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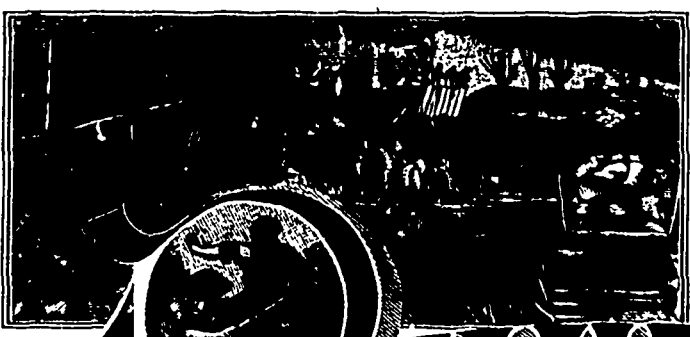
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THE

Canadian

Mining Review



Vol. V.—No. 9.

1887.—OTTAWA, NOVEMBER—1887.

Vol. V.—No. 9.

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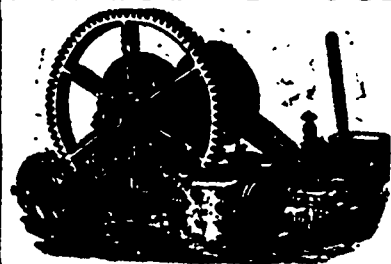
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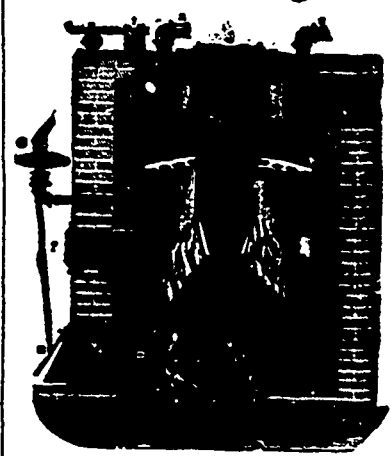
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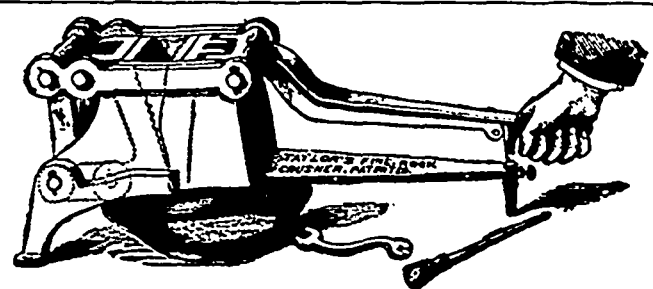
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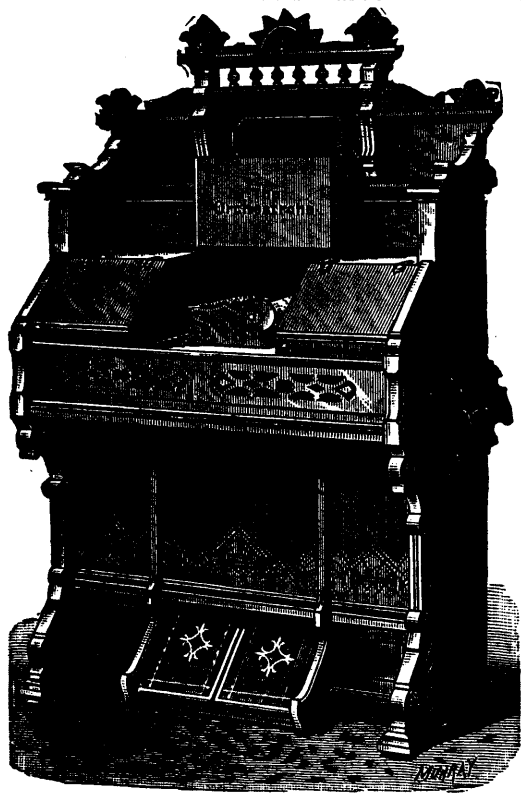
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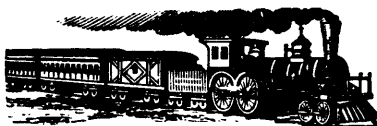


NOTICE RESPECTING PASSPORTS.

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

G. POWELL,
Under Secretary of State.

OTTAWA, 19th Feb., 1886.



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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, and which is transmitted to the chief analyst for analysis.

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

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

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

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

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

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

E. MIALL,
Commissioner.

hardly be undertaken by the experiment station than a series of field experiments for the purpose of testing these claims.

"The trials begun in 1885 at this station in the case of five experiments out of the eight on different forms, the phosphate being used with potash and nitrogen compounds, the increase of crop was greater with the more insoluble phosphate than with the more expensive superphosphate, and that in three of these five cases the 'floats,' the cheapest of all, did the best work, goes a little way, at least, toward showing that the superphosphate may have had its day."

Mr. W. H. Bowker in his lecture on Homoeopathy and Agriculture," says, "There may be places where insoluble phosphates can be advantageously applied, as upon lands covered with fruit trees or devoted to grass. Perennial plants, like grasses and trees, no doubt extract phosphoric acid more readily than annual plants, owing to their numerous and well developed roots. Winter grains, especially wheat, from the long time it occupies the ground, and its growth in the fall, may also be benefited by an insoluble or partially insoluble phosphate."

Calling attention to these statements, Mr. Ward says that in 1884 more than four-fifths of the cultivated land in New England was comprised in the hay crop, while the pasturage adds a vast acreage. If it be admitted that the crude phosphates are serviceable even to grass alone, an incalculable field is opened for their use.

There is no subject of greater importance to Canada than this one, and it is to be hoped that our Agricultural Bureau will give earnest attention to experiments that may tend to supply our farmers with a cheap and effective fertilizer, easily obtained, pleasant to handle, and inviting confidence by its simplicity. This would render more "protection" to agriculture than can be obtained from any amount of fiscal legislation, and would utilize extensively the valuable phosphate deposits which Canada has the good fortune to possess.

Gold Mining in the Yukon Country.

Dr. G. M. Dawson, Assistant Director of the Geological Survey of Canada, and his assistant, Mr. McEvoy, have returned to Ottawa from their preliminary survey of the Yukon country. Being interviewed with special reference to the gold mining in that vast region Dr. Dawson very kindly gave us the following information:

In the Cassiar country placer mining has been in progress for a number of years, and some very rich creeks were formerly worked. Mining is still carried on, though now largely by Chinese. Quartz veins of considerable size are known to exist in a number of places in the immediate vicinity of some of the paying creeks, but so far no attention has been paid to quartz mining. As this section is of comparatively easy access from the coast and a wagon road could be constructed without

difficulty from the head of navigation on the Stickeen, it seems very desirable that efforts should now be made to test some of the quartz deposits.

East and north of Dease Lake, on the Dease and Lard Rivers, placer mining was some years ago quite remunerative. Still further north, along the Lewis, Pelly and Stewart Rivers—branches of the Yukon—and their tributaries, miners have been working river bars for several years past. The aggregate length of these streams, along all of which gold in greater or less quantity is found, is great, and the total area of the gold producing region which they drain is very extensive. During the summer of 1886 most of the work was done on the Stewart River, but in consequence of the discovery of 'coarse gold' at Forty-Mile Creek—further down the Yukon—nearly all the miners went to that stream this year. Forty Mile Creek has now been prospected for nearly 100 miles in length, and some rich bars discovered, though the miners unite in saying that the gold is 'spotted,' or unequally distributed. About 250 miners are estimated to have been at work this year.

Asked if the reported hardships and difficulties were adequate to the results obtained by the miners, Dr. Dawson said that while there was undoubtedly much difficulty and many hardships to be faced, mainly owing to the inaccessibility of the country—there being no practical route, and also from the limited working season and the difficulty in working frozen ground when covered with moss and wood, he still had reason to believe that on the average good pay had been obtained, and while numbers were found to speak disparagingly of the results, on the whole he thought that the miners were very well satisfied with the country. He did not think, however, that any other than miners experienced in work on the western coast, men well accustomed to hard work and able to cope with difficulties of no ordinary character should be encouraged to enter the country at present.

Supplies are brought up the Yukon from its mouth in Behring Sea, yearly, by one or more steamers. The trading post now furthest up is near Forty-Mile Creek, but steamers could ascend much further if required. Supplies brought in thus, however, do not arrive till August, which is too late for the summer work of the miners. It is therefore customary for miners to carry in supplies over the Chilkoot Pass and down to the Lewis River. The best way, when possible, is to spend one winter in the country and thus get two good summers work. Little attention has yet been paid to other minerals than gold, but coal has been found on the Lewis, and evidences of copper are frequently met with.

The published maps of the country which at present exist are very incomplete and inaccurate, and though much still remains to be done, the work of Dr. Dawson's expedition will enable a much more accurate delineation of the region.

New Process of Treating Crude Phosphate.

Mr. F. S. Shirley, New Bedford, Mass., and managing director of the grinding mills at Buckingham has discovered a new process by which apatite in its crude state is rendered soluble to a marked degree in water and by which, it is claimed, that the poorer rock which now goes begging can be utilized and made marketable. Mr. Shirley is having his process thoroughly tested by several eminent agricultural chemists and as soon as their reports have been made known they will be communicated to our readers through these columns. The matter is one of vital importance to our phosphate industry and we await further developments with interest.

Our Asbestos Industry.

R. W. Ells, M.A., L.L.D., Geological Survey, of Canada.*

The mining of asbestos is carried on at several points along the line of the Quebec Central Railway, viz., at Thetford, Black Lake, Coleraine and Belmina. Some work has also been done near Coleraine station. Near Danville, four miles from the Grand Trunk railway, a mine of considerable extent has been operated for several years. As this industry has already grown to large proportions and bids fair to become one of the most important in the Dominion, a brief description of the various asbestos properties, its mode of occurrence, and some facts bearing on the future of the industry may be of general interest.

The various companies engaged in mining asbestos at Thetford are King Bros., the Boston Asbestos Packing Co., Johnston & Co., and Ward Bros.; while at Black Lake and Coleraine are situated the mines of the Anglo-Canadian Co., Frechette's and the Lionais Martin or Scottish Canadian Company's property. These all lie along or near the line of the Quebec Central railway which crosses the property at Thetford, while at Black Lake it is from a quarter to half a mile distant from the workings. At Belmina which is about four miles from the railway at Coleraine station, a small force of men, from six to eight, have been engaged for several years, merely on exploratory work on property owned by Mr. John Bell, of London, England. With a view of acquiring more definite information concerning this valuable mineral, a somewhat detailed examination of all these properties was made in order to render assistance, if required, to any parties interested in this industry.

All the asbestos mines in the Eastern Townships are situated on portions of the great serpentine belts which extend in tolerably direct lines, though with many breaks, northward from the Vermont boundary for some distance beyond the Chaudière river. Further east these peculiar rocks present large areas in the Shickshock Mountain Range, which extends through the northern portion of the Gaspé Peninsula in rear of Ste. Anne des Monts, and further east on the lower part of the Dartmouth river. Though indications of asbestos are found at most points throughout the whole serpentine formation, the developments of this mineral appear, in so far as yet known, to be greatest in the areas about Thetford and Black Lake and near Danville, though there is no apparent reason why it should not be found in paying quantities at other points, and it is prob-

able that subsequent exploration will largely extend the area where profitable mining operations can be carried on.

