enough to make itself felt, and which would state facts without fear or favor. It is impossible to overestimate the great amount of good such an organ can accomplish if it fearlessly adopts the plan of complete independence.

The thanks of those of us who wish legitimate mining to flourish in Canada as a business and not merely as a speculative game, are due to you for the admirable stand you have taken.

I must hasten to say that so far as the matter under dispute between Mr. Lionais and yourself is concerned, namely, whether a certain property justifies certain expenditures, I know nothing whatever about it. Your warning to investors against confusing "mining locations" for "mines" is of primary importance. The term "mine" has been altogether too loosely used in this country; its definition as a place where mineral is wrought by means of artificial light is lost sight of, and even our Ontario mining law describes "a mining location" as a "mine." This we may hope will soon be rectified.

Yours, etc.,

WM. HAMILTON MERRITT.

Toronto, 15th May, 1889.

Iron in Ontario.

The Editor

THE CANADIAN MINING REVIEW:

SIR—Mr. Charles S. Burt, until lately superintendent of the Detroit Furnace Co., is now visiting the iron districts of Ontario with the view of investigating the inducements for erecting a charcoal blast furnace, and it is to be hoped that he will find a situation sufficiently favorable for the purpose.

Over 180,000 tons of Charcoal pig iron were smelted in Michigan during the year 1887, while Ontario with equally as good localities has not a single furnace in operation; so there certainly should be a good opening for this important industry.

We have plenty of ores suitable for making Charcoal iron, which are distributed over a wide area, in some instances being conveniently situated to railway or navigation, with plenty of charcoal and flux within easy distance.

The Iron-ore, Bancroft and Ottawa Railway, running eastward from the Haliburton branch of the Grand Trunk, passes through the Township of Snowdon, in which are several deposits of ore suitable for charcoal iron. These are veins of magnetic ore close to this railway containing from 55 to 63 per cent metallic iron with very little phosphorus and no titanium. In the same neighbourhood are also found beds of limonite or brown hematite, which would mix well with the richer magnetites.

On the lines of the Central Ontario Railway and of the Kingston and Pembroke Railway are several large deposits of ore in the midst of well wooded districts, where charcoal can be obtained as cheaply as almost any place on the continent.

Situated in Lake Nipissing is Iron Island, containing a wonderfully pure red hematite, of which Professor Chapman has made an analysis showing metallic iron 65%; phosphorous, faint trace; sulphur, faintest trace; titanium, none.

Round the shores of this lake are large tracts of hardwood suitable for charcoal. North Bay, the junction of the C. P. R. with the Grand Trunk, should be a good point for a furnace, to which both charcoal and ore would have easy access.

Then on the shores of the Georgian Bay good ore is found. A mixture of magnetic and specular ore from the neighbourhood of Killarney has been analyzed by Dr. Chapman, showing metallic iron, 60.85; phosphoric acid, faint trace; sulphur, 0.04; titanium, none; silica, 7.61. This mine is close to the shore and is excellently situated for a furnace, as it is directly in the line of travel, and charcoal could be carried to it conveniently from any part of the coast. Or this ore could be shipped direct to Cleveland or other ports by water without the expense of any railway carriage.

Yours, etc.,

T. D. LEDYARD.

Toronto, May 15, 1889.

The Promotion of Mining Companies.

To the Editor:

THE CANADIAN MINING REVIEW:

OTTAWA, 18TH MAY, 1889.

SIR,—When there chances to be demand for an ore or mineral, in excess of the supply of the article, or, as the saying goes, if there is a "boom" in a metallic or non-metallic mineral, it seems in Canada to be a necessary accompaniment of the system of individual ownership of minerals, for gentlemen of large legal ability, to enter into the business of promoting mining schemes. This custom, by lawyers of legal, political and appropriate ability, has been carried on to such an extent as to be now, unfortunately, a too prominent feature in the industry, and of the failures of late years. In too many cases has this been proved, in the non-dividend paying qualities of the enterprises which they promote. Can dividends be expected when the purchase price is excessive, or beyond the actual capacity of the property, or necessary condition of ore in sight ready for stoping or mining? Mr. Lawyer promoter is interested purely in the "sell" question of the enterprise, and the "output of the mine," and "income in relation to capital," are secondary considerations to him and are relegated to the management of the company. The lawyer promoter does not hold himself responsible for excess of capital over the item of profits of working the mine. These legal gentlemen are highly protected by law from competition, in the courtly and just industry of "what is mine" by law, and the taxed account of court. So they enter the field of the mining engineer, armed with a large acreage of the so-called mining lands, more or less developed, and held in fee simple or in bond. This they desire to dispose of at very high figures, and if they succeed in doing so "according to legal principles," the manager, who usually is called in after the sale has been made, is held responsible for the success or paying qualities of this legally produced mining venture. Capital has then to appeal to the courts of justice. If the public press are found bold enough

to show up the actions of legal gentlemen, in such matters as not min(d)ing their own business, they have also to fight these lawmakers and legally capable "boomers" in actions for libel. In countries where the miners have rights, and where under good laws their rights are granted to them (such as the right to trade in their own calling or business), and where the laws allow them to exercise the at present liberal principle of "free trade" within their own province, we find the mining industry prospers. In countries where development and work are made conditions of tenure of mining claims, we find there is no chance for this legal parasitical growth. It ought to be the policy of a mining journal to protect labour engaged in, and capital invested, or about to be invested in the mining industries of the country; hence, your appropriate remarks in former numbers. Legally disposed gentlemen will have to re-write history to prove it otherwise.

Yours, etc.,

JOHN STEWART.

Amalgamation.

By B. C. Wilson, President Gold Miners' Association of Nova Scotia.

In the early days of California gold mining, amalgamation was an unknown term, and quicksilver and amalgam unknown quantities. We washed away the auriferous sands and got the golden grains in their original and yellow purity. Bye-and-bye some of the large sluicing and hydraulic companies introduced quicksilver, and it was soon in general use, but being very crudely handled immense quantities were washed away with the debris, and if quicksilver can do it, certainly the whole state of California should be thoroughly salivated.

When quartz crushing was inaugurated in Nova Scotia the quicksilver and gold were not introduced to each other until after the ore was crushed, and not during the process of reduction; consequently the present system of copper plates was unknown, but the crushed sand was washed over riffles and pools of quicksilver arranged according to the ingenuity of the experimenters in various tempting ways to inveigle the gold into a new home, and it was not considered inconsistent to employ 100 pounds of quicksilver per battery of four stamps.

I think the first person to introduce quicksilver amalgamation to crushed ores in Nova Scotia was the late Charles Puttner, of Bavaria, who came here from Carolina at the instance of the late Joseph Wier, and set up an experimental Chilian mill at Freshwater, Halifax.

If I am not in error, I started the third stamp mill in Nova Scotia, making all the patterns myself and invented, without knowing it, the present style of stamp head and method of attaching it to rod. Our venture was a joint stock affair owned in Halifax, and the directors deemed it their duty to do a great amount of detail directing on matters of which they were perfectly ignorant, and in the light of present improvements I was not much better, and I got a decided reprimand for putting in round stamps instead of square ones, and learning that I entertained certain heretical ideas of putting mercury in the mortar while the ore was being reduced they took early precaution to direct me "not to do it" under penalty of their severest displeasure.

We crushed three weeks without quicksilver, other than in riffles and in sluices; and finding particles of unamalgamated gold going off in the tailings, I then without the knowledge of any one, charged one battery with quicksilver and ran the other without. The result of the

week's work was 25 per cent more gold in the quicksilver mortar than in the other—next week I changed the quicksilver to the other mortar and ran the first without, with just about the same results in favour of the one with mercury in it. I followed this up for four weeks to thoroughly satisfy myself and then reported to the directors, who kindly directed me to use my own judgment in the matter.

This innovation called the copper plates into existence. At first they were very small and very thin; later on we got thicker ones, and made wide at the top and narrow at the bottom like the inverted gable of a house, and, so enduring are early impressions that I regret to say many persons who consider themselves authorities on this subject still adhere to this form of plate. It requires, however, but little demonstration to show the fallacy of the principle; whatever increases the quantity of water or pulp on any part of the plate disturbs the adjustment to an extent which makes either one or the other part inoperative as a saving appliance.

More recently a copper plate with an electro deposition of silver on one surface (more popularly known as "silver plate") have been introduced. My own experience with these extends over only half a year or so, but I am free to record my appreciation of them, as they always present a clean amalgamated surface from the word "go," which cannot be permanently obtained on a copper plate until there is on it an amount of amalgam equal to about two ounces of gold per square foot, which must be kept there as long as you expect the plate to be efficient, though, of course, you can get it all back when the plate has outlived its usefulness (provided the temptation offered has not induced some one to rob you of them in the meantime), while on a silver plate the permanent accumulation of gold seems to be practically inappreciable, so that, all things considered, the silver plate is both an economy and a security.

There seems to prevail an idea that any gold once attached to an amalgamated plate is practically saved. This I have lived to know, is an expensive fallacy, and one which I believe to be largely increased on the silver plate as compared with the copper one, and I deem it very important to provide means to intercept the slow glacier-like progress of amalgam which commences an almost imperceptible journey down and eventually over the plates and out of the mill.

It is an acknowledged axiom that the best thing to catch and retain gold, is gold amalgam itself; and it is familiar to mill men that a plate roughly coated with beds or ridges of amalgam is the best thing to have your gold fall on as it comes from the stamps, but this is a condition of things not always possible or convenient to maintain, and, even if it were, small particles of gold, either owing to their ragged form presenting an increased surface to the flowing water, or from some other cause seeming to have less specific gravity, will keep working away from the main mass and along down the plates, aided, no doubt, by the small quantities of mercury draining from the amalgam as well as that continuously supplied from the mortars, which mercury too, always carries some fine gold with it—and together they eventually pass off the plates, resulting in very considerable loss.

Various methods are adopted in every mill to intercept these fugitives, the more familiar of which used to be:

1st. Shaking tables, which I might characterize as wolves in sheep's clothing; they have gone out of practice, however.

2nd (and what is in most general use at the present day), boxes, pools or trays containing more or less mercury as a nucleus into which the whole current is precipitated and where, it is fondly hoped, any truant particles will be induced to remain. My experience with these has been that they serve to relieve the conscience or the incompetence of the architect and the mill man, hoodwink the owner or the capitalist, and pass along to the bank of tailings, about all the gold that ever comes into them.

3rd. Riffles and blankets at the tail of the plates with facilities for catching and retaining particles of mercury, gold and the denser sulphurets. Riffles cannot be objected to if too much confidence is not placed in them. They are not human, but nearly as unreliable. Blankets are unquestionably of service, particularly if no other system of concentration is employed, and though they take a great deal of attention they undoubtedly save much valuable material for further treatment, and it is simply a question of condition of ore and capacity of mill whether it will pay to keep a man specially employed at them or not. In many mills of even small capacity I have found an official known as an "amalgamator," whose duty seems largely to be to stand and serenely listen to the hammering of the stamps, and it might in such cases be very profitable to employ blankets and let him attend to them, which besides the monetary benefits resulting, would also largely relieve the devil of finding employment for otherwise idle hands.

To prevent the loss of mercury and floating gold I believe the first principle is to afford reservoirs or deposits of mercury in connection with the plates, but under no consideration to allow such a flow or fall of the pulp as will disturb or break the surface of the mercury, and yet have these reservoirs so constructed that their shall be no accumulation of pulp or sulphurets upon the surface of the quicksilver.

There is an arrangement of the copper plate which I have found most efficient in arresting the truant particles of gold and mercury before referred to, but the arrangement is so simple that it does not generally recommend itself; also the correct adjustment lies within such narrow limits between success and failure, through impatience and neglect to investigate the cause of results, that parties are apt to "damn the arrangement" when a little more attention would have demonstrated its usefulness.

When properly adjusted it is self-acting, needing no attention, and is always in order, and consists of peculiar curved troughs formed at the lower end of each copper which allow the water and pulp to flow down the curve—not to fall—and which have sufficient elevation at the bottom to form a shallow reservoir the whole width of the plate, but with not sufficient obstacle to admit of the accumulation of sulphurets or heavy particles.

Some believe in a long sheet amalgamated plate—sometimes as long as twelve feet—my experience is, that no individual plate need, or should be, more than thirty inches long or thirty-six inches at most, that as many of these plates should be placed below each battery as circumstances or the will of the owner may consider necessary. I would suggest three as ample but there is no great danger of having too many.

As usually laid down the plates present a plain even surface from top to bottom and then perhaps a precipitate fall of one to three inches into another plate, or a series of plates. Now the plan I have mentioned locates at the bottom of each plate this peculiar curved trough which at starting may be charged with

about one pound of mercury. As work goes on the mercury is always increasing and possibly some will have to be removed before cleaning up day. Now if just the right fall and slope and rise at the foot has been obtained the down coming water will follow the curve and impinge against the quicksilver at the bottom and keep a clean mercurial surface ready to absorb all light gold or particles of mercury, and as this surface is never broken it follows that no pieces of amalgam can become detached and wash away after once attached, while the small obstruction at the foot causes the waters to curl back on itself but does not afford sufficient lodgment for sulphurets to block the current and cover the mercury, and thus derange the operation.

Now as to practical results—after a week's running on fairly good ore with the copper plates kept in good order, I have had in the first one of these troughs a ridge of amalgam from one-eighth to one quarter inch deep, an inch or so wide, and four feet long (the width of the plate) and over 1½ pounds of mercury, all, or very nearly all of which I have reason to believe would have been lost under the ordinary process of straight plates and falls and traps.

As before stated their efficiency depends altogether in getting just the right adjustment proportionate to the fall and amount of water used, which is simply a matter of experimental testing and requiring a little patience.

Now all this applies strictly to the copper plates, after them may follow all the other devices desired but it will be found that their occupation will be gone to a large extent.

