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Canadian

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1889.—OTTAWA, MARCH—1889.

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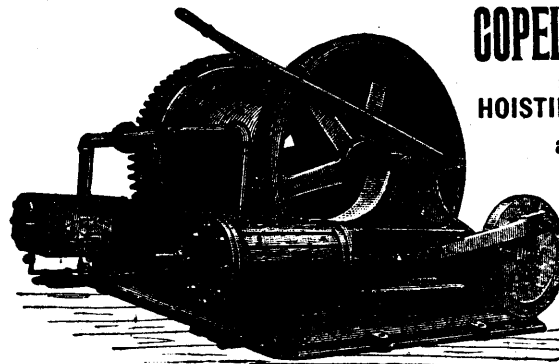
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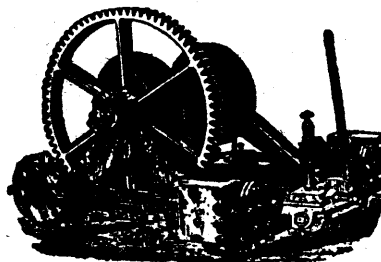
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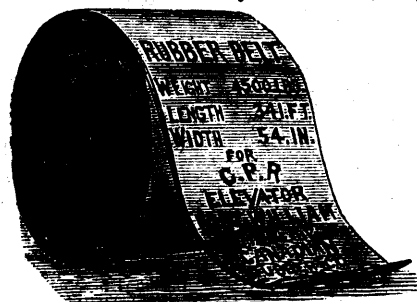
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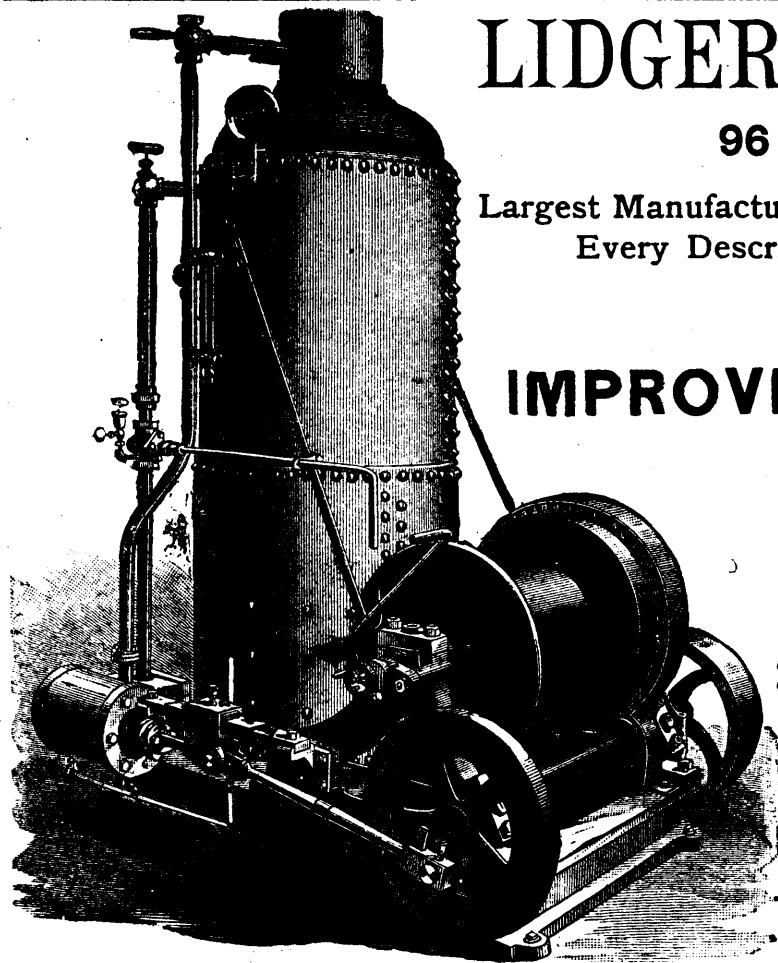
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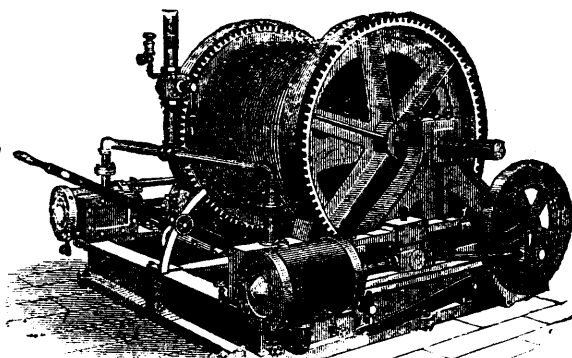
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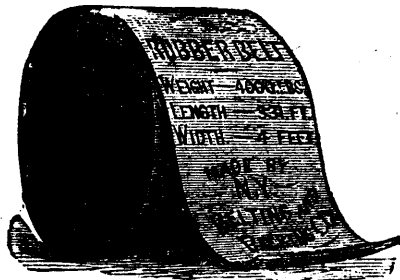
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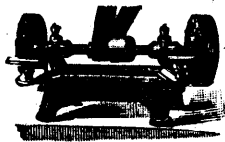
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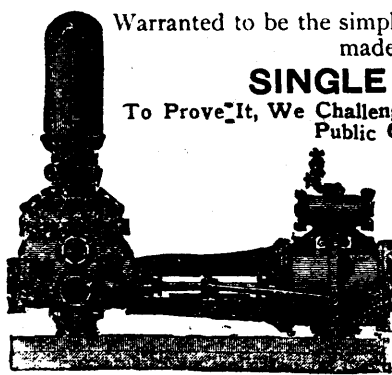
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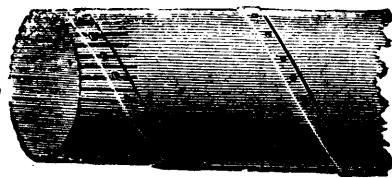
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ONTARIO Mining Regulations.

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 staked 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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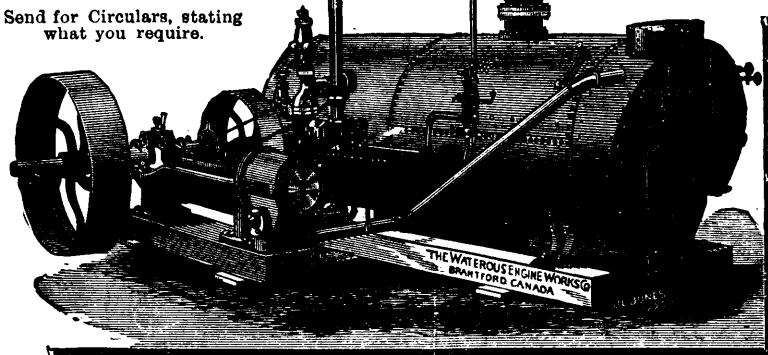
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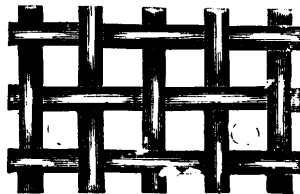
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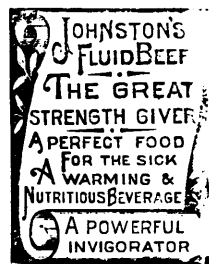
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Electric Pumping in Collieries.—The application of electricity to underground pumping has enabled Mr. F. Brain to give particulars which prove that this is a method of transmitting energy capable of wide and economical application. The electrical pumping plant, which the author describes, has been put in to deal with the main feeder of water in the deep working of the Trafalgar colliery, Forest of Dean. The pump and motor are placed at a distance of 1650 yards from the bottom of the shafts and water has to be forced by this pump to a vertical height of 300 feet to the pit bottom. The pump, a double 9 inch plunger with 10-inch stroke, is driven by the motor running at 650 revolutions per minute to 25 revolutions of the pump. Trials gave for the engine 29.49 indicated horse power to 10.36 actual horse-power of water lifted. The actual proportion of power given off by the steam engine used to lift water is therefore 35 per cent. The first cost of the plant was £644, the pump (£130) and pipes not being included. The cost of pumping 114 gallons per minute with this machinery, through 1300 yards of 7-inch pipes rising 300 feet vertically, is £7 17s. for one week's pumping, twenty-two hours per day, or in other words 0.02d. per horse-power, or 1.8d. per 1,000 gallons of water raised. When not required for pumping, the power available is used to drive a small fan underground.

Premature Explosions of Gunpowder.

—W. H. Williams, writing to the London *Mining Journal* says: "I have had a very extended experience with blasting by gunpowder in mines, and from careful daily observation I found that one cause of premature explosion resulted from charging the bore hole with naked powder, loose grains of the powder rest on their way down on the projecting and irregular sides of the bore, and when the stemming was done a bit of grit in the tamping, striking, or giving off a spark would convey fire to the powder charge by these loose grains of powder, and a premature explosion would be brought about. The other cause was that the naked powder filled up a greater part of the bore hole when first run in than it would occupy when stemmed, consequently the metal stemming bar, being of small diameter than the bore hole it went down in the powder charge, leaving a lining of the explosive some distance up its sides, forming really a hole lined with powder. Stemming then goes on, and a bit of grit or other exciting cause producing a spark, the powder charge is exploded prematurely. I have known charges of powder go down 3 and even 5 inches when rammed or stemmed below the point they stood at when loosely run into the bore hole. To remedy these very dangerous and sometimes fatal occurrences I first had every powder charge placed in a good case (cartridge) and gently but firmly pressed to the bottom of the bore hole. placing on top of these a small woollen wad about three inches long made of pump ring lagging (called engine shaggy). This wadding was a strip about 4 inches long and 3 inches wide tied tightly in the middle and allowing both ends to spread out something like a figure 8 flattened top and bottom. This went down on the cartridge and not only would it brush down all loose grit but spread out all over the unequal sides of the bore hole and set up a perfect non-conducting separation between the material used for stemming or ramming, and the powder in the bottom of the bore hole.

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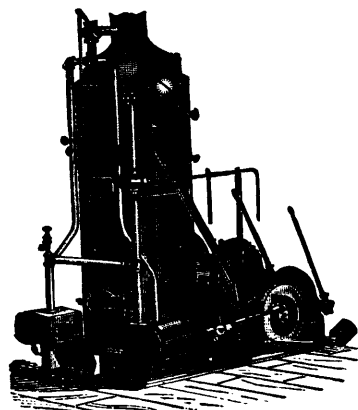
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Obituary.

Sir John Morris, Kt., J. P., Chairman of the Anglo-Canadian Phosphate Co., Ltd., died Feby. 27th, at his residence, Enfield, London, from inflammation of the brain. He was for many years head of the firm of Morris & Griffin, fertilizer manufacturers, Wolverhampton, and was one of the earliest English investors in Canadian phosphate lands. He was formerly Mayor of Wolverhampton, and was for ten years Chairman of the Chemical Manure Manufacturers' Association. The deceased gentleman was greatly beloved for his many amiable traits and was highly esteemed for his business integrity.

The Geological Survey. Its Staff and its Director.

As a country expands and progresses it is only natural that its public institutions should correspondingly keep pace with its growth, and when these are kept up by money voted by parliament, it is to be expected that their management should be watched by the people, and their action commented upon. A wise government, to foster the industries of its country keeps up establishments intended to aid these industries by their investigations, experiments, and researches, and by announcing results so afford their experience to all interested. The experimental farms will be of untold value to the agriculturist and the intending settler in a country new to him; and in like manner the Geological Survey is of the utmost value to the miner, the prospector, the capitalist and intending investor in mineral lands. In the earlier days of Canada when Sir William Logan almost single-handed undertook the work of a Geological Survey, a comparatively small area of that which now forms the Dominion, was invested with any particular degree of interest, and his labours met all the requirements of his day. Now with the unbroken sweep of country from ocean to ocean and territory extending to within the Arctic circle giving evidence of mineral wealth, some idea may be formed of the increase of work the Geological Survey Director has to control, and the wonder is how with the comparatively limited staff and means at his disposal, so much work has already been achieved, as the annual reports of the Survey show Dr. Selwyn to have accomplished and to be still carrying on. It is not our province to flatter or adulate an official for doing his duty; that, the country expects of him; but we do feel that it is not out of place

in a publication like the CANADIAN MINING REVIEW to defend an official when unjustly attacked. These remarks are drawn forth from a telegram which appeared in the *St. John Globe* of the 17th February last, belittling Dr. Selwyn, and charging him with favouritism and partiality in selecting localities for survey. It is not the object of the institution he controls to advertise mining properties in any one locality by giving them a preferential report, but it is its object to follow up any new discoveries made by individuals and to publish the results of its labours in such districts for public use. Such a course may have led jealous persons to assert some particular survey as savouring of partiality, but it is only ignorant or disappointed parties whose minds could conceive such narrow views of Dr. Selwyn, whose career of scientific investigation can be pointed to as evidence of his whole course of impartial action through life. As an evidence of the esteem in which his work is held abroad, the comments of men of standing in the United States and elsewhere give no uncertain sound. Mr. E. E. Thompson of New York, says of the maps published by the Director that they are "truly magnificent; my highest expectations are more than realized in them; they are indeed models of method and precision, and the most noble monuments to their originator." Another gentleman of very high standing in the Lower Provinces speaking of Dr. Selwyn's maps says: "It is my unbounded appreciation of what has hitherto been done by the corps of the Geological Survey under the Directorship of an able and eminent chief of whom Canada may well be proud, that prompts me to suggest and impels me to advocate the expenditure of a few tenths of a cent more apiece, to enable the Survey to continue recording and establishing in the most satisfactory manner work that is *being well done*, and which ensures to the industrial development of the country while it will be at the same time a source of honest national pride when we compare our record with that of other countries." Surely such comments as these speak volumes for Dr. Selwyn's ability and work, and the comments of the *St. John Globe* depreciating these labours would not be worthy of notice, were it not that if allowed to stand unnoticed, the idea might gain ground that there was some cause for them. Any visitor to the Geological Museum must at once be struck with the order and arrangement existing in the display of its specimens, and when the small vote at the disposal of the Director is taken into account, the only wonder is how so much can be made out of so little at his disposal. The vast extent of territory represented by specimens testify to the field work done, and the annual reports are an index of the care bestowed on the outdoor labours of the staff. Dr. Selwyn can afford to stand all attacks without harm being done, but at the same time narrow minded and ill-natured thrusts which irritate like a thorn in the flesh, require like the latter a magnifying glass to show their insignificance, and when disposed

of share the fate of the thorn, in being cast aside as worthless matter. While upon this subject we would again remind the Federal Government that the accommodation provided for this important branch of the public service is utterly inadequate to its wants and uses. The present building, besides being too small, may be destroyed by fire at any time. Just now it contains probably the most precious collection of minerals, fossils, and botanical specimens contained in any one building on the North American continent. The loss of such would be irreparable. We trust that in order to do justice to this valuable collection, the day is not far distant when the Geological Survey and Natural History museum will be provided with a much more commodious building than that which it now occupies, and that the present able director may be spared in health and strength to assist for many years to come in its management and supervision.

The American Institute of Mining Engineers to Meet in Ottawa.

Our readers will be gratified to learn that arrangements have been made for holding the fall meeting of the above Institute in Ottawa early next October. The suggestion was made by Dr. Bell of the Geological Survey, Mr. R. G. Leckie and Major Markham, Canadian members, who attended the late New York meeting, and was very warmly received. A meeting was held in the office of the CANADIAN MINING REVIEW on 5th inst., when it was decided to call a larger one. This resulted in a very influential gathering in the City Hall on the 8th inst., at which it was resolved to invite the Institute to Ottawa and to take steps to raise money for their proper reception. A deputation consisting of upwards of twenty leading citizens and members of parliament for Ottawa and the surrounding counties waited upon Sir John Macdonald and requested aid for this purpose. In response the Government has agreed to grant \$1,000. This, it is confidently expected, will be largely increased by the governments of Ontario and Quebec. The consent of the Council of the Institute was required in order to appoint Ottawa as the place of meeting. This has been obtained, and the secretary, Dr. Raymond, has written that the way is now clear for us to have the autumn meeting. This will be a great boon. The Institute numbers over 2,000 members, and embraces wealthy mine owners and distinguished practical scientists. Their coming to the Capital of the Dominion will increase the importance of Canada and Ottawa, not only to our neighbours, but to the world generally. Excursions will be organized to our mining districts in all directions. These will have the effect of bringing our phosphate, mica, iron, copper, gold, silver and other mines under the direct personal notice of the men most likely to invest or to influence the investment of money in them, and will be certain to lead to sales of

both developed and undeveloped properties. Other interests will also be sure to benefit, as the average American is always open for any opportunity for the profitable investment of money.

The interest which capitalists may take in our mining districts will necessarily be heightened after personal investigation. Even those who may not invest, if they are afforded a pleasant visit will come again. One good feature of these meetings of the Institute is that the members always bring their ladies with them, and friendships formed at agreeable meetings often last for life. By making the acquaintance of our own scientists they may draw from them some of their hidden knowledge, and the meeting may thus be advantageous. The reading and discussion of papers on subjects of practical importance will be a treat to our citizens and mining men; and the speciallists in different departments may give valuable hints or advice on the ground during their visits to the various mining districts. The publication of the volume of Transactions referring to the "Ottawa Meeting" will tend to bring this region into prominence in mining circles throughout the world.