The serpentines, without going into any detailed account of their mode of formation, may be stated to be intimately associated with masses of dioritic or doleritic rocks, of certain varieties of which, rich in olivine or some allied mineral, the serpentine is in many cases doubtless an alteration product. The serpentines are also frequently associated with masses and dykes of whitish rocks, often composed entirely of quartz and feldspar, but at times with an admixture of black mica, forming a granitoid rock. They occur generally not far from the axes of certain anticlinals which exist in the group of rocks designated the altered Quebec Group by Logan. The asbestos traverses the serpentine in veins, often irregular, and which range from mere threads to a thickness of three and even in some cases of six inches, in all of which the fibre of the vein is, unless affected by the dislocations of the containing rock, at right angles to the sides of the fissure. The rock is in many cases somewhat impure from the admixture of grains or small irregular veins of chromic iron, which break the continuity of the fibre in the vein and require the mineral to be carefully 'cobbed' in order to separate these impurities. The veins at or near the surface are also affected by the infiltration of water by which the asbestos is discoloured and its value correspondingly reduced. This is especially noticeable in areas where the surface serpentine is shattered, either by the action of weather or other causes, and this discolouring ceases as the rock becomes solid. As a rule the veins increase in value or quality of fibre as lower depths are reached. Veins are not, however, continuous; the size frequently varies, and like all mineral veins they are affected by faults or slides which often cut off, completely, a valuable working face. In such cases the slicken-sided character is very marked; sheets of impure or imperfect asbestos with long coarse woody fibre lying along the lines of fault. The veins have often the aspect of true segregation veins, and the containing walls often change their character for a distance of half an inch to three inches on each side of the vein. The theory of their formation is however as yet an open question.

Asbestos mining was commenced at Thetford in the year 1878, by what is now known as the Boston Asbestos Packing Company. The demand at that time was exceedingly limited and considerable difficulty was at first experienced in finding a market. The output for that year did not exceed 50 tons, but its value was soon ascertained and explorations on the serpentine belt at this place resulted in finding asbestos in workable quantity over a considerable area.

The Thetford river appears to mark the western limit of the serpentine on these properties, the rocks on the other side of the stream being altered slates and sandstones. To the east of the railway which cuts directly across the area the serpentine forms a knoll with an elevation of about 90 to 100 feet above the track. All the works are confined to this portion of the area and consist of open cuts in the face of the hill, nothing apparently having yet been done to ascertain the value of the area between the railway and the river.

The quality of the asbestos at all the four mines at this place may be stated as excellent. The fibre is fine and readily worked and the veins are, for the most part, especially in the lower cuts, comparatively free from chromic

iron or other impurities, reaching a width of from three-quarters of an inch to four inches, though in some, notably the quarry of Johnston & Co., veins of five or six inches are observed. The fibre in these large veins is not however of such good quality, in so far as yet worked, as that found in those of less size, and veins of one and a half to three inches give as good material as can be wished. Numbers of such veins yielding fibre which ranks as extra first quality are found in all the mines at this place. In some of the cuts these appear as a perfect interlacing network in the surrounding walls and can be counted by the dozen. While all these properties may be said to be about equally productive that of the Boston Company may be especially mentioned both for the amount of its output, which will probably equal that of the three others combined, as well as for the excellent way in which the property has been developed by its experienced manager, Mr. Thomas Sheridan, with a view to successful future operations, and also as illustrating the remarkable improvement in the quality and increase in the quantity of the fibre as the depth increases; a feature clearly established at all the mines, not only in this vicinity but also at Black Lake.

The profitable output of the asbestos is at present apparently only limited by the demand. The amount extracted since the commencement of operations here may be briefly stated thus:—

Boston Asbestos Packing Company, opened 1878, output for 1886, 700 tons. Total output to end of 1886, 3,000 tons.

King Bros., for 1886, say 250 tons, adjoining to north, total since 1881, 850 tons.

Irving-Johnston Company, for 1886, say 400 tons, opened since 1879, total 1,000 tons.

Ross-Ward Bros., one quarry, three years only, say 400 tons.

The cost of extraction varies in different localities and depends upon the amount of barren rock encountered, which owing to the action of faults is greater in some cuts than others. It may, however, be safely put down at \$20 to \$25 per ton.

The prices obtained for the asbestos at points of shipments on railways range from \$50 to \$55 per ton for second quality to \$80 or even \$100 for first, a considerable portion of that taken from the lower cuts realizing the latter figures. The markets are Great Britain, Germany, Belgium, the United States and Italy.

The majority of the veins worked range from three-fourths of an inch to two inches and a half. The material is blasted out, carried to the dump, broken up and cobbed by boys and old men, who grade the asbestos, this latter depending upon the colour as well as purity of the fibre, with due regard to its length. The wages paid for labourers in the quarry range from \$1 to \$1.10 per day, and for boys and cobbers, 50 cents.

The comparison of the cost of extraction with the value of the raw material shows a very good margin for profit. The works at this place are, however, carried on, for the most part, during the six months of summer and autumn only, since it has not as yet been found advantageous, in view of the limited market, to undergo the inconvenience and extra expense of continuing operations during the winter. As the market enlarges, however, the mode of working will doubtless adjust itself to the demand. The properties worked at Black Lake are situated on the west side of a steep ridge of serpentine which rises to a height of about 900 feet above the waters of the lake itself.

The three areas are contiguous and from a fourth to a half mile east of the railway. The work is carried on by open cuts in the face of the hill, in all of which veins of excellent asbestos are disclosed, ranging in size up to four inches. The fibre is, in most of these, somewhat discoloured from the presence of water which penetrates the shattered serpentine, and, as a consequence, the greater portion of the output grades as second; but in most of the openings the solid rock is now reached, and the quality of the asbestos is rapidly improving. These mines have not been in operation so long a time as those of Thetford, but the output, which is as follows, show readily the growing importance of this locality:

The output of the Anglo-Canadian (formerly Hopper's mine), for 1886, may be stated at 330 tons, and the total output for the four years, 1,500 tons.

The Frechette mine has been at work only one year, with an output of about 200 tons.

The Lionais-Martin mine, now the Scottish-Canadian Company, has done a large amount of exploratory work. Its estimated output for 1886 may be stated as 250 tons, with a total from the commencement of, say 700 tons.

The cost of mining here varies but little from that at Thetford, and may be stated as averaging \$25 per ton.

In the vicinity of Black Lake several other areas occur, in which the exploratory work done, though not very extensive, shows indications that fully warrant the statement that a valuable and profitable output may be expected. These properties are known as the Reed and Hayden properties, and are situated on Lots 27 and 28, Range B, Coleraine. In various open cuts in the side of the hills numerous veins are disclosed, ranging upward to a width of two and a half inches, with surface indications apparently in no way inferior to those of the adjoining properties now being worked at this place, or even of those of Thetford, not only as to number and size of veins but also as to quality of fibre. These indications appear at many points on both the Hayden and Reed properties, which embrace a total of 200 acres. Between these and Caribou Lake the serpentines extend as an apparently continuous ridge, and show at intervals very good indications of asbestos, but this portion has not as yet been explored to any extent, and but little can be said from actual examination of the value of this section of the serpentine belt, though that it will be found equally productive with the adjoining areas seems reasonable.

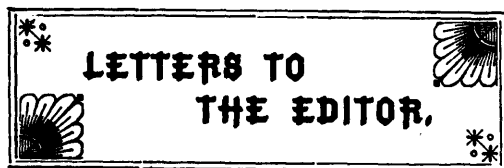
In the vicinity of Coleraine station serpentine also occurs, but the main ridge, extending south-west from Black Lake, keeps to the north-west about one mile and a half, where it forms a conspicuous hill feature. This has been but little examined, but an opening was made on its south-east extremity during the present year by Mr. Kennedy, disclosing the presence of a number of veins of asbestos, one of which had, near the surface, a thickness of nearly four inches. Sufficient work was not done to determine the persistence and value of these veins. An interesting feature in connection with this opening is the presence of mica in considerable quantity in direct contact with the asbestos, a feature not as yet noted at any other point.

The asbestos area of Wolfestown is situated on the north east extremity of a serpentine ridge, which extends south-westerly, with several interruptions from the road leading from Coleraine station to Wolfestown, to the vicinity of Lake Nicolet. It is owned by Mr. John

Bell, of London, Eng., and though a considerable sum of money has evidently been spent on this property it has been largely in the way of explorations. The surface indications, while not equal to those of Black Lake, yet show at several points numbers of veins, some of which reach a thickness of one and a half and even two inches. Only a small force of men is employed, and the property cannot yet be said to be fairly proved. Considerable deposits of chrome iron are found in the hills on this area, which embraces 600 acres. At present it would be exceedingly difficult to give any decided opinion as to the merits of this property. A very fair showing of workable veins has been exposed in the upper part of a deep cut which it is now proposed to intersect at a considerably lower level. Should the same rule of increase which holds at Black Lake and Thetford apply here, there should be good paying ground when the lower level is driven in past the capping of barren rock, provided the veins already disclosed are not cut off by faults, whose presence is noted here as at other points. The total amount of asbestos taken from the Belmina area is about twenty-five tons.

In addition to the properties already described the only other point where this mineral is worked successfully is on Lot 9, Range 3, Shipton, about four miles from Danville on the Grand Trunk Railway. The outcrop of the serpentine is quite limited here, with steep sides all round, and contains a number of veins of asbestos, mostly of small size though the quality of the fibre is good. Faults have affected the value of this property considerably, some very good veins with a thickness reaching two inches having been cut off completely at a depth of 50 feet from the surface. The output, however, is considerable, for the year ending 28th August, 1886, being 450 tons, but from various causes it is at present much less, the mine not being worked to its full capacity.

It will be seen from the facts here presented that the asbestos interests of the province are very important, and judging by the ratio of increase for the last six years will soon assume large proportions. The demand is annually increasing as new uses for the raw material are being found, and from the prospects presented not only at the mines already opened, but in those areas contiguous and which appear equally rich, the supply is practically limitless.



The Utility of Crude Phosphate as a Fertilizer.

48 Congress St., Boston.
1st November, 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—Noting your article in regard to Ground Phosphate and the utility of its application to the soil in its crude state, I feel that the miners and others interested in phosphate do not fully realize the advantages they are losing by inaction and their failure to push their product more into notice, for no matter how advantageous its effects may prove, to be appreciated it must be constantly brought to the notice of the agricultural world, and by persistent trial prove its value so as to receive the endorsement of such recognized authorities

as will vouch for the effective results of its application. I have been informed that some little time ago Mr. R. C. Adams, of Montreal, requested subscriptions for the purpose of introducing this article in the United States, but it was not responded to. Prof. Shaler, of Harvard, has unbounded faith in the utility of the crude material, but requires funds for experiments, and other professors are ready to test its efficacy but naturally feel that as it is the phosphate industry that is to be benefited it seems only fit that those interested in it should be the ones to contribute to the expense, as a small contribution from each would create a sufficiency for the purpose. I trust you will urge its being carried out; if money is lacking let the mine owners contribute the material, say if each mine will contribute from three to five tons of rock and the mill you refer to the grinding, a sufficient quantity would be accumulated to furnish the several United States Experimental stations with a supply for a fair test. Now is the time; for it should be dressed in before winter, and its beneficial results will record themselves next year and soon score a convincing mark that cannot be questioned or rubbed out. Trusting you can enthuse the interested ones.

