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D. R. Bell

THE CANADIAN MINING REVIEW

Established 1882

Vol IX.—No. II.

1890.—OTTAWA, NOVEMBER—1890.

Vol. IX.—No. II

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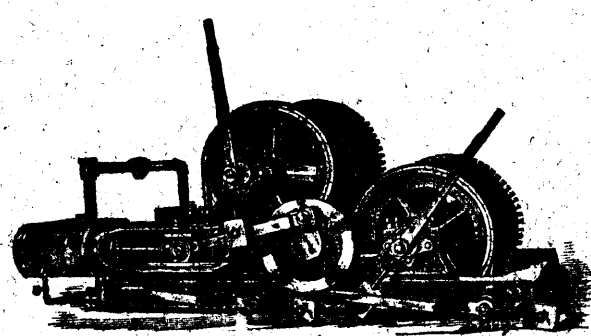
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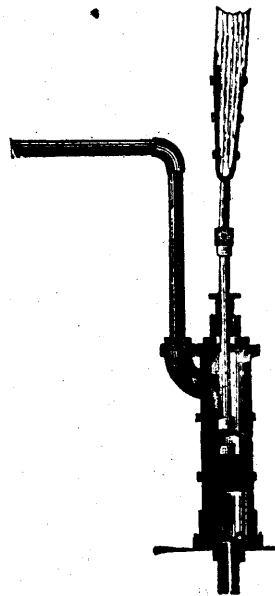
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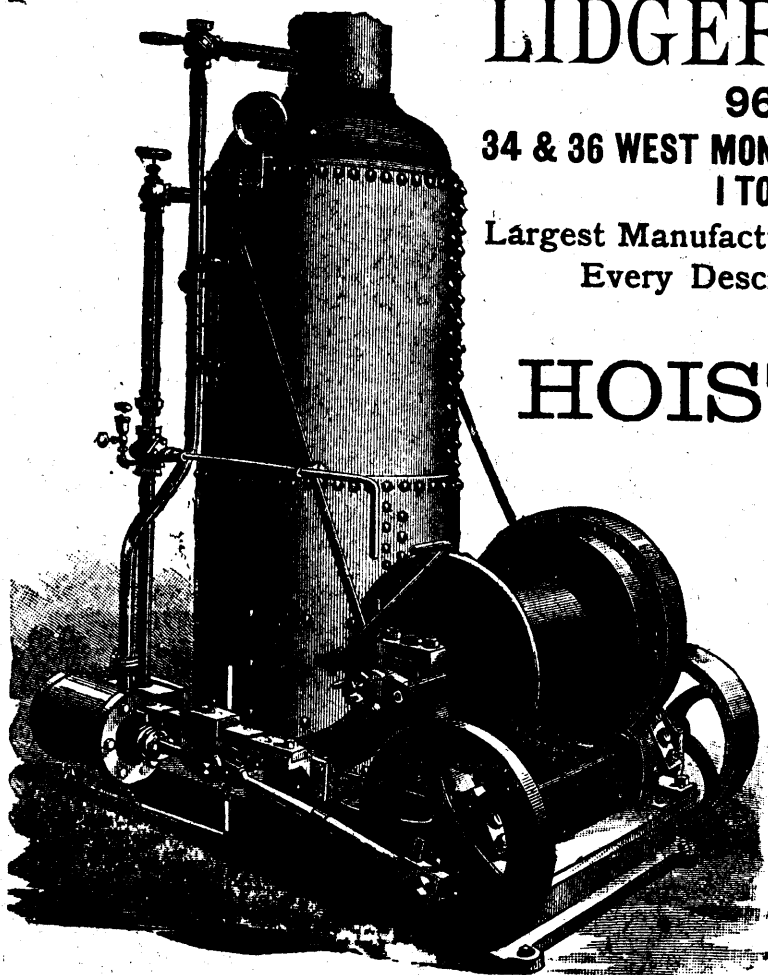
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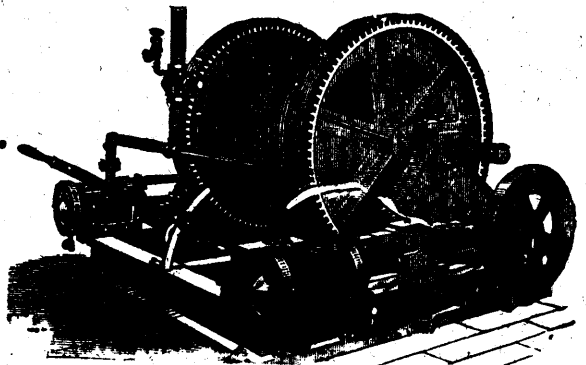
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Vol. IX. NOVEMBER, 1890. No. 11

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The publishers earnestly request the co-operation of readers of the Review for information, communications that can be utilized, suggestions, news items, etc., etc. All such should be addressed to the Editor.

The Proposed Mining Tax.

The Lieut.-Governor of the Province of Quebec has intimated in the speech from the throne, at the opening of the present session of the Legislature, that among the proposed means for raising revenues is the imposition of a tax upon the mining industries of the Province.

We have repeatedly in these columns expressed the opinion that the true method of dealing with mining lands is to lease them on royalty, with compulsion of operation, or failing that, the forfeiture of the lease. This would put an end to the locking-up of valuable lands by speculators, would give the prospector and discoverer a chance of profiting by his enterprise, and would greatly add to the revenue of the Province. The monopoly and control of our mineral lands by men who have no intention of doing mining work themselves, and whose only effort is to "unload" the properties upon others at exorbitant prices, has become a crying evil, and we call upon the Government to put a stop to it. Henceforth let any applicant, with guarantees of continuous working, have the privilege of mining on Government land, paying a royalty on the output. The present system tends greatly to prevent the operation of mines, because the first purchasers being mainly speculators (often government officials who are able to pull wires