We have so far said nothing of the direct and immediate advantage which our city and the country generally will derive from the visit of such a large number of strangers with money to spend. Our railways, steamboats, hotels, shops, cabmen, etc., will profit to a very considerable amount in the aggregate, although this will be insignificant in comparison with the larger advantages which will be sure to follow.

Since this was written, the Provincial Government of Ontario, with a foresight that does it credit, has made a grant of one thousand dollars to the fund. We now look to the Province of Quebec for a similar contribution.

Phosphate Quality.

Much perplexity has been occasioned in the minds of Canadian phosphate producers and dealers by the variation in the demand for quality on the part of English buyers of phosphate. When the trade began, some 12 years ago, no guarantee over 70 per cent. was ever asked for. In a few years 75 per cent. guarantees were required, and then 80 per cent. was strenuously demanded, and for the past three or four years anything under that standard was very difficult of sale, or had to be disposed of at much lower relative prices. The reason generally adopted by Canadians as an explanation of this demand for high guarantees was that owing to the great uncertainty of the results of sampling and analysis the buyer often had a chance to buy in at a low price a good lot of phosphate which had chanced to be rated below the guaranteed standard and was therefore rejected. However this may be, there has been a sudden reaction since last summer from this practice and up to the present not a ton of 80 per cent. phosphate has been sold for next season's delivery to England, while there has

been a lively demand for grades below 75 per cent., and lower qualities have been sold than ever before, in fact phosphate that has heretofore been thrown upon the dump as worthless is now found to be marketable. An explanation has just been received from an English correspondent that throws new light upon the subject. It is well known that our phosphate, after being finely ground, is mixed with about an equal weight of sulphuric acid in order to render it soluble in water. In this state it is known as superphosphate. It is found that, although at first nearly the whole quantity of phosphate may be rendered soluble by the acid, after a while a portion "reverts" or becomes insoluble again, and as it is usual to sell superphosphate upon the basis of the "available," or soluble, phosphate that it contains so that what has reverted becomes a loss to the manufacturer, or if sold on the full analysis the farmer may think he has sustained a loss. Canadian phosphate is higher in quality than almost all others, but is said to revert more than do some of the lower grades. These remarks will explain the words of our correspondent, who says, "It must be remembered that not only are manufacturers wishful to get a price for the phosphates that revert, but farmers are beginning to see that it is better to buy at a low price supers of say 26 per cent. phosphoric acid (equal to about 57 per cent. of phosphate of lime) than to give a relatively very much higher price for a higher percentage superphosphate, and the bulk of the trade is now in supers of about 26 per cent. phosphoric acid, which can readily be made from the low class easily worked phosphates, and this is, of course, against high grade Canadian."

Very likely reasons may be found to change back again to the use of higher grades, but even if it is not so there is enough low grade phosphate in all Canadian mines, heretofore discarded, which, if judiciously mixed with the high grade and the expense of cobbing dispensed with, will render the returns of this industry more profitable than ever.

The Canadian Asbestos and Antimony Company, (Limited.)

This Company has been formed in London to purchase and develop certain mineral properties owned by Dr. James Reed in the eastern townships, comprising 16½ square miles, with mining rights over 9,500 acres in addition. The capital is fixed at £160,000, in £5 shares, of which 22,000 are now offered for subscription at par. The purchase price is £130,000, payable £50,000 in cash, and the balance in shares, leaving £30,000 for working capital. The Directors of the new concern are: Sir Henry A. Isaacs, St. George's House, Eastcheap, London, Chairman; The Right Hon. Lord Gifford, V. C., Reigate, Surrey, Vice Chairman; David J. Carmichael (late senior member of Council, Madras), 21 Sussex Gardens,

London, Lieut.-Col. H. C. Gleadow, 5 Cornwall Gardens, London, W. A. Vanderbyl, 3 Great Winchester Street, London, and R. H. Jones, 82 Queen street, Cheapside, London. The local board in Canada includes Hon. Francis Laugelier, M.P., and Mayor of Quebec; Frank Ross, Director of the Quebec Bank, Quebec; and Dr. James Reed, Reedsdale. The properties to be acquired are: (1.) The Nicolet freehold estate, containing 2,267 acres, seven miles from Garthby station on Quebec Central Railway; (2.) a freehold estate at Thetford, comprising 7,776 acres, with mining rights over 9,500 acres; (3.) the Coleraine freehold estate, lots 27, 28 and 29, containing 450 acres. The *Financial News* and *Financial Times* speak very favourably of the scheme and its promoters; but the *Stock Exchange Times* describes the project as "another attempt to draw funds from easy going people who have more money than wits." This paper concludes its criticism thus: "The vendors will take £80,000 out of it, and they will considerably leave £30,000 for working capital. Kind folks! What care they if the estates remain undeveloped and unprofitable for lack of adequate capital to work the deposits of asbestos and the 'seams of antimony?' Their exploitation is in the inexhaustible field of credulity which distinguishes the British investors. Let that much abused class for once abandon its idiocy and be wise. The end of investment is profit—this is an excellent rule; the end of this scheme is the sole profit of the vendors and promoters, *et hoc genus omne*." No authentic information bearing upon the extent and richness of the mineral deposits said to be found upon the two first mentioned properties is to be had, and we are therefore not in a position to speak of their value. The Coleraine property, on the other hand, has been partially opened up, and Dr. R. W. Ellis, in his recent report to the Geological Survey, speaks very favorably of it as a probable asbestos producing property. We understand that in consequence of these disparaging remarks Lord Gifford has requested the Geological Survey to furnish him with full information, and with this object in view it is not unlikely that a special examination of the property will be made.

Largest Producing Gas Well of New York—According to Mr. C. A. Ashburner, the greatest amount of gas ever discharged per diem from any well in the State of New York was from the McMullen and Hallock well, commonly known as the "Mullen Snorter." This well is situated in Olean township, Cattaraugus county. Gas was struck on May 30, 1877, at a depth of 1,180 feet, in a sand bed 25 feet in thickness. The Bradford oil and gas sand proper was struck at a depth of 1,230 feet. From careful measurements on June 1, 1877, the author determined the discharge of gas to be at the rate of 24,480,000 cubic feet per day of 24 hours. With the gas there was discharged about a barrel of oil per day. The discharge of gas continuously decreased until 1882, since which date the well has produced two to three barrels of oil per day, with a comparatively small amount of gas.

The Vancouver Coal Mining and Land Company.

An extraordinary general meeting of the above company was held at the London offices on Tuesday, 5th ulto. Mr. Galsworthy presided, and the proceedings only lasted a few minutes. There were very few shareholders present.

It was stated that the meeting was called as the directors had found it necessary to formulate a scheme for the reconstruction of the company on more convenient lines. The following is the scheme as set forth in a circular sent round to the shareholders: "A new company will be formed to be called the New Vancouver Coal Mining and Land Company (Limited), with enlarged powers and appropriate regulations. The discount shares, other than a few which by estoppel have been confirmed, will be specially acquired by the new company on the terms of an agreement already entered into with them, by virtue of which the holders of each discount share will be entitled to 10 l. fully paid shares in the new company; the assets and liabilities of the existing company will be made over to and undertaken by such new company; the members of the existing company will receive 10 l. shares in the new company for each 10 l. share fully paid in the present company, and 10 l. shares with 18s. per share credited as paid up thereon, for each 10 l. share with 9 l. paid up thereon in the present company; and the existing company will, in due course, be dissolved." The principal objects claimed to be attained by this reconstruction are: (1) To overcome the difficulty created by the recent decision of the Court of Appeal in *re Almada and Tiritto Company*, where it was held that the issue of shares at a discount was *ultra vires*, and to place the holders of such shares in this company in the position which all parties intended that they should stand; (2) to remove the existing difficulties in the way of a declaration of dividend, and (3) to remove any doubt that may exist as to the company's power to sell its entire undertaking to Messrs. Rosenfeld or otherwise.

The chairman moved the following resolutions, which were duly seconded and carried:

"That it is desirable to reconstruct the company, and to transfer the undertaking thereof to the New Vancouver Coal Mining and Land Company (Limited), and with that view thereto the company be wound up voluntarily, and that Mr Joseph Ramsden should be and is hereby appointed liquidator for the purpose of such winding up."

"That the draft agreement submitted to this meeting, and expressed to be made between this company and its liquidator of the one part, and the New Vancouver Coal Mining and Land Company (Limited) of the other part, be and the same is hereby approved, and that the said liquidator be and he is hereby authorized, pursuant to section 161 of the Companies Act, 1862, to enter into an agreement with such new company, in the terms of the said draft, and to carry the same into effect with such, if any, modifications as he may deem expedient."

These resolutions were carried unanimously.

The chairman explained that a call of 20s. per share had been made on the 9 l. shares; also that a bonus of 20s. per share had been declared on all the shares of the company, both payable 30th April next. This was done to equalize the shares, which would place them on a much better footing than they had been in the past. The reports from the mines were satisfactory, the output for the month of January being 29,000 tons. There was little doubt

Mr. Rosenfeld would purchase the undertaking from the company, and then the shareholders would get about 12 l. per share instead of about 7 l. per share if their shares were sold at present. There was no other business.

Silver Wolverine (Limited).

The shareholders of the above company held their first ordinary general meeting on Tuesday, 5th ulto, at the offices, 115 Cannon Street, London.

Major General W. O. Swanston presided. The directors, he said, had nothing to tell the shareholders. There was no report to make and no accounts to present, and at present no dividend for them. He did not know that he had anything to do, except, perhaps, to introduce the directors to the shareholders. Upon the table was some of the stuff that had come out of their property. He might inform the meeting that work had been commenced. They had erected several buildings for the workmen and stables for the horses, and had actually commenced to dig. The last telegram they received from their engineer was dated February 1, and was as follows:—"Wolverine looking well. Sinking by contract in good milling ore." Before that they received a report from another engineer, to whom they wrote on the subject, asking him for information as to the cost, and he concluded his report thus:—"I would say that the Wolverine vein is similar in character to all the best mines in the section, and as far as can be seen you have good reason to expect the Wolverine will develop into as good a property as the Beaver and the Badger." So far as they had gone their condition and prospects looked hopeful.

Mr. Pearson: I should like to ask one or two questions. First, whether it is correct that the directors proceeded to allotment before half the number of shares reserved for the public were subscribed for—that, is, before 10,000 out of the 20,000 shares were subscribed for? Also whether out of that less than 10,000 shares 5,000 were not subscribed for by one man alone? I should further like to know whether, after allotment, the directors sent out to Canada a person to ascertain whether the capital which had been subscribed was sufficient to start with, and, if so, why that information was not obtained previous to allotment?

Major J. A. Winter (director): The amount allotted really is 9,695 shares, and that comes to the same number of pounds, and here is the estimate for the works, which amounts to about 4,700 l. That ought to satisfy you, considering we are told that before working a year we shall be paying a dividend.

Mr. Pearson: My next question is as to whether the directors after allotment did not find it necessary to send someone out to Canada to ascertain the amount of money which would be necessary to work the mine, and, if so, why that information was not obtained previous to allotment? (Hear, hear.) My reason for asking that is because I understood when I subscribed for my shares directors who had put their names at the back of the prospectus were fully acquainted with all the information which it was necessary to obtain for the development of the mine. But if it was found necessary after allotment to send out someone, then I suppose the directors did not understand the amount of money that would be necessary.

The Chairman: The first estimate that we had before we took any steps was that it would be about 4,000 l. for the working of the first year.

To satisfy ourselves that that was right we sent out to an independent engineer for his estimate. His estimate arrived after we had made some of the allotments, and that estimate coincided almost exactly with the one sent before as to amount, except that he included machinery, boats, horses, and waggon, which we had to purchase. These are all the things that we had to purchase the first year, and we shall not have to do so the second year. The whole of that makes a little over 4,000 l., and we have 10,000 l. to work with; and if we make anything at all, we shall make it before we spend 10,000 l.

In reply to the question it was stated that working had commenced in the mine.

At the conclusion of the ordinary an extraordinary meeting was held to consider the following resolutions:—"That the following Articles be added to the Articles of Association of the company—Share warrants to bearer: (133) The directors, with respect to any fully paid-up shares, or with respect to stock may, if they think fit, issue share warrants, stating that the bearer is entitled to the shares or stock therein specified, and may provide, by coupons or otherwise for the payment of future dividends on the shares or stock included in such warrants. (134) The directors may determine, and from time to time vary, the conditions upon which share warrants shall be issued, and in particular upon which a new share warrant or coupon will be issued in the place of one worn-out, defaced, lost or destroyed; upon which the bearer of a share warrant shall be entitled to attend and vote at general meetings, and upon which a share warrant may be surrendered, and the name of the holder entered in the register in respect of the shares or stock therein specified. Subject to such conditions and to these presents, the bearer of a share warrant shall be a member to the full extent. The holder of a share warrant shall be subject to the conditions for the time being in force, whether made before or after the issue of such warrant."

The company's solicitor (Mr. Philips) explained that the resolution was proposed in order to give the directors power to issue share warrants, so as to enable the shares to be dealt with. The directors thought it possible that there might be some dealings in the Paris market in the company's shares, and therefore they proposed to take power to issue the share warrants. They had not yet actually decided whether they would issue them. The resolution must be passed by three-fourths of the meeting present.

After some discussion, Major Winter said it was not compulsory for any shareholder to have dealings as suggested. It might strengthen the company, and could not do any harm. Supposing a shareholder went to the Paris market and made a market for his shares, others would be inclined to do the same thing. There would be little expense to the company beyond the printing and registering at Somerset House. The only other expense would be to the individual.

The resolution was carried unanimously.

PHOSPHATE.

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The Asbestos Industry, 1888.

Dr. R. W. Ellis.*

The asbestos industry of Thetford and Coleraine continues to rapidly increase in importance. The formation of the new Bell Company of London during the past season, by which detached areas have been brought under one management, and the wonderful advance in the stock, has incited fresh explorations, and several new openings have been started. Prospecting has been active during the past season, not only in Thetford and Coleraine but in the great serpentine area of Wolfestown, and good indications of asbestos have been found at several new points. But the largest quantity and the best quality of fibre continues to be derived from the Thetford mines, though the very bad season of 1888 has reduced the output very seriously. The asbestos at these mines differs very materially from the greater part of that obtained at other points, both in Broughton on the one hand and in Coleraine on the other. That from Coleraine and Wolfe is to a certain extent affected by a harshness and stiffness which pertains to a very considerable portion of the output, rendering the percentage of firsts much less than at Thetford. The fibre is also for the most part shorter, and much of it, especially near the surface, is discoloured, probably from the percolation of surface waters charged with iron.

Although large areas of serpentine exist at various points in the townships above named, a great part of them are, in so far as explorations have extended, apparently devoid of profitable veins of good asbestos; in some, short-fibred veins of harsh and brittle mineral are found, but these have as yet no economic value, so that the really valuable areas are not very numerous. During the past season all the old mines were carefully examined, as well as the new openings being made during the year. Among these last may be mentioned the Megantic mine, one mile and a half from Coleraine station, first prospected in 1886, but now worked by Fenwick & Scater, of Montreal. A peculiarity of this mine, not noticed elsewhere so far, is the occurrence of considerable quantities of mica in veins with impure asbestos. The rock here is very much shattered near the surface and the fibre is consequently discoloured. Veins up to one inch and a half are found, and in the more solid portions the quality improves. The output from this place has been necessarily small, owing to the time spent in opening the mine and the delays from bad weather, the quantity mined in four months to October 1st being 39 tons, of which one-third may be classed as seconds, the rest as thirds. An average number of 12 men was employed.

Near Black Lake several openings have been made along the track of the Quebec Central Railway by Messrs. Johnston & Lomas. Only three to four men were employed, and the work was of a preparatory nature. The quantity of asbestos obtained was not stated. On lot 32, range B, Coleraine, work has been begun by Capt. Williams. At my visit in October the average number of men employed was 15, and the output to date 29 tons, of which $4\frac{1}{2}$ tons were firsts, the rest about equally divided between seconds and thirds.

In this district also the Bell Company began operations on the north half of lot 28, same range, formerly the Hayden property. Very good surface indications are here visible, many small veins showing, while in the cut

now going in towards the base of the hill fibre an inch and a half to two inches long of good quality is found. The south half of these lots 28 and 27 belonging to Dr. Reed, has lately been sold to the Wertheim's of Frankfort, Germany, who are putting in machinery preparatory to developing the mine. This property is the most elevated of any in the district, being not far from 600 feet above Black Lake Station. The surface indications are here very favorable, veins up to two inches and a half having been found. Prior to the sale about twelve tons were taken from this place, of which two tons were firsts, four seconds and six thirds. It is now being worked by contract at \$25 per ton, ready for market. On the north side of the Poudrier Road, in lots 27, 28, 29, range A, Coleraine, several openings have been made and good indications have been obtained. At the time of my last visit, veins of asbestos up to an inch and a half were seen with a number of smaller ones. On lot 26 also an opening in the surface of the hill disclosed small veins. These areas are separated from those of Black Lake proper, by masses of white granulite and dioritic rock, a belt of which closely associated with the serpentine extends from the shores of Black Lake to the rear of the Thetford mines.