There has been and I suppose always will be, some loss of mercury through being floured and otherwise, but I am led to believe there are erroneous ideas abroad in regard to floured mercury and what it really is. Technically it is mercury divided into such minute particles that individually they are not visible to the unassisted eye. It is only when a number of them are together that they are readily visible as a white film along the edge of the palm, and I am of the opinion that the actual preventable loss from this source is very small, and the gold carried with it still less; but there is a very appreciable loss of mercury in most mills in particles or little globules readily visible, one of which will contain as much mercury as twenty or a hundred of the floured kind. These all carry more or less gold, and it is to the saving of these that the trough in the plates before described will be found particularly applicable—gravity naturally keeps them near the bottom that is next the plate, and when impinged by the current against the clean surface of mercury in the troughs a majority of them will be arrested, while if allowed to fall into boxes or receptacles of mercury, more or less covered with heavy sulphurets and with an accumulated force of water, but very few of them are retained.

In the falling of the pulp from the mortars to the plates and from one plate to another, that is the "splash," more care to have the same uniform, and occasionally the distribution changed or distributed, should be exercised than is sometimes given it. It often happens from the wearing down of a die or a shoe or some variation in drop of one stamp in a mortar that a greater quantity of water and crushed material is thrown out on one part of the plate than another, with the result that the accumulated amalgam is worn off the plate in one particular spot, even the electro-deposited silver I have seen so worn off, and the red copper showing up destitute of any amalgam or quicksilver, and my experience is that amalgam as worn off from any particular part of the plate, is more difficult

to save than new amalgam falling from the stamps. Sometimes a wire screen or perforated sheet iron is interposed in the fall from plate to plate; the flow is thus broken and the distribution accomplished; but for greater security where such are used it is desirable that they be arranged so that a slight change if only one-eighth of an inch can be made every hour.

In all the foregoing I have referred exclusively to the amalgamation and arresting of the free gold after it has been liberated from the matrix. That much gold still remains in the crushed ore in the shape of gold both mechanically and chemically combined, and which is run off and lost, is, I think, a fact patent to all. This is more a question of concentration and after treatment than of amalgamation, and is one which should engage the earnest attention of every one interested in the gold industries of the province, but in the meantime it is important to give every attention to the perfection of such processes as we have in use and to general mill treatment. Too much honest and legitimate attention by the responsible man in the mill cannot be given to his amalgamation processes, whatever their form, and to seeing that the crushing machinery is performing its duty properly and uniformly, for no irregularity can exist without affecting the whole matter of crushing, amalgamating and retaining the ore.

The Natural History of Coal.

(Contributed by Francis D. Taylor, M.E., Brockville.)

[Continued from April Issue.]

Imagine this process repeated as many times as there are coal seams in a district, and it conveys the most accurate and correct opinion that can be found of the way in which coal and coal strata was deposited.

In some coal fields there are (at least) 50 seams of greater and less thickness, all of which were produced in the way described. And the question is now forced upon the mind, how long did this vast accumulation of vegetable matter, and these siliceous and aluminous shales take to deposit?

Mr. McLaren, a Scotch geologist, who in his Geology of Fife, says as the result of a train of elaborate reasoning, founded upon ascertained facts. That every coal seam 3 feet thick, must have taken at least 1,000 years to form; and that the whole of the coal strata, with its many seams, must have taken between three and four millions of years to form.

The mind would be entirely baffled and confounded in connection with such periods did we not consider "That one day is with the Lord as a thousand years, and a thousand years as one day."

In order to make this matter still more clear it will be remembered that the coal strata in Wales is from 10 to 12,000 feet thick, and in the theory propounded there must have been a gradual sinking or depression of strata equal to that extent.

Mont Blanc is about 15,000 feet in height, and the gradual depression therefore of the Welch coal field must have been nearly equal to the present elevation of Mont Blanc.

There are one or two other points to refer to before quitting this part of this subject, and first, as to the kind of atmosphere that must have existed at the time of the coal formation.

It is probable that there was a much larger proportion of carbonic acid in the air than there is at present, and that as the result of this, vegetation grew at a much more rapid rate.

There is no evidence that the growth was very much more rapid than it now is, as some

have supposed, but still the effect of a larger proportion of carbonic acid in the air would doubtless be to produce a more rapid growth than we have now.

The proportion of carbonic acid in the air at present is $\frac{1}{2500}$ part of its volume, and one of the principal reasons why Providence has given foliage to trees is to enable them to collect from the air this gas which forms so important a portion of the food in which they live.

It is the opinion of many that the carboniferous era helped to absorb a large portion of the carbonic acid from the air, and by that means left it more fit for the reptile and mammaliferous developments of life that soon after came upon the stage, and that thus each succeeding geological age has helped to prepare the world to become a fit habitation for man, who is (as this world is concerned) the noblest work of God.

Second—The temperature in which most of the vegetation grew, which forms our coal deposits, must have been at least equal to our tropical climates, and could not have been less than 75° , as nearly all the plants found in the coal shales are among the class that are only found in tropical climates, where this temperature exists.

This brings out another question of great importance and difficulty, viz.: The existence of coal within the arctic circle, proving that even there the temperature was once high.

This has been accounted for by some men of eminence and science on the supposition that the plane or angle at which our planet now revolves has been altered, and instead of its revolving, as it now does at an angle of 25° , it revolved in almost an upright form. The effect of which would, of course, be to equalize the temperature all over the globe.

Astronomers inform us that is the way in which Jupiter at present revolves round the sun, so that it is not at all out of the range of probability that the opinion relative to the former position of our earth is correct.

And now to the third part of this subject, viz.: The present position of our coal beds and the changes to which they have been subjected.

This is a large and important subject, upon which there is not time to fully enlarge upon, and includes:

First—The chemical changes which coal has undergone since its deposition.

It is singularly interesting to trace the gradual chemical changes to which coal has been subjected in its various stages, from vegetable fibre to its present compact form, and it is equally interesting to know that those changes have not destroyed the chemical affinity of coal to vegetable life.

By the aid of chemical analysis we learn that the same elements may be obtained from coal as are found in vegetable life, the main difference being that they are combined in different proportions, and strange as it may seem, the diamond is composed of the same constituents that constitute nearly the whole substance of our coal, namely, carbon. Yes, the diamond is composed of the same elements as coal, and is the result of the decay and crystallization of carbon.

If burnt, it takes the same amount of oxygen as charcoal, and gives off the same volume of carbonic acid, and melts at 14° less temperature than silver.

Second—Another most important subject that comes under this head is the question of faults, or the subsequent dislocation, upheavals and depressions to which the coal strata has been subjected.

Though coal was found as described in a com-

paratively tranquil state of the world. It has been very roughly handled since then by nature.

There is hardly a coal field in the world but shows evidence of the disturbance and agitation that has taken place since its formation.

These faults sometimes throw the strata up or down for several hundred yards, and are to be found at all angles and of all sizes, proving the truth of those sublime words of one of the earliest geologists of whom we have an account. The old patriarch Uz, who said: "He putteth forth His hands upon the rock and overturneth the mountains by the roots (Job xxviii, 9)."

There are one or two laws relating to faults worth knowing:

First—That the largest and strongest faults generally run north and south.

This rule, however, is not entirely without exceptions, but it may generally be relied on.

Second—By observing the angle of the cheek or face of the fault, it is possible (nearly always) to tell whether the coal is thrown up or down, and for want of knowing this simple law thousands of pounds sterling have been lost in mining.

Third—As regards the present position of our coal seams.

It is known that coal lies at all depths from the surface, and that in some cases it is worked at the surface of the ground, like the open-top workings of the thick (or 10-yard) coal of South Staffordshire. At other places it is worked nearly 1,000 yards below the surface, as at the Dunkenfield colliery near Manchester.

During the early stages of coal mining, when the mechanical power for winding coal was limited to the hand-reel and the horse-gin, of course the operations of coal mining were of the most primitive character, and had to be carried out on the most limited scale.

At present one-half mile below the surface seems to be about our maximum limit for mining.

At present the greatest obstacle to going depths is not the lack of mechanical powers to draw the coal (we can supply that), but we want some means either mechanical or chemical of neutralizing the increased temperature of great depths. The temperature appears to increase to the extent of about 1° for every 50 or 60, or say 5° for every 100 yards. And at this rate the temperature at 500 yards deep would be 25° greater than at the surface, and in practice this is found to be the case.

Can this difficulty be got over is the question, and it is one to which our best men of science will, it is hoped, devote time, attention and thought.

That man will indeed be a benefactor of his species, who can contrive some means of lessening the temperature of deep mines.

What a blessing it is, however, that even with our present appliances so much of this useful mineral is within our reach.

Fourthly—One or two general and miscellaneous points.

First—The importance of skill in raising our coal so as not to waste what has been so benevolently and graciously provided.

A bed of coal usually produces about 1,200 tons to the acre per foot thick, but less than half that quantity is brought in some instances to the surface and sold in consequence of the waste and unnecessary loss in working it.

The introduction of the "long wall" system of working coal has benefitted the output in some cases 30 per cent. or more, and much credit is due to Mr. Moses Taylor, mining engineer, for introducing this system and adapting it to the working of the 10-yard coal in South Staffordshire.

Again the conversion of the small coal into patent fuel has done much to improve the system of working, and to economize the produce of mines. But much more has to be done yet.

Second—The adoption of wise and proper means to ensure the safety of those who are engaged in this most important branch of national industry seems naturally to grow out of what has been said.

If coal is valuable, the lives, health and happiness of those engaged in mining is more valuable still, and we are called upon by every consideration of humanity, self-interest and national honor to use every possible means to insure safety in working mines, and certain it is, that safety and economy will be found to be synonymous terms in relation to mining.

Third—The importance of a correct knowledge of the structure of the earth is suggested by this subject. Without this it is difficult to know where to look for the minerals, or metals, which are locked up in the secret recesses of nature, and which she only opens and makes known to those who have knowledge sufficient to read her language and decipher the hand writing on her rocks.

The geologist by means of carefully looking at this hand writing is able to direct the practical miner where to sink and how to act, and thus science and practice unite to promote human happiness and the material greatness of the world.

Fourth—The wonderful way in which God has arranged and adapted the earth to provide for man's wants, is suggested by the "Natural History of Coal."

Tell me what we want that the earth will not supply?

Its surface provides food of every kind, and in great abundance; fruits and flowers to please the taste and gladden the eyes.

The rocks yield our metals, and the seams of coal furnish us with fuel.

Well may the inspired "Psalmist" say: "He opens His hands and satisfies our wants."

And that heart must be cold and hard that can look upon all that God has done for the happiness of his creatures, and not exclaim, "Great and marvellous are Thy works Lord God Almighty."

Gypsum Deposits in Northern Manitoba*

J. B. TYRRELL, B. A., F. G. S.

On the Little Saskatchewan River, which carries the overflow of Lake Manitoba into the western side of Lake Winnipeg, there is a comparatively small shallow lake which has been known since the time of the early voyageurs as Lake St. Martin. It lies in latitude, $51^{\circ} 30'$, longitude, $98^{\circ} 40'$, has an area of 115 square miles, a greatest depth of about fifteen feet, and an approximate elevation above the sea of 790 feet.

Lying to the north-west of this lake, there is an area of level or very gently sloping country, which is now covered by extensive natural meadows, separated by groves of poplar and birch, as well as occasional forests of spruce and tamarac. This country is as yet in its native beauty, being entirely untouched, either by the woodman's axe or the plough of the farmer; but the time cannot be far distant when a thriving agricultural population will occupy the district, reaping from the fertile soil bountiful and continuous harvests.

In the early part of the past summer, the writer made a short journey on foot into this country, from the shore of the lake, in order to determine the question of the existence or non-existence of beds of gypsum in the vicinity.

Starting from the north-west corner of the Indian Reserve at present held by the Saskatchewan Band of Saulteaux Indians, we travelled in a general north-westerly direction for five miles, till we reached a rounded gravel ridge, rising from fifteen to twenty feet above the general level of the country to the northwest of it, and along the foot of which, on the alluvial plain, are scattered numbers of rounded, weather-worn, gneissoid erratics. This ridge represents a beach of the extended Lake Winnipeg, called by Mr. Warren Upham, Lake Agassiz, when it covered the whole of this area, and when the surrounding fertile alluvial deposits were being laid down near its gradually receding shore. The height of this ridge, as shown by aneroids read simultaneously on it and on the lake, is about 840 feet, being fifty feet above Lake St. Martin, and thirty feet above Lake Manitoba. Its chief interest, however, did not centre in the fact that it had once represented a lake shore line, for these shore-lines are very commonly to be met with in all this apparently level Manitoba plain, but that in little holes and caves in it were to be seen small exposures of soft, compact, snow-white gypsum.

Following the ridge, still in a north-westerly direction, for a mile, the surface becomes very rugged and irregular, being broken by deep pits with steeply sloping sides. In this rough country, gypsum may be seen in numerous outcrops, being usually soft and crumbling from the effect of weathering, but in some cases it is still quite hard. The height of the tops of the knolls in this hilly area is about thirty-five feet above the eastern level plain, or sixty feet above Lake St. Martin. The breadth of the hilly country was not determined, but an Indian who accompanied us stated that it extended in a south-westerly direction as far as a certain point on our journey of that day, which was about a mile and a half distant from where we were then standing, beyond which the level country began again.

In a north-westerly direction the ridge was followed for two miles further, to a rather conspicuous hill a short distance north of the Ninth Base Line in section 2, township 33, range 9, west of the Principal Meridian. In this distance it appeared to be broken through by considerable gaps in several places, but where it was well marked it invariably showed the irregular surface so characteristic of country underlain by gypsum deposits. In many places, small caves would extend in from the bottoms or sides of the pits, some of which held beautifully clear, cold water, a luxury of which we were able to appreciate the value, after tramping for the greater part of a sweltering July day through meadows, forests and swamps, where the mosquitoes and black flies did not attempt to treat us any the more tenderly because we were strangers.

This country is a famous winter hunting-ground for the Indians, for in the autumn the bears retire to these caves, as being comfortable quarters in which to pass the time until the following spring, and many of them are killed every year. Around the mouths of several of the caves could be seen marks of the axe, where the hunter had been obliged to widen the entrances to the caves to be able to get into it to secure his prey. The thickness of the exposures of gypsum in these holes and caves was nowhere very great, ranging as a rule from three

feet to six feet six inches, but in none of them was the total thickness of the deposit seen.