and get favorable grants), sell the lands at prohibitive prices; and many investors who would be willing to risk their capital in actual mining operations, will not pay in advance a large sum for the privilege of what is well known to be a hazardous risk. Men need to be *coaxed* into mining more than into any other industry; for though its profits are often large it has a great percentage of losses. It is stated in Chambers' Encyclopædia that 92 per cent. of the mining capital of the United States has been sunk. The great prizes occasionally won in that country have overcome this discouragement, and venturesome men still invest. But in the Province of Quebec our mines have not had time to yield but few brilliant results; there have been no great successes such as to tempt a large influx of capital, and it requires the most judicious consideration and every possible offer of inducement on the part of the Government to prevail upon capitalists to undertake mining ventures. Even if these fail to be profitable to the investors the money expended goes to the toilers of the country, and is of incalculable benefit in those regions now, unfortunately, so widely spread, where farming has become unprofitable or the lumbering business has declined. The mining industry is not one that is making such profits on the average that it can bear to be taxed. It has accumulated no gains by the fostering hand of government through a protective tariff, and owes no acknowledgement for favors received. On the contrary, the privileges given by government to manufacturers have operated in every respect adversely to the mining interest, increasing their expenses in every direction without the least compensatory return. If any single branch of trade is to be selected to bear a special burden of taxation let it be that which has been most fostered at the expense of the community. Let not the tax fall upon the one almost sole manly industry of Canada that is struggling unaided to its feet, and asks no privilege but "a fair field and no favors!" A tax on mines, coming in addition to the high prices demanded by present owners of mineral lands, would operate as a fatal blow to many prospective enterprises, and would prove to be in some cases the last straw that breaks the back of a struggling industry.

It is hardly in our province to proclaim schemes of political economy, but upon general principles we must condemn special taxation upon individual industries and demand that taxation, which is made presumably for the good of all shall be so levied as to be paid by all in some sort of equitable proportion to their means and privileges. A tax on all land values would more nearly approach to ideal equity, or a tax on incomes, though irksome and difficult, would be in the direction of justice. The Government having sold its lands for the greater part outright, would be guilty of breach of faith if it now demands further payments; and in the cases of late sales, where the possibility of taxation was intimated, assurance having been given by legal enactment that this res-

triction would not be enforced for a given period, a feeling was created that the Government was opposed in principle to such taxation and investment has been made in confidence that such a liberal policy would be continued. If any tax is to be levied we would suggest that it should be placed upon the mineral lands held in idleness by speculators; then they would either go to work or else abandon the lands, and in the latter case they could be leased on royalty to bona fide miners. Let industry be untaxed, but let monopoly, idleness and special privilege be made to pay richly for their usurpation of natural opportunities which ought to be ever fully available to all willing workers. The more mining is prosecuted the greater is the chance of discovery. Venturesome capitalists dared to pursue the dubious production of copper at Sudbury, and were unexpectedly rewarded by the discovery of nickel. For the interests of the country therefore we say,—Hands off from every struggling industry and let not the parent be the one to heap unnecessary burdens upon the child!

Another Bluff.

In another place our readers will find the full text of Mr. S. J. Ritchie's Memorandum to the Canadian Government praying for a liberal bonus to the Central Ontario Railway. Without commenting upon a proposition of so much magnitude, one cannot help comparing these, his latest utterances, with the promises so glibly given a few months ago to the Ways and Means Committee of the U. S. House of Representatives. On that occasion, Mr. Ritchie was prepared, in the event of the duty being removed from imports into the United States of nickel ore and matte, to utilize the natural gas of Findlay, Ohio, for the manufacture and treatment of his ores, indeed, he said, "we are contemplating bringing in all our ores to that place to be smelted." In the face of these contradictory statements we are compelled to accept with caution the very glowing promises he now booms out before the public. As a matter of public policy, the Montreal *Gazette* hits the nail squarely on the head, when it says:—

"We recognize and appreciate the immense value of our undeveloped, unused resources, but if the development can come only through government backing, then, by all means let the Government stand to reap the profit of the investment as well as the loss. Mr. Ritchie denies that his enterprise is a private and individual one, but surely this is a most transparent quibble! Other person may put money in the venture and so make the interest that of a community of shareholders, but none the less the public phase is wanting. And where is the line to be drawn? There are iron, silver, gold, coal, petroleum and other mineral deposits in various parts of Canada; is public money to stand behind private interest in the development of these resources? If not, why not, under the reasoning of Mr. Ritchie. Or is an exception to be made in his favour because he is an American citizen, who cooperates with the most gigantic monopoly in the United States, and has more than ordinary assurance in pressing for favours? The Sudbury mines are either valuable or worthless. If the latter, then the Government would be guilty of squandering public funds in using the receipts of customs to back up Mr. Ritchie; but if the former then the merit of the deposits should secure all the capital required. We fear our Ohio friend has been trying to play it on the Government, forgetful of the fact that a country may be young without being green."

Mineral Production in 1889.

The Annual Report, published under direction of the Division of Mineral Statistics and Mines, has been issued to the public. From these official returns we learn that there has been an increase over the year 1888 of three million dollars in the value of the minerals raised last year. Mr. Ingall is to be congratulated on the greatly improved compilation of this valuable volume, which contains a number of new features, greatly enhancing its utility as a handy reference book.

The following summary of the mineral production in 1889 is reproduced from the work:—

Product.	Quantity.	Value.	Compared with 1888.(a)
Antimony ore, tons.....	55	\$ 1,100	Decrease.
Asbestos, tons.....	6,113	426,554	Increase.
*Bricks, thousands.....	200,501	1,273,884	do
*Building Stone, cub. yds.	341,337	913,691	do
Cement, bbls.....	40,474	69,790	do
Charcoal, bush.....	1,593,300	93,463	do
Coal, tons.....	2,719,478	5,584,182	do
Coke, tons.....	54,539	155,043	do
Copper (fine, contained in ore), lbs.....	6,809,752	885,424	do
Fertilizers, tons.....	775	26,606	do
Fire Clay, tons.....	400	4,800	do
Flagstones, sq. feet.....	14,000	1,400	Decrease.
Glass and Glassware.....		150,000	do
Gold, ozs.....	72,328	1,295,159	Increase.
Granite, tons.....	10,197	79,624	Decrease.
Graphite, tons.....	242	3,160	Increase.
Grindstones, tons.....	3,404	30,863	Decrease.
Gypsum, tons.....	213,273	205,108	Increase.
*Iron, tons.....	73,231	2,763,062	do
Iron Ore.....	84,181	151,640	Decrease.
Lead (fine, contained in ore), lbs.....	165,100	6,604	do
*Lime, bush.....	2,948,249	362,848	Increase.
Limestone for flux, tons.....	22,122	21,909	do
Manganese Ore, tons.....	1,455	32,737	Decrease.
Marble, tons.....	980	980	do
Mica (exports of cut and crude, lbs.....)	35,529	28,718	do
Mineral Paints, tons.....	794	15,280	Increase.
Mineral Water, galls.....	424,600	37,360	do
*Miscellaneous clay products.....		239,385	Decrease.
Moulding Sand, tons.....	170	850	Increase.
Petroleum, bbls.....	639,991	612,101	Decrease.
Phosphate, tons.....	30,988	316,662	Increase.
Pig Iron.....	25,921	499,872	do
Platinum, ozs.....	1,000	3,500	Decrease.
Pyrites, tons.....	72,225	307,292	Increase.
Salt, tons.....	32,832	129,547	Decrease.
Sand and Gravel (exports) tons.....	283,044	52,647	Increase.
Silver, ozs.....	383,318	343,848	Decrease.
Slate, tons.....	6,935	119,160	Increase.
Soapstone, tons.....	195	1,170	do
*Steel, tons.....	27,873	973,282	do
Sulphuric Acid, lbs.....	10,998,713	152,532	do
*Tiles, thousands.....	10,526	134,265	do
Estimated value of mineral products not returned (principally nickel, iron and structural materials)		992,838	do
Total.....		\$19,500,000	Increase.
Total, 1888.....		16,500,000	