I am sir, yours, &c.,

F. STACEY SHIRLEY.

Seabury, Que., 9th Nov., 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—We note the remarks in your October number in regard to ground phosphate, and it seems a great pity that the value of this in its crude form, without any acid treatment, is so little known, and more so that some organized effort cannot be made to secure it the attention it deserves, for though the effects on the soil are not so rapid as the high priced fertilizers, the lasting effects obtained are more than an equivalent for its lack of rapidity, especially when the cost is compared, the mild acids formed in the soil and constantly accumulating from atmospheric changes, forming a continuous solvent for it. It is becoming a question with agricultural scientists whether under all circumstances this will not in the long run prove the most profitable when the results are considered against those from high grade fertilizers; for though these produce big results they also impoverish the soil and render their continuous use a necessity, whereas the steady improvement of the soil while giving fair average crops is the proved result of the application of the crude rock when finely ground.

We hope you will use your best efforts to make its value known, for on this depends not only the continued advancement of our phosphate industry but also better and more profitable results to our agricultural community.

The mills here are now idle owing to the low water in the river preventing the shipment of supplies of crude rock, but for this the output could have been readily doubled, as the power from the new wheel put in this season is unlimited, and the new grinders and cleaner lately erected make the equipment complete and ensure most satisfactory results.

Yours truly,

Du Lièvre Milling and Manufacturing Company,
per R. C. Hunton.

Montreal, October 27th, 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—The use of crude phosphate on the soil is a matter of the greatest importance both to the phosphate industry and the country at

large, and it seems improper that we should be compelled to go outside of Canada to gain information on a matter of really national concern. The subject was urged upon Dr. Selwyn's attention last spring, and he stated that he should urge the necessity of making experiments on the Government farms. During the ten years that phosphate has been exported largely from Canada scarcely anything has been done to promote its home consumption, although the worn-out lands of Eastern Canada offer the most urgent opportunity for its use. Two struggling factories have attempted to introduce the phosphatic manures, but the lack of information as to its value has limited their use.

A New England firm writes: "We are doing all we can, without going to too much expense, to educate the farmers of this section to the advantages of using ground apatite, but it is very difficult in the absence of any testimony as to its advisability by known authorities on fertilizers. At the same time we believe that a little money expended in advertising its merits would be a good investment on the part of those interested in mining it."

Your journal cannot do better service than to urge upon the agricultural departments of the Government the desirability of prompt and thorough experiments and the diffusion of knowledge as to the results of the use of phosphate upon the soil in various forms.

It would be wise also for the producers to encourage every possible experiment in the United States, as the northern portions along the lake shore are the natural field for the consumption of Canadian phosphate, and an immense demand must arise there in the future.

Yours &c,

ROBT. C. ADAMS,

Managing Director Anglo-Canadian Phosphate Company (Limited).

Improvements in Coal Washing.

In an exhaustive paper on this subject, read before the South Wales Institute of Engineers, Mr. R. de Soldenhoff has separated the treatment into three divisions:—(1) Sub-division of coal according to sizes; (2) Washing the coal; (3) Storage and loading of the washed coal. Sometimes also when coal above $\frac{3}{8}$ inch in size has to be used for coking, the coal has to be crushed after it is washed. Also at times when two different kinds of coal are washed, then the mixing takes place after washing, and simultaneously with storing and loading. The apparatus used to sub-divide the coals described are revolving screens, reciprocating tables, and pointed boxes. The washing machines are of two kinds: one to wash 5-inch to $\frac{3}{8}$ -inch coal, and the other (the felspar washing machine) for washing coal of sizes from $\frac{3}{8}$ -inch to impalpable powder.

Having described the principal elements of a washing plant, the writer gives a description of the very complete and simple plant at the Hohenzollern collieries in Upper Silesia, and the more complicated plant at Dowlais. The washing machinery at the Hohenzollern colliery is situated quite close to the pit, and the whole of the coal is tipped upon two screens placed side by side. The large coal above 3 inches is taken by a Briard transporter and carried to the railway sidings, while the smaller coal drops into a 120-ton bunker placed beneath the screens. From the bunker the small coal is lifted by means of an elevator to the top of the building, where it is submitted to a first

sizing in a revolving screen, which divides it into six sizes.

The first five sizes are washed separately, in five machines ranged on the first floor of the building. After being washed the coal is drained in five short revolving screens, and each of the five sizes is stored in a separate bunker overhanging the railway sidings. The water drained off from the screens is used for steeping the smallest sized coal. This fine coal is separated into five sizes in a pointed trough, and each of these sizes is washed in a separate felspar washing machine. The small coal after being washed mixes together in a trough, which takes it to a cistern from which an elevator with perforated buckets lifts it into the bunkers. The washing machinery is capable of treating 400 tons of coal in ten hours, and requires 32 cubic feet of water per minute. The building is 53 feet long by 35 feet wide and 45 feet high. A horizontal single cylinder engine is employed.

The Dowlais washing plant is of a more complicated character, owing to the machinery having to be erected on a long narrow slip of ground divided by an arched-over incline, and provision having to be made for washing bituminous and steam coal separately. The arrangement therefore comprises two sets of plant—the washing system for bituminous coals, and the washing system for steam coals. The bituminous coal is brought to the Shephard machine, which existed previous to the erection of the new washing machine, where it is crushed by means of rolls. It is then elevated into a revolving screen, which divides it into two sizes—from $\frac{3}{4}$ -inch to 0, and from $\frac{3}{4}$ -inch upwards. The nut coal, from $\frac{3}{4}$ -inch upwards, is raised by means of another elevator into a second revolving screen, placed above the Shephard washing machines. This screen divides the coal into five sizes, which are each washed in a separate machine. After washing, the nut coal is raised by an elevator into bunkers—from which the nut bituminous coal may be discharged into waggons as required. The fine bituminous coal, from $\frac{3}{4}$ -inch downwards, is transported by a current of water along a trough to a revolving screen, which divides the coal into two sizes, from $\frac{1}{4}$ -inch to $\frac{3}{4}$ -inch, and from 0-inch to $\frac{1}{4}$ -inch. The coal from $\frac{1}{4}$ -inch to $\frac{3}{4}$ -inch is washed in two felspar machines placed immediately below the screen, and the coal from 0 inch to $\frac{1}{4}$ -inch is conveyed by a current of water to a pointed trough. It is here divided into six sizes, each of which is washed separately in the felspar machines placed next to the pointed trough. The bituminous coal, $\frac{3}{4}$ -inch and upwards, is sent from the elevator raising the washed coal into a crusher. After being crushed it meets the small steam coal in a bunker situated below the crusher, from which the elevator raises the coals, already partly mixed, to a screw placed on the bunkers erected in front of the crushing department. The screw finally mixes the two coals and distributes them into bunkers, from which the small mixed coal is taken to the coke ovens.

The steam coal is also treated in the new washing arrangement. Arriving in waggons, it is tipped into a bunker, and from there an elevator raises it into a large revolving screen. This screen divides the coal into six sizes, one of which is 0 to $\frac{3}{4}$ -inch, the five others varying from $1\frac{1}{2}$ inches to $\frac{3}{4}$ -inch. The last five sizes are each washed separately in five machines ranged on the ground floor, whence the coal is run off on to five reciprocating tables for the purpose of draining off the water. The dry coal drops into bunkers, whence it may be sent

away in railway waggons. When, however, the five sizes are required for coking, the coal is sent by a trough into a revolving screen, fixed next to the crushers, whence it is taken in a dry state by means of a screw to the crushers. The water draining off, which contains small coal in suspension, coming from the drying revolving screen and the reciprocating tables, returns to the felspar machines.

The fine coal from 0 to $\frac{3}{4}$ -inch, from the large revolving screen, enters first into another revolving screen, which divides it into two sizes, $\frac{3}{4}$ -inch to $\frac{1}{4}$ -inch, and $\frac{1}{4}$ -inch to 0. The first size is washed in two felspar machines, while the second and smaller is carried by water to a pointed trough similar to that used for dividing the bituminous coal. The pointed trough divides the coal into six sizes, each of which is washed in a separate machine. All the fine washed coal in a felspar machine runs together into a large basin, whence an elevator with perforated buckets raises it to the top of the bunkers. This small coal may be bunkered if desired; if not, it may be sent by transporter to the crushing building, where it re-mixed with the crushed bituminous and steam coals. The overflow of small coal from the small-coal basin runs first into a long trough provided with a screw, and as the small coal settles, the screw brings it back to the common small coal basin, whilst the water runs into settling ponds or clarifiers. The clarifiers are three long pointed troughs, provided with a screw situated underneath. The dirty water, after having passed through the clarifiers, returns to the well of a centrifugal pump, by which it is sent back and redistributed to the washers. The mud, settling in the clarifiers, drops by gravity into the trough of the screw, which transports it to an elevator which raises it and drops it into a bunker.

The Canadian Iron Trade.

By James H. Bartlett, M.E., Montreal.

I desire, very briefly, to call the attention of the Institute to the Iron trade of the Dominion of Canada.

A wonderful development is now going on in Canada. The completion of the Canadian Pacific Railway, and the numerous extensions of the various railways all over the country, combined with the progress made in nearly every kind of manufacture, is drawing attention to the field offered in Canada for the profitable employment of capital, and specially to the opportunity there is for the manufacture of iron.

In a paper presented to the Institute at the Halifax meeting,* the writer gave a review of the various attempts to manufacture iron in Canada. The facts then presented were not such as to offer much encouragement to anyone to embark in similar enterprises under the conditions then existing, but, happily, these conditions are now changed, and an early development may be anticipated.

There are two reasons which make the present time an appropriate one to direct attention to the field offered for enterprise in this direction, the first being the favorable reports of the experts who examined and reported on the exhibit of minerals at the Colonial and Indian exhibition, held in London, England, last year. The exhibits there of coal and iron attracted so much attention that at the request of the Iron and Steel Institute a paper on the "Ironmaking resources of our Colonies as illustrated by the Colonial and Indian Exhibition," was prepared and read at the last meeting of the Institute.

This report of 135 pages is very exhaustive, and the conclusion arrived at, so far as Canada is concerned, is, that she has in many parts of the country every natural facility for the manufacture of iron.

The second and more important reason is the recent change in the Canadian customs tariff inaugurated in May last. The tariff is now generally two-thirds of the American tariff, in addition to which the Government, in order to encourage the manufacture of iron, grants a bounty upon pig-iron made in Canada out of Canadian ore.

The present tariff changes in full are to be found in the Appendix.