In the township of Ireland on the west side of the great serpentine area, which extends north east from Wolfestown, King Bros. have started two openings on lots 24, 25, range 3. The elevation of these by aneroid is about 500 feet above the surface of Black Lake, which is 200 feet below Thetford Station on the Quebec Central Railway. The asbestos here is found principally in two knolls about one fourth of a mile apart, and occurs at times in a series of thin veins from one eighth of an inch upward, as many as twenty being sometimes found in a space of six inches. Many of these veins show a selvage of whitish weathering serpentine on either side, separated by a thin vein of asbestos from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch thick. Other veins of greater size are numerous, ranging in thickness to $1\frac{3}{4}$ inches; the aspect of the rock and the veins at this place strongly resemble in many respects those on the Belmina property in Wolfestown. The surface indications in so far as visible are excellent, but the mine has not been thoroughly opened, only two months' work with a small force having been spent on it.

At Thetford, new openings have been made to the west of the Quebec Central Railway by Messrs. Ward Bros., by Mr. Johnston and by King Bros. These prove to a certain extent the serpentine area between the present workings and the Thetford river, and good indications of productive ground are found at all the locations, though the lower lying level of the ground may necessitate drainage works.

On lot 28, range VI, Thetford, good indications are found, as also on lot 32, R. C. Coleman, but no work has been done on either of these during the past year. Further north, on lots 16, 17 and 18 in range IV, Thetford, a belt of serpentine occurs which has been opened by Dr. Reed, who reports some very good veins of asbestos. Chromic iron, also, is found in this area, but the samples seen by us seemed too poor in chrome to reach the required standard. Noses of serpentine also occur on lot 13, range V, and on range XI, Broughton, from which asbestos has been reported, but, in so far as yet learned not in such quantity as to be economically valuable. The Broughton mine was also worked during the past season; the vein, of which there appears to be only one, in places reaches a thickness of 3 inches; at others it is split up into a number of thin strings of no

value. The returns from this mine have not been received.

The established mines in all the districts have been working during the past year, though the output has been greatly lessened by the very bad weather, especially during the autumn months. An attempt to obtain the output from each mine has been made, but has been only partially successful, several of the managers neglecting to forward the requisite information in time. Of the Thetford mines, the output of the Bell Company mine, formerly the Boston Company, still far exceeds the others. The shipments for the season to 1st December being 1,350 tons, of which 930 tons were firsts, 105 tons seconds, and the rest waste or thirds. The quality of the asbestos from all the mines of this district is excellent and the prices obtained are even higher than quoted in the report of 1886; *seconds* in some cases command \$75 per ton and *firsts* from \$80 to \$110. The output from King Bros.' mine for 1888 was: *firsts*, 170 tons; *seconds*, 165 tons; *thirds*, 245 tons. Average number of men employed 32; boys 20. The returns from the other properties are not yet in, but there has been great activity in them all, and the output has been correspondingly large. Rock drills worked by compressed air have recently been introduced at the Bell mine.

In the Black Lake district the principal mines in operation are the Scottish-Canadian, the Anglo-Canadian and the D'Auville. Mr. Penhale, the manager of the Scottish-Canadian, states that in the eight months ending 10th November, 400 tons were shipped from that mine, of which 40 tons were firsts, 110 tons seconds and 250 tons thirds; but operations were hindered by scarcity of men and bad weather, so that the new workings could not be carried on. This mine is equipped with improved machinery, air compressor, rock drills, hoisting engines and dumping skips, with a new set of appliances for crushing the rock and separating the asbestos, more particularly in regard to the lower grades, to avoid the great expense of cobbing by hand. This machine was in operation but a short time, but is claimed by the manager to be a great success. Should this be the case and the asbestos of short fibre be easily separated, it will largely enhance the profits of the industry, since many of the dumps, most of which now cover very valuable ground, can be profitably worked over and the refuse disposed of for ballasting or other purposes, while under the present system of hand-cobbing, the shorter veins do not warrant the expense necessary for their separation. The Anglo-Canadian mine for the six months ending 15th of November, produced, according to Mr. Hopper, about 210 tons, the average number of hands, including cobbers, being 30 to 35. The principal pit at the mine has been sunk to a considerable depth and Mr. Hopper reports veins at the bottom of very superior asbestos, resembling that from Thetford, from 3 to 7 inches thick. These veins have been uncovered since my visit. The percentage of firsts from this mine has, according to the manager, increased from 10 to nearly 20 per cent. Openings in the face of the knoll to the west of the principal pit are now being worked, the indications here being very good. The output of the Fréchette or D'Auville mine, which lies between the two just mentioned, is given by Mr. Hopper for the season to 1st December as about 300 tons.

The cause of the difference in quality between a great part of the output from the Black Lake mines and those of Thetford has long been a

*Summary report of the Geological Survey of Canada to 31st December, 1888.

source of enquiry to the mine owners of those places. By some it is supposed to be due to the difference in level between the two places, the works of the Scottish Canadian Co. being from 250 to 300 feet higher than those of Thetford. Yet this can hardly be taken as satisfactory, since at the Reed mine, 300 feet higher, some excellent fibre is found. A more likely reason may possibly be the driving off of the contained water in the fibre, since asbestos is a hydrous silicate of magnesia, by the action of diorites or the metamorphism preceeding from the presence of the granites, which occupy a considerable area in the Black Lake district. If the soft silky fibre is heated it changes its character at once and becomes harsh and brittle. The serpentine near the contact with the granitic veins or masses is often very considerably shattered as though the presence of the granite had exercised a marked influence on its condition. At Thetford the granite masses in the mines are limited to small and thin dyke-like veins, which have not produced any great effect upon the asbestos. It must, however, be said that the stiff fibred mineral is not in all cases confined to the vicinity of visible granitic masses, and other causes may in such cases have produced a similar effect.

Practical Prospecting for Gold and Silver.

The following paper was read by Mr. James Brady, D. L. S., Victoria, B. C., at the annual Convention of the Association of Dominion Land Surveyors held last month at Ottawa:

Surveyors in the practice of their profession have many opportunities of examining the rock formation, and ascertaining to some extent the mineral resources of various parts of the country, and, although many members of the profession and of this association are quite as well posted as I am on the above subjects, others may not have given them much attention, and will not object to a few hints that may assist them in determining when they are in a country that may be expected to produce gold, silver, or other ores how to search for the same in an intelligent manner; and how veins may be opened up, in a preliminary way, so as to ascertain as cheaply and quickly as possible the character, value per ton and probable production of ore, thus determining the nature of reduction works required, and being enabled to estimate the cost of mining and reduction plant necessary to work the mine to its full capacity and of the returns and profits that may be anticipated.

It is said that most of the great mines of the world were found by chance and not by regular prospectors. This is probably true as regards lodes and veins, but it must be remembered that until within very recent years the average miner or prospector had little or no knowledge of the rock formations in which gold, silver and other metalliferous veins were likely to be found, and simply roamed over the mountains in a haphazard way, and was as likely to look for gold quartz in cretaceous limestone as in metamorphic slates, or to follow the wrong formation longitudinally as to cross it and get into a better one.

One instance, however, may be mentioned where intelligent observation and persevering search led to the discovery of immense gold fields and the settling up of a great continent—namely, the discovery of gold in Australia by Hargraves in 1851.

Nothing will build up a new country so rapidly as the discovery of gold and silver

mines. Agricultural and manufacturing enterprises are of slow growth, no matter how fertile the soil or how excellent the facilities for successful operation, unless they are given an impetus by something such as the discovery of gold or silver, which will cause an immediate influx of population. When such a rush occurs as is generally the case on the first opening up of a new mining country the work of exploring and development goes on rapidly, and all the resources of the country are developed in a proportionately rapid manner. Lumbering, farming and stock raising enterprises spring at once into existence, as the mines furnish a ready market and good prices for their products.

The old pioneer prospector is rapidly disappearing, and organized prospecting and exploring parties, under the direction of competent mining engineers and experts, are taking his place; and this manner of acquiring mineral properties will be largely adopted in the future as being the cheapest and in every way the most satisfactory manner of gaining possession of valuable mining rights.

The head of such a party starting out to prospect any particular range of country would first acquaint himself with all the geological and other information to be had from the reports of the Geological Survey and other parties who had visited the region of his intended exploration. Failing such sources of information he would take such reports and evidence as he could find relating to the mineral resources, etc., of other districts on the same geological belt or mineral zone, and thus get some idea of where to look for the particular class of ore or mineral desired.

The following extracts from an article on "Mineral Zones and Mountains," from the *Mining and Scientific Press* will help to explain this point:

"One of the plates accompanying King's Exploration of the 40th Parallel is a section of the Warren map of the U. S. Engineer Department. The section given includes the main central region of the great basin, with a part of the coast system of California, and the outlying chains of the Rocky Mountains. A brief study of this map will teach the *one great and prominent law of arrangement of Cordillera Mountain chains, namely, that they trend from north to south, or from north-west to south-east.*"

"In strict subordination to this longitudinal direction of ranges," says King, "are grouped all the structural features of local geology. The average strike of the great areas of upturned strata is generally with the meridian. All the larger outbursts of granitic rocks conform to it as well, since their rents are most commonly the axial lines of actual folds; and, lastly, when the tertiary uplift occurred, its ranges bordered the older mountains in parallelism, and the volumes of lava accompanying it found exit through longitudinal rents, and either built themselves up along the ancient line of structure or through new fissures piled up chains of volcanoes conforming in trend with the general north and south plan."

"Over these mountains are found localities of the *precious metals*, and it is not surprising to observe that, following its leading structural idea, they appear to arrange themselves in *parallel longitudinal zones.*"

1. "The Pacific coast ranges on the west carry quicksilver, tin, and chromic iron.

2. "The next belt is that of the Sierra Nevada and Oregon Cascades, which upon their west slope bear two zones; a foot-hill chain of copper mines, and a middle line of gold deposits. These gold veins and the resultant placer mines

extend far into British Columbia and Alaska.

3. "Lying to the east of this zone, along the east base of the Sierras, and stretching southward into Mexico, is a chain of silver mines containing comparatively little base metal, and frequently included in volcanic rocks.

4. "Through middle Mexico, Arizona, middle Nevada and central Idaho is another line of silver mines mineralized with complicated association of the base metals, and more occurring in older rocks."

5. "Through New Mexico, Utah and Western Montana lies another zone of argentiferous galena lodes."

6. "To the east again the New Mexico, Wyoming and Montana gold belt is an extremely well-defined and continuous chain of deposits."

From this it can be seen how any information relating to the geological structure and rock formation of a district, or the character of its ores, will assist in determining what may be expected at other points in similar respective positions, on the same range. As an illustration of this I may mention the fact that on the Selkirk range in Kootenay District, B. C., large and valuable lodes of silver bearing lead and copper associated with other base metals, have lately been discovered. The ores of this district correspond in character with those of Idaho and Western Montana, immediately south and on the same range, and with those of mineral zones 4 and 5.

It being a fact that nearly all the valuable gold-bearing veins of the world have been found in metamorphic slates and schists of different ages, from the Silurian in Australia to the Jurassic in California, it is more reasonable, and one is more likely to prove successful, in searching for gold, to confine one's explorations to metamorphic rocks. In like manner all the great gold placers, being chiefly composed of sand, clay, gravel and boulders derived from these and allied rocks, it seems reasonable to prospect for gold placers on the lower slopes and benches of mountains and hills composed of such rocks (particularly where traversed by many quartz veins) and on the rivers and streams draining a country of the above character.

Gold-bearing lodes may be looked for in quartz veins traversing and interstratified with the softer metamorphic crystalline rocks, such as argillaceous, chloritic, talcose and hydromica slates and schists. Also to a much less extent in granite, gneiss and the harder metamorphic rocks.

The minerals or ores commonly associated with gold, in quartz veins, are iron, copper, lead and zinc sulphurets, and sometimes tellurium; the presence of one or more of these, being considered a good indication in a gold country; and their entire absence as unfavorable to the permanency and regular yield of the lode—even though free gold may be visible in the quartz. The most permanently productive gold quartz mines have been those in which free gold was seldom or never seen, and the above sulphurets were more or less represented.

The quartz is frequently rusty or cellular, and discolored brown, yellow, reddish, blue, etc., by the decomposition of the base ores accompanying the gold.

The most certain and reliable way of finding out if a quartz vein carries gold in paying quantities is to pound up pieces from different parts of the vein and pan them out. If the quartz is pounded very fine and then carefully washed down in a pan or horn, fine particles of gold will be found and can be seen with the naked eye, if there is sufficient in the quartz to pay for working; and it is not worth while

spending much time over a vein (as a gold vein) unless colors can be found in that way. Of course gold is found in paying quantities associated with ores of silver and other metals, as in the Comstock lode, where its presence cannot be ascertained by simply panning out; but this really comes under the head of silver ore, and will have to be assayed in a similar manner.

Veins and streaks of solid arsenical and other pyrites often carry gold in what would appear to be paying quantities, but such mines have seldom been worked successfully.

Silver and its ores are so intimately connected with many of the ores of lead, copper, antimony, zinc, etc., that in indicating the rocks in which we may expect to find silver-bearing veins we necessarily include the others.

Native silver, ruby silver, and silver ores proper, such as are mixed with base metal ores to only a limited extent, are found most frequently in syenite, trachyte, andesite, porphyry, gneiss and allied metamorphic rocks, and in shaly sandstone, conglomerates, etc., in the vicinity of eruptive rocks, and generally in a quartz gangue.

Argentiferous galena, and carbonate of lead carrying silver, argentiferous grey copper ore, etc., in argillaceous shale and schists, crystalline limestone, etc., and porphyry. And low grade argentiferous galena and carbonates in carboniferous and other limestones.

The vein matter, or gangue, may be quartz or calcspar, or both, and may be mixed with heavy spar, flour-spar, or pearl-spar, and in some of the largest and most productive lodes the vein matter is chiefly yellow or brownish clay with boulders of iron manganese rock, and horses of the country rock, and in this character of gangue the largest chimneys of galena and carbonates, carrying silver, have been found.

The character and value of silver ores cannot be accurately determined except by regular assay. They are mixed with so many other ores and minerals that in many cases they cannot be distinguished from the ordinary ores of the base metals. After long experience a man may be able to form a fair estimate of the ores of the particular district in which he has been working, but take him into a new district, where the combinations are different, and his opinion as to the value of an ore, from simple inspection, is quite worthless.

A collection of small specimens of different metallic ores, which can be obtained in New York and readily carried along, will be of some assistance, and with a blow-pipe outfit tests which will determine at least the presence or absence of silver and many of the other metals can be made. These, with "Dana's Manual of Mineralogy," an elementary treatise on geology, and a book of instructions for the use of the blow-pipe, a gold pan or horn and a bottle of nitric acid will enable one to get a fair idea of any ore, rock or mineral, he may come across.

A pick and shovel, hand-crushing machine or pestal and mortar, and one or two rock hammers and small prospecting poll picks should be carried along; and on regular prospecting expeditions, where such things can be packed or carried, a small bellows and anvil, drills, striking hammers, powder, fuse, caps, &c., should form part of the outfit.

In prospecting a given belt of country it is best to cross it as often as possible, and where the rock formation is most exposed, following up the beds of the streams where practicable, and making lateral excursions at convenient points and where the formation seems favourable.

At or near a change of formation, say from slate to granite or limestone, and near porphyritic

or other igneous rocks, in stratified or metamorphic beds, large and productive lodes may be looked for.

Large veins are generally split up or divided into several branches in the valleys or crossings of streams, but the large and solid outcrops can generally be found on the high ridges on either side by taking the general direction of the veins at the crossing, and it is usually on these ridges or hills that the largest and most valuable deposits of ore are found.

Preliminary development.—The first thing to be done in opening up a lode is to ascertain the extent of the ore-body on the surface, so as to determine the best place for a shaft or tunnel. This can be done by sinking to bed rock at several places along the general line of the lode where it is not already exposed, and making cross-cuts at these points. If the mine is to be opened up by means of a shaft it may be located about the centre of this ore-body, and should follow the vein down. The dip of a vein is so liable to change near the surface that a perpendicular working shaft cannot be properly located until prospecting works have been carried to a depth of at least 200 or 300 feet. Drifts or levels should be run about every 60 feet, and where the vein is wider than the drift, cross-cuts should be made at about the same distance apart. The extent to which this work should be carried and the size of shaft, &c., must be determined by the nature of the vein and its ore, the developments made in sinking and drifting and the amount of money the manager has at his command for this purpose. A shaft from 200 to 300 feet deep, and drifts as above, say 120 feet on each side of the shaft, with cross-cuts about every 60 feet, will generally be considered sufficient to decide the probable value of the property and the cost of mining and reduction works for permanent operation.