The hill at the furthest point to which the ridge was followed, rises as a rounded knob, twenty feet above its general level. This hill, like the others, appears to be composed of gypsum, as on its sides are holes extending down twenty feet below its top in which beds of gypsum are well exposed.

In the north-west corner of township 32, range 8, west of the Principal Meridian, is a rounded hill rising thirty-five feet above the plain, its greatest length being about 600 feet, and its greatest breadth 150 feet. Its surface is overgrown with small canoe-birch. Two holes, each about eight feet deep, have been dug by prospectors in this hill. One at the top shows, below a foot of decomposed material, seven feet of hard, compact, white anhydrite or "bull plaster," exhibiting a more or less nodular structure, and breaking on the surface into small irregular fragments. Very little bedding can be detected in the mass. The other hole is in the side of the hill fifteen feet lower down, and shows on top two and a half feet of white clay, consisting of decomposed anhydrite, below which is five and a half feet of white nodular anhydrite similar to that in the other hole. This gives a thickness, almost certainly, of twenty-two feet of this rock, and it is not improbable that the hill is composed entirely of it.

Again, just north of the Ninth Base Line, and two miles east of the township corner, between Ranges 8 and 9, is a poplar-covered hill or ridge, thirty feet high. In various places on this hill are exposures of snow-white gypsum, similar to what has been described above, showing in some cases a thickness of ten feet in one section. The most of it is massive or cryptocrystalline, and lies in regular beds which dip slightly towards the west. Some of the beds or layers, however, consist of beautifully crystalline, clear, colourless selenite, which is easily broken out in lamellar masses of considerable size. This is the mineral which in the west, has been so often mistaken for mica.

The above is a brief statement of the known extent of the deposits of gypsum in this district, but it is highly probable that further investigation will prove them to extend over a much larger area. The Indians of the Saskatchewan Band, who live on the western shore of Lake St. Martin, informed me that similar rock was to be found in several places further north, and they have named a lake on a tributary of Warpath River, which flows into Lake Winnipeg north of the mouth of the Little Saskatchewan, Ka-ka-wusk Sa-ka-higan (translated in English as Mica Lake) from the alleged presence of selenite in its vicinity.

Towards the south-west, at a distance of 90 miles in a straight line, in the bore that was sunk on the bank of Vermilion River by the Manitoba Oil Company, a bed of gypsum 15 feet in thickness was struck between 550 and 565 feet, at approximately the same geological horizon as that of the gypsum beds above described. Gypsum deposits are therefore in all probability very widely distributed throughout Northern Manitoba.

As far as examined they preserve a pretty constant character. Where they immediately underlie the surface the country is very rough and hilly, and the prevailing poplar of the region is mixed with birch, or the spruce of the adjoining low-lying land is replaced by Banksian pine. The gypsum itself is generally very pure, of a dead white color, and usually stratified in rather thin beds, which are either horizontal or dipping at a low angle. Among the massive beds, however, are many others, com-

posed of crystals or crystal-masses, in which the crystals usually stand transverse to the plains of bedding. Some plates could doubtless be obtained from the crystal-masses sufficiently clear for optical purposes. No anhydrite was seen mixed with the gypsum, but one of the hills, as above stated, appeared to be composed entirely of it. It is much harder and tougher than the gypsum or hydrated sulphate of lime, is considerably heavier, has a roughly nodular, rather than a distinctly stratified structure, and is of a decidedly bluish tint.

Of the exact geological age of the deposit it is difficult to speak as yet with certainty, as the strata have not been continuously traced into any others, and no beds immediately under or overlying them have been seen. There is little doubt, however, that they occupy either the summit of the Silurian or the base of the Devonian limestones. All the evidence that we have on the point has not as yet been perfectly elaborated, but it consists in the general horizontality of the beds wherever seen throughout the whole area, and in the existence of limestones holding fossils on Lake Manitoba, twelve miles distant in a south-westerly direction, and of limestones holding fossils on Lake St. Martin, eleven miles distant in a south-easterly direction. Also reference might be made to the above mentioned bore on Vermilion River, where the gypsum was at the base of a bed of Devonian limestone 130 feet in thickness. Thus these deposits are practically of about the age of the Onondaga Formation of New York and Western Ontario, in which rocks plaster-quarries have been worked for many years. This formation also contains the great salt deposits of Ontario, and it is a significant fact, that a short distance to the west of the area under consideration, around the shores of Lakes Manitoba and Winnipegosis, many brine springs are known to occur. In the State of Michigan, many of the plaster-quarries are also in rocks of about the same age. In Nova Scotia, the gypsum deposits are of lower Carboniferous age, and in Iowa they are stated to belong to a still higher horizon.

The general hilly and irregular character of the surface underlain by the plaster beds, and the fact that isolated hills of gypsum rise above the surface of the otherwise level plain, make it appear probable that the deposits occur as lenticular masses in the beds of limestone which seem to compose the general floor of this whole area, though in most places the limestone is covered either by a mass of glacial till, or by the alluvial deposits laid down on the bottom of the ancient Lake Agassiz. The gypsum also resembles the limestone in being clearly stratified horizontally or at a very low angle. Besides this, some of the limestone of Northern Manitoba contains a large amount of sulphur scattered throughout its mass in the form of minute grains of iron pyrites. The iron pyrites readily oxidises into a sulphate or double sulphate of iron which combining with the carbonate of lime give as products of the double decomposition, sulphate of lime or gypsum, and carbonate or possibly sulphate of iron. In the Cretaceous shales of the Duck and Riding Mountains and of the Plains further west, this process is clearly seen to have gone on. Iron pyrites is constantly present, and the shells of Inocerami, Ammonites, Baculites, etc., furnish an abundant supply of carbonate of lime. This shale is therefore often filled with minute, or sometimes even large crystals of gypsum, and side by side with them are masses of ironstone or impure carbonate of iron, which, after being formed in the above described way, has collected in rounded or lenticular nodules about a shell,

fragment of a crayfish, or other nucleus. In the case of the Paleozoic limestones, however, no trace is found of the carbonate or other salt of iron which would have resulted from the double decomposition, and if it was ever formed in the rock, it has since been dissolved away by water percolating through the strata.

The gypsum may, however, have been formed in a different way. The whole of this country has undoubtedly suffered very considerable erosion since Cretaceous times, the shales and marls of the Duck and Riding Mountains having almost certainly extended much further east than Lake St. Martin. Many of the springs that now flow from these shales are strongly impregnated with sulphuretted hydrogen, which might readily be oxidized into sulphuric acid. This acid acting slowly on the beds of limestone would alter them into sulphate of lime without disturbing the stratification at all.

Of the uses of gypsum it is unnecessary to speak. In the Western States, where the air is dry and atmospheric erosion is very small, it is used as a building stone, being very easily worked and sufficiently durable and strong for residences and all ordinary buildings.

By roasting, its water of crystallization is driven off and it is reduced to the fine powder commonly known as Plaster of Paris. By grinding the crude gypsum as it comes from the quarries between ordinary burr stones, land-plaster is obtained, a substance of which it is difficult to overestimate the value in a country whose resources are almost entirely agricultural. The soil of Manitoba and the North-West Territories is very fertile now, but a time will come when having raised crop after crop it will need replenishing. The value of this extensive gypsum deposit will then be thoroughly realized. Lying as it does within twelve miles of Lake Manitoba, a navigable stretch of open water extending southward almost to the Manitoba and North-Western Railway, it can readily be brought to all parts of the province. It is also on the line of the projected railway from Winnipeg, between Lakes Winnipeg and Manitoba, to Hudson's Bay, and by this railway would be within one hundred and fifty miles from Winnipeg, and as the intervening country is very level, the cost of carrying it there would not be great.

The Ormerod Safety Cage.—At a recent meeting of the Wigan Mining and Mechanical School, Mr. Edward Ormerod, of Atherton, exhibited and explained to the students his patent safety cage. It is well known that safety hooks and over-winding gear, however perfect, will not deal with the accidents arising from the break of a winding rope, in which case the liberated cage rushes headlong to the bottom of the pit, and the occupants, if any, are almost inevitably killed. Even if there are no persons in the cage, very much havoc and destruction of property results. The object of all safety cages is to prevent a cage falling when the rope breaks; the cage grips the conductors and remains firmly and safely suspended. Many safety cages have been introduced, but are chiefly applicable to wood conductors, and do not answer at all for wire conductors. Mr. Ormerod has endeavoured to invent a safety cage which shall be applicable to conductors of any kind, either wood, iron or wire. The experiments made with the model were all completely successful and were witnessed with very much interest by Mr. C. M. Percy M.E., F.G.S., and Mr. R. Betley, F.G.S., and a large number of students. Mr. Ormerod will undertake to fix his safety appliance to any cage or hoist, and if satisfaction is not given will re-

move the appliance free of cost. Not only is the safety cage a means of dealing with accidents by breakage of rope, but it also operates very effectively in supplementing the action of the safety hook in case of an overwind. There have been cases in which the momentum of the cage in falling back after detachment has shattered the safety hook, and the cage has not been held; but with this safety cage there is practically no falling back, because immediately the cage commences to return after detachment the safety appliance comes into operation and holds the cage. The invention is well worth the attention of our colliery managers and colliery proprietors, anxious as they ever are to adopt all appliances which can lessen the number of accidents in connection with collieries.



Shipments.

The following have been the Shipments of Canadian phosphate since opening of navigation to 15th May, from Montreal to Europe:

Date.	Name of Vessel.	Destination.	Shippers.	Quantity.
Apl. 30.	S.S. Lake Nepigon	Liverpool	Lomer, Rohr & Co	240
May 13.	" Toronto	"	Aglo. Can. Phos Co	350
" 15.	" Lake Winnipeg	"	Lomer, Rohr & Co	95
" 15.	" Loch Lomond	London	" "	567
	Total			1252

RECAPITULATION.

Lomer, Rohr & Co. 902
Anglo-Can. Phos. Co. 350

Total 1252 Tons.

At time of writing the following vessels are being loaded: S. S. Oxenholm, by Wilson & Green; S. S. Tremona, by Millar & Co.; S. S. Castellano, Alcides and Montreal, by Messrs. Lomer Rohr & Co.

Mr. T. W. Hotchkiss, American Consul, furnishes us with the following values of the exports of ground phosphate to points in the United States from Ottawa Valley mines:—January, to Chicago, \$1,000; February, to Chicago \$1,000; Buffalo \$519,50; March, to Buffalo \$700; April, to Detroit \$1,349.85.

Kingston District.

The Foxton Phosphate Mining Company was registered in London, Eng., on the 18th ulto., with a capital of £12,000 in £1 shares to acquire and work the phosphate mine formerly owned by Mr. James Foxton, Sydenham. No prospectus was issued to the public, the money being subscribed by a few capitalists. Mr. John Higginson, formerly of the North Star Mines, has been engaged as Superintendent. The work is progressing satisfactorily at the pits, but until everything is well organized no large output is looked for.

Du Lievre.

The shipping of phosphate on the river is now in full swing, and the aggregate quantity daily loaded into cars and coming from the High Rock, Dominion, Emerald and Canadian Co.'s mines average some 250 tons. The ore from the Central lake mine will swell this output; we understand that the first shipments of it are to be made at once.

Prospectors for phosphate properties are very active in this locality, but few of the many operations on foot for the acquisition of phosphate properties appear to materialise.

The Prospectus of the Emerald, Central Lake and Lievre District Phosphate Company will be issued next week.

Mr. O. M. Harris, of the Canadian Phosphate Co., reports that work is proceeding satisfactorily at the mines; about 500 tons have been shipped since opening of navigation.

A small force is doing development work at the Little Rapids mines. A number of very promising shows have been opened on Lot 7, adjacent to mine. Both of these properties have recently been visited by American capitalists, it is said, with a view to purchase

Templeton District.

The Jackson Rae Company has gone to allotment. The capital is \$25,000, in £1 shares, of which 13,000 are offered to the public.

In General.

In his recent Report the Minister of Agriculture cites the following instance of the utility of ground phosphate as a fertilizing agent: "I am creditably informed that an experiment was made during the past year with crude phosphate which had been ground to an almost impalpable powder on a field of potatoes in this district, half of it being treated with this fertilizer, and the other half with ordinary farm yard manure. The result was that the part of the field where the phosphate had been used yielded much larger and cleaner tubers than the other half, the soil in both cases being exactly the same."

A prominent German importer has recently visited the Lievre phosphate region with the object of arranging for larger consignments of Canadian rock to be sent direct to his factory at Hamburg. This gentleman wishes to avoid the brokerage and other charges incidental to the present system of shipment.

Mr. Thomas Macfarlane, F.R.C.S., Dominion Analyst, again calls attention to the large amount of money which farmers pay for the ammonia in fertilizers which might be saved if sufficient care was taken to preserve that contained in barn-yard manure. Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excrements of the animals, and one-half of it is contained in the urine. It is further the fact that 95 per cent. of the potash contained in the food of oxen and sheep may be recovered by carefully saving the liquid manure only. To secure the nitrogen or ammonia and the potash, the means are very simple. The dung from the different animals should be brought together, and kept under cover at a lower level than the stable floor, so that the liquid manure may flow upon, over and down through it. In this way all the different sorts and both parts of the manure are properly blended, the solid part and the bedding kept moist and none of the urine escapes. It is further necessary to strew the stable floor, below and behind the animals, with 2 lbs. per 1,000 lbs. live weight, daily, of ground plaster or sulphate of lime, which has the effect of retaining the ammonia resulting from the decomposition of the liquid, and the fermentation of the solid manure. It has recently been proposed to obtain these results by the use of superphosphate, in place of ground plaster, and experiments by Heiden, Dietzell and others in this direction have been entirely successful. Dietzell mentions that 1½ lbs. of phosphoric acid only are required for the treatment of 1000 lbs. of stable manure. The use of "plain

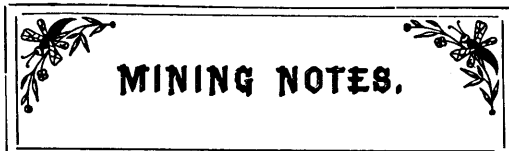
superphosphate" in this way must result in the production of a manure of every excellent quality.