It will be remembered that the Provinces forming the Dominion of Canada were only confederated in the year 1867. Previously they were all separate and distinct colonies, each with its own fiscal tariff. After confederation the customs tariff was simply a revenue not a protective tariff, until the year 1879, when an import duty of \$2 per ton was imposed upon pig-iron which previously had always been admitted free of duty; but the iron section of the tariff was still very incomplete. As Canadian iron-workers' wages are regulated by Pittsburgh wages, it is impossible, unless sufficient protection is afforded, to compete with Belgian, German and English manufacturers whose wages are on a much lower scale.

With one single exception all manufactures of iron in Canada have been made with charcoal as fuel. Many of the attempts were made early in the century, when the operations were of very small dimensions. The only furnaces which have been successful have used bog iron-ore and have made only a few tons of iron per day.

The various attempts to make charcoal pig-iron and blooms in the four older Provinces of Ontario, Quebec, New Brunswick and Nova Scotia, have generally met with a want of success. The failures are clearly attributable to want of protection, the sparsely settled condition of the country, want of transportation facilities, and of judgment in the selection of the situation.

The market, as may be supposed, was at the time very limited, as, saving the small quantity of charcoal pig-iron required in making car-wheels, there was no home market, except in competition with imported coke-iron, to meet which was impossible. A variety of experiments have been made, which are counted as failures in the iron manufacture, bringing unwarranted discredit upon this industry. The experiments in many cases were costly, and were undertaken by patentees of all kinds, of no standing or experience in the trade. The only attempt ever made to manufacture coke pig-iron and refined bar-iron has proved the possibility of doing so. The quality of the article is in both cases superior to that imported and commands a higher price.

The importance of the manufacture of iron to the country generally will be appreciated when it is stated that the total balance of trade against Canada from 1868 to 1886 was \$381,000,000. The total value of the imports of iron and steel during that period was \$253,250,000, from which it may be assumed that the balance of trade would have been in our favor, had we made our own iron.

A great bar to the trade has been a want of information regarding the extent of the market to be supplied. This difficulty has been to some extent removed, the writer having collected and tabulated the statistics of the

Canadian iron trade for all the years since confederation, so that it is now possible to see what has been required in the past, and to estimate what will be necessary in the future.

Some particulars of the nature and extent of the Canadian iron trade may be of service at the present time as a guide to anyone desirous of ascertaining facts necessary for the direction of enterprise in this special field. The confederation of the Dominion of Canada took place in 1867, and particulars of the trade only date from then.

The following table will show the Canadian iron trade.

Imports of Iron and Steel and Manufactures thereof into the Dominion for Home Consumption for years.

1868.....	\$ 6,885,365
1869.....	7,385,780
1870.....	7,750,867
1871.....	10,808,645
1872.....	15,913,179
1873.....	25,435,020
1874.....	20,700,387
1875.....	18,199,198
1876.....	12,965,117
1877.....	11,082,321
1878.....	9,398,306
1879.....	7,962,295
1880.....	10,123,660
1881.....	12,955,855
1882.....	17,499,488
1883.....	20,080,274
1884.....	14,790,727
1885.....	11,415,713
1886.....	11,053,365

Total..... \$253,210,512

This large amount of \$253,000,000 was paid out in hard cash by the people of Canada to support the iron industries of other countries. Of this amount \$94,879,630 was free, and \$158,330,882 dutiable.

The value of iron and steel and their manufactures imported into Canada for home consumption during sixteen years, 1868 to 1884, is over \$230,000,000. The trade is divided into seven headings, the value of imports under each from 1868 to 1884 being as follows:

Iron.....	\$75,179,153
Steel.....	9,938,614
Rails.....	48,068,618
Castings and forgings.....	9,703,717
Cutlery and edge tools.....	10,742,331
Hardware and manufactures....	47,926,637
Machinery and engines.....	29,182,414

Total..... \$230,741,484

The imports under the headings alone of iron, steel and rails amounted in 1883 to 328,838 tons, and in 1884 to 273,967 tons; and the annual import since 1875 has averaged over 250,000 tons.

It might be supposed that a very considerable proportion of this weight is due to rails for the Canadian Pacific Railway; but apart altogether from the Pacific rails, there have been on the average over 64,000 tons of rails imported each year for the past ten years.

For a young country with a small population, the amount of iron and steel consumed in Canada is remarkable. In the year 1878 a greater money value of iron and steel was imported into Canada than into the United States; and not making any iron of our own, the value of our consumption of iron and steel, *per capita* of the population, is always many times as much as the value of the imports *per capita* into the United States, as will be seen by the following figures:—

The following table shows the *per capita* consumption of imported iron, steel and manu-

factures in Canada and in the United States since 1868:

Year.	Canada.	United States.
1868.....	\$2.04	\$0.66
1869.....	2.17	0.74
1870.....	2.25	0.84
1871.....	3.01	1.09
1872.....	4.55	1.30
1873.....	7.01	1.39
1874.....	5.77	0.81
1875.....	5.15	0.46
1876.....	3.46	0.28
1877.....	2.89	0.22
1878.....	2.40	0.18
1879.....	2.00	0.20
1880.....	2.49	0.91
1881.....	2.98	1.00
1882.....	4.05	1.02
1883.....	4.56	0.75
1884.....	3.32	0.60
1885.....	2.28	0.50
1886.....	2.20	0.81

CANADIAN IRON WORKS.

There are in the Dominion at the present time only the following iron works:

Londonderry, N.S.—Two coke blast-furnaces and puddling furnaces, with refined bar-mill, forge, etc.

Rudnor, near Three Rivers, Que.—One charcoal blast-furnace.

Drummondville, Que.—Two charcoal blast-furnaces.

New Glasgow, N.S.—Open hearth steel furnace and rolling-mill.

Halifax, N.S. (one); *St. John, N.B.* (three); *Montreal* (four); *Hamilton, Ont.* (two); *London, Ont.* (one)—rolling mills for re-working scrap and puddled bars, mostly into nail plate.

New Glasgow, N.S. (one); *Hamilton, Ont.* (one)—forges for re-working scrap, mostly into car-axles.

Montreal.—Rolling-mill for making butt-welded pipe; foundry for steel castings.

Toronto, Ont.; Hamilton, Ont.—Foundries for cast-iron pipes.

In Canada, as in the United States, the greatest consumption of iron and steel is created by the construction of railways. When the change from iron to steel rails took place, there were four rolling-mills re-rolling iron rails in Canada, one in Montreal, two in Toronto, and one in Hamilton. The substitution of steel rails, however, caused the mills to suspend operations, their machinery and appliances not being suitable; the mills were dismantled, and the consequent losses have not yet been entirely forgotten. But another and a more recent disaster, namely, the commercial failure of the Steel Company of Canada, Limited, has been most disheartening, effectually dampening the enthusiasm of many believers in the possibilities of the development of our natural resources in this direction. It is hardly to be wondered at that the general Canadian public should lose faith, when an enterprise so brilliantly ushered into existence should only have lasted so short a time, and with such bad results, not only to the shareholders and others financially interested, but to the country generally. When the actual facts are known the reasons of this failure will be plainly seen. These facts are here presented simply with a view to clear the iron industry from this cloud under which it at present rests.

THE LONDONDERRY MINES.

In the forests of the Cobequid Hills, in the Province of Nova Scotia, miles away from any road or settlement, a vein of iron-ore was years ago discovered. Geologists visited the locality and pronounced the deposits of great extent, and a grant of land was obtained from the Government. A Catalan forge was built in 1850, and

three years later a small blast-furnace was put up, charcoal in both cases was used as a fuel, the trees from the forest around being made into charcoal. A small stream ran past the iron mine, and was made to drive the blast-engine. The iron-ore was very pure, so the pig-iron made was of superior quality. There was no home market, but it was exported to England, although the iron had to be carted to the nearest shipping point, namely, Great Village, six miles away from the furnace, and situated at the entrance to a small tidal river on the Cobequid branch of the Bay of Fundy. Navigation on the upper end of the Bay of Fundy is dangerous; the tides, which here rise to the height of 71 feet, rush in and out with great rapidity; the river could only be entered at high tide by vessels drawing not more than 12 feet of water, and the navigation to the entrance of the river was bad. The construction of the Intercolonial Railway, which eventually was brought within three miles of the furnace (at the expense of permanently lengthening the main line by five miles, and unfavorably affecting the gradients and curvature) made the place more accessible. It was still only a little hamlet in the midst of the forest, but it was self-contained, having plenty of ore and timber for making charcoal. There was a demand for the iron, as, owing to its superiority, the English War Office, upon the recommendation of Sir William Fairbairn and others, were using it for the manufacture of ordnance. This was before the age of steel; no doubt the iron commanded a high price; and, altogether, the works were remunerative to their owners.

In 1873 the Acadia Iron Mines, as they were then called, were purchased by a company of a few English capitalists having Sir William Siemens at their head with a capital of two and a half millions of dollars. Their intention was to make steel directly out of iron-ore by a new patented process, invented by Sir William Siemens, and also to make coke, pig-iron, etc. This company, known as "The Steel Company of Canada," had its headquarters in England and managed the Londonderry business from there. They paid \$400,000 in cash and \$600,000 in paid-up stock for the Acadia iron mines, also \$40,000 for the patent rights, a total of \$1,040,000.

The accidental location of the little charcoal blast-furnace seems to have given rise to the choice of the situation for the new works. It would be different to account for the selection in any other way. Works specially designed for the new patented process, with rotators, regenerative melting furnaces with gas-producers, two blast-furnaces, branch railways to the Intercolonial Railway and the different ore-mines, houses, buildings, etc., etc., were built. The scale on which the expenditures were made can be best understood by reference to the item of cost for the manager's house, which came to \$40,000.

The works were completed and got into operation, probably at a further expenditure of about \$1,250,000. The new process did not seem to do very well; and after costly experiments, and repeated trials, it eventually proved here as elsewhere, a complete failure. Hundreds, perhaps thousands, of tons of expensive machinery had to be broken up, and the melting furnaces and gas-producers were pulled down. A second-hand rolling-mill was purchased, some puddling furnaces were built, an axle-forge with a foundry for car-wheels and general castings were added, and the products of the works was changed from steel to pig-iron, bar-iron and castings. The place was not now

self-contained, as before; charcoal was no longer the fuel used, so the trees were of little use, except for timbers in the iron-mines. What was wanted was coal and coke; and, although at the time of the purchase coal was supposed to be on the property, it has never yet been actually discovered. The coal-field of Pictou is 51 miles to the eastward, that of Cumberland 34 miles to the westward. Limestone in considerable quantities is required, and is obtained from Brookfield, 25 miles to the eastward. When, after having paid freight on all these materials, iron is made out of them, there is no outlet but by the same Intercolonial Railway, the distance by rail to Montreal being 773 miles.

This condition of affairs was bad enough; but the situation was made much worse by the fact that the company had never built any coke-ovens of its own, and that, at this time, only one colliery mined a coal suitable for coking, and also owned the only coke-ovens in the country. This colliery, consequently, supplied coke at its own price, helping materially to kill the goose which laid the golden egg. One day, an explosion took place in this particular coal-mine, set the mine on fire, and closed it. It has been closed ever since, but is now being opened again. For a time coke was not to be had, at any price; the blast-furnace had to be shut down, and the loss, from this cause alone, can be better imagined than described. After this experience, some coke-ovens were built, and to some extent this has made the company independent. Finally, a coal mine was purchased and fully equipped; but, upon practical trials, the coal was found to be to a considerable extent unfitted for the company's uses. It was also discovered that, through an arrangement to have the iron-ore mined by contract, the contractor had made money for himself, but had permanently injured one of the iron mines.