The ore taken out of the shafts and drifts will help to pay for the work, and the mine will be in a condition to put on men enough to stope out ore while reduction works are building to keep them running while the permanent shaft is being put down.

If the vein crops out on a side hill, or bluff, so that a tunnel can be run along the vein, at a sufficient depth from the outcrop on top, much time and money can be saved, and both hoisting and pumping works dispensed with. But if the strike of the vein is such that the tunnel must be run any distance through country rock before encountering the vein, it must be prospected and proved to a sufficient depth before a tunnel can be attempted without great risk of miscalculation and disappointment.

In lodes that are not too wet, rock and water can be hoisted for the first 100 feet by windlass and from 200 to 300 feet by a whim; but where much water is encountered an engine will be required.

The following points in relation to mining claims should be carefully noted:

1. Location or position on the map.
2. How to reach it, and condition of roads, trails, etc.
3. Course or strike, width and dip of vein or lode.
4. Class of ore or mineral, as nearly as can be ascertained.
5. Quality of ore or mineral, and samples if possible.
6. Length or width of ore body exposed.
7. Gangue or matrix of vein.
8. Character of walls.
9. Country rock.
10. Water-power, if any, fall, number of inches, etc.

11. Quality and cost of wood, timbers and lumber.

12. Cost of labor and board.

13. Price of provisions, grain, hay, etc.

14. Rate of freight from nearest railway station, steamboat landing or town.

15. Distances from nearest railway station, steamboat landing or town.

16. How lode is situated for development by tunnel or shaft.

17. Distance and freight to nearest smelter or reduction works; and rates paid for ore or charged for reduction.

18. Remarks on climate, labor, supplies, grass, etc.

19. Sketch of claim and surroundings.

In closing this paper I will quote the following from a report of the Legislative Council of Victoria, Australia, March, 1854:

"The discovery of the Victoria gold fields has converted a remote dependency into a country of world-wide fame; it has attracted a population extraordinary in number, with unprecedented rapidity; it has enhanced the value of property to an enormous extent; it has made this one of the richest countries in the world; and in less than three years it has done for this colony the work of an age, and made its impulses felt in the most distant part of the world."

Knowing the immense results that have followed the opening up of mines in Australia, California, Nevada, Montana, etc., one would suppose that our Government (both Provincial and Dominion) would offer every inducement to prospectors and miners to prosecute their work of exploration and development instead of hampering them with unnecessary and harassing rules and regulations. The mining laws of all the provinces, and the Dominion, should be assimilated, and many alterations made, and mining machinery which cannot be or is not manufactured in Canada should be admitted free of duty, at least until such time as we can manufacture it ourselves.

The Treatment of Ores.

(Mining Journal.)

II.—Silver Milling.

The ores of silver suitable for treatment by the milling process may be divided into two classes, according to their chemical compositions—viz.: (1) Free milling ores, or those capable of being treated without a preliminary calcination or roasting, and (2) ores which require roasting before amalgamation. The ores suitable for treatment by the free milling process are those containing the precious metal in such forms as are acted on by quicksilver directly, or by the aid of reagents. Ores containing silver in a metallic form may be treated by direct amalgamation, as in the case of free milling gold ores. Other ores of silver best adapted to this process are those containing the metal, as chloride, as kerargyrite, or horn silver, bromide, iodide, and various combinations, with sulphur, whilst in South America ores containing antimony and arsenic are worked by the process, but the sulphides of these base metals, and those of iron, copper, zinc, and lead, if present in considerable quantities, seriously interfere with the process by the fouling or "sickening" of the mercury, and by their reactions on the chemicals employed. The operation is usually performed in amalgamating pans. The process in any case is a slow one and is, generally speaking, only suitable for the treatment of decomposed ores,

or those containing silver in a very free state. Its adoption to the treatment of refractory ores is confined to districts where the cost of fuel is too heavy to permit of roasting-milling. The cost is very high, varying from 40s. to 80s. per ton, besides a lot of silver amounting to from 15 to 20 per cent. of the contents. Roasting-milling is employed on ores containing large percentages of the base metals. Such ores are crushed dry and roasted with salt previous to amalgamation in pans as in the case of free milling ores. The process is rendered more costly than free milling by the additional expense of dry crushing, and the use of the extra re-agent. Dependent upon local circumstances, the cost may vary from £2 to £5 per ton, but the loss of metal is with careful manipulation only 10 to 15 per cent. of the contents. Where the ores contain zinc, however, the loss would be considerably higher.

III.—Lixiviation.

Under this heading is included several methods of extraction of silver from its ores by the conversion into soluble chloride or sulphate, which is dissolved by water, a solution of common salt, or by other suitable solvents, the silver being recovered by precipitation instead of amalgamation with mercury, as in the free milling and roasting milling processes. The wet methods are less costly and more rapid than the amalgamation process, but require more skill in working them, especially in the calcining stage. Ores suitable for these processes should not contain large quantities of lead, zinc, antimony, or arsenic, while the presence of either cuprous, sulphide, or iron pyrites is necessary to produce the reactions of the roasting stage. The great skill required in this stage of the process militates against the adoption of the process except in well appointed metallurgical works. The cost varies from £3 to £6 per ton, or even higher where the quantity of ore treated is small, but the loss is comparatively small.

IV.—Concentration.

Whatever process may be most suitable to a given description of ore, a preliminary treatment in many cases will be necessary to remove the gangue and earthy constituents of the ore. The degree to which this concentration should be carried depends upon the nature of the gangue, the characteristic distribution of the metallic portions, and the process which has been selected for the subsequent manipulation of the ore. Under these classifications concentration may be divided into two classes—fine and coarse concentration.

Coarse concentration is applicable to ores in which the heavy minerals, such as those of lead, zinc, iron, and copper, are distributed in masses through the gangue, and in which a rough concentration is sufficient to separate the mineral. The ore is first crushed, and afterwards sized by passing through a series of graduated sieves, and as the success of the operation depends in an absolute degree on the perfection of this classification too much care and attention cannot be bestowed on it, each size being treated on a separate "jig." The "tailings" or waste from the jigs frequently contain particles of ore with mineral attached which has not been detached in the first crushing; such tailings should be recrushed, but the thoroughness of the operation in this respect would naturally be regulated by the margin of value contained in the imperfectly crushed ore after allowing for the additional cost entailed by recrushing. The slimes require to be treated by distinct machinery, such as revolving buddles, as employed on tin ores in the Cornish mines; by Rittinger tables; or by the more modern "vanning" machines of Amer-

ican invention. Slimes which have been enriched by the addition of brittle minerals of the precious metals, occurring with the baser metals, such as ruby silver ore, and various tellurides, will require extreme care in their manipulation. To prevent loss in dust, wet crushing should in all cases possible be adopted.

Fine concentration will be necessary in all cases where the mineral is disseminated in fine particles throughout the gangue rock, and where coarse crushing is inadequate to separate the mineral. As in the case of slimes from coarse concentration, machines adapted to the treatment of pulverized ore are necessary, the most common being revolving buddles, Rittinger tables, or vanning machines. Ores containing galena, blende, silver glance, tellurides of gold and silver, grey copper, iron, and copper pyrites in fine state of division may all be successfully concentrated in this way, with the exercise of care. The process is suitable for low grade silver ores, provided they are not chlorides, or decomposed ores, which are best treated by the free milling process. It is not adapted, however, to carbonate ores where the mineral is disseminated in fine films or mere discolorations through the rock. In the Lake Superior district silver ores containing only 6 ounces of silver to the ton are profitably treated, and the concentrates shipped 600 miles to a smelter.

The subsequent treatment of the products from either coarse or fine concentration must depend on the description of ore operated on, but in most cases where smelting facilities are within reasonable distances it will be found preferable to send the ore to the smelting establishment.

Transmission of Power Through a Bore-Hole.

Mr. Wm. Hall, Manager of the Spring Hill (N. S.) mines, gives the following account of the successful completion of a winding plant, situated on the surface, and hoisting from an underground slope:

One of the most noteworthy improvements made at Springhill collieries for some time past is the successful introduction of a new system of underground haulage, for winning coal.

To place engines underground has always been a source of annoyance and danger to the workmen. The air is excessively heated, and the roof more or less affected, sometimes disastrously by reason of the hot air, and escaping steam operating upon the air courses, where there is fire-clay, loosening it so that there is pieces falling continually.

The North slope is sunk 800 feet down to the working levels. From this slope from seven to eight hundred tons of coal are raised daily.

This seam of coal has also been tapped 500 feet to the deep of the North slope, by means of a tunnel driven through the intervening strata, between the north and south seams, a distance of eight hundred feet. This tunnel was started from the 1300 foot level in the West slope. The coal from the 500 foot lift in the north seam will be taken through this tunnel and hoisted up the West slope.

A bore-hole four inches in diameter has been put down from the surface to the bottom of 1300 foot level (North slope) a depth of 600 feet perpendicular. An engine and boiler have been placed in position on the surface close to the bore-hole. Power is then transmitted by means of a wire rope, and an arrangement of pulleys at the top and bottom of the bore-hole. Beside the wire-rope in the bore-hole is placed

a signal cord. By means of this cord communication is kept up between the engine-men and the man at the bottom.

A slope which is to be 750 feet deep has already been started on the 1300 foot level at the bottom of the bore-hole. It will be sunk at the rate of 200 feet a month. The coal taken out of this slope will also be brought through the tunnel previously mentioned, to the West slope. When the slope is completed and opened out, the coal will be hoisted up the North slope to the surface a distance of 2,000 feet.

This method of working coal will enable a large body of coal to be won twelve months earlier than it could possibly be done under the present circumstances. The placing of an engine on the surface obviates the conducting of steam in pipes a long distance, with all its attendant injurious effects upon the workings. The mine is kept perfectly free from hot air and steam.

The first cost of the bore-hole is not nearly so great as that of 1800 feet of steam pipes, while the cost of repairs, where pipes are suspended from the roof by means of hooks, will be entirely saved. Other repairs necessary to prevent leakages in the pipes will also be obviated, thus effecting a very material annual saving.

This I believe, is the first experiment of the kind in Nova Scotia—or in the Dominion.

Canadian Asbestos Co.

Many Canadian and American capitalists are interested in the affairs of the Scottish-Canadian Asbestos Company. The company has been in liquidation in Scotland for some time and periodical cablegrams marked the progress of proceedings. A notice was published in Scottish, Canadian and American newspapers, calling a meeting of all creditors and contributories of the company at Arthabaskaville, at 2 o'clock on Tuesday the 19th instant. An impression appears to have been formed among American and Canadian stockholders that an old country clique was formed to gain control of the mines. Mainly owing to mismanagement the affairs of the company have been in a bad state for some time. A few of the English creditors came to an arrangement with the company's directors whereby they advanced \$15,000 for the working of the concern. By this means they aimed at securing predominant influence, and standing for a privileged claim and a guaranteed interest-revenue from the proceeds of the works. Then they put the company into insolvency. The notice advising intention of this action only reached this country after the Scottish courts had granted the petition and appointed curators.

The meeting of creditors called for 19th inst. was to have discussed the position of the corporation. Mr. Guerin, of Messrs. Greenshields, Guerin & Greenshields, went out to Arthabaskaville on behalf of a number of Canadian and American creditors, representing some \$195,000 of the company's stock. He was instructed to fight the petition for putting the concern in liquidation, but the judge before whom the case was to come was sick at home and no court could be constituted. Attorneys for the liquidation party asked Mr. Guerin to register an appearance, but he would not, so that now the case in forensic phrase "by the intervention of Almighty God" is quashed. During the six or more weeks it will take to bring forward the case again, all proceedings having now to be gone over again, Mr. Guerin and his clients will have time to prepare a definite line of action.



PHOSPHATE.

In General.

A good deal of interest has been awakened in England in the Canadian phosphate industry and if judicious selections of properties are made the investment of capital will redound to the benefit of both countries.

Market.

Canadian phosphates appear in good demand abroad, and the market may be quoted at 9d. for 70%, 10½d. for 75%, and 11½d. for 80%, all with one-fifth per unit rise.

Du Lievre.

On going to press, we learn that the properties of the "Société de Phosphates de Canada," in liquidation, have been suddenly acquired by European capitalists. The property comprises some 5,000 acres of phosphate lots, chiefly in Portland West, and of which the Baisson group is acknowledged to contain a rich deposit.

Reports concerning the North Star continue to be exceedingly satisfactory. A splendid show at the No. 2 pit (the only one at present being worked) is yielding regularly and easily 800 tons per month with few men. The completion of the new wharf under construction will probably be retarded by the early collapse of the river road for sleighing.

The output of the High Rock mines for the month of February is reported to have been fully 1,000 tons; this is a record for these mines. Ample preparation is being made for a busy season.

There is nothing special to report from the Emerald or Little Rapids mines.

At the Canadian Phosphate Co.'s mines, the Beaver Meadow boiler house was totally destroyed by fire on the 5th instant. The loss, however, has caused no serious delay of the works, for the energetic superintendent, Mr. Lainson Wills, had the engine running before noon on the following day, and a new house constructed in twenty-four hours. The new car track has been kept running without difficulty all through the winter. The pier at Crownhill has been completed, and by appearances may be taken as a model of an inexpensive and yet efficient means of readily loading the scows. Six tenement houses and a general house for manager, and office, will be immediately added to this part of the company's property. Two new scows are also in construction. The various pits are all looking well.

The winter which closed up so unexpectedly in this place, promises to give an equal surprise for early navigation. Those who have their ore above the Little Rapids may well have some anxiety on the score of getting their scows past this obstructed part of the river should not the Provincial Government render some assistance. It is evident that something in the shape of a steam winch on float will be required to draw the scows up the channel. We would suggest that the miners organise and send a deputation

to Quebec to insist that something should be done to facilitate the shipment of ore at this point.

Mr. C. W. Spencer, Assistant Superintendent of the C. P. Ry., visited Buckingham on 21st to meet the representative of the phosphate and mineral companies with a view to having more satisfactory means of transshipment from the scows into the cars than at present exists. As pointed out in our last issue there is an urgent necessity for the erection of elevated bins and extra sidings to meet the requirements of the industry.

Templeton District.

Mr. C. Lionais, formerly superintendent of copper and asbestos mines in the Eastern townships, is reported to be making elaborate preparations for commencing work on some lots adjoining the Blackburn estate. Telephone communication to the station, electric light and a costly plant is said to be in course of erection. Perhaps it might be well to ascertain and prove the true value of the property before going to all this expense. Extravagance and illadvised management has in the past wrought enough harm to our Canadian mines, as a number of properties with which Mr. Lionais is not unacquainted can testify.

Mr. Robert Blackburn informs us that the new works at his mine continue to progress satisfactorily.

The Templeton & Blanche River Company are negotiating with English people for the transfer of their property.

Perth District.

The Anglo-Canadian Phosphate Co. report a continuance of the favorable operations at Otty Lake and Bobb's Lake mines, and will have about 1,500 tons of phosphate ready for shipment at the opening of navigation. It is expected that the force of miners will be largely increased after the spring thaw is over, as several deposits have been opened.

Kingston District.

J. Foxton, of Sydenham, has fifteen teams hauling phosphate down to the lake. Notwithstanding the inclemency of the weather, 100 tons were laid down last week. The mine still looks remarkably well; the more depth attained the larger the body of apatite.

Remarkable progress of a South African Gold Mine.—The hitherto comparatively unexplored district of Witwatersrandt having been prospected is now producing results as sensational as were experienced in the days of the Australian gold fever, and those results will evidently be supplanted when enterprising speculators have gone further afield. During the past year no fewer than fifteen hundred stamps have been laid down at Witwatersrandt, thus bringing up the total number to two thousand; and further extensive engineering works are being carried out to meet the exigencies of a development in mining that is truly phenomenal. A sufficient illustration of this development is found in the yield of the Robinson mine, which, with a ten-stamp battery, had a crushing in November of four thousand ounces. It can, therefore, give rise to no astonishment that a 20s. share in this mine has now reached the extraordinary value of £64. Such a figure is, of course, exceptional, though the shares of other companies command a very high premium.



MINING NOTES.

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

Nova Scotia.**NOTICE.**

At the Annual Meeting of the Gold Miners' Association of Nova Scotia, held at Halifax, on 6th instant, 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.

The annual meeting of the Gold Mining Association of this province was held at the Halifax Hotel, Halifax on the afternoon and evening of Wednesday, 6th March. A large amount of business was transacted, and some important changes in the by-laws were made. The retiring officers were re-elected but as these gentlemen declined to take office again, a fresh ballot was taken with the following result: President, B. C. Wilson, Waverley; Vice-President, G. W. Stuart, Truro; Secretary-Treasurer, J. H. Townsend, Tangier; Committee on Publication, Messrs. J. E. Hardman, T. R. Gue, John McGuire; Committee on the Mining Law, Messrs. F. B. Wade, J. M. Reid, J. H. Townsend. It is gratifying to note that the membership is growing rapidly and a Bill to incorporate the association with a capital of \$10,000 is now before the Provincial Legislature. The association meets a long felt want in the province and it has thus far had a very considerable influence for good upon the industries.

Darr's Hill District.