Market.

Messrs. Couper, Millar & Company, London, send us the following report of the Fertilizer market of the United Kingdom:—

About this time last year we had to report that Ammonical materials were "booming," and Phosphates depressed. The position for this year is for the moment reversed, principally through the recent fluctuations in the Nitrate, market. The scarcity of organic Ammonia however, must before long effect an upward influence in prices for this class of material, while phosphates of every description, but in particular, those of high test, are likely to touch much higher prices owing to the unprecedented lowness of stocks and the comparatively small quantity available at the moment.

MINERAL PHOSPHATES.—Canadian 80 per cent. has been sold at 1/0½d. with 1-5d. rise English terms, while 10½d. and 11½d. are asked for 70 and 75 per cent. qualities respectively. South Carolina has been sold lately at 9½d., and there are numerous enquiries from both home and continental buyers, but this figure does not tempt shippers the United States demand being very active. Somme has been largely dealt in this year, and the prices of all qualities are very materially increased as the end of the supply of the higher grades is within measurable distance. Belgian must advance in harmony with other phosphates, but, at the moment it is cheap and therefore well worth attention. Cambridge coprolites offer in such small lots as to be hardly worth mentioning, but business has been down lately at 45 shillings f. o. r. Bedfords are not offering.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

NOTICE.

At the Annual Meeting of the Gold Miners' Association of Nova Scotia, held at Halifax, on 6th March, a resolution was passed adopting the "Canadian Mining Review" as the official organ of this Association. Our readers may therefore rely upon the accuracy of all information published in these columns bearing on the gold mining industry of the Province.

Nova Scotia.

Lake Catcha District.

The Oxford Gold Mining Co. has just completed a trench about 400 feet long, and drained off the body of water known as Lake Catcha. This throws open and makes prospecting possible on some 16 areas heretofore nothing but swamp. While little is known of the lake bed, good drift has been found indicating valuable lodes in the swamp. Vigorous prospecting has been started and will be continued all season. The mill is crushing on good pay ore.

Malega Lake District.

Considerable activity is displayed in this district, a great deal of prospecting being done with very satisfactory results.

The Parker Douglas Co. are raising good ore from their old workings, and have also opened up a new lode, which is promising. We understand that the owners are very well satisfied

with results and with the general outlook. At present the output of gold is limited, as they have but five stamps in their mill; but this plant will probably soon be enlarged, as they have a body of ore which apparently would warrant the erection of a twenty stamp mill.

The Caledonia Mining Co. are erecting a building for hoisting plant, and the machinery for it has been shipped; an air compressor and drills will be put in also. A contract for sinking a shaft 100 feet has been let.

The Malega Mining Co. are working three lodes, but owing to the recent fire, in which the pumping and hoisting plant of two of them was destroyed, the output of ore has been so curtailed that the twenty stamp mill has been run only on half time. The three lodes from which ore is now being taken are the "Chester," "Rabbit," and "Nine Boulder." The "Chester" is a twelve inch lode yielding one ounce of gold per ton, and which is opened down to a depth of 200 feet; not much ore is being raised here, as it is the purpose of the management to sink and drive. The "Rabbit" lode is thirteen inches thick, yielding by the regular mill run two ounces per ton, and in places is much richer. One ton of ore taken down a short time ago was estimated to contain one hundred and fourteen ounces of gold. The "Nine Boulder" is the largest lode discovered on the property, running from 36 to 43 inches in thickness. It is heavily charged with sulphurets, and yields about fifteen dwt. of gold per ton. This lode being the greatest ore producer of the property, reduces the average yield to one ounce five dwt. per ton from the three lodes combined.

A shaft is now sinking and some drifting being done on the "Nugget" lode, but no ore has been taken down. This lode, though not large, is rich. A piece weighing 200 pounds slid off a short time ago and was broken up. From it 30 pounds of ore was selected which was mortared by hand, yielding 25 ounces of gold.

Tributers are working a five inch lode with satisfactory results, their first crushing having yielded at the rate of one ounce per ton. The company is doing a great deal of prospecting, and new lodes are being opened.

North Brookfield District.

The Philadelphia Mining Company are erecting a steam pumping and hoisting plant. Their last "clean up" gave them 265 ounces. Considerable prospecting is doing in the district.

Westfield District.

The machinery for the plant at the "Jumbo" is on the ground, and work on the mill being crowded. The lode in one place is over 80 feet thick, and it is the intention of the owners to have their plant equipped with all modern appliances for saving both the free and the combined gold.

New discoveries west of this district are attracting considerable attention.

Whiteburn District.

The McGuire mine continues its regular output of gold, and was the largest producer in the province last year, excepting only the Dufferin mine at Salmon River. The Graves' mill has started up again with new facilities for hoisting and pumping.

Gold River District.

The Neptune Gold Mining Co., under the management of C. E. Willis, has been actively engaged during the winter and spring in developing the property purchased by them in December. The company have erected hoisting works, and other necessary buildings, and have a fine ten stamp mill about ready to run.

Two other lodes are being worked in open cuts from the foot of a steep hill, and about one hundred and fifty tons of ore will be taken from each as a test. The company is cross-cutting its property and has opened several lodes on which test shafts will be sunk during the summer.

Mr. McMillan is opening up the property belonging to Messrs. Fulton, Foster & Gammon, and is taking out some very good ore from an eighteen inch lode, on which the shaft is now down forty-five feet. He will shortly start sinking on a five foot lode which has indications of being a good one, and will cross-cut the one hundred foot belt, in which there are some sixty feet of quartz. Should these large lodes prove remunerative, a fifty stamp mill will be required to handle the ore.

Mr. John McGuire has started men prospecting on his claims, and several other owners are about ready to begin, and a large amount of development work will be done during the summer.

The main shaft on the "captain" lode is now down one hundred feet, and drifts have been driven east sixty-eight feet, and west seventy-six feet on the vein. The shaft is now being sunk to the two hundred foot level and will be finished before stoping is begun. The lode, which was eight inches thick where first opened in the shaft, has increased to about two feet at the one hundred foot level, and seems to be increasing in richness as well as in size, as sinking continues. The best ore yet encountered has been taken out between eighty-five and one hundred feet in depth.

Miscellaneous.

At the Pictou County Collieries the prospects of work during the summer are far from encouraging, for at most of the mines, up to the middle of the month, large numbers of men were idle, while those that are employed have much idle time.

At the Acadia colliery the depression is still felt and although no men have been thrown out of employment entirely there has been a good deal of broken time. The sinking of the new lift at this place is being steadily pushed forward.

At the Black Diamond, however, there seems to be a steady demand for the whole of the output, and the only lost time has been caused by some necessary repairs. Work at the Drift to prove the underlying seam has for the present been suspended.

At the Albion mines the Acadia Company is still engaged, at enormous expense, in the re-opening of their mines. The re-opening of the Foord pit is by the utmost care and perseverance being successfully carried on despite the great difficulties that are met with. The sinking of the English slope to the famous Cage pit seam and the reopening of the other slopes still continues. The hydraulic pump failed to give satisfac-

tion, and is now being replaced with a steam one. As at the other collieries, trade is very depressed.

Work is somewhat brisker at the Vale Colliery, and probably this fact has led to another influx of Belgian miners.

In this vicinity a small pit has been opened by a Mr. McNeil, of New Glasgow, but operations at present are suspended.

The Colchester Coal Mining Company purpose commencing operations on their property at Coal Brook early in June.

At the Drummond Collieries the state of trade is such as not to warrant the re-opening of the Scott Pit and No. 4 Slope, consequently men are yet out of employment who have been looking hopefully forward to the resumption of work at these places.

The Cumberland Coal Company, of Springhill, N.S., has bonded a quantity of coal land on Queen Charlotte Island, in the Pacific. On the property there is already a 400 feet tunnel run by a former company. The Nova Scotia company will run the tunnel 400 feet further, and then sink a shaft. It is their intention to institute a thorough search for coal.

Mr. R. G. Leckie late managing director of the Springhill Mines, is negotiating for the purchase of the Joggins Mines in Cumberland County, N.S., which with the Joggins Railway and the neighboring Prospect Mine, are mainly owned in St. John. The price suggested for the principal mine is \$1,000,000, and for the Prospect Mine \$40,000, while the offer said to have been made for the railway is \$140,000. The railway is twelve miles long.

Mr. W. Hall, manager at Springhill has asked the men to double up in the East and North slopes for a short time, as he is unable to keep the West slope running on account of the quality of the coal.

At Little Glace Bay, banking is about to start for the second time here. It's reported that they will bank 5,000 tons this time, which will make a bank of 15,000 tons with what is already stocked.

The first steamer arrived at the Intercolonial Company's wharf on the 18th instant to load coal for Montreal; it is understood that this is the only boat chartered as yet by this company for the season.

A discovery of coal is reported on land adjoining the Acadia and Black Diamond areas, but up to time of writing no particulars have been obtained. It is understood that these areas have been leased.

Notice is given that a meeting of the Lake View Mining Company (Limited) will be held at Newark, New Jersey, on 8th June, for the purpose of organizing and transacting other business.

Prospecting at Five Islands has been stopped for the present. There has been 500 feet of drifting done, and a shaft sunk 56 feet. Four small seams of coal have been gone through.

The main shaft of the Eastern Development Company, Cape Breton, is down to the third level, 244 feet; one larger stringer of ore had passed out of the slope to the north, and another was just coming in in the bottom. These stringers are part of vein C, which will be cut from this level. Vein B will not be cross-cut to until the next level is reached. Connection between the first and second levels in vein B has been completed by the up slope from the second level; the vein holds in width and quality of ore. The west drift of the second level is now coming in with rich purple and yellow ore. Letters from the mining captain in charge state: "It is the best showing yet made in this rich vein." South cross-cut into the mountain has entered a change of rock, and cut stringers dipping to the north same as the other veins, but nearer perpendicular. It is expected to soon cut vein E at this point. Five ladders and buckets have been provided for all the surface buildings, and the force organized into a fire brigade. The company has received official assurances from Ottawa that the Dominion Government will furnish the rails for the proposed railroad from the mine to Sydney Harbor. Reports from Messrs. Humboldt & Co., of Kalk, Germany, on the treatment of the low-grade ores sent them, show that the 2.25 per cent ore was concentrated up to 9.50 per cent., and the 3.46 per cent. was carried to 12.61 per cent., showing conclusively that the low grades can be handled to advantage.

New Brunswick.

A party of professional and business gentlemen have arranged to visit one of the many coal mines in Queen's County with a view of taking stock therein and pushing the development. It is said that Mr. John Byers, who for many years was the manager of the Albertite mines, and Major Markham are to be of the party.

The Pope Manganese Company have commenced operations at the Markhamville mines, with Mr. W. C. Pope as manager in United States and Major Markham at the mines.

The Philamaroo gold and silver mine is in active operation. Capt. Alley, of Bar Harbor, was in Sussex this week looking after its interests, and also that of his manganese mine on the Glebe in Waterford, where he has a few men prospecting.

Quebec.

An English correspondent informs us that the Asbestos quarry at Coleraine owned by Messrs. Fenwick & Schater, Montreal, has been sold, but at time of writing no particulars have been obtained.

The Anglo-Canadian Asbestos Company have uncovered some large veins in a new pit, and these are said to be yielding stuff of excellent quality.

We have no special information from any of the other mines, operations are, however, going ahead briskly, and things are getting into good shape for the season.

We are informed that nothing has been accomplished by Major Evan's English people with the Ross-Ward mine, and that the matter is now off. Mr. T.H. Carman, Winnipeg, states that he has now obtained an option on the property and that he is negotiating with a strong English syndicate for its sale.

Messrs. M. Beatty & Son, Welland, have shipped a new hoisting engine, boiler and derrick to the Frechette mine at Thetford. It is intended to do a larger business than heretofore at these pits.

Mr. S. P. Franchot, Buckingham, has shipped from Montreal, through Messrs. Lomer, Rohr & Co, 165 tons of feldspar from the Villeneuve mica mine.

Mr. W. H. Dickson, has uncovered a very promising show on his Buckingham plumbago

Ontario.

Port Arthur District.

Notwithstanding the recent constant heavy rains and bad roads, travel into and traffic to and from the silver mining region is steadily increasing. Several heavy New York capitalists are now here in the interests of the railway, and the result of the conference of the combined companies is almost certain to result in a rapid rush of the work for the first fifty miles at least. The shipping of ore from the present rich workings on Silver Mountain East resembles towing in mud scows.

There is nothing unusual to report concerning the various standard mines. Silver Mountain West keeps on developing very richly, and the Badger, Beaver and Elgin are all turning out rich ore. The Beaver is preparing for a steady output to the mill, which will shortly be working.

Docks are being built for the accommodation of the Silver Fox, Wolverine and Queen mines north of Whitefish Lake. It is rumoured that the Palisade and Medicine Bluff veins will shortly be put under development by Eastern capital.

Now that the Minnesota iron lands are so difficult to obtain there is a great rush after iron in various localities in the district. Applications are pouring in for lands for iron extending from Rainy Lake in the west to Nipigon Lake in the east. The taking up of iron lands promises to be one of the large sources of revenue to the province.

The Board of Trade at Port Arthur has had a fine set of cabinets prepared, and is receiving splendid collections from the various mines for exhibition.

The West Beaver mine, as reported, has been successfully floated in England, and the prosecution of work will likely take place at once. This property is most favorably situated, adjacent to the road, railway, and some of the chief producing mines.

The "West End Company" is the name of the new organization which is seeking incorporation, and will operate the famous west end of Silver Mountain on an extensive scale, commensurate with the results anticipated.

Several interests in the Silver Mountain region have recently changed hands at figures realizing handsome profits to the settlers.

Manitoba and North-West Territories.

Notice of application has been made by James Baylis, Montreal, John Lamb, Toronto, Samuel Mathewson Baylis, Montreal, Joseph James Tolfree, Toronto, George Samuel Wait, Montreal, for letters patent to incorporate them under the name of "The Stair Coal Mine and Manufacturing Company."