Instead of running a general store, from which a considerable revenue would accrue, some outsider was granted the privilege, and took advantage of it.

It is not surprising that, after all the vicissitudes, and in view, also, of the fact that until 1880 imported pig-iron was admitted free of duty into Canada, the company failed. It is more to be wondered at that the struggle was maintained so long.

In 1880 an import duty of \$2 per ton was imposed, and in 1883 a bounty of \$1.50 per ton of pig-iron manufactured out of Canadian ore was granted by the Dominion Government. Under these improved conditions, the company's operations were continued by the liquidators. Since the change in the tariff, a reorganization has been effected. The management is now centered in Canada, and the enterprise will no doubt be made productive to the proprietors and the country at large. Under a careful management, there can be no question that a satisfactory dividend can be earned upon the expenditure of the works as they stand.

It is manifestly unfair to condemn every projected iron-making enterprise in Canada simply because, in the past, this particular case has not succeeded. In spite of all their troubles, the pig-iron, bar-iron, and other products of the Londonderry works, have been of a very superior quality, and have always commanded the highest price in the market.

RESOURCES OF NOVA SCOTIA AND OTHER PROVINCES.

In almost every Province iron-ore is found in abundance, and the Provinces which have not coal have an abundance of timber fit for making charcoal. We possess the only deposits

of coal on both the Atlantic and Pacific shores; in Vancouver's Island and Cape Breton the coal seams run out under the ocean. In both these Provinces, British Columbia and Nova Scotia, nature has been prodigal with deposits of various descriptions of iron-ore of very good quality, and with plenty of flux, all in the immediate vicinity of the coal fields.

There are now a number of collieries mining a good coking-coal in Nova Scotia; and the railway construction now progressing there will bring an unlimited supply of fuel within reach of all parts of the Province.

In the county of Pictou, N.S., iron, coal, and limestone are found in the closest proximity; within a radius of ten miles there is everything necessary to build up a great and successful industry; and this mineral wealth is found on the seaboard, so that the products of the industry can be cheaply transported by water to the head of Lake Superior, if required; several descriptions of iron-ore are found in this county. There is specular iron-ore, with 68.33 per cent. of metallic iron; compact limonite, with 57.71; fibrous limonite, with 59.50; red hematite, and also fossiliferous hematite, with 54.36, and spathic ore, with 43.56.

(To be continued.)

OUR LADY FRIENDS will be interested in knowing that by sending 20c. to pay postage, and 15 top covers of Warner's Safe Yeast (showing that they have used at least 15 packages) to H. H. Warner & Co., Rochester, N.Y., they can get a 500 page, finely illustrated Cook Book, free. Such a book, bound in cloth, could not be bought for less than a dollar. It is a wonderfully good chance to get a fine book for the mere postage and the ladies should act promptly.



Phosphate shipments from Montreal to November 15th, 1887: -

Date.	Shippers.	Ship.	Destination.	Tons.
Sept. 27	Lomer, Rohr & Co.	s.s. Cascapedia	Norfolk...	274
" 29	Wilson & Green	s.s. Oxenholme	Liverpool...	304
" 29	Anglo-Can. P. Co.	do	do	260
" 29	Gilliespie Paterson	do	do	54 1/2
Oct. 5	Anglo-Can. P. Co.	s.s. Panama...	Havre	210
" 5	Lomer, Rohr & Co.	do	do	100
" 6	"	s.s. Concordia	Glasgow...	200
" 13	"	s.s. Colina...	do	220
" 15	"	s.s. Grassbrook	Hamburg...	462
" 28	Wilson & Green	s.s. Harbinger	London...	498
" 28	Lomer, Rohr & Co.	do	do	175
" 29	Millar & Co.	s.s. Euskaro...	Liverpool...	95
Nov. 10	Lomer, Rohr & Co.	s.s. Cynthia...	Glasgow...	95
" 10	"	s.s. Thorndale	London...	300
" 10	Millar & Co.	do	do	80
" 12	Anglo-Can. P. Co.	s.s. Khrwieder	Hamburg...	355
" 12	Wilson & Green	do	do	566
" 11	Lomer, Rohr & Co.	s.s. Toronto	Liverpool...	160
Total				4,408 1/2

The price for 80% phosphate continues firm abroad, and a sale has been made to a port on the west coast of Great Britain at a shilling and a farthing. One shilling per unit with 1/4d. rise is the quotation for 80% in the principal ports. Cable offers for ground phosphate have been received at 8d. per unit with 1/2 rise for 60%, and 10 1/2d. per unit with 1/2 rise for 70%. Prices are also quoted at Buffalo and Chicago at \$10 per ton for 65% ground in bags. These enquiries show that the much desired demand for ground phosphate is increasing. English prices for the

lower grade crude phosphate remain at last quotations, 9d. for 70% and 10d. for 75%, both with 1/4d. rise, which is some advance over the ruling prices for the season. The sale of the grades has been somewhat hindered by competition from French phosphate and by offerings of Aruba phosphate at 8 1/2d. for 70%.

The shipping season as usual closes with higher rates, as shippers do not like to carry stock over winter and therefore submit more readily to the demands of vessels. Rates to Hamburg were 15s. per ton; to England 10s. to 12s. 6d. direct, or 6s. 3d. via Southern cotton ports. The low water in the Lievre River has kept back a considerable quantity of phosphate which might otherwise have been shipped. The completion of the canal is eagerly looked for.

The reprehensible system by which large numbers of valuable phosphate properties are acquired, and held undeveloped by speculators, is severely commented on by the *Canadian Trade Review*, which in a recent article says:—

"The manner in which the phosphate racket is worked ought to have the attention of the Provincial Parliament when it next assembles, and the question might be considered whether it is not in the public interest to make such provisions that those who have mining claims and refuse to turn them to some practical advantage to themselves and the public should within a certain specified time be compelled either to work them or surrender them on payment of a royalty—to themselves and the province,—to such parties as may make bona fide offers to operate them. This locking up of one of the provincial resources out of which a public revenue is derivable ought not longer to be tolerated in the interest of mere speculators, who have at present every thing to gain and nothing to lose by their delay."

Two eminent United States scientists, in a report on phosphate deposits at present under consideration, have given an extended discussion to the question of the utility of crude phosphate as a fertilizer. When their studies are completed we are promised their report for publication in these columns.

Du Lievre District.

Operations are being conducted on a very much reduced scale at the Little Rapids Mine. The men are principally employed cobbing the ore.

Over 90 men are working on the new lock and dam at this point. The length of the lock is to be 135 feet, and it is thought the work will occupy a little over a year before it is completed.

A new cobbing house is being erected at the Union Mines, the lumber for which is being drawn from Holland's mills.

News reaches us from the North Star Mine that everything there is highly satisfactory. Mr. J. F. Higginson states that the last shipment has been made for this season. Capt. Williams states that the new boiler and machinery which has lately been put in proves very satisfactory and works well. He is making preparations on the wharves for his winter's drawing.

The Emerald, North Star and Union Companies have managed at last to get their output down the river. They have suffered much inconvenience from the low water.

The High Rock Company have supplied about 6,000 tons of phosphate, and there are about 4,000 tons remaining which the management have been unable to send down. A new

cobbing house 45x30 is being built which will make the tenth now on this property. Something like 170 men are constantly employed at this mine, which is one of, if not the best, on the Du Lievre.

Shipping on this river is gradually ceasing. Two mines have already finished their season's work, but one or two seem determined to push their produce through as long as they can.

Wakefield.

On the property recently acquired by Mr. W. H. Fuller, Ottawa, a pit has been sunk to the depth of 80 feet in a highly felsphatic rock enclosing some veins of a grayish-green apatite, portions of which are comparatively free from inclusions. Other portions of the veins, however, are somewhat mixed and require hand cobbing to make it at all marketable. This lot, together with some small pits on lots 17 and 18, in the 2nd range, will probably have yielded by the spring about 200 tons, including a first and second quality.

Kingston District.

At the property of Captain Boyd Smith, at Eagle Lake, there has been shipped to Kingston during the season about 1,800 tons of No. 1 phosphate, of which about 1,500 tons have gone to Montreal by barge, and the balance to Philadelphia. Any further shipments will go to the phosphate works at Philadelphia. The seasons output will average 85 per cent.

The No. 2 ore will be kept for shipment to Chicago and other Lake ports on opening of navigation next spring. Besides this there has been mined ready for market an amount of magnetic iron ore, in stripping veins and leads, and in prospecting for and mining phosphate, some 500 tons of which will average 65 per cent. This has been mined and saved at a mere nominal cost, as it was generally one of the walls of vein matter and would have to be taken out to make room for the mining of the phosphate along side of it, for, strange to say, both iron and phosphate are part of each other. Much more work would have been done this season but for the scarcity of efficient hands. Most of the miners in this section being employed at high wages by the new iron companies on the line of the K & P. Railway.

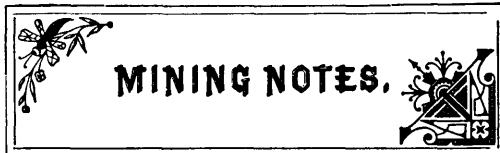
Mr. Joseph Harris, superintendent of these mines, writes:—

"Until now we claim to have the best organized force for its size, and to be getting out the cheapest mined and highest grade No. 1 phosphate of any phosphate mine in Canada. This is in great part on account of exceptional cheapness of cobbing, owing to freedom from mica, pyroxene, rock and pyrites, or, in fact, any foreign matter (vide the report of Dr. T. Sterry Hunt), while for the markets of the United States we are so placed as to have a fair profit, in the difference of freights alone, in our favour. The phosphate, too, does not occur so much in bunches or in irregular quantities as elsewhere in Canada; but in regular leads or veins which can be depended upon for regular mining work."

On account of the scarcity of efficient hands there has been little work done at the St. George's Lake mines. There are some 150 to 200 tons of high grade No. 1 there to be shipped next season.

During the winter there will be employed on both properties between 50 and 60 of the best men sufficient to run a large force, and accommodation for these is being provided in the comfortable houses being erected. Cornwall miners and their families will be brought out and every endeavour made to mine and handle

from 4,000 to 5,000 tons of high grade ore, or more, should the market justify it. Captain Boyd Smith is of the opinion that the best market for all his output will eventually be found in the United States.



Nova Scotia.

A preliminary meeting for the purpose of organizing a gold miners association was held at the *Critic's* office on Wednesday afternoon, the 9th instant. After some discussion on the necessity of such an association the meeting adjourned for permanent organization on Tuesday, 6th December.

Mr. Kamper, of the German Syndicate which contemplates establishing iron works upon an extensive scale in this Province, has recently stated that he and his associates are prepared to invest three or four thousand dollars in that enterprise provided the Government's fiscal regulations are favourable and the quantity and quality of available iron come up to their expectations. The syndicate manifestly intend operating on an extensive scale, for, everything being satisfactory, they contemplate turning out from forty to fifty thousand tons of iron per year and supplying all the steel rails that the Canadian market requires. The syndicate have engineers engaged making the necessary inquiries and experiments and will ship some hundreds of tons of iron to France to be tested there.