* Incomplete.

(a) Comparison of values only.

A Curious Blunder.

Much merriment has been caused among the miners of the Eastern Townships by the publication of the following remarkable news item in a recent issue of the *Engineering and Mining Journal*:—

"SCOTTISH CANADIAN ASBESTOS COMPANY, LIMITED.—The mines belonging to this company are equipped with seven air compressors, rock breakers, cornish rolls, revolving picking tables, screens, etc. About 2,000 men and boys are worked by the company. Last year 6,000 tons of ore were mined; the amount this year will be over 7,000 tons. Some of it sells as high as \$200 per ton; the average price for the year is from \$125 to \$150 per ton."

As our readers are aware this company has been in liquidation for a number of years, and

is not now in active operation. The item probably has reference to the asbestos industry in general, and has evidently been badly "mixed" through ignorance of the district worked.

Visit of the Iron and Steel Institute of Great Britain to Canada.

The recent visit to Canada of the Iron and Steel Institute of Great Britain is one which, taken in connection with the several excursions with which it has been associated, should be of the greatest importance not only to mining, but to the iron and steel industries of the provinces visited. The time at the disposal of the party was unfortunately limited to a week, and it was therefore totally impossible to show the visitors in this time, even a small portion of our industrial, commercial and mining industries. Still, it is hoped, sufficient has been done to give the visitors some slight impression of the growing importance of Canada, as a promising field for the judicious investment of capital. We can heartily re-echo the wish, so often expressed during their journeyings among us, that at some not very distant day, a full Meeting of the Institute may be held in one of our large industrial centres, when, with more time at its disposal, a better opportunity would be afforded of gaining a more thorough and comprehensive idea of the mineral, agricultural, industrial and commercial resources of the Dominion.

At Niagara.

The party, numbering some 200 ladies and gentlemen, arrived in Niagara Falls, Ont., at noon on Tuesday, 28th October. Of these, one hundred and twenty-five had signified their intention of taking part in the series of excursions provided by the Dominion Government; the remainder only desired to see the Falls and would return direct to New York.

The visitors were met at the station by Dr. A. R. C. Selwyn, Director of the Geological Survey of Canada, Mr. H. B. Small, Secretary to the Department of Agriculture, Mr. Thos. MacFarlane, F.R.S.C., Dominion Analyst, and Mr. B. T. A. Bell, Editor of the CANADIAN MINING REVIEW, these gentlemen acting as the Canadian Reception Committee, on behalf of Her Majesty's Privy Council, whose guests the visitors were to be. The party was accommodated at the Clifton House. After luncheon, the visitors divided into parties, and spent the remainder of the day viewing the wonders of the great Niagara, and in visiting the many scenic beauties on both sides of the famous old river. The glory and majesty of Niagara will doubtless linger long in the memory of the members of this party; but we venture to predict they will also carry home with them a very vivid, and perhaps more lasting impression of her hotel bills, cabmen's hires, toll dues and other extortions imposed on a colossal scale, only equalled by the great Falls themselves. A prominent member of the Institute gives it as his opinion: "I have travelled much and been occasionally extortionately charged, but never have I come across such wholesale extortion as was perpetrated on this party." A very fair idea of the shameful and scandalous nature of the extortion practised on members of the Institute, may be gathered from the following experience of one of their number:—

"As guests had to leave early on Wednesday morning I thought it wise to pay my bill overnight, and, being hurried, did not much question items. I should mention that my wife and daughter remained at the Clifton House until the afternoon of Wednesday, consequently taking luncheon. They are represented on the bill as one day, dinner, two persons, \$13. Finding great dissatisfaction expressed by my fellow-travellers at the varied extortions practised on them, I, early next morning, asked at the office what was the \$3 item for, and was told it was for placing a cot in my room for one of the Canadian committee who had most kindly given up his room to two guests, who, no doubt, paid for it, as did the gentleman himself as his bill, room No. 106, shows.

"On my remonstrating at such a charge as \$3 for an extra cot in a room already paid for, I was told that it was correct and no deduction would be made. Consequently No. 106 must have paid some \$5 to the Clifton house for a simple cot in addition to his food, which would then stand at \$5.50, the total bill being \$7.50.

"It will be noticed that the baggage, etc., charge of \$2.50 was only to depot, and the baggage consisted of only one piece, a portmanteau, the other baggage having been expressed from Washington to New York."