The purposes for which such incorporation is sought are: 1. The purchase and sale of coal, mineral and other lands near Stair in the District of Assiniboia, in the Northwest Territories and especially in Township thirteen, Range six, west of the fourth principal meridian; and the working of said mines, the quarrying of stone, the manufacturing of bricks and iron, the purchase, erection and operation of flour mills, and the transportation and sale of the products thereof; the purchase, construction, maintenance and operation of all works for, and the employment of all suitable means of, transportation of the products of the same whether by land or by water. 2. Carrying on a general mercantile business in connection therewith. 3. Acting as financial agents, receiving money on deposit and lending money at interest. 4. The construction and operation of telegraph and telephone lines in connection with said mines and works. The chief place of business of the company will be in Montreal, in the Province of Quebec.

It is understood that the Canadian Pacific Railroad Company has agreed with the Government to build a branch line from Brandon southwest 100 miles to the Souris coal district, and also an extension of 25 miles from the present terminus of the Manitoba & Southwestern Railway to a junction with the projected Souris branch above mentioned. The condition which the company undertakes the construction of these lines is the usual grant of 6,400 acres to the mile.—*E. & M. Journal.*

British Columbia.

The Irondale Iron Works, Port Townsend, which have been two years in operation, have increased their capital, and are going to erect rolling mills for the manufacture of steel and wrought iron, in addition to their present output of first-class pig iron, which is much in demand at the Union Iron Works, San Francisco. Their facilities for shipping and transshipping are good. Their magnetic iron ore from their mines located on the Southwest coast of Tuxeda Island, B. C., is of excellent quality. The ore is simply quarried out of a high bluff of iron ore close to the shore; 25 men are employed daily the year round. It is conveyed by steamer to Irondale, Port Townsend, W. T., and mixed with some iron ore found near Irondale, of a limonite character. Lime is shipped from San Juan Island for fluxing, and at little cost of transportation. The company are now employing 400 men or more in mining, making charcoal, and smelting, and it is reported that about 40 tons daily of pig iron is produced. The capital is \$1,000,000, and head office at San Francisco, California.

Twelve months ago a search for coal was made near Comox by the Union Mining Co. Two slopes have been driven 1500 feet and a seam $4\frac{1}{2}$ feet thick of superior coal is now being worked. Eleven miles of railway have been also built to Hart's Point; two locomotives have arrived and 60 coal cars are in course of construction. New hoisting machinery have been put down at the mines and everything is being pushed forward for an early shipment of coal. About 8,000 tons have been banked and await the completion of cars for shipment.

At the meeting of the new Vancouver Coal Mining & Land Company, Mr. Galsworthy, who presided, said 181,470 shares in the new company had been applied for and allotted, and

very few shares were left. The company was now in position to dispose of its property to the executors of Messrs. Rosenfeldt. The output of the mines this year has been better than it has ever been. An interim dividend of $2\frac{1}{2}$ per cent. was declared.

The workmen employed in sinking the No. 6 shaft of the Wellington Collieries, succeeded in reaching the coal on Friday afternoon, and have now got through the seam, which shows excellent coal eight feet thick. The No. 6 shaft is situated down the Mill stream valley, in the direction of the East Wellington Colliery property, and conclusively proves the large area of the coal property of Messrs. Dunsmuir & Sons.

The Pacific Bullion Mining Co. has been registered at Victoria under the Companies Act. The object for which this company is formed is for the mining, milling, smelting and working of ores and minerals contained in the mines known as the Spokane and Trinket, situated in the West Kootenai Mining district, formerly known as the Warm Spring Mining district near Kootenai Lake, British Columbia, and such other mines as the company may hereafter acquire. The amount of capital stock is one million dollars, divided into one million shares of the par value of one dollar each, and said stock to be unassessable. The place of business of the company is at Nelson Warm Springs, Lower Kootenai Mining district, British Columbia.

The Crow's Nest Coal and Mineral Company Limited is applying for a certificate of incorporation. The company is formed for the purpose of acquiring and selling coal and mineral lands in the Province of British Columbia, and working the same in a miner-like manner, and extracting the coal and mineral therefrom, and selling the said coal and mineral extracted therefrom, and for erecting and using all the buildings, machinery and plant, railways, tramways and roadways necessary for working and winning coal and mineral from the said lands in an efficient and workmanlike manner, and transporting the same to place of shipment, and for the purpose of erecting all the necessary buildings, machinery and appliances therefor, and for the purpose of building or purchasing steamships or other vessels to carry and convey the said coals, coal oil and materials, and articles of merchandise from the place of shipment to whatever place may be desired by the company, and generally to use the said vessels and steamships in connection with the business of the said company. The amount of the capital stock of the company is two million dollars, divided into twenty thousand shares of one hundred dollars each. Five trustees shall manage the concerns of the company for the first three months, viz.: Lieutenant-Colonel James Baker, Joseph Despard Pemberton, William Ferne, Peter Creak Fernie and Edward Bray. The principal place of business of the said company shall be at the City of Victoria, in the Province of British Columbia.

Improved Ore Stamps.—An improvement has been invented by Messrs. C. E. Appleby and G. E. Abrahams, London, Eng., the object of which is to increase the power and efficiency of the ordinary ore stamps, which are raised by a series of cams upon a revolving shaft, and are then allowed to fall upon the ore or other material to be pulverized. According to the arrangement which has hitherto

been general, the stamps depend for gravity alone for their pulverizing force, but the inventors have determined to employ additional mechanism for assisting the stamps in their downward course. For this purpose a piston is fitted by a universal joint to the upper end of the stamp, and it moves in an upright cylinder which is closed at the upper end. When the stamp is displaced in an upward direction by the cam the piston compresses the air within the cylinder, and after the action of the cam has terminated the compressed air assists the attraction of gravity in forcing the stamp upon the material. The same result may be gained if a spiral spring is arranged within the cylinder, and an additional effect is obtained if both the spring and the air are employed. The upper end of the cylinder may be raised or lowered so that the degree of compression may be varied according to circumstances. Two claims are made for the method of aiding gravity by means of the compressed air and spring.

Canadian Mines on the English Market.

	Price Per Share.
General Mining, Limited £219,752 fully-paid shares of £8	4 $\frac{1}{4}$ 4 $\frac{1}{4}$
Low Point, Barrasois and Lingan, \$309,100 fully-paid shares of \$100	—
Ditto, \$200,000 vendors fully-paid shares of \$100	—
North-Western Coal and Navigation, Limited, £160,500 6 per cent. debentures; coupons June 30 and Dec. 31; principal 1904	—
Ditto £149,500 fully-paid ordinary shares of £10	—
Ditto £900 fully-paid deferred shares of £100	—
Sydney and Louisburg Coal and Railway, Limited, £50,000 cumulative 10 per cent. first preference shares of £10, £6 paid	7 9
Ditto, £14,560 fully-paid non-cumulative 6 per cent. second pref. of £10	3 5
Ditto, £250,000 fully-paid ordinary shares of £10	1 2
Vancouver Coal Mining and Land, Limited, £66,850 fully-paid shares of £10	—
Ditto, £118,150 shares of £10, £9 paid	6 $\frac{1}{2}$ 7 $\frac{1}{2}$
Excelsior Copper, Limited, fully-paid shares of £1	—
Ditto, shares of £1, 178, 6d. paid	—
Shuniah Weachu, Limited, £99,888 fully-paid shares of £1	—
Silver Wolverine, Ltd., £68,465 fully-paid shares of £1	—
Anglo-Canadian Asbestos, Limited, £39,132 fully-paid shares of £2	—
Anglo-Canadian Phosphate, Limited, £46,340 fully-paid pref. shares of £10	—
Ditto, £15,050 fully-paid deferred shares of £10	—
British Columbia Smelting, Ltd., £25,000 preference shares of £1, 10s. pd.	—
Ditto £40,000 fully paid ordinary shares of £1	—
Canadian Asbestos and Antimony Company, Limited, £160,000 fully called shares of £5	—
Canadian Phosphate, Ltd., £100,000 fully paid shares of £1	3 $\frac{1}{4}$ 1
Bell's Asbestos, Limited, £100,000 fully paid shares of £5	18 $\frac{1}{2}$ 18 $\frac{1}{2}$
White's Asbestos, Limited, £20,000 fully paid shares of £1	—
Ditto shares £1 paid	—

General Mining.—Accounts to December 31 submitted in April, but an interim meeting is held in November. Dividend for 1884, 5 per cent; for 1885 and 1886, $3\frac{1}{4}$ each year; and for 1887, £4 13s. 9d. per cent. Reserve fund, £29,850.

Low Point.—The vendors' shares, up to the end of 1888, do not rank for dividend until 7 per cent. per annum dividends have been paid on ordinary. Accounts to Dec. 31. For 1887, 5 per cent. was paid on the ordinary shares other than those held by the General Mining Assoc., that Company foregoing their dividend rights.

North-Western Coal.—The deferred shares receive on dividend until 15 per cent. per annum (cumulative) has been paid on the ordinary. Accounts to June 30. Dividend for 1887-8, 5 per cent.

Sydney and Louisburg Coal.—Accounts to Dec. 31 submitted about May. Out of the profits of 1884 one half-year's dividend on the first preference shares was paid. No dividend since. Debit to Dec. 31, 1887, £1,574.

Vancouver Coal.—Accounts to June 30 and December 31 submitted in November and May. In the half-year to June, 1888, there was a net profit of nearly £11,000. Debentures, £57,200. Reconstruction has been decided on.

Excelsior Copper.—Registered September 26, 1888. Authorized capital, £450,000; purchase consideration, £400,000, in cash or shares. Fully-paid shares issued to the vendor; partly paid to the public.

Shuniah Weachu.—Accounts to Nov. 20 submitted in February. No dividend yet.

Silver Wolverine.—Registered October 19, 1888, with a capital of £100,000, of which £80,000 was the first issue. Most of the shares were issued to the vendor.

Anglo-Canadian Asbestos.—The Company was registered in November, 1885. Accounts to October 31 submitted in March. No dividend yet. Debentures, £3,450. Reports are not obtainable, but this information is official.

Anglo-Canadian Phosphate.—The preference shares rank first for 7 per cent., and after a like rate has been paid on the deferred shares, both classes rank equally.

British Columbia Smelting.—The company was registered May 9, 1888. The ordinary shares were issued to the vendor, and they do not rank for dividend until the preference shares have received dividends amounting to 100 per cent.

Canadian Phosphate.—Accounts to November 30 submitted in February. Eleven months to Nov. 30, 1888, resulted in a profit of £2,576, which was carried forward.

White's Asbestos.—Registered April 9th, 1889. The authorized capital is £100,000; first issue, £60,000, of which £20,000, fully paid, was issued to the vendor.

Coal Mining in Nova Scotia.*

By E. GILPIN, JR., A.M., F.G.S., F.R.S.C., etc., Deputy Commissioner and Inspector of Mines for Nova Scotia.

The earliest discoverers do not mention coal in their accounts of Cape Breton, although its outcrops in the sea cliffs are visible for miles. The first printed account is found in Denny's work, published in 1672. In 1711 considerable amounts of coal were taken away by the French and English, being broken out by crowbars and loaded into boats. The building of the great fortress of Louisberg in 1720 led to the first regular coal mining in the Island of Cape Breton. The great numbers of artificers, soldiers, etc., engaged in its construction were supplied with fuel from the ten feet seam on the north side of Cow Bay, now known as the Block House seam. These old workings were carried on above water level, and can still be entered.

During the English occupation of Cape Breton from 1745 to 1749, the beds of coal at Burnt Head and Little Bras D'Or were drawn upon for fuel, and block houses were built to protect the workmen against the Indians and pirates. In 1752 the pit at Burnt Head took fire, and the fort and other buildings were burned. The traces of the fire are still visible for nearly a mile along the outcrop of the seam. From this date until 1784, when Cape Breton was erected into a province, little was done in the way of coal mining. No satisfactory leases were issued, and the records show little beyond the supplies of fuel dug by the soldiers for the garrison at Halifax, and the steps taken to prevent theft of the coal by Americans, etc.

In 1820, when the island became part of the Province of Nova Scotia, more decided steps were taken, and considerable amounts of coal were mined from the Sydney main seam. Finally, in 1827, all the mines of the province passed into the hands of the General Mining Association of London. It may be remarked here that in the Pictou and Cumberland districts the coal seams attracted less attention, as they were not so accessible as in Cape Breton; but previous to 1827 numerous attempts were made to open mines in Pictou County. The causes of the ill success of all these ventures hitherto made were the excessive royalties charged, the shortness of the leases, two to five years, and the want of a regular market.

From 1785 to 1827 the annual coal sales in Cape Breton varied between 2,000 and 11,000 tons. The selling prices per ton being about \$2.50. The royalties charged were, from 60 to 90 cents per ton.

The transfer of the Crown mineral franchises of the province was a curious one, and marks almost the last of the excessive prerogatives exercised by the English crown in colonial matters. The Duke of York having become greatly embarrassed financially, his brother King George the Fourth, by an act of the Royal prerogative, granted him for 60 years all the mines and minerals of the province, subject to certain rents and royalties, for the purposes of the provincial civil list. This princely gift recalling the generosity of eastern potentates, was transferred by the Duke of York to the great firm of London jewellers, Messrs. Rundell & Bridge, who had organized the General Mining Association of London, for the purpose of acquiring and working mines in various parts of the world.

This company expected at first that the copper ores of Nova Scotia would prove a source of revenue to them, but after a careful mineral survey they decided to turn their attention to

the coal deposits. They vigorously opened mines at Sydney, Bridgeport and Lingan in Cape Breton, in Pictou County at a point now known as Stellarton and at the Joggins in Cumberland County, and worked them with varying success up to the year 1858, which saw the opening of a new page in this history.

The monopoly was at first viewed with great approval in the province, and the immense expenditures necessarily involved in starting these mines, and their equipment of foundries, machine shops, tramways, etc., were favourably received by a scattered population, entirely engaged in farming, fishing, and lumbering. In a few years however, as population and enterprise increased, the restrictions of so great a monopoly began to cause irritation, which found expression in many an angry speech in the Provincial Legislature. Finally in 1858 the General Mining Association agreed with the province that they would retain for a term of 18 years certain large tracts of coal lands, with powers of extension under lease, and surrender for ever all other coal seams and other minerals. The consideration for this was the reduction of the royalty on large coal to 4^s d, and the abolition of the fixed rent of £3,000 per annum. The General Mining Association under this agreement retained possession of 46 square miles of coal lands. These areas were selected by Mr. R. Brown, then their general manager, with excellent judgment. His work on the coal fields of Cape Breton gives the coal mining history in full detail.