Quebec.

Very satisfactory reports continue to be received from the Wright Silver Mine at Lake Temiscamingue. Arrangements are being made with the Temiscamingue Railway Company to carry the ore eastward. The management expect to ship ore every week next summer.

A local exchange says:—There is talk of William McVeigh making a sale of his iron mine, which is situated at the end of the Grand Calumet Bridge. Another mine has been struck three miles east of here and is supposed to be rich. We think that the railway company will yet build a branch line here, if not a loop connecting Bristol Iron Mine, the McVeigh and all the other rich surroundings.

Mr. S. P. Franchot, reports that everything at the Central Lake Mine looks well, and we may look for great things from this new mine next season; the shows on the property are really fine and look to be of a high grade ore.

Work on the Hamilton Powder Co.'s new magazine is going ahead, and when completed will prove a boon to the mining community, who have long felt the want of such on the river from which they could obtain their blasting material without having to send to Montreal for it and very often experiencing great delays in transit. The magazine is a step in the right direction.

There is nothing very new to report in the matter of the recent find of gold on the property of Captain Bothwell. Several miners are at work and a ton or two of the ore is to be barrelled up and sent to England for treatment. The Captain states that he has certificates of

several analysis, which have since been made and which have all shewn gold in more or less quantities. He promised to send us copies of these certificates for publication, but up to the hour of going to press they have not been received. Despite the fact that assays made from specimens taken by uninterested parties from the pit, and made by Dr. Donald, of Montreal, and Dr. Hoffmann, of the Geological Survey, have been found void of any trace of the precious metal, Captain Bothwell has every confidence in his mine, and feels sure that he will soon be in a position to remove the doubts that are expressed by those skeptical of the value and importance of his discovery. The latest specimens of the ore shown us are certainly of a totally different character and of a much superior quality to those submitted when the discovery was first made public.

The Nailon property, one of the adjoining lots to that of Captain Bothwell's, has been purchased by a syndicate of four Buckingham gentlemen and is being worked for gold. The indications are reported encouraging.

The Graphite City Plumbago Mill is being put into thoroughly good shape, it being the intention to commence operations again there next summer. It presents rather a difficult job as the entire building 100 x 40 has to be raised in order to insert new timber and posts, however, under the superintendence of Mr. Chas. Devenney the work is progressing satisfactorily.

Mr. Thomas Daley, of Upper Wakefield, has struck a valuable vein of the clearest mica, together with one of iron and another of stone suitable for porcelain, on lots 19 and 26, Portland Township, which he recently purchased. These mines are pronounced by an expert to be ones that will pan out handsomely.

Reports of an unusually busy season reach us from the mica mines of the B. & C. M. & M. Co., at Villeneuve. At present there is a very large demand for the product of the mine both in Canada and the United States, and in order to meet this two steam drills and a staff of forty men are kept hard at work both night and day. Work on the old pits has been stopped for the present, and slicing the hill from the outside is now being conducted on two beautiful seams of Muscovite of a very superior quality. The business has increased so much within the past few months that it has been found necessary to remove the hands employed in cutting, cleaning, sorting and packing the mica from Buckingham to the mines, where increased accommodation has been provided. This will greatly facilitate the handling of the product. Mr. Key, the mine superintendent, did not give satisfaction, and he has been superceded by Mr. Neil Cochrane, a miner of considerable experience. A market for ground mica has been found in Cleveland, Ohio, where it is used for lubricating purposes, and for this, large quantities of the waste product are being utilized. Pure white feldspar entirely free from iron or other deleterious impurities is found in large quantities on the property, and the management have good reason to believe that this will be utilized in the pottery manufacture. Dr. Stackhouse, of Ottawa, has made a report on specimens submitted to him, and states that for dental purposes alone the feldspar will prove of great value. Already several orders have been filled for Canadian dentists. The amount of

cuttable mica shipped for the month ending the 15th was over 3,400 tons.

Messrs. J. & C. Russell have lately put in some working plant at their silver mine on Calumet Island. Before winter sets in several car loads of the ore will be shipped to New York and Philadelphia where it will be smelted, and upon the results and expence of this operation will depend very much whether operations are to be resumed next season.

Ontario.

The two calcining furnaces at the Bristol Iron Mines are nearly completed, and the gas producer will be finished in the course of a fortnight. A cargo of gas producing coal is already on hand when roasting work will be commenced and about one hundred tons will pass from the mine through the calciners per day. A very convenient skip and self-dumping iron car is completed which will convey the ore direct from the bottom of the pit to the furnaces. The stock pile having become inconveniently large, mining was suspended for a time in order to make but one handling of the ore, which will now be done entirely by machinery. The company have not as yet settled the question as to whether the ore will be shipped the coming winter by the Brae Side, C.P.R., or by the P.P.J. railway.

Mr. E. B. Haycock, who has been prospecting all summer in the Temagamingue district, has returned to Ottawa. He has been successful in securing some very promising locations bearing rich indications of gold, silver, copper and asbestos. An assay of the copper specimens by Dr. Donald, Montreal, has given a very high percentage of copper while others, examined by Dr. Hoffman, have been spoken of very favourably. Mr. Haycock will sink a shaft on some of these locations next season, and upon the results then obtained will depend the extent of further operations.

The Victoria Galena mine, near Sault Ste. Marie, has done nothing this year, the management awaiting the completion of the railway and bridge at Sault Ste. Marie.

With reference to the very rich discoveries of gold reported within the past month from the Sudbury district our correspondent writes: "Several claims of gold discoveries are reported in this vicinity, that is from six to thirty miles distance from Sudbury. Some are quartz bearing gold, others are veins of quartz with iron and copper pyrites containing gold to a certain extent. The most important gold bearing quartz discovery has been made by Messrs. Tough & Company, at a point about twenty miles from Sudbury. I have seen some specimens showing free gold taken from the surface of the rock at a height of over one hundred feet and others from a lower point near the level of the ground. The mineral can be seen in a great many places in quartz veins running through the rocks. Some blasting has been done for specimens for the assayer and free gold was taken out with each shot. Mr. J. Heys, of Toronto, who made the assays, was here about ten days ago and informed me that an analysis of the specimens gave from \$40 to \$7,000 to the ton. Assays from discoveries made by different prospectors have shown \$200 per ton for good specimens, and from \$30 to \$100 for some inferior quality of quartz. Experts pronounce the discoveries of immense importance, while such as have gone over the

Tough propy state that they have never seen richer indications. Agents of New York and Chicago capitalists are at present in Sudbury with the object of purchasing the Tough mine. Current gossip has it that one and a-half million dollars is wanted for it. No doubt a good round sum will be required before a purchase can be carried through. Messrs. Tough's location covers about one square mile. Other locations have been made under the Mining Act. Good strong energetic company's will find investments that will pay in this district."

The Bedford Mining Company has been organized with a capital of \$250,000 to mine iron and other metals at Bedford, near Kingston. The incorporators are Sir Richard Cartwright, Hon. Alex. Morris, Wm. Morris, John D. Hower, Benjamin W. Folger and others.

A meeting of the Elgin Silver Mining Company has been called for November 8th, when the business of the company will probably be wound up. The mines, located at Jackfish Bay, Lake Superior, have been experimentally worked by the company for several seasons past at an expence to the shareholders of about \$10,000.

It is reported that Mr. Adam Burwash, Mattawa, has gone to England with the object of floating a company to work the gold said to have been found in that vicinity.

The Port Colborne Natural Gas, Fuel and Light Company have sunk its well at Port Colborne to a depth of 150 feet and has obtained a supply of gas of extra quality sufficient for lighting and for all the fuel they can supply. The greatest flow was at 800 feet.

Port Arthur District.

At the Beaver Mine sinking in No. 2 shaft has been started again—the shaft being still in silver. A wing on the lower level, 150 feet north of the shaft, is also going down. Drifting north on the middle drift has been commenced, and the stoping in the upper portion of the mine of the same quality of rich ore, still continues. The organization of the company still goes on, and Mr. W. H. Foulonge has finished his underground surveying and sampling. A one-quarter interest has been recently purchased in this property by Gov. Alger, of Michigan, and a one-twentieth interest by another Michigan gentleman.

Sinking the main shaft of the Rabbit Mountain Mine still goes on with unabated vigour, and they are nearly 300 feet deep now; they will drift to the south as soon as the 300 feet level is reached. The bottom of the shaft is looking well, and in it some of the decomposed magnesian silicate so rich in the Beaver Mine is now being found. The drift on the 250 foot level to the north is looking as usual.

The reported sale of the Porcupine has not been effected, and the property is consequently lying idle.

Due south of the Porcupine, and only a short distance away, is a very promising prospect—The Badger. An adit is now in some 200 feet, and some very rich ore is extracted. The vein is, however, left standing so that the value is only ascertained when they break into it.

A reported very rich strike at Silver Mountain lacks confirmation, but at least development is going ahead steadily and mill rock is constantly being extracted.

R. 230, situated north-west of Whitefish Lake, is being systematically opened up, and some ore, unsurpassed anywhere, is being taken from two shafts upon it. Other properties on this vein also show silver, and altogether this part of the district bids fair to come to the front in a short time. Numerous other claims are being prospected with greater or less success in a small way, and enquiries by capitalists are coming from everywhere.

The Attick Lake mines, located about 25 miles south-west of the Beaver, and which are also in the slate formation, are showing up very favorably. There are now four veins opened on locations E 19 and R 238, varying from three to seven feet in width. Two of these veins are of exactly the same character as that of the Beaver vein, and much better indications of silver than that which the Beaver vein showed at the same stage of development. Some further developments are now being made at the junctions of these two veins, on location R 238, owned by W. A. Allan, of Ottawa. At this point, the spar and vein matter is about 12 feet wide, showing both native and leaf silver within two feet of the surface.

There have been a good many new locations taken up in this neighbourhood within the last four months, but so far very little work has been done owing to the difficulties in getting in supplies, there being no waggon road within 20 miles; but this obstacle will soon be removed, as the Port Arthur and Duluth Railroad, which is now in course of construction, will pass close to Attick Lake.

Rat Portage District.

Mr. A. C. Lawson, of the Geological Survey, has returned to Ottawa from his season's work in this region. He reports abundant evidence of gold at Manitoulin Lake, where it is found in quartz veins carried by a green slate formation. He also reports an immense iron bed at Hunters Island, Lake of the Woods, and the discovery of silver and other economic minerals at various points.

Work will be started almost immediately on 211 P., Clearwater Bay, Lake of the Woods, on two very promising gold veins owned by Mr. Dounais, of Port Arthur. No mining is now going on in this section, though the opening of the Gold Hill Property on a large scale, next spring, is now assured.

Manitoba and North-West Territories.

A company called the Calgary Mining and Smelting Company are making application to the corporation of Calgary for a bonus of \$10,000 with a view to the erection of smelting works at that place. The company own the Carrilton location situated upon Mount Stephen, near Field, B. C., containing a vein of galena ore carrying silver extending along the full face of the location, 1,500 feet. The company propose to smelt the ore from their own mine as well as ore from the other mines in the district.