The following members of the Institute left Niagara at nine o'clock in the morning of Wednesday, 29th October, on the Canadian excursion: James Allan, Coatbridge, Scotland; Charles Bell, Stirling, Scotland; Sir James Bain, Glasgow, Scotland; A. C. Bamlett, Thirk, Eng.; Mr. and Mrs. Bantock, Wolverhampton,

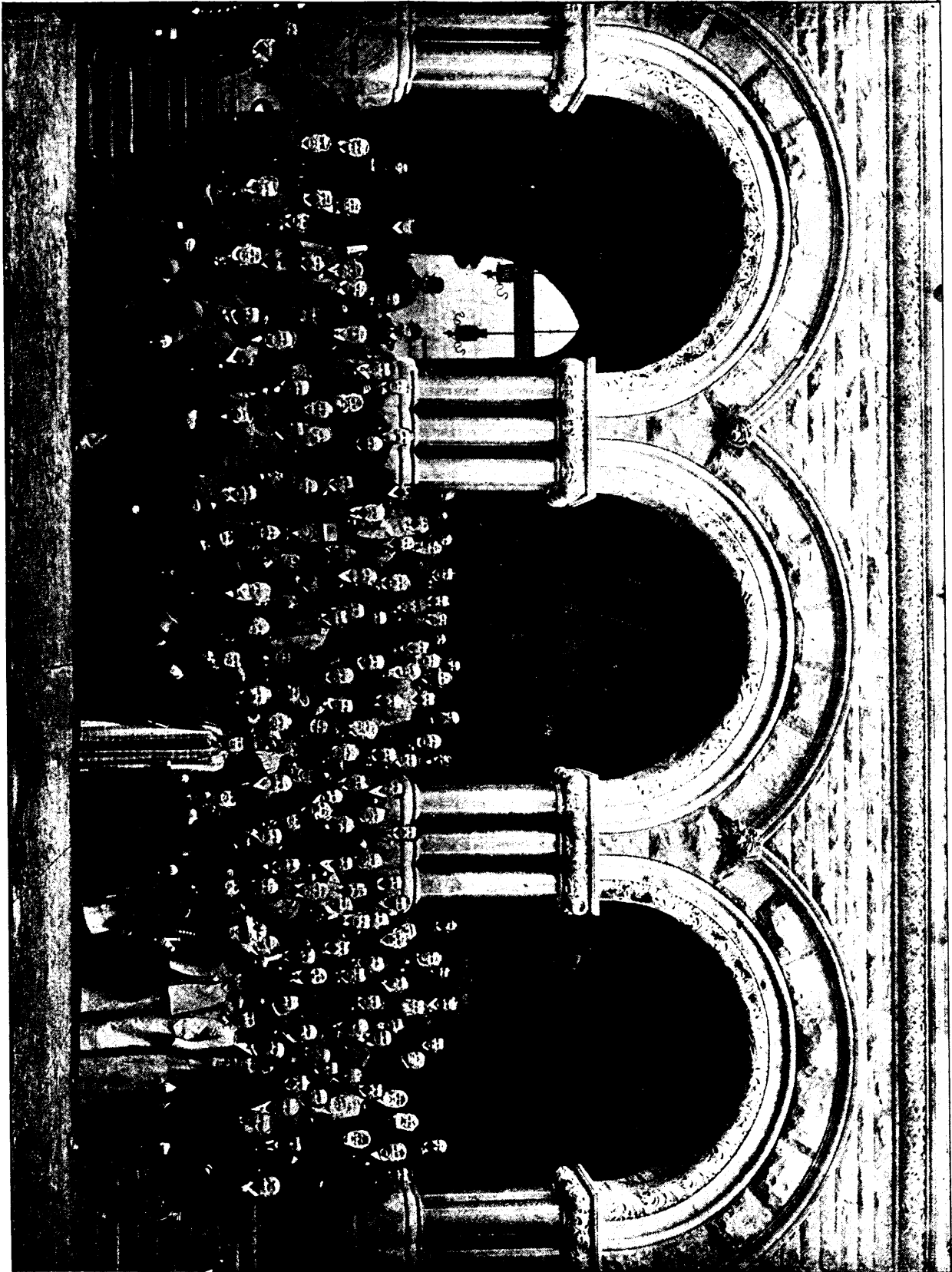
Eng.; Isaac Butler, Newport, Eng.; A. R. Byles, Bradford, Eng.; Mr. and Mrs. Thomas Cook, Sheffield, Eng.; J. H. Coghlan, Leeds, Eng.; W. Colquhoun, Tredegar, Wales; Mr. H. S. Craggs, and the Misses Craggs, Middlesboro-on-Tees, Eng.; Herr A. Diechman, Berlin, Germany; Mr. and Mrs. Dickinson, Wolverhampton, Eng.; Mr. and Mrs. Drummond, Bradford, Eng.; A. H. Dunnachie, Glasgow; Mr. and Mrs. Evans, Lanelley, Wales; Mr. and Mrs. Ellison, Worthington; W. Farnmouth, Swindon; S. F. Fellowees, Wolverhampton; A. Goldbach, New York; Joseph Gregory, Manchester; G. K. Harrison and Miss Harrison, Stourbridge; J. F. Hobson, Durham; Herr Hoffer, Genoa, Italy; Howat, Mr. and Mrs., Glasgow; Col. Holland, C. B., Tunbridge Wells; Prof. and Mrs. Huntingdon, London; W. T. and Mrs. Jackson, Burton; J. S. Jeans, London; Walter Jenks, Wolverhampton; James Johnstone, Manchester; W. H. and Miss Jones, Rotherham; Col. Kearsley, Ripon; F. R. Loeber, Leeds; R. Laybourne, Newport; J. F. Maclaren, Glasgow; Herr Marburg, Wiesbaden, Germany; B. Marsden, Manchester; C. Marsten, Wolverhampton; S. Vaughan Morgan, London; Miss Moss, London; A. Muir, Manchester; J. N. Muller, Middlesborough; Gerald R. Oakes, Derby; F. Oakes, Middlesborough; J. F. Pease, London; J. W. Perkins, London; W. D. Phillips, Aberdare, Charles Phillips, Newport; Edward Porritt, London; H. G. Powell, Wolverhampton; Joseph Richardson, Stockton-on-Tees; J. C. Ridley, Newcastle; F. H. Rummles, London; M. Salter, Bradford; Herr Siebel, Dusseldorf, Germany; J. Simpson, Whitehaven; Mr. and Mrs. Service, Glasgow; G. J. Smith, Sheffield; Mr. and Mrs. and Miss Snelus, London; Mr. and Mrs. Sparrow, Wolverhampton; J. C. Tannett, Leeds; J. L. Thomas, Aberdare, South Wales; F. Thomas, Sydbrook; W. H. Walker, Sheffield; F. C. Wilson, Alston; S. W. Wilson, Alston; E. B. Wilkinson, Port Henry, N.Y.; J. M. Bruce, Melbourne, Australia; H. Banks, Wolverhampton.

At Hamilton.