The Dufferin mine was sold at public auction in Halifax on the 14th. It was knocked down, after spirited bidding, to Peter McGregor Archibald for the sum of \$141,000. Mr. Archibald bought the property for a syndicate comprising A. K. Archibald, the Administrators of the estate of the late Capt. E. Archibald, Timothy Archibald, G. A. Leslie, Annie Dixon, widow of the late Henry Dixon, and George W. Stuart (all of whom were previous owners) and Gardner Clish, of Truro, N. S. The sale was therefore virtually that of the one-quarter interest hitherto held by Charles F. Mott, of Halifax, N. S. The syndicate contemplate incorporating as a stock company at an early date; meantime work at the mine is going on continuously.

Moose River District.

The new water-power stamp-mill erected for Mr. D. Touquoy has been crushing for ten consecutive months and gives entire satisfaction. The product for February was about \$1,700. Mr. Touquoy continues to crush his surface gravel and boulders with uniform results and with a profit. The material averages \$1 per ton in gold, and the total expense of handling and treating the same varies from 35 cents per ton in summer to 40 cents per ton in winter. The supply of this material is said to be very large. Mr. Touquoy is also working a lode yielding about one-half ounce to the ton.

Oldham District.

Work on the Standard Gold Co's. property is being pushed this month. A new level has been started to the east at a depth of 350 feet and the corresponding level will be commenced as soon as soon as possible. Slopes 12 and "B" are working with a full compliment of men, and the main shaft has been cleaned out preparatory to sinking. The east shaft has now a total depth of 368 feet, and the quartz in the bottom looks better than at any other point below the 250 foot level.

The Oldham Gold Co. have stopped work in their No. 3 shaft, Baker Vein, owing to the poor prospects held out by the work already done. The vein seems to have pinched out altogether in the bottom of this shaft. In No. 5 shaft but little work is doing, the vein here being only a seam. Only the 400 foot level south, and the 275 foot level south being worked. No stopping has been done for some months on account of the low grade character of the ore so far met with.

Renfrew District.

The manager of the Empress Gold Mining Co. expects to drop ten stamps in the new mill within a month; the other stamps will not be put in just yet. Considerable quartz is on the dump, and a large amount broken below. The shaft is down about 300 feet, but is not now sinking. The average of the ore is said to be about \$12.

On the Free Claim property development work is being pushed. From the shaft on the Brook lode a cross-cut is driving to the south, which has already cut three lodes, one of which shows well in free gold. A level is being driven on the lode preparatory to stopping overhand. There is a large amount of ground opened up on the Brook lode, and stopping has been already begun.

The example of the manager, Mr. E. C. McDonell, in adopting the system of driving levels and back-stopping is worthy of imitation by all our gold miners, and in this particular case we can see the effect of a little leaven "which leaveneth the whole mass."

Waverley.

The work of widening and retimbering the 360 foot shaft on American Hill is slowly but surely progressing. About 260 feet have been timbered to date leaving only 100 feet more before active sinking operations can be commenced. The surface plant is said to be the finest in the gold districts of the Province.

Crow's Nest.

A small amount of prospecting is going on at this mine, and the owners propose to do considerable development work this summer. The property geologically is an exceedingly interesting one, and its advantageous position for cheap extraction is rarely surpassed.

Pictou and other Districts.

The coal trade in Pictou County is at present in a more depressed state than it has been at any time since the close of navigation. This is more or less general at all the mines with perhaps the exception of the Black Diamond, at which a steady local trade is as usual being carried on. At this place the work of driving the drift through hard rock to the underlying seams is still pushed forward with vigor.

At the Acadia Colliery there has lately been a great deal of broken time but most of the workmen are retained, and they get a fair share of what work there is.

The depression is perhaps more keenly felt at the Drummond Colliery, and in consequence a large number of men are out of employment. There is, however, quite a number of hands regularly employed, and the number is being increased whenever circumstances will permit.

The operations carried on just now are entirely of a preparatory nature, rendered necessary by the adoption of a different method of working the new lift that is being rapidly opened up to meet the requirements of the summer trade.

At the Albion Collieries mining operations are also affected. The important re-opening of the works so frequently referred to in these columns is still being pushed forward with a determination well worthy substantial reward. Your correspondent hopes to report at early date that the long closed pits have been successfully opened and worked.

Rumors of the starting of the much talked of iron works have so long been rife that little or no interest is now taken in any report that is heard. It is difficult to understand why some kind of works have not been put up long ago in such a favorable locality, unless it be that capitalists hesitate to invest in consequence of the poor success of the steel company at Londonderry.

The following official statement shows the revenue derived by the Province from coal royalties during the past three years :-

	Cape Breton.	Cumberland.	Pictou.	Other Counties.
1886	\$44,210.80	\$30,534.90	\$26,894.38	\$16.45
1887	64,066.82	31,391.82	24,211.52
1888	63,608.45	28,309.36	32,853.75	4.50

SUMMARY.

Total Revenue, 1886.	\$101,656.53
" " 1887.	119,670.16
" " 1888.	124,776.06

The revenue obtained from other sources has been :-

1886.	
Prospecting Licenses	\$ 8,896.72
Rents (Leases).....	3,794.00
Gold Royalty.....	8,550.16
Licenses to Search	2,980.00
Coal Royalty.....	101,656.53
Licenses to Work.....	500.00
Renewals of Coal Leases	479.00
	\$126,856.91
1887.	
Prospecting Licenses	\$ 10,567.66
Rents (Leases).....	4,268.00
Gold Royalty.....	9,420.77
Licenses to Search	2,560.00
Coal Royalty.....	119,670.16
Licenses to Work	1,025.00
Renewals of Coal Leases and Fees.	945.70
	\$148,457.29
1888.	
Prospecting Licenses	\$ 9,571.49
Rents (Leases).....	4,720.50
Gold Royalty.....	8,612.41
Licenses to Search	3,940.00
Coal Royalty.....	124,776.06
Licenses to Work.....	1,275.00
Fees.....	371.03
	\$153,266.49

Cape Breton.

Dr. E. D. Peters, jr., left Boston on the 13th inst., in company with General Manager Gragg of the Eastern Development Company, to visit the property of the company in Cape Breton. During the trip, Dr. Peters will arrange the final details of his plans for the smelting works of the company, on the large scale which the development of the mine seems now to fully warrant. The last reports from the mine show the work in ore body to be progressing well;

main shaft 226 feet, and the slope on vein B now 44 feet, and holding the same breadth from the bottom. The south cross-cut is now passing through strongly mineralized rock.

Quebec.

Mr. E. Wertheim has returned from Europe and is at present at his asbestos mine in Coleraine. The results of the work done during the winter have been very satisfactory, although only a small force have been at work. Mr. Wertheim is making preparations for enlarged operations to be commenced as soon as the snow leaves the ground.

Mr. W. H. Walker is making many improvements on his graphite property, near Buckingham. Several substantial new stone buildings have been put up, and everything is being put into good shape for the recommencement of mining operations.

The Excelsior Copper Company's mines are reported to be working to the satisfaction of the owners. We understand that the shipments are fairly regular and of good quality.

The Thetford Asbestos Mining Company are applying for letters of incorporation. The capital stock is placed at \$20,000, the number of shares, 2,000 of \$100 each. The names and addresses of the applicants are: Arthur H. Murphy, Montreal; John T. Wilson, of Montreal, merchant; William S. Patterson, of Montreal, merchant; Robert W. Patterson, of New York; Henry C. Eno, of New York, physician, and John C. Eno, of the city of Quebec; of whom Arthur H. Murphy, William S. Patterson and John C. Eno are to be the first directors of the said company.

Mr. A. M. Evans, M. E., Cardiff, Wales, of the well known firm of Blakemore & Evans, has sailed for Canada. He is interested in asbestos and antimony in the Eastern Townships.

Ontario.

The Wahnapiatae Mining Company will put in some machinery at their Sudbury properties, and do preparatory work as soon as the snow leaves the ground.

Preparation is being made to open up and work the Guinea gold property, in the township of Kaladar. The owners are: Dennis Guinea, John Guinea and A. P. Wickware, of Kaladar; Rev. Father O'Donoghue, Erinsville; F. Burrows, H. M. Deroche and J. H. Downey, Napanee, and R. A. Helliwell, of Chicago. A crusher has been completed and a large quantity of ore hauled out already for use. Thirty tons of ore will be crushed per day, and it is expected the yield will be from \$7 to \$10 per ton, or even \$15 per ton.

As announced in another portion of the REVIEW, it may be taken for granted that Ottawa will be the meeting place in October of the American Institute of Mining Engineers. A large and influential committee is being organized to carry out the arrangements, towards which the Federal Government and the Provincial Legislature of Ontario have made grants of \$1,000 each. An effort is being made to secure a similar sum from the Province of Quebec. It is also proposed to raise an additional \$1,500 by private subscription.

It is reported that American capitalists are organizing a syndicate to convey gas to Detroit from the gas well recently discovered at Kingsville. The reports from the new well are said to be satisfactory.

Port Arthur District.

The Provincial Government has decided to aid by a grant the proposed Port Arthur smelting works. This has given great satisfaction to the miners.

The Government has also granted a bonus of three thousand dollars per mile for fifty miles to the Ontario and Rainy River Railway Company. It is thought that this will make certain the construction of a railway through the rich mineral country west of Port Arthur, satisfy Fort William, and give general pleasure to the whole district.

The Supplementary Estimates contain a grant in aid of the Whitefish Valley wagon road.

Owing to our Correspondent's letter having miscarried we regret to be unable to furnish our usual budget of news from this region. All the mines however are working briskly, and yielding satisfactory outputs. A number of rich strikes, particularly at Silver Mountain, are reported.

Developments on "Silver Wolverine" so far consist of two openings, Nos. 1 and 2 shafts, the former being down to date, 20th ult., to depth of 42 feet from collar. This work has been carried out by contract labour. The location is traversed by two strongly defined and well mineralized lodes, the gangue of which is chiefly composed of flour, calc, quartz and heavy spar, carrying in addition to leaf and black silver the usual argentiferous black blende and fine grained argentiferous galena peculiar to this district.

No. 2 shaft is but partially opened on outcroppings of vein at a point 600 feet east to No. 1, and on the same lode, and so far as development has gone in this direction the vein matrix is of the same class as No. 1.

From collar to bottom both walls are well defined and slickensided throughout. Trap however to the 40th foot has been the prevailing rock, but at the 41st foot a change became apparent, and an increase of silver occurred, and the black or silver bearing slates begin to appear on the foot wall; at this point the vein measures 4 ft. 2½ ins. in width, with a pay streak of ore averaging 22 inches in width.

Surface improvements on this mine consist of stable, blacksmith shop, powder magazine, sleeping camp, shaft house, and one large substantial boarding and dwelling house combined. A large store house is also nearing completion. The buildings enumerated are ample for the requirements of the mine, and their value is estimated at \$2,500.

The Wolverine Mine is situate to the immediate east of the "Queen," on the north shore of Whitefish Lake. The location contains nearly 80 acres. The located line of the Port Arthur, Duluth & Western Railway, part of which has already been contracted for, passes through the property.

The Wolverine is well wooded with timber suitable for building and mining purposes, while its elevation above the lake affords facilities for economical mining seldom met with.

Manitoba and North-West Territories.

Mr. Thomas Mitchell, jr., of Toronto, is at Medicine Hat with the sole purpose of having a shaft sunk on the Medicine Hat Railway & Coal Company's lands a few miles west of that place.

Letters patent have been issued incorporating David Hyslop, of Killarney; G. Crowe, W. H. Hastings, Thomas H. Preston and Colin H. Campbell, barrister, the last four of Winnipeg, under the name of "The Manitoba Coal Company, Limited," for the purpose and with the object of mining and extracting coal in the Province of Manitoba. The district to be opened lies about 15 miles south-west of Deloraine.

It is reported that Lieutenant Cochrane has organized an English company with a capital of \$1,000,000 to develop the coal beds in the vicinity of Cochrane, N.W.T. Lieutenant Cochrane is expected home from England this month.

British Columbia.

The miners employed by Messrs. Dunsmuir & Sons, of the Wellington Colliery, now working at what is known as the Sabiston and Horne Mine, have opened into a seven-foot seam of excellent coal. This property is in the famous Millstream Valley on the Nanaimo side of the East Wellington property, and the work of opening it up will be prosecuted with the utmost vigour. Quite a number of men are now engaged at this work.

At a recent meeting of the shareholders of the Canadian Anthracite Coal Co. held at St. Paul, it was decided to continue the present contract for supplying the whole output—which amounts to 100 tons a day—to San Francisco merchants and to renew the contract with the miners for mining the coal and placing it on the cars. The difficulties between the company and the Canadian Pacific railway company have been satisfactorily adjusted and the working of the mines will probably continue unchecked. The whole output is to be deposited at San Francisco and no attempt will be made to supply eastern markets. Improved machinery has been erected at the mines and the coal is now turned out in regular sizes, screened and free from shale. Some new seams are being opened just east of the present workings, and another colliery will be started shortly.

Despatches from Field, under date of 13th, state that between thirty-five and forty men employed at the Monarch mine were discharged to-day, but as none of them appear to have received the slightest explanation it is not known why, or for how long, work will be suspended. It is reported that the company's smelter at Vancouver has proved incompetent to handle this ore, and that about two months will probably elapse before the necessary alterations can be made. The British Columbia Smelting Company therefore do not require any more ore at Vancouver just now, and it is not convenient to have any quantity accumulate here. It is to be hoped that active operations will be resumed at the Monarch immediately the smelter is in working order as the successful working of this mine would be of much benefit to the neighborhood, and its failure very discouraging.

The latest report, dated the 19th inst., states that the Mount Ceniz Tunnel, Perry Creek, is now driven in 616 feet. Ten experienced miners are working day and night shifts, and besides these other men are constantly employed

hauling timber and sawing out lumber. The result of last month's washing was 80 ounces gold of the same quality as the 60 ounces previously received, which, assayed at Selby's Smelting works in San Francisco, yielded \$18 50 per ounce. The pump and machinery intended for the company's shaft, distant six miles from the tunnel, is still lying at Cranbrook. With the beginning of spring (the present temperature at Cranbrook is 12 degrees below zero) it will be moved and work commenced on this portion of the company's ground.

It is reported that when the price of coal went up the wages of all miners on Puget Sound were advanced 15 per cent. on the stipulation that if the price of coal went down wages should be lowered as much as they had been advanced. During the past few months the price of Seattle coal has dropped from \$10 to \$6 in the San Francisco markets, the supply being so much greater than the demand. Owing to this drop in prices the coal companies now claim that at the present prices coal cannot be mined and marketed so as to leave a fair margin of profit. To meet this exigency meetings have been held by the mine operators, and a reduction of 15 per cent in the wages of miners has been determined upon. Just when the reduction will go into effect has not been definitely determined upon, but it will not be longer than a few days.

The *Colonist* says: Col. Baker has received intelligence from the mine on Perry Creek to the effect that \$1,440 had been taken out of the tunnel for the four weeks ending 17th February, \$400 of that sum in the last week. The canyon has narrowed down, and bedrock is flat, and the evidences are that the end of the canyon is about reached. When once rough bedrock is secured it is thought that large quantities of gold will be taken out. Every day may bring news of a big strike.

A Big Blast.—On 25th ult., five tons of powder were exploded in Schneider's granite quarry, at Graniteville, Mo., and the force upturned a mountain of granite fifty-two feet in the air. The shaft was sunk 100 feet in solid granite, and the chambers were thirty feet long, cut on each side of the shaft. The powder was packed in close. About one hundred people witnessed the great upheaval from a safe position. The concussion was terrific, and the windows in houses for some distance were broken. Blocks of granite weighing 100 tons were tossed in the air.

A Remarkable Well.—A remarkable well was completed on Tuesday at the Mabel furnace (S. Perkins & Co. proprietors), Sharpsville, Pa. It is a shaft 11 by 13 feet and 84 feet deep, and furnishes clear, pure, soft, cold water at the rate of from 25,000 to 30,000 gallons, or over 100 tons, an hour. The workmen passed through 15 feet of surface, and then through 40 feet of blue clay, when they struck sand and gravel, evidently the bed of an ancient river. Water was first found at a depth of 74 feet, but the shaft was pushed on down 10 feet further, when the rapid inflow forced a cessation of further operations. It was sunk under the efficient supervision of Mr. M. W. Jenkins, mining boss of the New Virginia Coal Co., and took about two months.—*Colliery Engineer.*

Canadian Mining Companies in England

	Price Per Share.
General Mining, Limited £219,752 fully-paid shares of £8	4½ 5
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 de'erred 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	6½ 7½
Excelsior Copper, Limited, fully-paid shares of £1	—
Ditto, shares of £1, 17s. 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	¾ 1

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, 3½ per cent 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 Asbestos and Antimony Company, Limited.—Registered March 2, 1889. Of the capital as above, £50,000 was issued to the vendors as fully paid, and the remainder was allotted to the public, £3 being payable on application and allotment, £1 one month after, and the balance two months after.

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.