In a three days competitive test of the Canadian Anthracite Company's coal made recently in San Francisco, results of a highly satisfactory character were obtained. It is expected that by the new machinery now being put in

the output of the mine will be increased to 250 tons per day. Large shipments are now being made to San Francisco and San Diego.

The following analysis of this coal was made by C. A. Luckhardt, of the Nevada Metallurgical Works, San Francisco:

Fixed Carbon.....	81.06	p. c.
Volat. Carbon, &c.....	11.31	"
Moisture, &c., 212.....	0.90	"
Hygrosopic Water.....	1.00	"
Sulphur.....	3.77	"
Ash.....	4.96	"

100.00 "

Ash contains:

3,402 Silica.
1,257 Oxide of Iron and Alumina.
0,269 Lime as Oxide Calcium.

4,925 per cent represented.

Specific gravity..... 1,417

An Order-in-Council has been passed on the recommendation of the Minister of the Interior, and under the provisions of the "Act respecting Public Lands," correcting the regulations of the 7th March, 1884, with respect to the disposal of mineral lands, other than coal lands, in Manitoba and the North-West Territories, and of such mineral lands in British Columbia as are the property of the Government of Canada. Generally, it may be said that the few changes in the mining regulations have for their object the assimilating of the system of administering mining lands within the railway belt in British Columbia with the mining laws of that province, adhering, however, to the principle that the purchaser of mining lands shall acquire the right to such mines, minerals, and substances as may be found within the boundaries of his claim produced vertically, but not the right to follow the lead or vein of gold or silver bearing quartz, which originated in his own claim, outside of those vertical lines, as is the case under the ledge or California system, which prevails in the province.

An anthracite coal mine is being opened near Canmore by a company organized by Mr. Brickendorf.

The Canadian Anthracite Coal Company have had an engine and boiler and a considerable amount of new machinery recently put into their property.

British Columbia.

Reports from the Illicillewaet mines are very good. The company are making regular shipments of silver ore to Omaha and to the Silby Smelting Company in San Francisco. The ore bodies are increasing in thickness as they penetrate the mountain and it is now an established fact that the mineral belt extends for two miles in a straight direction. The ore found is rich in lead and silver, and is very desirable for smelting. In some of the company's mines, a drier and richer ore is found assaying up into the hundreds. The company are extracting ore from four or five mines, and all paying largely over expenses. They feel confident that they can in another season supply a forty ton smelter. Limestone and iron ore for fluxes are to be found in the immediate vicinity of the mines. The shipments now are one car load per week.

Alaska.

James McAdams and four other miners who have been working all summer at the new diggings at Forty-Mile Creek have returned to San Francisco. They are the first to reach this point from the new diggings, about whose

reputed richness much has reached Californian papers at odd times by the telegraph from Victoria. McAdams is one of the discoverers of this district, and Mulheim has been in these wilds for the past two years. The latter says: "About 100 miners came out with us. Some have made as high as \$1,000 this season, while others were broken. The average was from \$200 to \$500 each. The thermometer falls to 80 degrees below zero up there. The ground is thickly covered with moss and is frozen for the year round. It is the most fearfully wild country. I would not advise anybody to go to this region. I don't think people would be justified in doing it. It has been greatly over estimated."

MISCELLANEOUS PARAGRAPHS.

Value of Manganese Ore.—In response to numerous enquires Messrs. Ledoux & Co., New York, mention the following uses for which manganese is available:—The First. Chemical use. The demand for this purpose is comparatively small, all Europe taking not more than 10,000 tons per annum, of which 4,000 tons goes to Liverpool. The price varies from 10 pence to 12 pence per unit of peroxide per ton of 2,240 lbs., the principle thing being, first, that the ore shall run as high as possible in peroxide and that it shall contain no carbonates. Second. Metal use. For metal use an ideal manganese ore should contain not less than 50 per cent. of manganese, not more than 0.10 per cent. of phosphorus and not over 10 per cent. of silica. Carbonate of lime present is an advantage; copper decidedly objectionable if over 0.15 per cent., while nickel and cobalt should be absent. Two good shipments, highly praised by the English metal men as to quality, recently analyzed as follows:

	No. 1.	No. 2.
Manganese.....	53.85	51.35 per cent.
Silica.....	7.29	4.00 "
Phosphorus.....	0.04	0.01 "
Carbonate of lime.....	4.00	11.79 "

Manganese ore for metal use is worth about 1s. 4d., with 1d. per unit deducted if the silica runs over 14 per cent., or the phosphorus over 0.13 per cent. The present system of payment is generally, first, an advance of 75 per cent. of value through New York bankers against the bills of lading, balance on the confirmation of the analysis by the buyers or some independent chemist. You will notice that I give only English quotations, the American market being in the hands of one or two buyers only, who pay whatever price they have to, without reference to any standard schedule. Like all English metal dealings there a great many deductions and charges difficult to understand here. For example, a shipment of 100 tons ex steamer from Norfolk, Va., sold in Liverpool as follows: *By sale*, agreed analysis: Manganese, 50.00 per cent.; moisture, 2.00 per cent.; 100 tons, less 2% moisture, net 95; 1s. 3d. per unit of metal, £3 6s. 8d. per ton, £336 13s. 4d. *Charges*.—Marine insurance, £300 at $\frac{1}{2}$ per cent., £1 10s.; sea freight, at 8s. per ton, £40; sampling, at 6d., £2 10s.; analysis fee, 21s., preparing sample, 10s., £1 11s.; commission at $\frac{2}{3}$ per cent., £8 8s. 4d.; total charges, £55 19s. 4d.; net proceeds, £282 14s. The only things in this account of sales that interest the shipper are the weight, assay and net returns. From this we will see that his 100 tons of 50 per cent.

ore brought him £282 14s., or \$1,371.09, being \$13.71 per ton of 2,240 pounds.

Copper Mining in Michigan.—"Comparatively few," writes C. D. Lawton, Commissioner of Mineral Statistics, "comprehend the scale on which all the work is carried on at our great copper mines. They do not realize the fact that the rock from which the copper is eliminated must be mined far underground at a depth of from hundreds to thousands of feet, and thence raised to the surface, taken to the rock house and passed through breakers, whence it must go to the stamp mill—perhaps several miles away—and there it must be pounded into fine mud and sand, which in turn is run over a system of sieves, jiggers, and slime tables, undergoing an elaborate process of mechanical separation of the copper from the sand, after which the copper must be taken to the smelting works, and then cast into ingots, when it is ready to be sent to the market." Then Mr. Lawton in enumerating the expense of reduction says that "Few, even mining men, who are not acquainted with the details of the work at our Michigan copper mines are ready to give credence to the statements that rock which has a gross value of but \$1.65 per ton, or less than 15 pounds of refined copper, on an average, to the ton, can be mined at a depth of more than 1,000 feet below the surface, hoisted, broken, stamped, washed and separated, smelted, and taken to a market and sold, and still leave a net profit of 22 cents on every ton. Yet this was the year's result at the Atlantic mine in 1885, is equally favourable for 1886, and the company paid a dividend of one dollar per share to the shareholders. In order to accomplish this, 800 tons of rock were raised and stamped per day. Each year, as the price of copper has diminished, the daily production has been increased, in order to reduce the average cost. Ten years ago, when there were but 230 tons of rock mined and treated per day, the average cost was \$3.90 per ton at this mine. The cost of stamping and washing was then 88 cents per ton, while now it is but 30 cents. The total average cost per pound of copper obtained at the Atlantic mine ten years ago was 22 cents, in 1885 the same was produced for 9½ cents. The mine is no richer now than formerly, in fact, there has been, practically, no change in the quality of the rock. The advantage gained is due to improved facilities for mining and manipulation, and to a better comprehension of the work."

Chlorination of Gold-Bearing Sulphides.—Mr. E. Gybbon, Spilsbury, New York, gives the following description of a novel method of chlorination:—The chlorinator consists of a plain iron barrel lined with lead, and provided with a manhole on one side for charging and discharging the ore. The ore is charged in one-ton lots. The barrel is first partially filled with water; then a sufficient quantity of chloride of lime is dropped in, on top of which the roasted ore is charged. On top of the ore is poured the requisite amount of sulphuric acid, the manhole cover is put in place and thoroughly secured, and the barrel is started to revolve. The reason for charging in this order is to prevent the sulphuric acid and chloride of lime from coming in contact before the barrel has been securely closed. When the charging is completed the barrel is started and is kept revolving until the whole of the gold is dissolved. A very ingenious arrangement has been devised which enables the operator, by means of a clay pop-valve, to test from time to time, without

opening the barrel, the presence of an excess of chlorine gas. With the sulphides operated on, each one-ton charge consumed 20 pounds of chloride of lime, and 25 pounds of acid. The time occupied in chlorinating so far has been six hours, but as experience is gained it is expected that this time will be reduced by nearly one-half. When this operation is completed, enough water is introduced to nearly fill the barrel, which is again revolved so as to thoroughly wash the ore and dissolve the chloride of gold. The barrel is then opened and the liquor is decanted off upon large shallow filter-beds. Another wash-over is then put into the barrel, which is again revolved for a few minutes, and then decanted upon the filter. Ultimately the whole charge is turned down in the ordinary way, and a final wash-over is given on the filter. The results so far obtained have been remarkably successful. The result of the last eight charges run is appended. Each charge contained a little over one ton of ore of such fineness that 99 per cent. of it would go through a 100-mesh and 60 per cent. through a 150-mesh screen. The assays made of the roasted ore showed 36.70 gold per ton.

Assay of tailings from first charge gave.....	\$1.56
" " " second "	1.03
" " " third "	0.78
" " " fourth "	0.52
" " " fifth "	trace
" " " sixth "	0.78
" " " seventh "	trace
" " " eighth "	0.78

In order to further test the advantages of this system, one charge considerably heavier than the others was tried and it was endeavored to filter it direct in the usual way. While nearly double the amount of wash-water was used for this charge, and while the time occupied in filtering was much more than the other charges required, the tailings resulting contained \$5.68 per ton. There seems to be no difficulty in filtering through a bed of ore from 3 to 4½ inches thick, but when the thickness of the bed is greater, then the filtering of such very fine material becomes almost impossible; hence the advantage of decanting. The precipitation is done in the usual manner with proto-sulphate of iron. The cost of roasting, labour, chemicals, and power will never exceed \$4 per ton. So far it has not attained that figure, some of the work having been done as low as \$3.15 per ton. The actual gold recovered is in all cases within a few cents per ton of the full assay value of the ore, less the amount shown by assay to have remained in the tailings. While the gold obtained in the stamp-mill and amalgamating works is seldom purer than \$97 fine, the gold obtained by this process is generally over 978 fine.

That Bad Man.

Some of the Influences that Make Sinners of us Instead of Saints!

Moral characteristics are too often the outgrowth of physical causes. If so, should a man with a diseased body be trusted with armies, banks, railroads or other great enterprises?

In order to strengthen the mind, we must strengthen the body. But in aiding physical forces, certain muscles are frequently strengthened, because of their use, at the sacrifice of the parts of the body unemployed.

The oarsman develops the muscles that are brought into use in rowing, and by continually developing them he is prepared for the great

event. The poet and the artist study nature to improve the mind and the eye.