The special train arrived at Hamilton at 10:30 a.m., the visitors being met at the station by the Mayor and members of the City Council, the President and members of the Board of Trade and other corporate bodies. After the leading members of the party had been introduced, the visitors were escorted to the carriages in waiting, and then driven through the principal streets, visiting the leading industrial establishments, the principal public buildings, and other points of interest in and around this enterprising and progressive city. A drizzling rain was falling when the party started from the station, compelling the use of closed carriages, but at the top of the mountain, the weather, fortunately, cleared, and permitted a delightful view of the lake and city, and the fine stretch of cultivated country lying beyond. On returning to the city an opportunity was given of witnessing some very creditable movements by the fire brigade, after which the party adjourned to the Arcade Hall for luncheon. The hall was beautifully decorated with flags, flowers, and evergreens. About 250 persons were at the tables. Mayor McLellan presided. After ample justice had been done to an excellent menu, a short toast list was proposed. In proposing "The Queen," the Mayor said: "It is a toast that is always received in Canada with hearty goodwill, and it would no doubt be so received on this occasion, both by British and German delegates. When the Queen's name is mentioned, 'not only Canadians, but Americans also, receive it with every mark of respect.'" The toast was received with ringing cheers, again and again renewed, and the National Anthem was sung with great heartiness. His Worship then extended to the visitors a hearty welcome to the city of Hamilton, stating that it was greatly to be regretted that their stay was not longer and that the weather was not more propitious. He trusted that their impressions of Hamilton would be favorable. (Hear, hear.) He then proposed the health of the Iron and Steel Institute of Great Britain. The toast was received with great enthusiasm. Mr. Snelus, in responding, said that the members of the Institute had been received in Hamilton with real brotherly love, and their kindly and hearty reception would not soon be forgotten. "We have seen to-day," he said, "a community of 50,000 people where not long ago existed a wilderness; and this community is not dependent on any one industry, but many diversified industries, for its prosperity. It is indeed a remarkable development."

Mr. Adam Brown, M.P., said the remarks of the last speaker were most encouraging and spoke well for Canada's future. Together with his colleague, Mr. McKay, he welcomed the delegates, on behalf of the Parliament of Canada, to the first important point they had visited in the Dominion. Pointing to the British flags which adorned the walls, Mr. Brown said that if the delegates wished to find evidence of the devotion of Canadians to the British Empire, let them look around. (Immense applause.) Mr. Brown then proposed the health of the German visitors. "He did so," he said "with the more pleasure, because some of the most valuable and

THE IRON AND STEEL INSTITUTE AT HAMILTON: A PHOTOGRAPH TAKEN ON THE STEPS OF THE CITY HALL.



prosperous citizens of Hamilton were Germans, who had come back from the old land to make their homes in this new country, where the difficulties and feuds of the old lands are forgotten."

Mr. Thomas Macfarlane, F.R.S.C., replied for the German visitors, and in doing so, remarked that the Germans and British were natural allies—allied in blood and kinship—and they would always stand together in the foreground of civilization. Sir James Bain, ex-Lord Provost, of the city of Glasgow, proposed "The Mayor," remarking that they had met with much kindness in America, but nothing like the fraternal feeling that had been shown in Canada under the British flag. "It was something the delegates would never forget." Mayor McLellan gracefully acknowledged the toast. The proceedings were brought to a close with "Auld Lang Syne," sung with great heartiness. At the City Hall the visitors were photographed; a reproduction of the group will be found in this issue. The party then left by special train for Toronto, which was reached at four o'clock in the afternoon.

In Toronto.

The party was met at the Union station by carriages and driven to a reception given in its honour at Government House. The guests were received and welcomed by Sir Alexander Campbell and his daughter, Miss Marjorie Campbell, in the large drawing room. A very large number of the prominent citizens of Toronto were present on invitation to meet the visitors, and a very pleasant couple of hours were spent enjoying the Lieutenant-Governor's hospitality. It was originally intended that the party should remain at least a day in the Queen city, but no satisfactory arrangement could be made by the Board of Trade or the City Council before the city of Hamilton came forward with its offer to receive their visitors. After leaving Government House the party had dinner at the Queen's, thereafter leaving at nine o'clock by Grand Trunk special train, consisting of four Pullman sleeping cars, for Sudbury via North Bay.

Wearied with the day's travel and pleasures, the visitors were soon snugly ensconced in their berths, and very few of them were about when North Bay was reached early in the morning. Up to this point progress had been somewhat slow, and the special was behind her scheduled time, but here C. P. R. Divisional Superintendent Bury took charge, and ran the 80 miles between North Bay and Sudbury in an hour and forty minutes. The road bed in this division is in magnificent condition, and to show the English and German visitors what could be done on a Canadian road, one section of 35 miles was covered in 32 minutes, and this without the slightest inconvenience to the passengers.

At Sudbury Mines.

The lively little town of Sudbury was found to be *en fete*. As the train drew up to the station platform at eight o'clock the town brass band played a stirring welcome. A reception committee of the leading citizens was in attendance, and escorted the visitors to the hotels. After breakfast, which had thoughtfully been provided by the local committee, the visitors assembled at the White House hotel, where Reeve Fournier, on behalf of the citizens of Sudbury, read the following address:—

LADIES AND GENTLEMEN OF THE VISITING ASSOCIATION.—We, the citizens of Sudbury, leg to tender you a hearty welcome to our midst, and trust that your visit to this region will be one of interest and pleasure to all. We will endeavor to entertain you to advantage, and trust you will leave us with the importance of our mineral wealth, especially in the product of nickel, vividly impressed upon your memories. We have, within a radius of 60 miles a supply of the mineral of the day, nickel, in sight that will probably furnish all requirements of the mercantile world for this and the coming generation. We understand and fully realize the fact that you must now be very much bored by the repetition of addresses which have undoubtedly been presented to you in this and our great and adjoining cousins' country, the United States, and for this reason will draw our address to a close by again, ladies and gentlemen, tendering you a hearty welcome.

Mr. J. S. Jeans, Secretary of the Institute, and Mr. James Richardson, Stockton-on-Tees, suitably replied. The visitors then took train and visited the mines and works recently opened by the H. H. Vivian Co. of Swansea. After these had been carefully inspected, the visitors took the cars and were quickly run out to Blezard, to the workings of the Dominion Mineral Company.