An Extraordinary Story.—The *Colliery Guardian* is our authority for the following extraordinary story: "A most singular experience has just befallen a Rhondda collier, named David Davies, of Treherbert. He was one of the many sufferers by the memorable explosion at Penygraig Colliery in 1880, for four years after which he was confined to his bed. He then gradually got about, but always remained absolutely deaf and dumb from the shock. The doctor who attended him advised him to try a shock somewhat similar to that which had caused his infirmity. A little while ago he placed himself as near, as safety would allow, to where six shots were to be fired in the Bute Pit, Treherbert, and, strange to say, at the sixth shot his hearing returned to him. Still he was dumb, but on Sunday, the 3rd inst., the Rev. E. Rowlands, missionary to the deaf mutes, said something to Davies which put him in a passion, and he involuntarily, or instinctively, made an attempt to express his anger. To his amazement, the power of speech came back, and he now talks freely."

Something About Coal Mining.

C. T. MAGRATH, D. L. S., LETHBRIDGE.

There seems to be a prevailing idea among a great many that the extraction of coal is a very lucrative business, one which requires little capital for development, and yielding immense profits.

One of the sources occasioning this error is doubtless the fact that seams of lignite and coal are very often visible in the outcrops along the valleys of our rivers, and to those contemplating the working of any of these seams I presume the two principal factors entering into their profit and loss statements would be the contract price paid to miners and a trifle for transport to markets, leaving a very large margin up to the selling price, to the consumer. For the proper development of a mine, the first consideration of the operator is a thorough examination of the coal area to be worked out, and a Diamond Drill, though somewhat expensive, is probably best adapted for this work, owing to its withdrawing a "core" from the different measures passed through. The general dip of the seam may then be obtained and shafts and surface works so located as to give the best combined results for the future development of the mine—for instance, underground drainage, also underground haulage with respect to grades. Seams of coal may be found dipping from 0 to 90 and the nearer a horizontal position the easier worked, for several reasons; one I might give, is the adaptability of such a seam for the introduction of mining machinery, of which I will speak later on. Rarely, however, is a seam found to remain level for any distance, being more or less undulating. Dipping seams, especially when they approach a vertical position, are often very uncertain, as in this position the seam may be most "faulty." I have seen in the mountainous regions of Southern Montana, abandoned coal mines, where, in one case, probably five hundred thousand dollars were expended in developing a vertical seam, to find that the coal ultimately disappeared. The percentage extracted of the total amount in the seam, varies from 50% in some mines to 80% in others, and depends altogether upon the character of the roof. In many instances in a mine with a soft roof, unfinished chambers have to be abandoned on account of the roof coming down, leaving buried large tracts of coal which it would be too expensive to reclaim.

Props for the support of the roof are quite an item in cost of production, and as the mine becomes developed the percentage of timbering increases, owing to the "entries" or arteries through which the coal is hauled, daily becoming longer. In addition, these entries require constant attention in the renewal of timbers. Then again in the chambers, the props are rarely reclaimed unless in mines where the roofs are composed of good strong shales or sandstone.

The manner of mining the coal is governed to a certain extent by its physical conditions. If the roof is very good, the system of long-wall work may be adopted with advantage. In this system a long continuous face of the coal is exposed and by propping the roof along this face, sufficient room is secured for the workmen, behind whom the roof keeps giving away as the work advances. The necessary roads through the workings are usually supported by masonry.

The other method of mining the coal is by "pillar and room" or chamber workings, which to be applied in different seams, requires changes and modifications, depending upon the nature of the roof. Under this system we have what

are known as "Double Entries," which consists of two passages, each about 8 feet wide, and driven parallel with a pillar of coal between them varying in thickness from 15 to 20 feet. From these, chambers or rooms are laid off, leading to the right and left from the respective entries. These rooms are driven 9 feet wide a distance of about 15 feet, when they are widened out to various widths consistent with the quality of the roof. Usually, however, with a fair roof, rooms 27 feet in width may be driven the full depth required, before the superincumbent mass is likely to come down. The locating of the rooms along the side of an entry depends upon the maximum width of room after it turns the pillar, i. e. where the width is increased after driving the last 15 feet. Provision is made so as to leave a pillar of coal about 12 feet in width between each room, running its entire length from which the coal is extracted backwards to within 15 feet of the entry, after the room has been driven the required length. By this means solid pillars of coal of about 15 feet in length by various widths may be found along one side of the entry and separated by the 9 feet entrances to rooms either worked out or under process of extraction, while the opposite side, with the exception of cross-drifts for air or roadways, is one continuous pillar of coal, separating the two entries. These pillars are left for the purpose of supporting the roof, and though 15 feet is mentioned herein as the usual distance pillars extend back from the entries, yet this does not follow in all mines as the dimensions of pillars for the support of roofs depend entirely upon the depth of stratification overlying the coal. "Double Entries" are necessary for ventilation. If the workings are on an extensive scale, the ventilating current is by mechanical means forced through one entry up to near the "face" or end of that entry, supplying on its way the several rooms, then passing through a cross-drift, the other entry is converted into a return air-way. As the entries are driven forward, these cross-drifts are closed up and new ones cut near the face, so as to ventilate the more advanced portions of the workings. Should it be found necessary at any time to abandon any particular set of entries, the pillars then standing may be extracted backwards from the face.

Some coals are much harder to cut than others, and owing to certain seams having a distinct cleavage, with faces regular and parallel, the coal is much easier cut by working on or against the faces, making it therefore necessary to drive the entries on or against the "butts." This is especially the case with the lignites and bituminous coals of North-Western Canada. The maximum depth of the rooms or distance between sets of entries is variable in different mines and the management in defining this distance, is governed by the quality of the roof, and also by the greatest distance it is desirable to make miners shove their mine wagons out to the entry, from which point the wagons are afterwards hauled to the shaft or other outlet by means of either horses, mules or machinery. Rapid slides have of late years, been made in the improvement of machinery used in connection with collieries, such as hoisting engines, coal-cutting machines, drills, mine waggons, tipples, underground haulage by means of endless chains, etc., etc.

Respecting coal-cutting machines, several forms have been invented, of which the "Legg" is probably the best in use to day. These machines are operated by compressed air, which is conveyed into the mine through large wrought-iron pipes about 5 inches in diameter, and stored in reservoirs situated in different parts of the workings. From these reservoirs, permanent

pipes carry the air forward, from which smaller and temporary ones, supplying the machines, lead to the various portions of the mine. The object of storing the air in reservoirs is manifold; the supply from them being more uniform than if direct from the compressor, as the deep pulsations of the piston would be felt by the machines. It is supposed that the exhaust from coal-cutting machines adds to the ventilation; however, in mines of any magnitude, the assistance is hardly appreciable. Coal cutting machines are undoubtedly of great value to coal operators, as the work they perform, viz.:—the under-cutting of the coal, is that which would otherwise require skilled labour, so that, wherever in use, the management is not altogether at the mercy of labour organizations. Apart from this, the machines—especially in mines where long-wall work may be carried on—materially reduce the cost of production, but if the roof of the mine is poor necessitating the driving of narrow rooms, then it is questionable if mining by picks is not as cheap, owing to the time lost in moving the machine from room to room.

In conclusion, it is hardly necessary to state that coal-mining is becoming quite an important factor in the development of trade in the North-West, mines already being in operation at different points along the Bow River, from Calgary westward, also at Edmonton, Medicine Hat, Lethbridge, and on the middle fork of Old Man's River. Of course, some of these have not yet been developed to any extent, still the Lethbridge colliery may compare favorably with any in the Dominion of Canada, possessing as it does, the latest improvement in all kinds of machinery requisite for the proper working of a mine. It will, therefore, shortly be necessary for our legislators to enact laws governing the mining of coals in the Territories so as to ensure safety against inexperienced and reckless miners.

Rich Galena Mine in B. C.—The Blue Bell mine, belonging to Dr. Hednryx upon the east side of Kootenay Lake, B. C., exhibits at a depth of one hundred feet from the surface, an unbroken body of galena, over 86 feet in width. This far exceeds the thickest vein in the celebrated Cour D'Alene mines.

How to Get the Best Results from Coal.—The best engineer in Christendom cannot produce the best results with his plant when he has to depend upon an unskilled fireman, or upon himself, acting as fireman. It is a common notion that anybody can shove coal into a furnace, and that this constitutes all that a fireman needs to do. A great many mill agents, treasurers, to say nothing of boards of directors, cherish this idea, without realizing how serious it is. We assert that no man ought to be placed in charge of a coal-pile who cannot tell approximately how much can be deduced from it; it represents a certain number of foot pounds work; and has, therefore, a definite evaporative value. To speak plain, the coal-pile means just so many dollars' worth of work. The duty of expending this money, this raw material, should be intrusted to a well-experienced and well-paid fireman. Every engineer has his own specific share of work, and only false economy demands that he should move out of it. Engineers are neither omniscient nor omnipresent, but if they know their business, and are not afraid to tell the truth, they will not hesitate to recognize and condemn the wastefulness of the policy of hiring either a cheap fireman or no fireman at all.—*Practical Electricity.*

A Visit to a Charcoal Iron Furnace.

(WRITTEN FOR THE REVIEW BY SAM'L D. MILLS, SUPT. MARTEL FURNACE CO., ST. IGNACE, MICH.)

The ore thus reduced is in the condition of a metallic sponge, saturated with carbon and mixed with earthy impurities. It passes down till it reaches the zone of fusion, as it is termed, where the heat is so great that both the iron and these impurities are melted and drop down into the "crucible" below the "tuyeres." Here the slag or cinder formed by the fusion of the earthy matter, being lighter than the iron, floats on top, and is tapped off through the cinder notch, which is so placed as to enable it to be drawn off without letting the iron run too. As for the iron you will see presently what is done with it.

We now hurried round to the end of the "Casting-house," and had just time to notice how the sand is moulded up to form the "pigs." A sort of ditch leads straight from the front of the furnace down the middle of the house, having on one side several branches communicating with the "pig" moulds. These are arranged in beds containing about 25 in a bed. The branches are called "sows," the main line the "runner." Across the "runner" are set wide iron staples, and resting against these and stuck down into the "runner" are the "gates"—cast-iron blades with long handles, in shape very much like the ace of spades—coated with clay, and large enough to dam up the runner. Up near the furnace is a large "gate," slightly different in shape, and with a long bent handle resting on a hooked iron staff fastened at the side of the "runner." This is called the "skimmer." While we were examining this portion of the furnace the whistle blew, and the keeper in charge started to work. He took a pointed bar and in a couple of minutes cut a hole into the iron notch, and the molten iron came leaping out. It was down the "runner" until it struck the first "gate," which forced its course into the first bed; and when this was partly full the "gate" was pulled out a little in order to let some of the iron down to the second bed, into which it was forced by the second "gate." By the time this was partly filled the first bed had been completely filled, and the "gate" was then "stuck" across the "sow" in order to prevent any more iron getting in. This operation was repeated until nearly eleven beds were full, making, we were informed, about twenty tons of iron. Just as they were filling the 6th bed one of the men called out "cinder!" and dropped the "skimmer" across the "runner." We saw a large stream of molten "cinder" flow over the side of the runner into a shallow channel, which led out into the yard close by the Casting-house. Three shrill blasts from the whistle sent the engine full speed; flames leaped from the iron notch, in turn succeeded by a brilliant shower of sparks which drove everyone out of the building. In a few minutes the men who had gone outside to get cool came in. Some pulled out the gates and staples; another threw sand on the red hot iron; two others, with wooden clogs strapped to their feet, walked over the red hot iron, and with long bars pried the "pigs" loose from the "sows," at the same time breaking the "sows" into pieces about 30 inches long. A workman who had been washing the hot "gates" with clay water came to the assistance of the others, and

in less than ten minutes the whole cast was broken up. We are told that in a couple of hours the "grader" and his men would come and break each "pig" in two, grade it all according to the grain, or chill, if it be a chilling iron, mark each piece, and pile it all according to the various grades in different parts of the yard.

We then asked the following questions: Why was it necessary to crush the ore if the absorption of the carbon broke it up? This was done because the process of carbonization, being gradual, the larger lumps are reduced and carbonized last, and if too large would pass down into the zone of fusion unreduced in part, this would cause loss, owing to the unreduced oxide combining with the silica and running off in the cinder as a silica of iron, causing irregular working in the furnace, making hard iron, and injuring the product in many ways.

Why was it necessary to level the ore in the buggies and have it placed so evenly around the bell of the furnace? Because as the ore is distributed in the "hopper" so will it descend through the body of the furnaces. If too much ore was charged on one side of the "hopper," that side of the furnace would work colder than the other; the gases would pass up chiefly on the other side, through the lighter "burden"; raw stock, or unreduced ore, would ultimately pass down to the tuyeres on the colder side; a tuyere might get closed up; and things would go from bad to worse unless the evil was attended to in time.

What is "chilling iron"? "Chilling iron is an iron in which a sort of crystallization can be produced by the sudden cooling of the molten metal. This has the effect of rendering it extremely hard and capable of standing a great amount of wear, or friction, a quality of great value in many ways, but particularly in the manufacture of car wheels. To utilize this property, the wheel is cast in a mould, the circumference of which is formed by an iron ring, some two inches thick, and of the full width, and same shape as the intended wheel, by contact with this the metal is chilled. By using a proper mixture of iron, the wheel when cast has an extremely hard surface on the tread, this hardness extending into the wheel about $\frac{3}{4}$ ", while the rest of the wheel remains soft and to some extent tenacious. Although it is customary to think cast iron brittle, it possesses considerable tenacity in comparison with chilled iron, which will sometimes break like glass. If the car wheel was chilled right through it would possess great hardness, but no strength, and it would be impossible, owing to its hardness, to bore out the hub of the wheel so as to fit it on the axle." A specimen of a chill was brought, and we were shown the peculiarity of its formation. It was what is called a good "needle chill," of a silvery white colour, and had a striated appearance as if composed of flattened needle points laid parallel, with the points extending, some a little further than others, into the grey, rather close-grained iron composing the rest of the piece (pig); the chill was very even all across the side of the pig, and was about $\frac{1}{2}$ " deep. "Here," said the manager, picking up a piece of pig, "is a specimen of iron chilled all through," then dashing it down upon another piece he broke it into three pieces and remarked: "This is what a car wheel would be like if chilled through. This iron was made at a time when we had some trouble with the furnace, in consequence of one of our water blocks cracking and letting a lot of water in. It chilled the furnace so that we got on to hard iron, and it was several days before we got work into good shape again."

An Ingenious Signalling Arrangement.

Our attention has lately been drawn to a most efficient arrangement for signalling by electric signal apparatus from cages in motion in colliery shafts, hoists, &c., which have been devised and carried out by Mr. William Armstrong, Jun., mining engineer, Wingate Grange colliery, Durham. The object is effected by inserting an insulated copper wire in the strand of the winding rope, and by connecting it at the cage end to a push in the cage by simple arrangements such as are ordinarily used in making such connections. At the drum end of the rope the insulated wire is brought out and connected to a brass ring working upon the drum-shaft, and upon which a strip of cotton rubs so as to maintain an electric connection with the signal bell and battery placed in front of the engineman working the winding engine. Those in the cage by touching the push can instantly communicate with the engineman at any part of the lift, and signal to him to stop or raise or lower the cage. At the Newbattle Collieries, Dalkeith, where the signalling apparatus is now working, it has been applied in the pumping shaft, 300 yards deep and is specially used by the pumpmen for working at the pumps in different parts of the shaft. By means of the signal, standing in, or upon the top of the cage, the men can instantly signal their requirements.

Connections are also put upon the frame of each deck of the cage, so that coal work signals can be made by means of the rope at a great saving of time.

The application appears to be of special value in case of repairs in the shafts, affording as it does absolute safety to the occupants of the cage in making the signals, and it would also be of inestimable value in cases of accident arising from explosion or break up in the winding shaft, where the state of the shaft or of the atmosphere is unknown, and where in such cases many lives have been lost through the occupants of the cage having no means of signalling to the engineman. A case such as this was the well-known and recent case at the De Beers mine in South Africa, where the cage and its occupants including Mr. Lindsay, the manager, was lowered into a deadly atmosphere without means of preventing the descent after the cage left the surface.

The whole arrangement appears to be most simple and effective, and must be a considerable economy, especially in making repairs where time is usually very important. The signal is working at several important collieries in England and bids fair to come into very general use.

A Grant from Quebec.—Mr. L. T. Rochon, M. P. P., states that it is almost certain that the Local Legislature will give \$1,000 to the fund for the visit of the American Institute of Mining Engineers.

The Production of Canadian Asbestos.

The following is the estimated production of asbestos in our Canadian mines since 1879 :

Years.	Tons of 2,000 lbs.	Value in Dollars.
1879.....	300.....	19,500
1880.....	380.....	24,700
1881.....	540.....	35,100
1882.....	810.....	52,650
1883.....	955.....	68,750
1884.....	1,141.....	75,097
1885.....	2,440 1/4.....	142,441
1886.....	3,458 1/4.....	206,251
1887.....	4,619.....	226,976
	14,643 1/2	851,465

The figures of the output for last year (1888) are not all to hand yet, but the production will be fully equal to 4,500 tons, if not above it.