By the judicious and well timed compromises made by the four parties interested—the crown, the representatives of the Duke of York, the Province of Nova Scotia, and the Association, a happy settlement of this great monopoly was arrived at. The incubus of a single corporation, owning by an unassailable title the varied minerals of a province, in great measure settled by those who left the rebel colonies to live under the English flag, was happily removed in time to prevent the development of feelings inimical to the powers that thoughtlessly perverted the guerdon of nature to those who had, by the greatest possible test, demonstrated their loyalty.

The energy and wealth of this company was of great benefit to the province, and its conduct and that of its chief officers has ever been honourable, and calculated to set an example of honesty and reliability. The Association has now disposed of all the coal lands owned by it in Nova Scotia proper, and retains its selections in Cape Breton, operating chiefly in the historical Sydney main seam, which has been drawn upon by the miner for over one hundred years.

The natural result of the unlocking of so vast an amount of possibilities of mineral wealth beyond the dreams of avarice followed this settlement. The development of the gold, gypsum and other minerals immediately followed the period during which the simple farmer doubted if clay were a mineral or not. The government upon the completion of the agreement threw open the coal districts, and leases were readily obtained. A large number of collieries were opened and much speculation indulged in. The 24 per cent. *ad valorem* duty on coal going into the United States having been removed in 1853, it was anticipated that an unbounded market was assured. The total sales in 1858 were 226,725 tons, of which 186,743 were sent to the States. From this date up to 1867, when a duty of \$1.25 was imposed, the exports to the United States had increased to 404,252 tons out of a total sale of 471,185 tons.

In 1872 the duty was lowered to 75cts., when the United States took 154,092 tons out of 785,914 tons sold. Last year the States took

73,892 tons (of which about 50,000 tons were smalls) out of a total of 1,519,684 tons sold. These figures show the steady growth of the home markets, and the fact that there is at present little room for Nova Scotia coal in the New England markets. The mutual removal of the duties on soft coal would, in the opinion of many of the provincial coal mine managers, result in the almost total loss of the Upper St. Lawrence trade, without any prospect of replacing it by a trade with the Eastern seaboard of the United States, which would have to start with a basis of at least 750,000 tons.†

The following tables show the coal sales to the United States for number of years, and the annual sales to all quarters by decades:—

*The ton of coal in this paper is 2,240 lbs.

COAL.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	118,173	24 ^s ad.	1869	257,485	\$1.25
1851	116,274	"	1870	168,180	"
1852	87,542	"	1871	165,431	"
1853	120,764	"	1872	154,092	75c
1854	139,125	Free	1873	264,760	"
1855	103,222	"	1874	138,335	"
1856	126,152	"	1875	89,746	"
1857	123,335	"	1876	71,634	"
1858	186,743	"	1877	118,216	"
1859	122,720	"	1878	88,495	"
1860	149,289	"	1879	51,641	"
1861	204,457	"	1880	123,423	"
1862	192,612	"	1881	113,728	"
1863	282,775	"	1882	99,302	"
1864	347,594	"	1883	102,755	"
1865	465,194	"	1884	64,515	"
1866	404,252	"	1885	34,483	"
1867	338,492	\$1.25	1886	66,003	"
1868	228,132	"	1887	73,892	"

Nova Scotia coal sales from 1785 to 1887.

Year.	Sales.	Year.	Sales.
1785 to 1790.....	14,349	1841 to 1850....	1,533,798
1791 to 1800.....	51,048	1851 to 1860....	2,399,829
1801 to 1810.....	70,452	1861 to 1870....	4,927,339
1811 to 1820.....	91,527	1871 to 1880....	7,377,428
1821 to 1830.....	140,820	1881 to 1887....	8,992,226
1831 to 1840.....	839,981		

The following figures will show the markets in which Nova Scotia coal is being sold at present:—

COAL.—SALES.—1887.

Markets.	Year 1887.
Nova Scotia:	
Land Sales.....	266,005
Sea borne.....	203,459
N. S.—Total.....	469,464
N. Brunswick.....	186,511
Newfoundland.....	82,053
P. E. Island.....	50,615
Quebec.....	650,857
West Indies.....	6,140
United States.....	73,892
Other countries.....	151

Total..... 1,519,684

The limits of this paper would be too extended were the geological and chemical particulars of the Nova Scotia coal beds to be given here, and the author trusts that at some future time the society may see fit to allow a description of them to find a place in the transactions.

The coal of Nova Scotia is bituminous and frequently coking, the differences in quality between the various districts being referable perhaps to local conditions of pressure, etc. Stratigraphically the Cape Breton seams hitherto worked are flat lying, those of Pictou and Cumberland are pitching, the average of the former being, say, 1 in 10, of the latter 1 in 3. The thickness of the seams worked in Cape Breton varies between 4 ft. 9 in. and 9 feet, of the Pictou seams 4 to 15 feet, and of the Cumberland seams 3 ft. 6 in. to 11 feet. The conditions of floor and roof vary in each mine but do not present any striking peculiarities. In the thicker seams when the roof is bad, it is sometimes

*Paper read before the Canadian Society of Civil Engineers.

practicable to leave on a few inches of coal to assist in supporting it. In some cases this coal is recovered when the pillars are drawn.

The earliest operations in the pitching seams of the Pictou district were conducted by sinking pits to gain successive lifts. The Pictou main seam, having a thickness of 38 feet, has so far been mined on two systems, of which the following account, taken from a paper read by the author a number of years ago before the North of England Mining Institute will serve as a description. The first system has now been abandoned, but it is interesting, as by it the coal was taken to the full height.

Levels were turned right and left from the pit, and when the shaft pillar was won, incline or gate roads were driven uphill, one half on the angle of the seam every 50 yards. Six "bords" or working places, 18 feet wide, were turned away as the gate road went up, parallel to the levels, and at distances far enough apart to secure pillars 8 to 10 yards thick. Eighteen inches of coal were left on as a roof. These "bords" were driven 12 to 15 feet high and continued until intersected by the next "gate" road. Rails were laid up the gate roads and into the bords, and over them the tubs, holding 12 bushels, were drawn by horses, into the working faces, filled, and taken down to the level. The force of the loaded tub descending the inclined gate road was lessened by fastening to the rear of the tub a loose chain passing round a stout post, fixed at the head of the gate road, and dragging on the ground.

When it was determined to work the lower division of the seam, the same gate roads were driven level until the bottom of the coal bed was reached, and then continued as before. The second lift of 15 to 20 feet in height was taken

out in bunches of regular open cast work in the former bords already worked on the top of the seam. Beams of 6 inch timber placed horizontally at the level of the pavement of the former bords secured the sides of the pillars, and if the roof proved bad, props were set on them. This plan of working was attended with much danger to the miner. His eye could not reach the roof of these murky chambers, and his candle's gleam was reflected only by the white fungus which covered the timber. The shape of the pillars at right angles to the dip, narrow, and having long jibs, was not calculated for strength. The dip of the seam rendered the course of the bords imperative, and the ribs were weakened by the cleat of the coal running obliquely across them. These pillars were never robbed, and have now nearly all crushed. As considerable amounts of gas were given off, ventilation was attended with difficulty, and serious fires happened, some of which were put out only by filling the workings with water.

The plan now most in favour is to drive a "balance" 10 feet wide and 10 feet high from the level straight to the rise of the seam for a distance of about 450 feet. One or more parallel airways are driven at the same time, and of smaller dimensions, in order that the necessary air may be carried uphill and down again as the work progresses. Two tracks of about 2 feet gauge are laid in the balance to within 20 feet of its face. Upon one of these tracks is placed an empty tub to be filled with ballast, on the other a truck having its floor made level through one pair of wheels being greater in diameter than the other. A section of rail corresponding in gauge to that used in the pit is laid on the platform.

(To be continued.)

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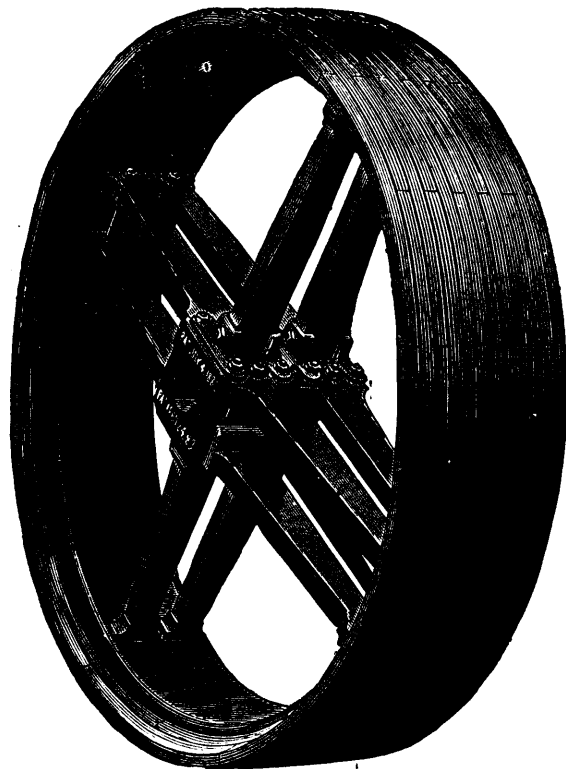
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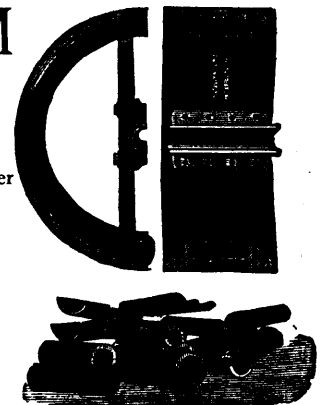
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Under the Dodge Patent System from 5 to 500 h. p. State power to be transmitted, speed of shafts, relative position of shafts, distance between shafts, and we can furnish a clear estimate.

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ASBESTOS.

The Ventilation of Mines.—Recent explosions in mines have again brought into discussion the very important question of the quantity of air required to be sent into the workings of a mine, and it may be remarked that what would be sufficient in one mine might not be sufficient in another, so much depending upon the nature of the workings, on the strata, and other matters. In one case, indeed, where there was a sudden outburst of gas, a powerful fan was working, sending at the rate of 220,000 cubic feet of fresh air per minute through the mine, yet that was insufficient for preventing the air and gas combining to an inflammable point even in the fan drift. In another case 14,000 cubic feet per minute were sent into one portion of a mine, but was ineffectual in preventing an explosion. Opinions vary a good deal, however, with respect to the quantity of air that should be sent into mines under certain conditions. Mr. J. T. Taylor, in his evidence before a select committee, said the quantity depended upon the condition and requirements of a mine. In a mine which yielded no firedamp, he said, "I should say that a current of 20,000 to 30,000 cubic feet per minute might be a fair quantity being properly conveyed up to the face of the workings and made to sweep those districts where the people were employed; but in a fiery mine I should require very much more than the quantity named." For vital chemical purposes alone, Mr. Richardson has estimated that there should be allowed, per hour, for breathing 84 cubic feet per man; for displacing carbonic acid, 62.8; for diluting nitrogen, 258.4; for displacing perspiration, 27.0; for the combustion of one light, 59.3; and for one-fifth of that needed for a horse, 517.0, making a total of 1,008.5 cubic feet. But even this does not provide for quite diluting the gases to a point whereby they would be no longer injurious, nor for removing the air after it has been treated, especially where a number of men have been continuously at the face of a rock. Indeed, experience has shown that a highly ventilated mine may be suddenly inundated with an explosive mixture paralysing for a time the most active agency of ventilation, so that the safety lamp alone has had to be relied upon for the escape of the workmen, thus showing that in a mine where gas is known to be given off in considerable quantities, any calculation as regards the quantity of air supplied to the workings cannot be looked upon as reliable. There should be no measuring of that element which is really vital to those working underground, but that the supply of air should be as large as possible and at the same time continuous, the stream being forced into all parts of the mine. Still, it is well that the question of air in mines should at all times occupy the attention of managers, and that they should be acquainted with the quantities of air individually required even where there is comparative, if not entire, freedom from explosive gases, and it is with this object in view that attention is again drawn to the subject of the ventilation of mines.—*Colliery Guardian.*

A Large Wire Rope.—One of the largest, if not the largest wire ropes manufactured in Great Britain, was recently despatched from the works of Dixon & Corbett and R. S. Newall & Co., Gateshead. Its length is 4,560 yds. and its circumference 5 inches, and it weighs over 23 tons, and it occupied three large railway trucks. It will be used by the North British Railway Company for drawing trains from Cowlairst Station to Glasgow.

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TENDERS.

SEALED TENDERS, marked "For Mounted Police Provisions and Light Supplies," and addressed to the Honourable the President of the Privy Council, Ottawa, will be received up to noon on Tuesday, 18th June, 1889.

Printed forms of tender, containing full information as to the articles and approximate quantities required, may be had on application at any of the Mounted Police Posts in the North-West, or at the office of the undersigned.

No tender will be received unless made on such printed forms. The lowest or any tender not necessarily accepted.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the service contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED. WHITE,
Comptroller, N. W. M. Police.

Ottawa, May 10th, 1889.



SEALED TENDERS marked "For Mounted Police Clothing Supplies," and addressed to the Honourable the President of the Privy Council, Ottawa, will be received up to noon on Friday, 31st May, 1889.

Printed forms of tender containing full information as to the articles and quantities required, may be had on application to the undersigned.

No tender will be received unless made on such printed forms. Patterns of articles may be seen at the office of the undersigned.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

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Ottawa, May 8th, 1889.

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INSOLVENT NOTICE.

In the matter of **BRADFORD L. NOWELL & Co.**, of the City of Montreal, Insolvents.

Lands and Phosphate of Lime Mining Rights in the Province of Ontario and Quebec for Sale by Authority of Justice.