The mine, buildings, machinery, plant, smelters and surface equipment were very carefully inspected, and many favorable comments passed thereon. Nearly the whole party then descended the main shaft to a depth of 100 feet, and examined the methods of extracting the ore. These are the first and only mines in Canada using electric light below ground. About 300 men are employed. In the afternoon the party took a run out to the Copper Cliff, and the other large mines and works owned and operated by the Canadian Copper Company. A very pleasant and profitable time was spent here, the party

being conducted over the properties by Mr. Evans, the courteous manager of the company. The party returned to Sudbury a little after dark well pleased with their outing, and loud in their praise of the many courtesies extended to them by the members of the local Reception Committee and the managers and officials at the various mines. At eight o'clock a parting cheer was given to their kind hosts, and the Special steamed *en route* for the Capital.

Entertainment at Ottawa.

The train was timed to reach the Capital before eight o'clock on Friday morning and no little surprise was therefore manifested when the party found themselves in the depot a couple of hours in advance of this time. Carriages had been thoughtfully provided by the Citizens' Committee, and in these the visitors were rapidly driven to the Russell House, their headquarters during their stay in the Capital.

The programme for the day commenced with a visit to the City Hall, where the visitors were received by Mayor Erratt and the members of the City Council. Sir Adolphe Caron from the dais addressed them, welcoming them to the Capital of the Dominion on behalf of the Government. He said it gave Canadians very great pleasure indeed to receive as visitors the representatives of those works which have made the wealth and prosperity of the nations to which they belong. He could only say, as a Canadian, we could not show Canada too often to those who wished to visit her shores.

The Mayor then read an address, in which the pleasure of the people of Ottawa that the members of the Institute had made Ottawa one of their places of call was expressed. It went on as follows:—

"We recognize in your presence the fact that the mineral resources of Canada are more largely engaging the attention of the capitalists of the Mother Countries, a fact which indicates that the time has come for the development of the valuable fields for enterprise existing in our country. We feel convinced that the practical development of the iron and other mines of the Dominion will not only stimulate industry and increase the general prosperity here, but will also prove a certain source of profit as well as gratification to the capitalists of Great Britain and the European Continent, who will find here fields of promising enterprise, equal, if not superior, to what can be found in any land. We welcome you as citizens from across the Atlantic, regardless of your nationality, and as men engaged with ourselves in the great work of national development and moral and material progress."

Mr. Snelus replied on behalf of the association. He could not express too strongly the pleasure and surprise that their visit to Canada had afforded them. As representatives from the Old Country it gave them very great pleasure to see one of her children doing so well. They had visited Hamilton, and that great city Toronto. They had seen a little of Ottawa, and had been surprised at the magnificent buildings of which they had a glimpse. This visit would do more to cement the friendship between England and Canada than any amount of literature. They wanted to know each other better. He hoped that many would make a more extended visit, as he intended to do himself. He hoped that some would do as he had done, and take an interest in the country. He believed that they could trust Canadians as brothers to take care of moneys entrusted to them. (Loud applause.)

A number of the members were then introduced to the Ministers and others. An inspection of the fire brigade followed, and at two o'clock carriages were taken by the whole party, who started on a tour of the points of interest in and around the capital, the industries about the Chaudiere engrossing most of the time of the sight-seers.

In the evening the members of the Institute attended a dance given in their honour in the Russell House. About seven hundred ladies and gentlemen were present, and dancing was kept up spiritedly until an early in the morning.

Reception and Luncheon.

During the forenoon the members were free to spend their time as they pleased, and in small parties visits were made to the Museum and Offices of the Geological Survey, the Parliament Buildings, Fisheries Exhibit, Art Galleries, and other points of interest.

By one o'clock all had got back to the Russell House, and shortly after that hour his Excellency Lord Stanley of Preston and Lady Stanley arrived. They held a reception in the parlor of the hotel. Sir John and Lady Macdonald, Sir John and Lady Thompson, Sir Adolphe Caron, Mr. Foster, Mr. Mackenzie Bowell and Mr. Carling surrounded their Excellencies, and introduced the ladies and gentlemen. This was one of the pleasant events in the series, all stiffness and formality being banished and the greatest good feeling and free interchange of conversation being indulged in.

The party then proceeded to the luncheon-room. His Excellency presided, having on his right Vice-President Snelus, who had escorted Lady Stanley to the room, Lady Macdonald sat on his left, having been escorted in by Colonel Holland, a famous British soldier

and traveller. The vice-presidents were Sheriff Sweetland, Sir Adolphe Caron, John Carling, C. H. Mackintosh, M.P., Honore Robillard, M.P., Mayor Erratt. The room presented a very brilliant appearance, having been handsomely decorated for the occasion. The menu was *recherche*, and a host of skilled waiters served the dishes deftly and perfectly.

After the good things had been disposed of, Lord Stanley arose and proposed the first toast, "The Queen," adding a few graceful words with respect to the position she holds in the hearts of her subjects. On rising to propose the second toast, he reminded the company that their guests were compelled to catch a train and therefore his remarks would be necessarily brief. There was one thing he said that Canadians desired to excel in, and that was the art of hospitality. Therefore it was with feelings of regret that they felt that they had to part with their newly made friends that day. They owed their friends across the line a good many benefits conferred. Perhaps Canadians do not always recognize and acknowledge these benefits, but they recognized the privilege which had been afforded them to-day through our American friends inviting the members of the Iron and Steel Institute of Great Britain and the German Association of Smelters to cross the ocean. It was not his place to speak of technical subjects before a body like this, but it would not perhaps be improper of him to allude to Canada's great mineral wealth, only requiring capital and skill to develop. Perhaps some of our neighbors thought that our resources were not developed as rapidly as they should be, but if their progress was somewhat slow it was solid and sure. Their future was certain, though perhaps not immediate. Their guests had probably seen the vast possibilities of production in the Sudbury region, and he could not but regard it as a fortunate accident that brought them to Canada's doors. He regretted that their stay had been so short, that they had not seen Nova Scotia's wealth of coal and gold, or the mineral riches of the Rocky Mountains. He welcomed also their German cousins, and concluded by expressing a hope that they would soon visit us again and stay longer.