The Koepe System of Winding from Shafts.*

The Koepe system of winding from shafts is the invention of Mr. Frederick Koepe, Manager of the Hanover coal mine, Westphalia, one of the collieries worked by Krupp, the well-known German ironmaster. The first trial of the system was made at the Hanover shaft, and proved so successful that several engines belonging to the same owner were reconstructed on the new plan. From an examination by inspectors it was demonstrated to the satisfaction of the German government that the system was not only in every respect more economical than the ordinary method of hoisting, but had also elements of a greater safety to recommend its universal adoption. The plan has since been adopted at several mines in the same district and others in France, and still later at the Bestwood colliery, near Nottingham, England. The principal and simplest form of the Koepe system can be applied to existing hoisting machines at little cost, by attaching and suspending an old hoisting-rope from the under side of the cage at the top of the shaft and connecting the opposite end to the under side of the cage at the bottom of the shaft. This balance-rope may hang loosely in the shaft, or it may pass around a tightening-sheave at the bottom. In this way all the parts of the hoisting-apparatus are perfectly balanced throughout the lift, which is not the case by any other system of adjustment. There are several modifications of the system ; but the principle is the same in all cases.

The advantages claimed for the Koepe system are as follows :

1. Balancing the hoisting-ropes, thus reducing the size of engine, consumption of fuel and cost of plant for a given duty.
2. The same engines will raise a given load from any depth in the shaft.
3. One rope only is necessary instead of two.
4. Safety from overwinding.
5. Less wear and tear of plant.

The benefit will be more readily appreciated by taking examples of engines fitted with parallel drum, in comparison with the Koepe engines with winding-pulley and counterbalancing tail-rope. This, according to the greater or less depth of shaft, varies from 35 to 64 per cent. of the power required to lift the unbalanced load. Wherever parallel drums are used it is possible to increase the duty of the engine by the addition of a balance-rope.

Quite recently a plan has been adopted at a Pennsylvania colliery, said to be a new invention, and called the "Poore" system, which is believed to be nothing more than a modification of Mr. Frederick Koepe's invention.

It is not necessary to enter into further particulars. The system will be found fully described and illustrated in the *Transactions of the Chesterfield and Derbyshire Institute of Mining, Civil and Mechanical Engineers*, vols. xi. and xii., 1882-83, from which I have gathered my information.

*Trans. Am. Inst. of Mining Engineers.

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KINGSTON DRY DOCK.

Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Dry Dock," will be received at this office until Thursday, the 24th day of March next inclusively, for the construction of a Dry Dock at Kingston, Ontario, in accordance with plans and specification to be seen on and after Wednesday, the 6th day of March next, at the Engineer's Office, 30 Union Street, Kingston, and at the Department of Public Works, Ottawa.

Intending contractors are requested to bear in mind that tenders will not be considered unless made on the printed forms supplied and accompanied by a letter stating that the person or persons tendering have carefully examined the locality, have satisfied themselves as to the nature of the materials to be excavated, and the foundations for the cofferdam and its probable cost. Tenders must be signed with the actual signatures of the tenderers.

An accepted bank cheque, not limited as to time of payment, for the sum of \$20,000, payable to the order of the Minister of Public Works, must accompany each tender. This cheque will be forfeited if the party decline to enter into a contract when called on to do so, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

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

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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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MANUFACTURERS OF

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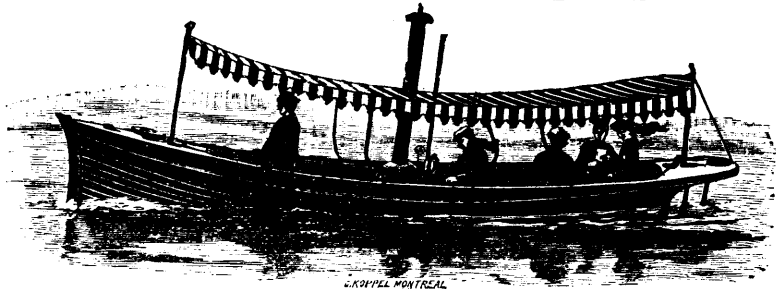
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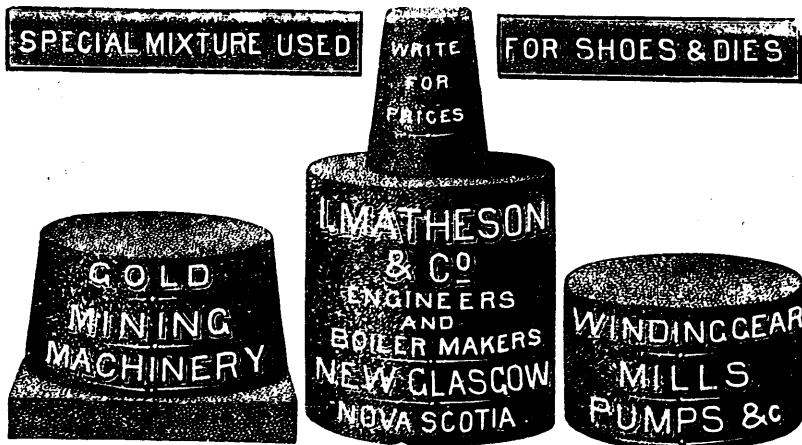
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1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

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.

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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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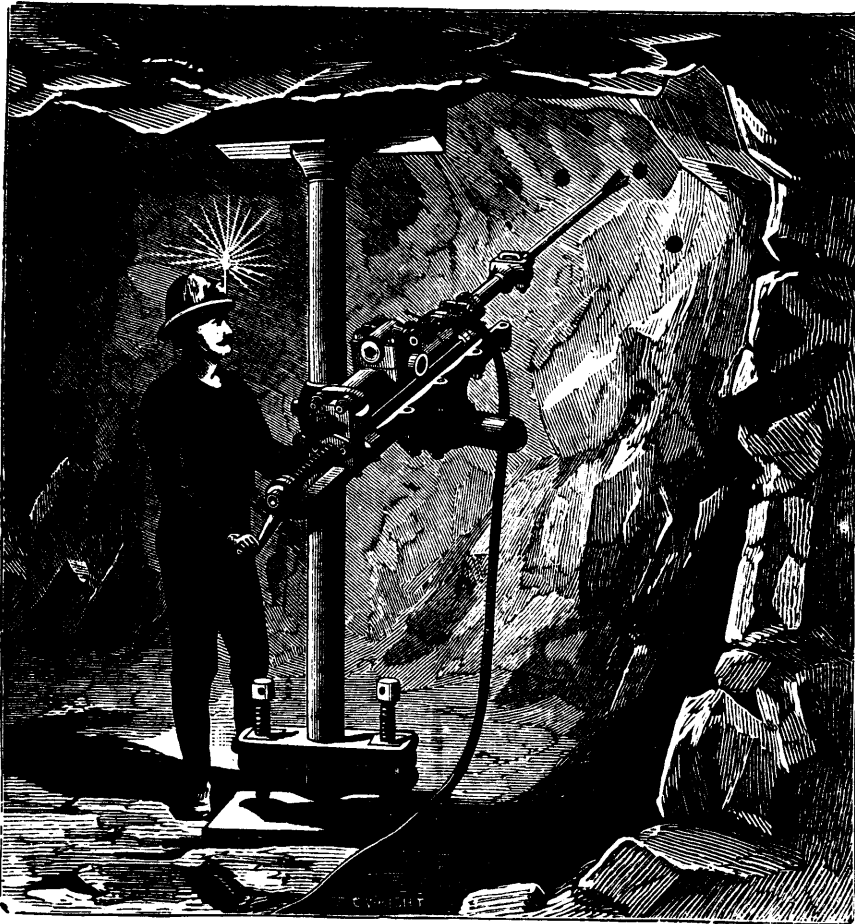
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DEPARTMENT
OF
Inland Revenue.

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

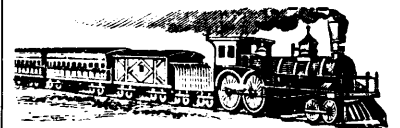
a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act 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 percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chapter 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. MIALL,
Commissioner.

January, 1889.



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Direct route between the West and all points on the Lower St. Lawrence and Baie des Chaleux; also New Brunswick, Nova Scotia, Prince Edward Island, Cape Breton and Newfoundland.

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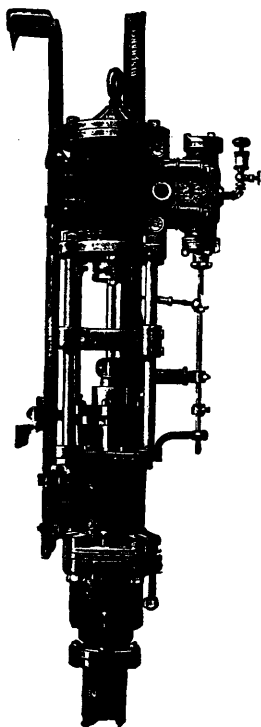
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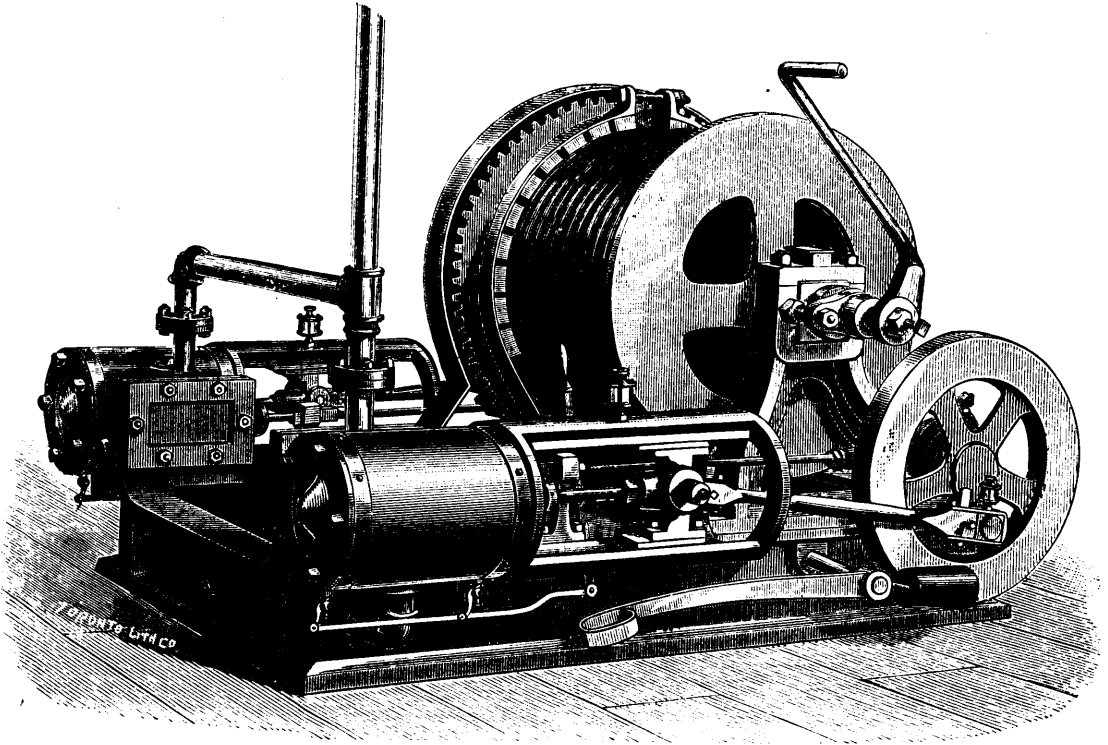


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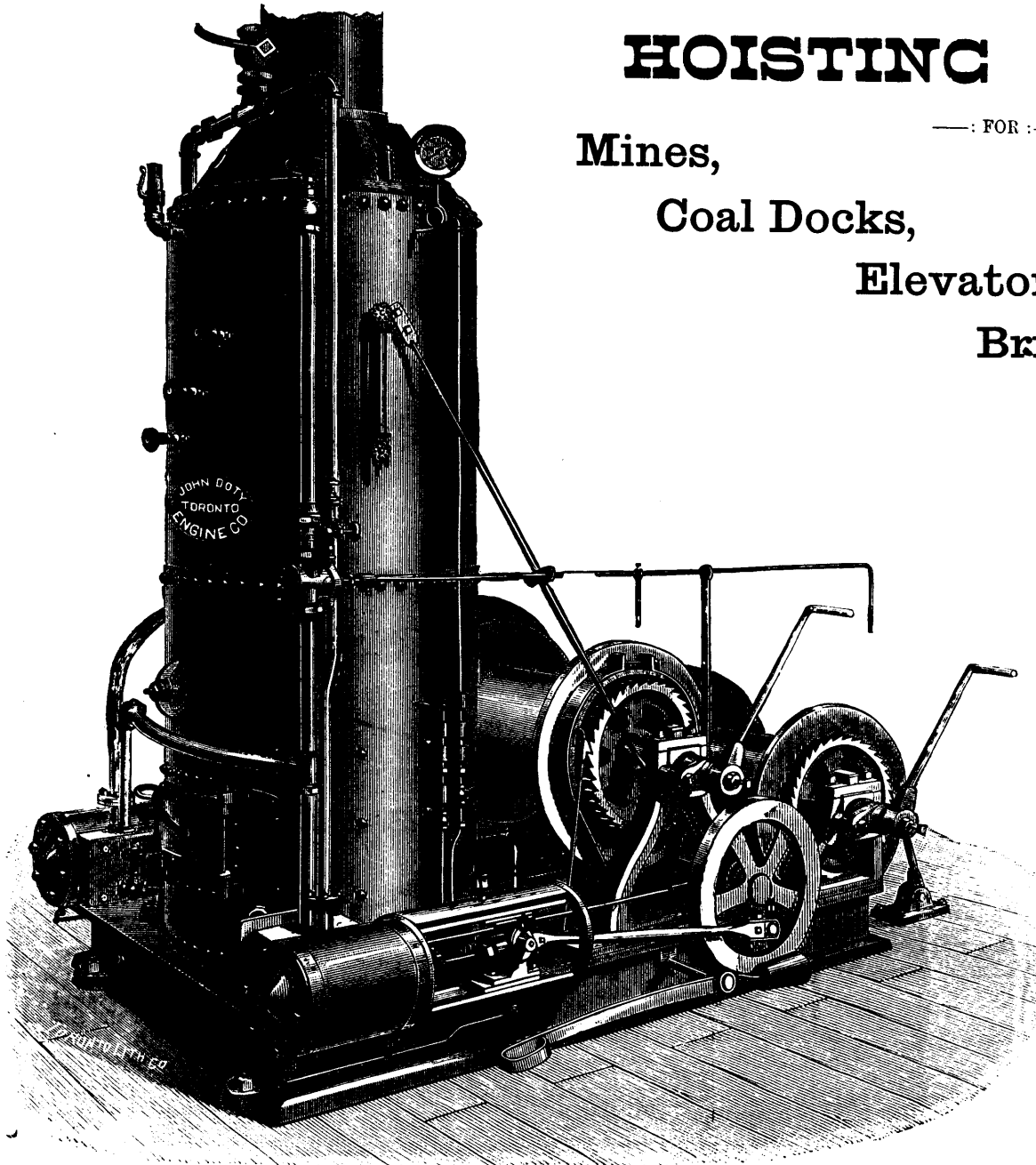
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For further information see OFFICIAL POSTAL GUIDE.