To enable one to employ all his forces to the best advantage, the body must be in a healthy condition, so that all parts may fully perform their functions and thus elevate the mind by strengthening the body.

The irritable man, the unjust man, the unsuccessful man, the woman in her duties of life, the counting room defaulters, and the thousands continually making failures, receive too little charity, even when the result is prostration by disease, or sudden death by suicide, or some terrible crime. For not until life is ended, and the result of the post-mortem examination is known, can the physician declare that the cause was organic derangement of the system. They pronounce it blood-poisoning, melancholy, loss of vigor, or nervous prostration. These so-called diseases, nine times out of ten, arise from the kidneys, which are diseased so that they cannot expel the waste matter from the blood.

There are hundreds of thousands of people who do not know that the same quantity of blood that passes through the heart (this much favored and admired organ), passes also through the kidneys. If the latter organs are healthy, injurious matter is not retained, but the pure blood that has become filtered by the little hair like tubes which fill the kidneys, goes to the heart to be diffused through the entire body, producing health, and again taking up deadly waste matter, as it goes.

But if the kidneys are diseased, the uric acid attacks the weakest organ in the body, which must eventually give away. It is then that the physician and the patient treat what are really the effects, not the causes. The strong point that the proprietors of Warner's safe cure make is that their great remedy cures so many general diseases because it corrects the causes, leaving the effects to right themselves.

Now, nearly everyone who becomes prostrated, is, if fortunate enough, able to secure the attentions of a physician, who seeks to make an analysis of the fluids passed. We have no doubt that the founders of this great Warner's safe cure, have awakened the medical men from their lethargy on the importance of urinalysis.

We are to-day in receipt of a little book, Warner's safe cure pamphlet, in which we find very valuable information in regard to diseases, the causes of their existence and their cures. It is very ingeniously put before the reader in conversational style, the reader asking questions, and the publishers in their answers making very plain some points but seldom understood. This matter will be received with much more interest than the mass of stuff which is floating about the country, proclaiming the various merits of pretended nostrums.

Personal Charms.

How the Delsartian Theory of Development Beautifies Women.

What is the Delsartian method?

If ladies can secure cultivation of the voice, so as to read and converse in sweetly modulated yet strong and deep tones, and by the same course of training acquire grace of carriage and the development of chest and lungs that ensures health and adds to personal charms, the methods employed are worthy investigation.

So thought our reporter, who called upon Mme Gray, the noted teacher of Oratory and Physical Culture at one of our leading hotels.

As he entered the room a lady tall but well proportioned came with graceful movement toward him. A well shaped head, crowned with a wealth of iron gray hair, dark, brilliant eyes, beneath finely arched brows, were noted as she approached. When she spoke it was with a voice sweet and low, yet with a wonderful compass.

"What is the secret of this power of vocal expression you seem to have?"

"Secret? there is no secret," laughed Mme. Gray. "Time was when I had one of the weakest and thinnest of voices. Any one can accomplish what I have done. It is so easy to acquire a full, resonant voice, that will never tire or grow hoarse. All vocal disabilities may be overcome, hesitation, stammering, stuttering, soon disappear under proper training."

"Does this training affect the physical system?"

"Yes, it will develop the bust to almost ideal perfection. Gentlemen will add four or five inches chest measurement in as many months."

"It is desirable from a point of beauty, then?"

"Yes, ladies gain the roundness of waist, taper of arm and hand, and the perfect poise, ease and grace in movement, that add so much to personal charms."

"Health, I should think, would be benefited, also?"

"Indeed it is. Lung and throat troubles decrease, narrow chests and thin arms are developed, and female weakness largely overcome."

"It seems to be a regular panacea?"

"No, I am sorry to say that some organs cannot be made good in this way after they have been injured as mine were by a sojourn near a southern swamp. Before I tried physical culture and Warner's safe cure I was a confirmed invalid. I was a consumptive in early life, and it is only a few years since I overcame a serious liver trouble. I owe much to Warner's safe cure, and I do not hesitate to acknowledge it."

"And the consumption tendency?"

"Disappeared after the use of this remedy, and when I had learned how to breathe. Not one in twenty breathe in such a way as to fill the air-cells, to expand the strong muscles at the base of the lungs, which should do the labor of expelling the air. Hence, if kidney disease prevails, the lungs affected by the kidney poisoned blood soon give way."

"Is not your system the Delsartian theory?"

"Yes, and I greatly rejoice when this grand teacher gave to the world his ideas. They correspond to those I had long taught, for I am a pioneer in this work and have devoted life and energy to teaching the world that women may gain vocal accomplishments, health, grace and beauty all at the same time by these methods of cultivation."

"You are yet teaching?"

"Yes, at the School of Oratory and Physical Culture at Syracuse, N. Y., a permanent institution, now in very successful progress."

*Preliminary Report to the Department of Interior, 1886.

†Engineering and Mining Journal, Vol. XLIV, No. 19.

‡Transactions American Institute of Mining Engineers.

VALUABLE PLUMBAGO

AND OTHER

Mineral Lands

FOR SALE,

IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.

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.

MICA

has also been discovered in quantities.

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.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

For information apply to

WM. H. DICKSON,
160 Walle St., Ottawa.

H. E. DICKSON,
Russell House, Ottawa.

OR TO THE OFFICE OF

THE CANADIAN MINING REVIEW,
OTTAWA.

FOR SALE.

VALUABLE

Copper Mining Properties

— IN THE —

Eastern Townships

TOWNSHIP OF ASCOT.

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

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

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

TOWNSHIP OF CLEVELAND.

6th. St. Francis Mine, $\frac{1}{2}$ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pump 25 gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

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

TOWNSHIP OF ACTON.

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

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

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

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

For further information apply to

WM. FARWELL,
SHERBROOKE, P.Q.,
CANADA.

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PROVINCIAL LAND SURVEYOR,

FOR ONTARIO, AND

Mining Engineer,

PORT ARTHUR.

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Farm Lands for Sale IN MANITOBA.

2560 Acres of Splendid Prairie Farm Lands, Class 1.

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

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

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

Terms of payment reasonable.

APPLY THIS OFFICE.



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.

THE
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Oxford & New Glasgow Railway SECTIONS.

- 1st.—Birch Hill Road to Pugwash Junction..... 13 miles.
- 2nd.—Pugwash Junction to Pugwash... 5 miles.
- 3rd.—Pugwash Junction to Wallace Station..... 7 miles.
- 4th.—Wallace Station to Ningo Road... 17 miles.

Tenders for Grading Bridge and Culvert Masonry, Fencing, &c.

SEALED TENDERS, addressed to the undersigned and endorsed "Tender for Oxford and New Glasgow Railway," will be received at this

office up to noon on Friday, the 18th day of November, 1887, for the grading, bridge and culvert masonry, fencing, &c.

Plans and profiles will be open for inspection at the office of the Chief Engineer of Government Railways at Ottawa, and also at the office of the Oxford and New Glasgow Railway at Wallace, Cumberland Co., Nova Scotia, on and after the 10th day of November, 1887, where the general specification and form of tender may be obtained upon application.

No tender will be entertained unless on one of the printed forms, and all conditions are complied with.

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

A. P. BRADLEY,
Secretary.

Department of Railways and Canals,
Ottawa, 20th October, 1887.

FOR SALE
GROUND MICA.

Ten Tons Finely Ground
**PURE WHITE
MUSCOVITE MICA.**

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CANADIAN MINING REVIEW.

A. R. WILLIAMS,

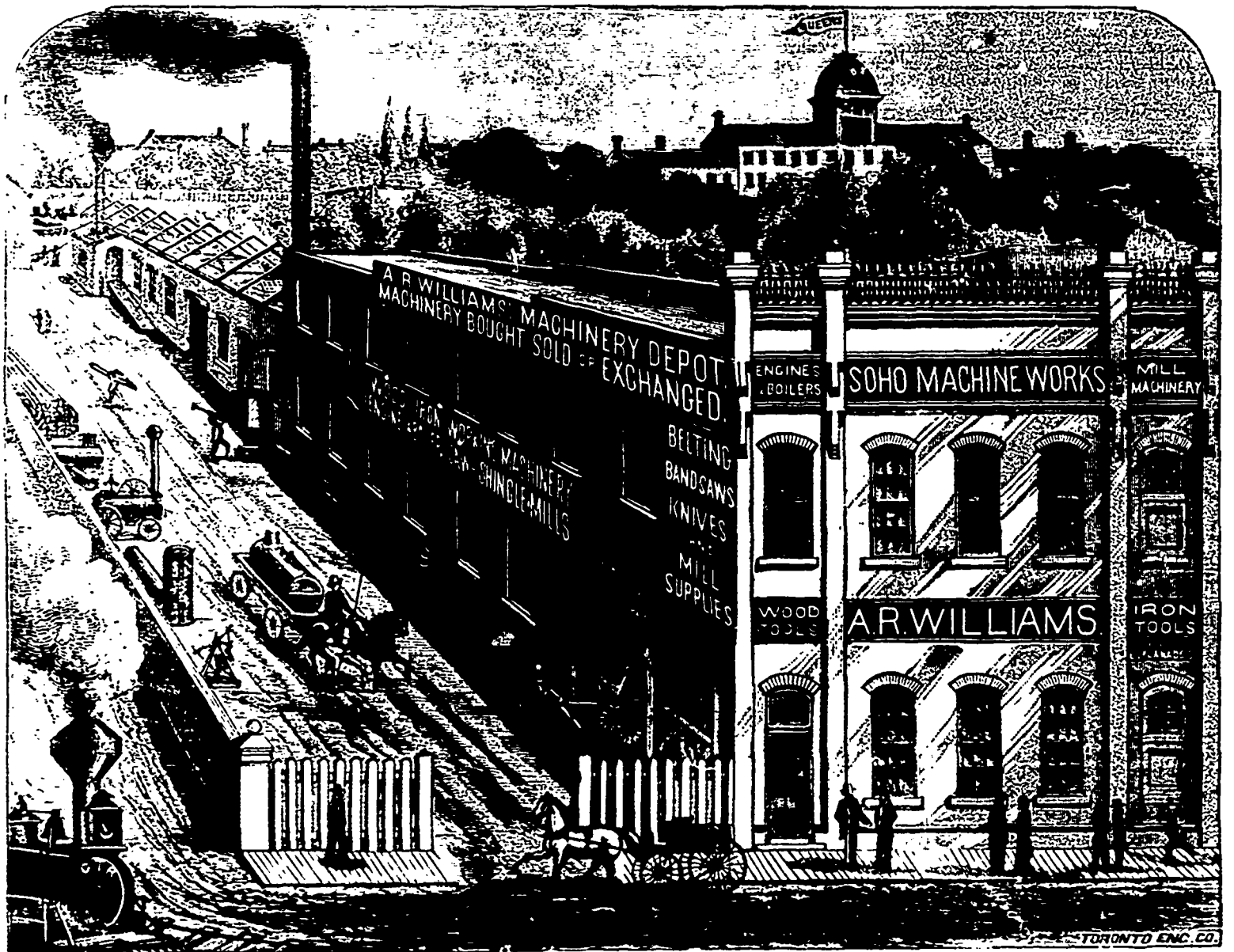
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