Mr. Snelus, vice-president of the Institute, replied on behalf the visitors, thanking their hosts for their princely hospitality. They certainly would not regret their visit to the Dominion of Canada. He personally, and on behalf of the members of both associations, thanked Sheriff Sweetland, Dr. Selwyn, Mr. B. T. A. Bell, the Mayor, and ex Mayor Macleod Stewart, for their unremitting kindness and attention. He and his colleagues had learned a great deal in this visit. Some eighteen months ago it was supposed that nickel was a rare production of nature, but the discoveries at Sudbury had revolutionized everything in the nickel world. They were glad and proud that their young daughter Canada had such a magnificent inheritance of metallic wealth. A friend of his in Alabama had said in reference to the mineral wealth of that State that when Dame Nature was distributing her blessings over the earth she let loose her apron strings when she came over Alabama. It seemed to him, however, that the place where the Dame had lost her hold of her apron strings was when she was over the Dominion of Canada. There she had dropped her heavy and rich ores—gold and silver and rich metals. An inspection of the Geological Museum proves how rich beyond measure she is. She had all the metals of value, beginning with gold and finishing with iron, and all the metals between these two. Then she had fuel which was so indispensable. There must be a great future for such a country. He spoke of the family feeling that existed between the Mother Country and her colonies, and recalled that Canadian boatmen piloted British troops past the dangers of the Nile. If any peril threatened the old land he knew they could look with confidence for assistance from Canadians. He concluded by proposing the toast of the Dominion of Canada, coupled with the name of Sir John Macdonald.

Sir John Macdonald on rising was received with a perfect storm of applause, in which the ladies joined very enthusiastically. He said the near approach of the hour for departure precluded his making a speech, even if he desired to do so, but fortunately those who preceded him made it unnecessary that he should do so. It was pleasant to hear their country praised by gentlemen who spoke with such authority as did their guests, and he expressed his great regret that they had to hurry away so soon. He thanked them for their kind reception of his name.

Sheriff Sweetland proposed the health of the Governor General, to which His Excellency replied very briefly. He particularly commended the social departure by which the ladies were able to be partakers of their pleasure on that occasion.

As arrangements had been made to leave for Montreal at half past four o'clock, and as but little time remained, a most successful banquet was thus somewhat hurriedly terminated, though not before ringing cheers had been given for the Queen, Lord Stanley and Sir John Macdonald. Prompt to the minute the special train steamed out of the

Canada Atlantic station amid a volley of small torpedoes, and many hearty cheers and counter cheers from the large crowd of citizens that had assembled to witness their departure and to wish them God-speed. At Vaudreuil the train made its only stop to allow acting Mayor Hurteau, Col. Stevenson, Aldermen Clendenning, Rolland, Villeneuve and others from Montreal, to enter the train and extend a hearty welcome to Canada's industrial metropolis.

At Montreal.

At 7.15 p.m. the Special rolled into Bonaventure depot, and the members were soon being driven in the carriages provided by the city, to the Windsor Hotel. During the evening Sir Donald Smith, Sir William Dawson, Sir Joseph Hickson, and many other prominent citizens called in at the hotel to welcome the members to Montreal. On Sunday, like all good people, the party went to church, the majority being present in the evening at a special musical service in the Church of the Gesu.

The visitors were early astir on Monday morning. About eight o'clock the civic committee arrived, and the party, embarking in carriages, set out for the Grand Trunk workshops, where they were received by Sir Joseph Hickson and Messrs. Edgar and Powell, who showed them through the works. A special train was taken at the Wellington Street crossing, and the party went through the Victoria bridge, stopping in the middle to examine it. The carriages were again taken at the Wellington street crossing and the party drove to the Canadian Pacific shops, arriving there after the noon hour when the men were all away from work. The inspection here was brief, and then McGill College was visited, a short time being spent in examining the Redpath museum, and the other interesting features of this excellent institution. Sir William Dawson and Sir Donald Smith received the visitors. This ended the morning's sightseeing, and the party drove to the Windsor for luncheon.

In the afternoon the party drove around the mountain. A start was made from the Windsor at half-past two, the route taken being along Dorchester Street to Fort, and up that street to St. Catharine. Here Ald. Clendenning led the party astray, going westward instead of east, but the mistake was rectified and the party drove up St. Mark to the Montreal College. The drive was along Sherbrooke Street and up Park Avenue to the mountain road. Half way up Mr. McGibbon, the Park Ranger, met the party and guided them the remainder of the way. It began to snow in a faint weak-hearted way. Nobody minded it. People who had wraps made themselves as comfortable as they could and people who had not wished that they had, and shivered. Then a mounted policeman was met. He was a very nice looking policeman and, moreover, he looked warm. This was the most cheering sight that had yet been seen. When the Look-out was reached everybody got out. The visitors were cold and didn't try to disguise it. The aldermen were also cold, but they endeavoured to hide the fact and maintained that it was not a very cold day. After admiring the view and buying a few souvenirs, the carriages were again entered and the descent begun. Several more warm looking mounted policemen were passed, in fact so many that the suspicions of some of the visitors were aroused, and they discovered that it was the same man, who had made short cuts and headed off the party in time to recover his statuesque position before the party again appeared. The further down the mountain the party got the warmer they felt, and when at last the Windsor was reached nearly everybody had made a start towards getting thawed out. It was too cold to enjoy the drive, but the visitors were able to appreciate the fact that at any time when the thermometer was not playing hide and go seek with zero that Montreal's mountain park must be a lovely spot. Nearly all the ladies of the party attended the drive around the mountain.

Banquet in Montreal.

Perhaps never in its long career has the St. Lawrence Hall had assembled within its walls such a representation of capital as was gathered upon the occasion of the banquet to the Iron and Steel Institute given by the City council, and certainly no banquet has ever been more successful and enjoyable. The speeches were most appropriate. The dining hall had been beautifully decorated with plants and flowers under the direction of Park Ranger McGibbon, and to add to the pleasure of the gathering Lavigne's orchestra played a nice selection of musical items at intervals during the proceedings. The guests were conducted to the dining hall by Piper Major Mathieson, who played a suitable selection on the instrument of Scotia.