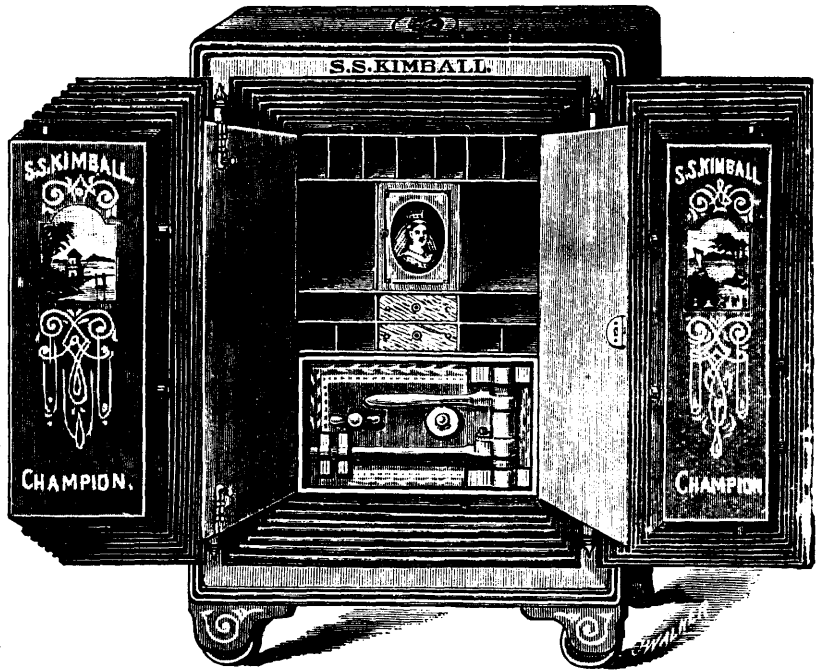
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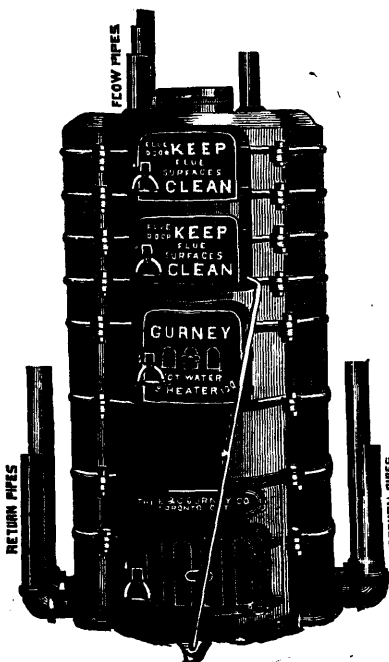
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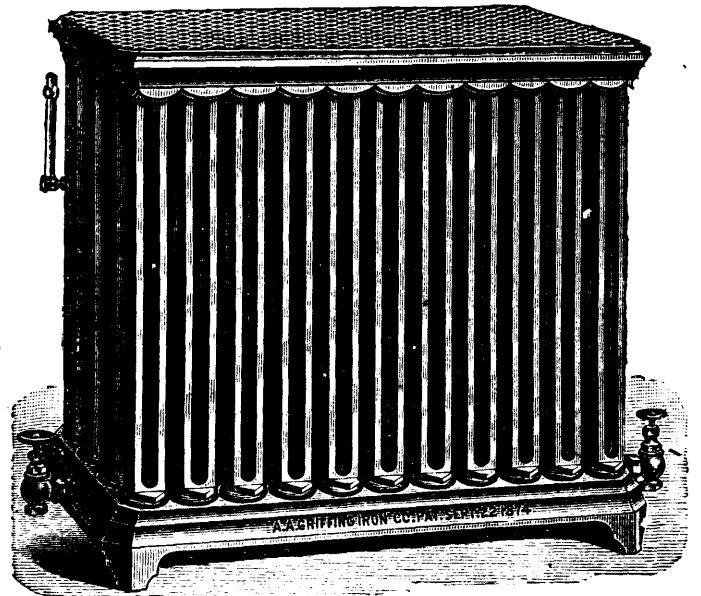
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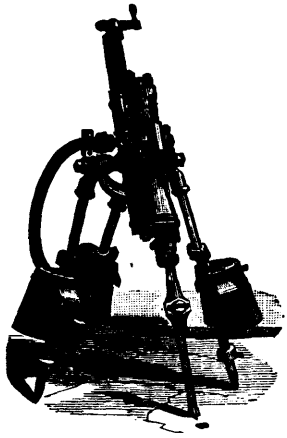
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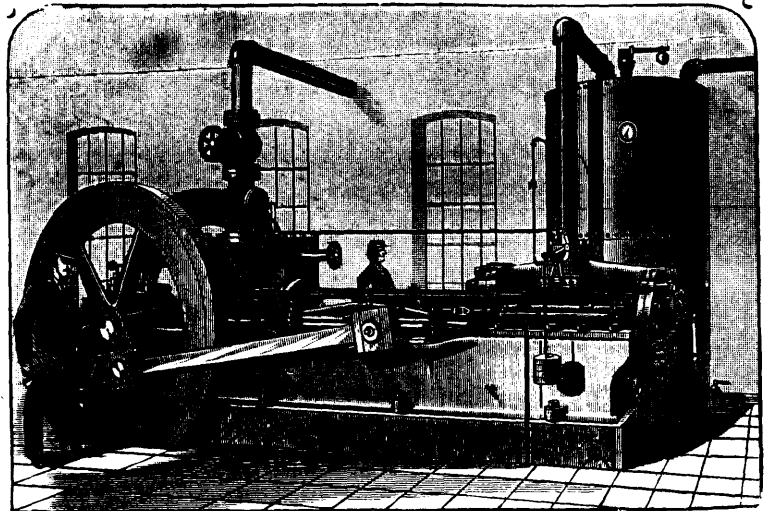


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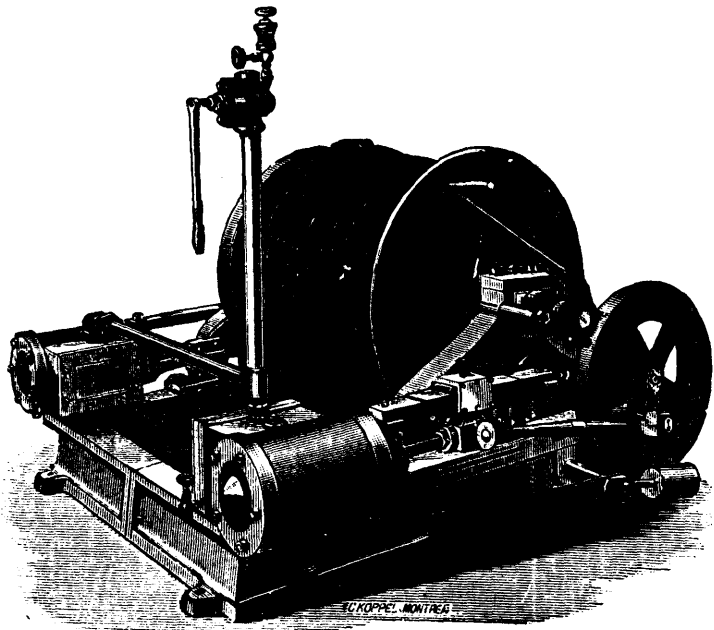


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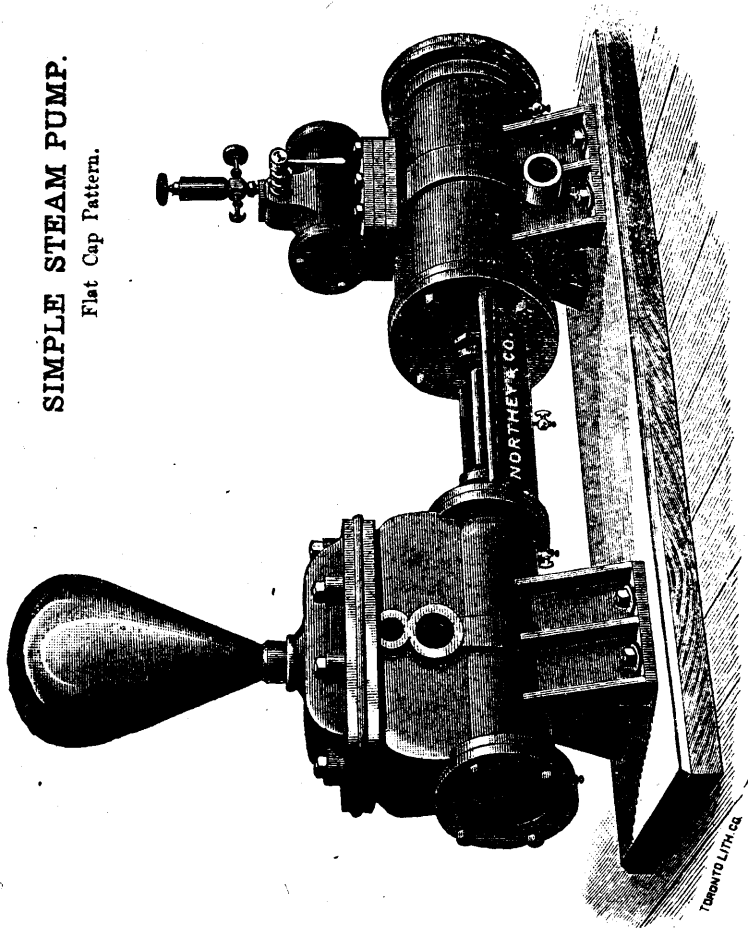
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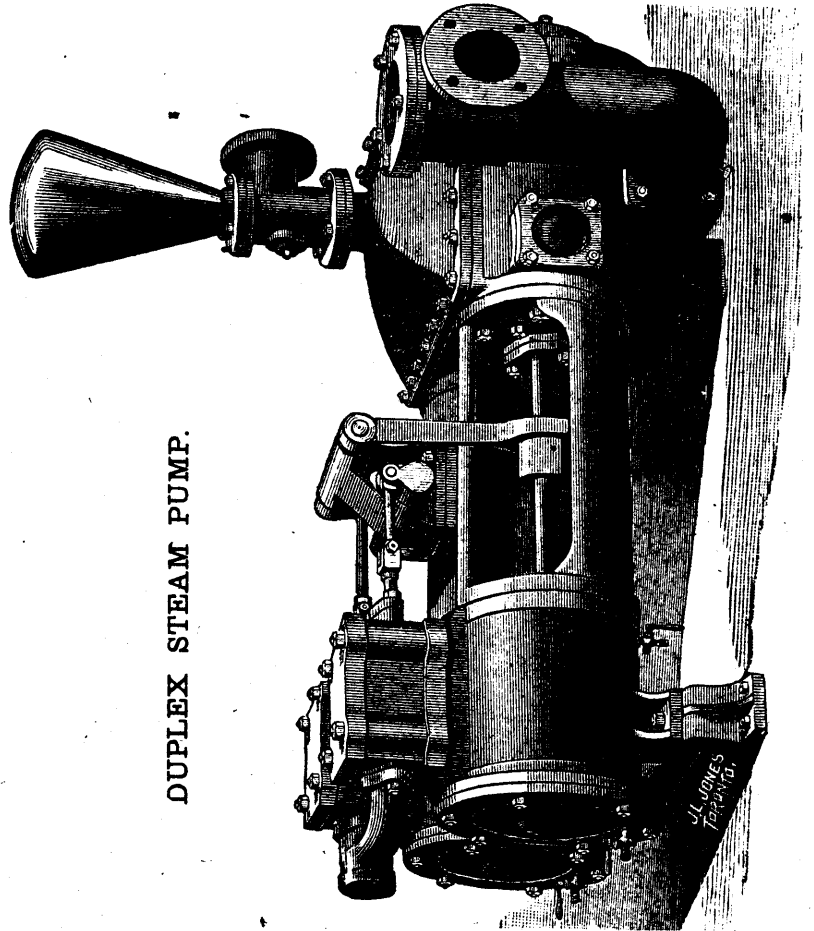
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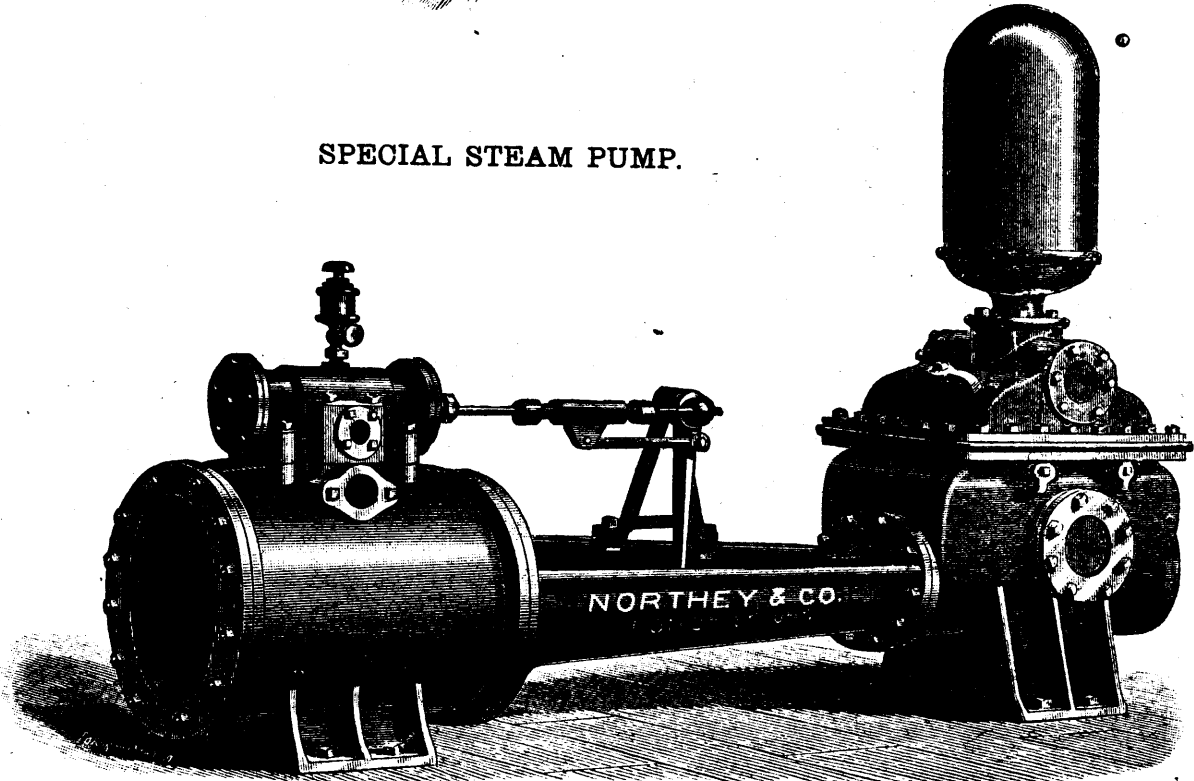
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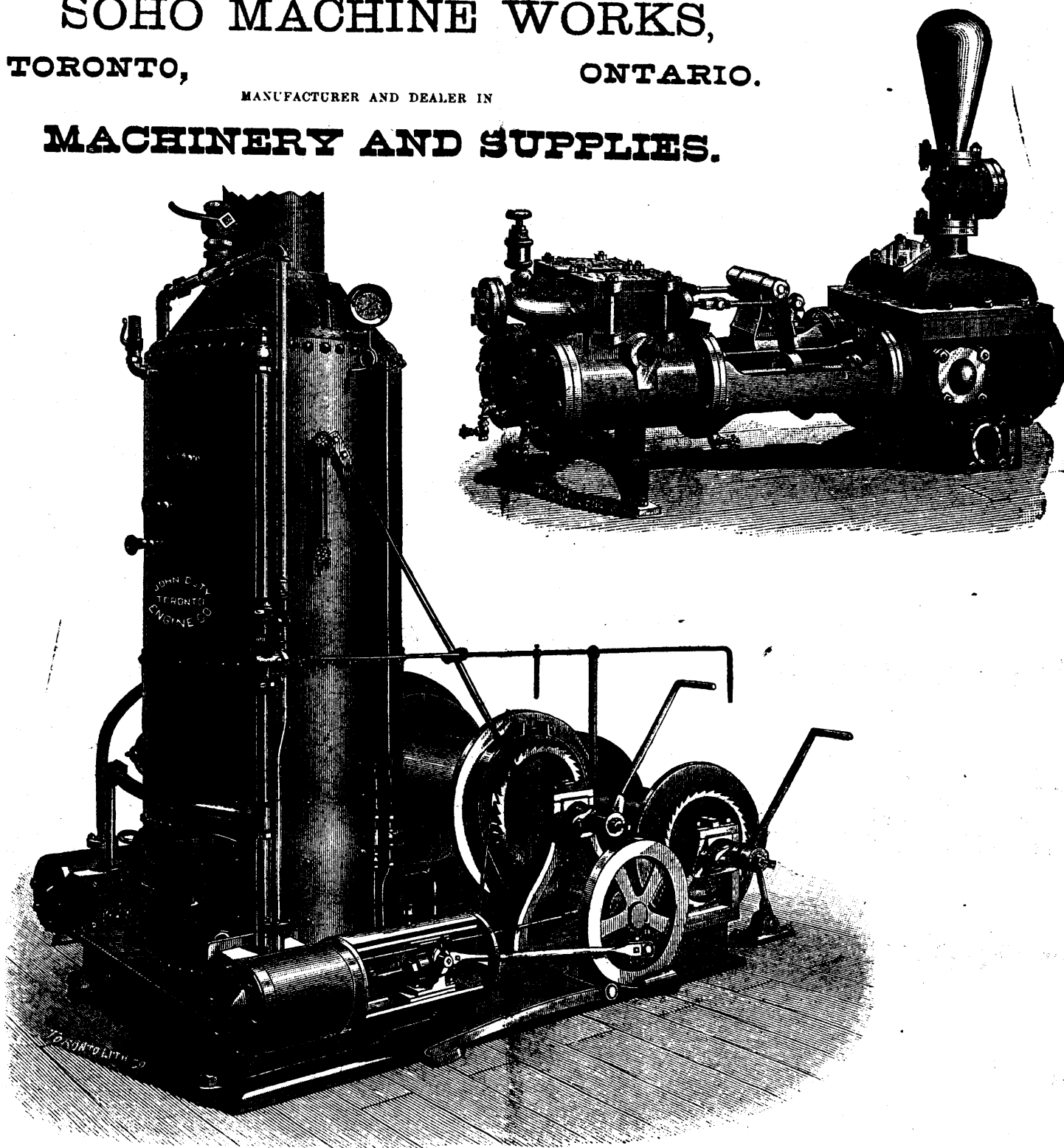
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