I am instructed by the undersigned Curator to sell by Public Auction, within my Sale Rooms, No. 1747 Notre Dame St., on

Tuesday, the 28th day of May next,

At 11 o'clock in the forenoon,

All and singular those certain tracts or parcels of land and premises situate, lying and being in the Township of Loughborough, in the County of Frontenac, in the Province of Ontario, and more particularly described as follows, to wit:

Lot No. 1.

Ninety acres, more or less, of the North part of lot Number Six, in the Tenth Concession of the said Township, described as follows: commencing at the North-East angle of said lot, thence West the width of said lot or thirty chains, thence South along the side line thirty chains, thence East thirty chains, thence North thirty chains to the place of beginning. Together also, with all mines and quarries of metals and minerals, in or under the land upon that portion of said lot being West of the West Bay or Gold Lake, whether already discovered or not, with liberty of ingress, egress and regress for the purpose of removing the same only.

Lot No. 2.

All the Phosphate of Lime in and upon lot Number Ten, in the Eleventh Concession of the said Township of Loughborough, with full, free, irrevocable sale and exclusive license to mine and work all and every or any of the mines, veins and seams of Phosphate of Lime opened as well as unopened in, under or upon the said lot without any interruption, claim or disturbance from or by the Proprietor of said lot or any other person whomsoever, and to carry away and dispose of all such Phosphate of lime as may be found therein, to and for their own use and benefit and for the purpose aforesaid to sink and make shafts, pits, levels, trenches, ways, gates and watercourses, and to erect and use any machinery, workmen's or other houses, and to use all lawful ways and means whatsoever for finding and removing the said Phosphate, and also to take and use sufficient groundroom, heaproom or pitroom, for placing the said Phosphate and for leaving the waste, refuse or rubbish to be from time to time produced from the said mines, and also with the full and free liberty to erect, construct or use any part of the said premises, or any roads or ways therein for any purposes connected with the said mines, and the removal, sale and delivery of the produce thereof, provided in so doing they do not injure the crops or other property on said lot.

Lot No. 3.

All the Phosphate of Lime and the full rights to mine the same in certain parcels or tracts of land situate, lying and being in the Township of Buckingham, in the County of Ottawa, in the Province of Quebec, comprising 200 acres more or less, and being west half of lot 21, and east half of lot 22, of the Eleventh Concession of the said Township of Buckingham. These rights are wholly undeveloped, no mines having as yet been opened on the property.

The lots will be sold separately, subject to existing mortgage and the reservations, limitations, provisions and conditions expressed in the original grant from the Crown.

Terms cash, or half cash, and the balance on approved security at three and six months.

All information can be had on application to the undersigned,

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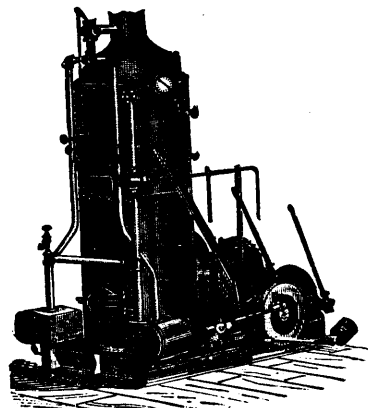
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Mining Regulations

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.

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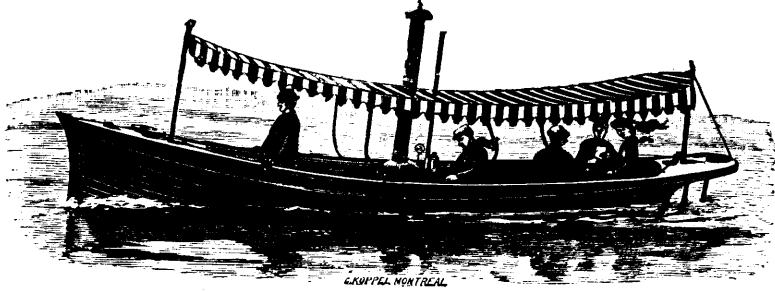
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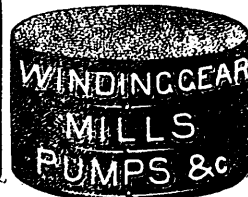
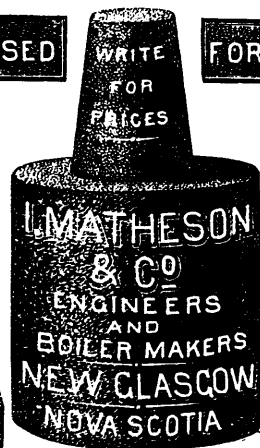
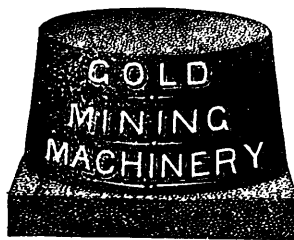
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3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantity. The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

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OR TO THE OFFICE OF

THE CANADIAN MINING REVIEW
OTTAWA.



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, or collected under the provisions of the Adulteration Act, or 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 inspectors 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 per-

centage 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.

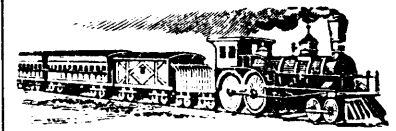
A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALI,
Commissioner.

January, 1889.

PROPERTIES FOR SALE.

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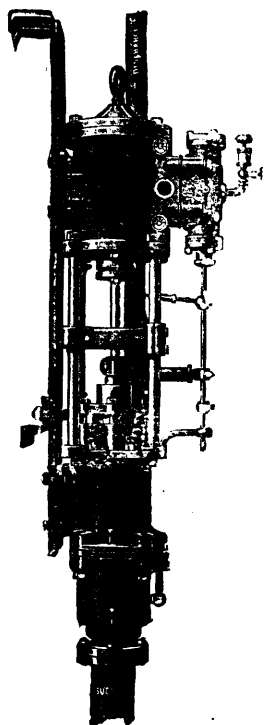
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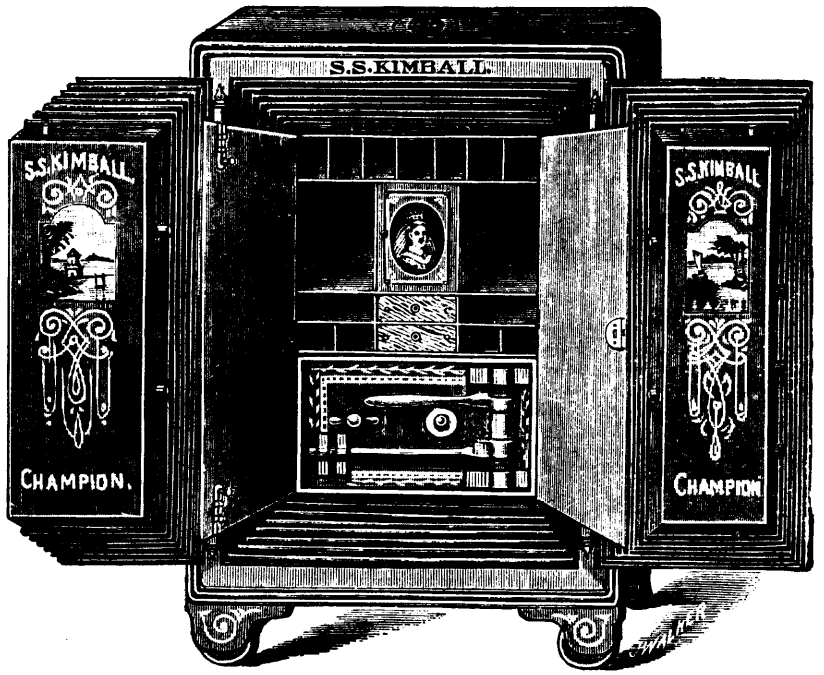
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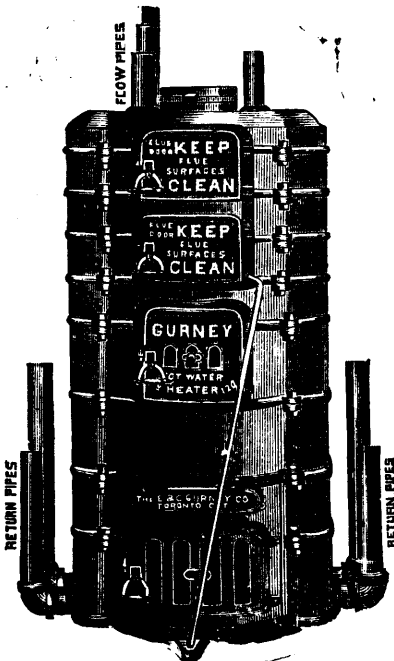
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For further information see OFFICIAL POSTAL
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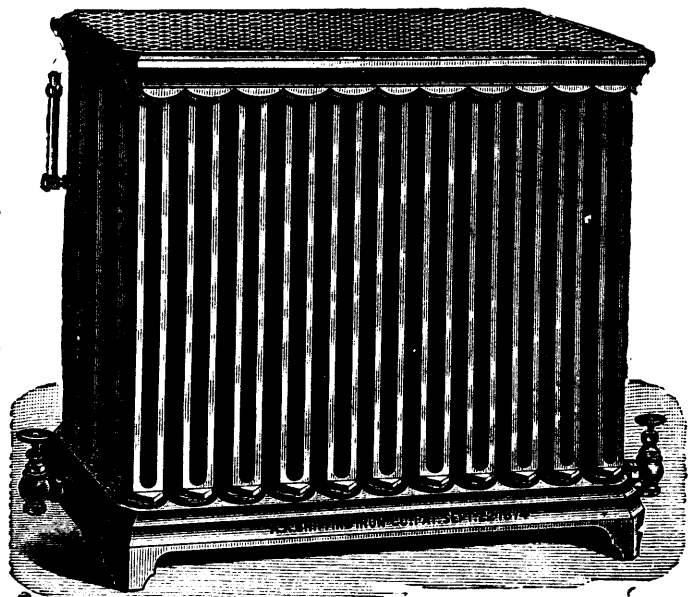
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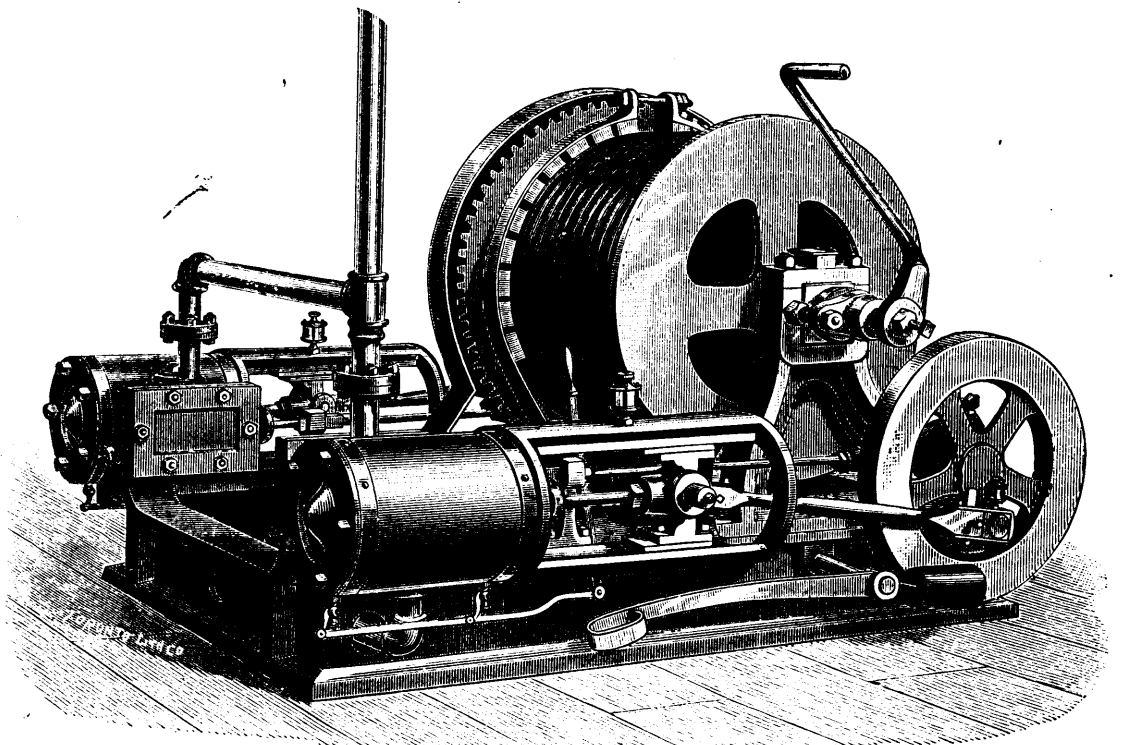
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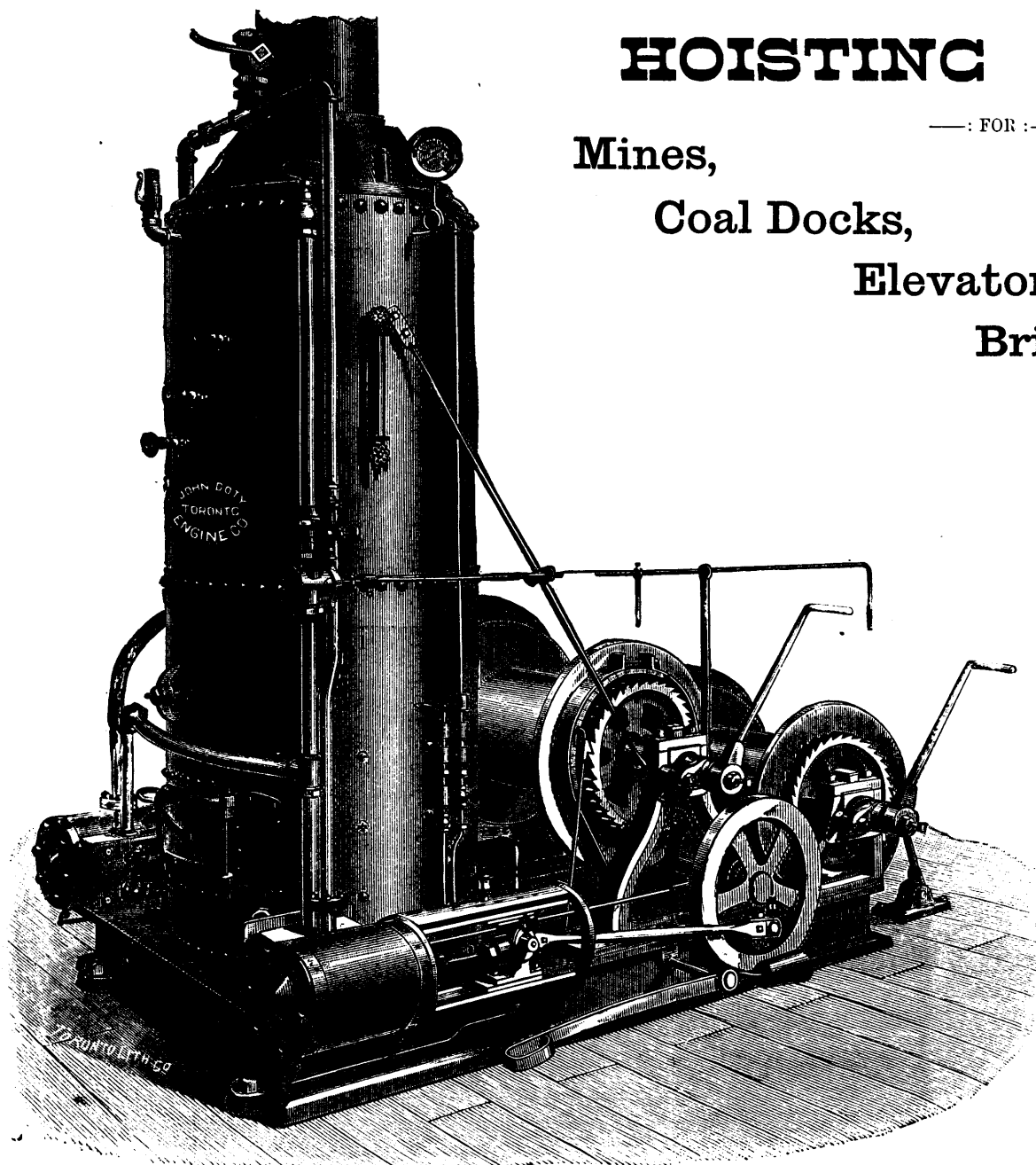
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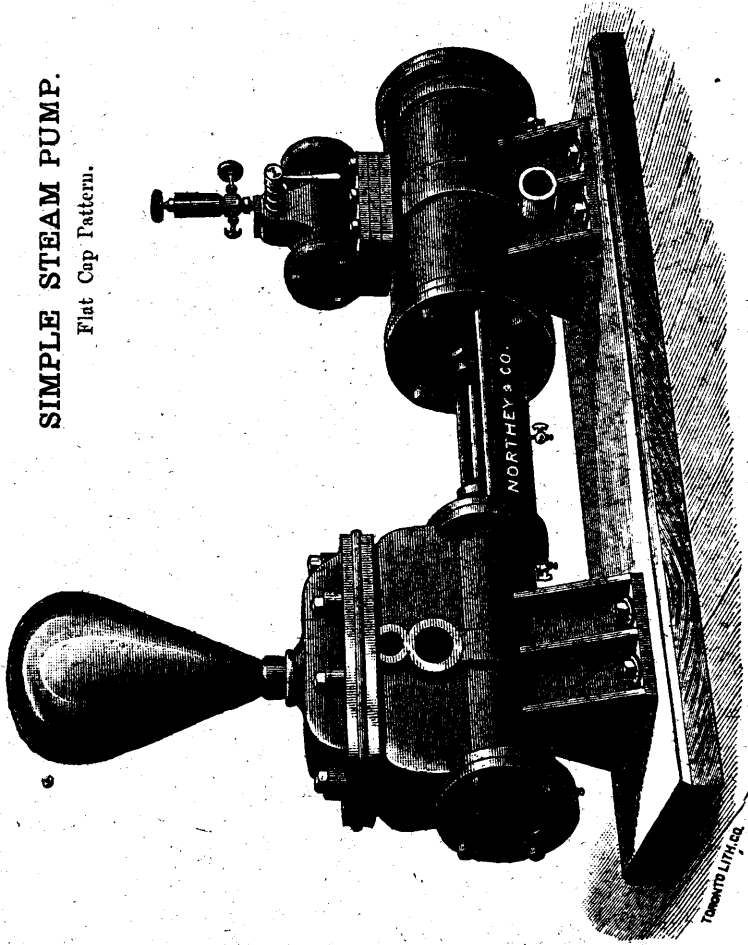
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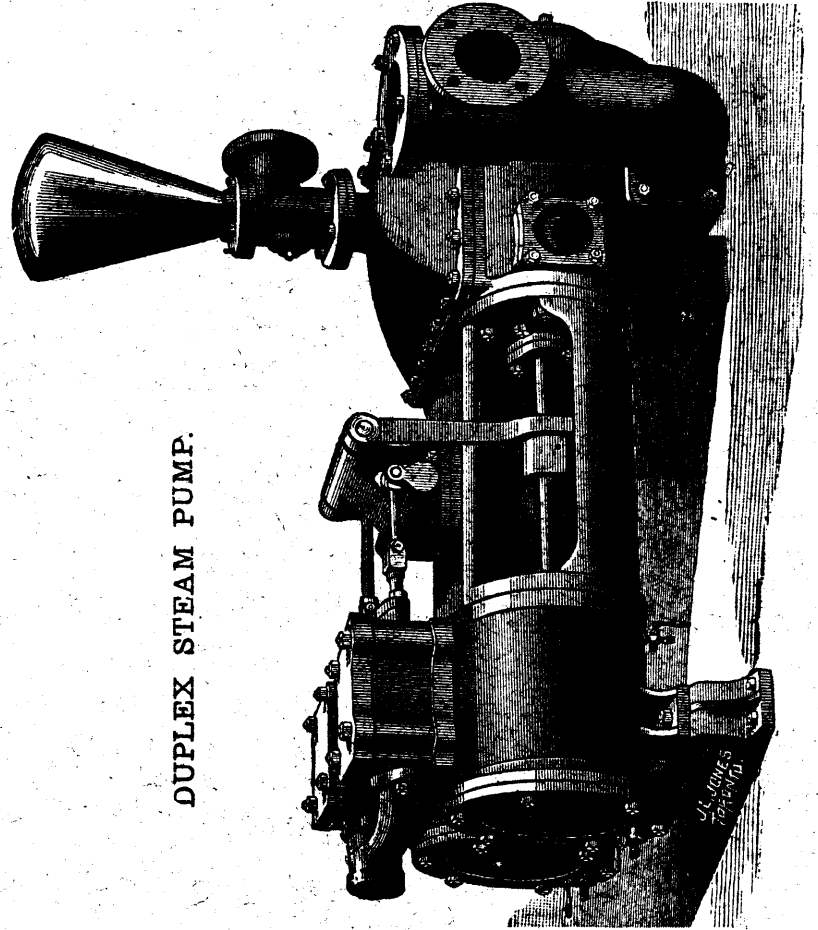
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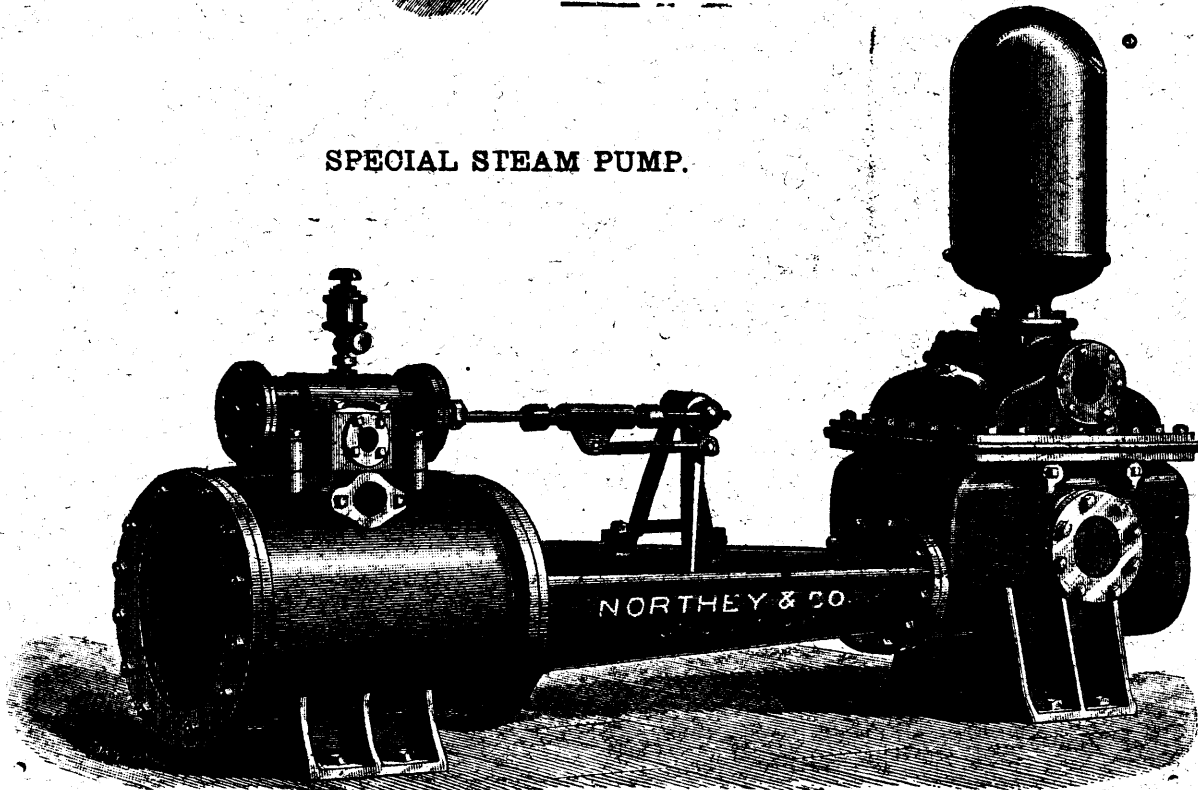
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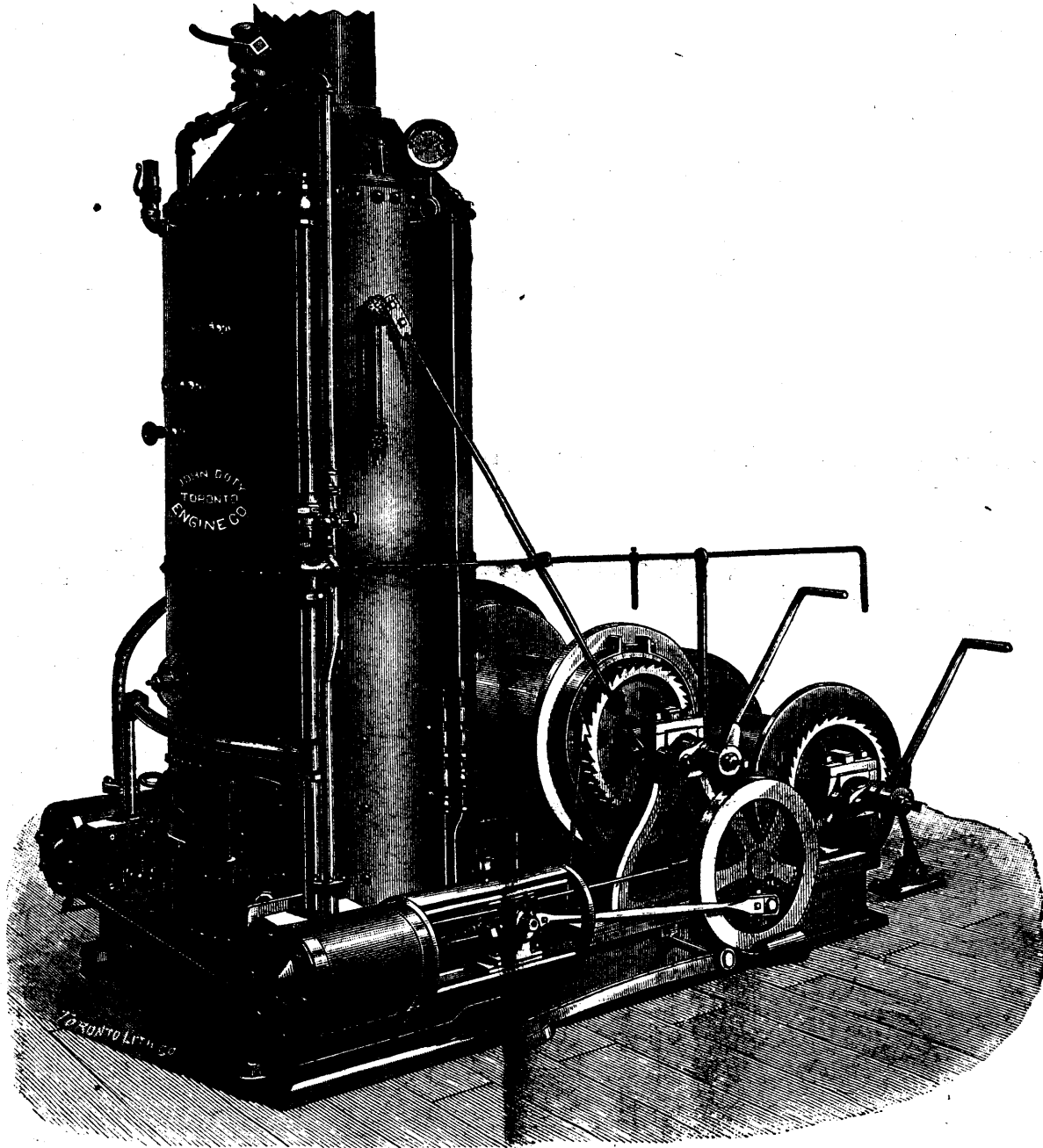


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