Acting-Mayor Hurteau presided in the unavoidable absence of Mayor Grenier, and on his right and left were seated Mr. E. J. Snelus, Sir Donald A. Smith, Mr. H. A. Budden, Mr. E. P. Hannaford, Sir William Dawson, W. H. Bulmer, Col. Holland, C. B., Mr. D. Parizeau, Mr. R. Esdaile and Mr. T. G. Shaughnessy. The vice chairs were occupied by Ald. Clendenning, Prefontaine, Stevenson, Farrell and Villeneuve. In addition to the

aldermen and the members of the Institute, the invited guests also included Sir Casimir Gzowski, K. C. M. G., Prof. Bovey, Hon. Ed. Murphy, Hon. J. R. Thibeau-deau, Hon. Alexander Lacoste, Hon. W. W. Ogilvie, Hon. G. A. Drummond, Dr. G. M. Dawson, Dr. B. J. Harrington, Messrs. J. J. Curran, M.P., A. T. Lapine, M.P., H. McLennan, Richard White, S. W. Wanklyn, D. Preston, K. W. Blackwell, P. W. St. George, E. W. Dodwell, C. A. Massey, Herbert Wallis, J. P. Cleghorn, P. A. Peterson, J. T. Beland, James McShane, J. S. Hall, jr., M.P.P., D. McIntyre, D. Lockerby, Andrew Allen, W. C. Munderloh and Mr. Graham Fraser, manager of the Nova Scotia Steel and Forge Company.

The repast was of a most *recherche* character, and at its close the Acting-Mayor announced letters regretting inability to be present from Hon. G. A. Drummond, Hon. Edward Murphy, Messrs. Andrew Allan, W. C. Van Horne, W. Wainwright and H. Wallis.

The toasts of "The Queen" and "The Governor General" having been proposed from the chair, Ald. Stevenson submitted "The Army, Navy and Auxiliary Forces," which was responded to by Col. Holland.

The toast of "Our Guests" was entrusted to Sir William Dawson, who, in submitting the same, referred to the great and valuable deposits of iron ore in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba and British Columbia, some of which, he remarked, was of the richest crystalline quality, and capable of producing the best kinds of iron and steel in the world. And we not only had the iron ore, but we had the coal to smelt it with. In the great western plains we had a vast quantity of mineral fuel of a somewhat different kind to that usually found in the mother country. We had great deposits of lignite and we had also bituminous coal. To despise those lignite deposits would be wrong as they would come to be of great economic importance by and by, for there were means by which they could be converted into the best kinds of fuel. If nickel steel should be the sort of steel required for the future, we could also show something in that line, as there were large deposits of the metal at Sudbury and in Newfoundland. In Nova Scotia and British Columbia there were also large deposits of gold which were not yet developed to their full extent. As for silver, there was no question about its being plentiful in the western regions. We had, therefore, in Canada much which might attract the attention of the members of the Institute if they were disposed to look at it from an economic point of view. In conclusion, he expressed an opinion that such a gathering was one in which they should all rejoice, as it tended to make the different portions of the Empire better acquainted with each other, a thing which was needed at the present time.

In responding, Mr. Snelus returned thanks for the hearty welcome which had been extended the Institute, and said they had been delighted to travel through Canada and to notice the evidences of prosperity which were everywhere visible. They had seen trade progressing on every hand, cities being built up substantially, and nowhere had they seen any beggars. Having referred to the great facilities which Canada possessed in its lakes and rivers, he alluded to its fine railways, 12,000 miles in extent, and passed an encomium upon the way in which they had been built. An idea of the vast extent of the country could hardly be gathered by so short a trip as the Institute had made, but when they remembered that they could easily deposit the British isles in one of our lakes without splashing the water over the sides, they could realize the extent of territory we had. He hoped that the members of the Institute would carry home with them such a good account of this country that they would induce a good many more English capitalists to bring money here. In conclusion, he spoke of the beauties of Montreal and its surroundings, and hoped that they would be able to visit it on some future occasion in more sunny weather.

"The Commercial and Mining Interests of the Dominion" was proposed by Mr. J. Stephen Jeans, who said that the members of the Institute had come into this country strangers as to the great resources and capabilities of Canada. They had been informing themselves as best they could with respect to these since they entered our hospitable domains, but it was not easy to speedily know much of a country which was thirty times the size of the British isles, and which had varied resources in every direction. In England they were given to understand that Canada was a land bounded by perpetual ice, a land barren and sterile in the highest degree; a land where it required the circulation of the *Daily Telegraph* to be able to stand the enormously cold temperature. But they came here and found it was a country which did not differ very much, except in the great extent of area, from England. Having spoken of the harmonious manner in which the two great races of the Dominion dwell together, he referred to the import and export trade between Great Britain and the United States and Canada. The British isles imported annually from the United States something like £77,000,000 of produce, and they exported only about half that quantity. From Canada they imported about £6,000,000 of produce and

exported to it about £8,000,000. This was a condition of things most of them would like to see reversed. He would not say how it was to be done, but he believed Canadians were working out their own destiny with enterprise and vigour, and he thought they would find a way whereby the condition of things to which he had alluded would be reversed.

Mr. H. McLennan responded to the toast and said he welcomed the Institute among us to come and see what progress we had made and to judge of what our future might be. Every Canadian to-day felt that an emigrant leaving the mother country and coming here would not suffer disappointment if he had the qualities that had made the men of this country and enabled them to accomplish what they had. We welcomed all to participate in the development of this country. Referring to the products of the Dominion, he expressed a hope that some practical solution would be found by which the mother country would show a preference for what was grown on the soil of the Empire. He would not undertake to say how the thing was to be accomplished, but he thought of adopting some system which would show a preference for the trade which went from British possessions. He had no doubt a solution of the problem would be found, but it behoved every man who had an interest in the prosperity of the Empire to recommend the importance of commercial intercourse as a great bond for cementing and perpetuating that sentiment of loyalty and fraternity which existed at the present day.

Dr. Selwyn, speaking of the mining resources of the country, said he had spent twenty years in studying them, and he felt to-day that he knew very little about them. What the Institute had seen in the Geological museum at Ottawa gave them but a very little idea of what he hoped these resources would be in the future. He regretted that time would not permit of the visitors seeing some other of the mines than those at Sudbury, for instance, the asbestos and phosphate mines, the former of which were very interesting. He hoped, however, that what the members of the Institute had seen would induce them to come here again.

The toast was also acknowledged by Mr. B. T. A. Bell, who said that the extent and importance of the mineral resources of the Dominion were beyond peradventure. They had only to refer to the Reports of the Geological Survey of Canada, and particularly to that excellent volume published in 1863, by Sir William Logan, to ascertain what a magnificent field really existed in the Dominion for the investment of capital judiciously applied. They need go no further than the Province of Quebec, where were found the richest phosphate and asbestos that now supplied the markets of the world—minerals in quantity and quality which were acknowledged universally to have no superior anywhere in the world. The Governments, Provincial and Federal, had spent much money on agriculture, in colonization, on railways, but they had shown most culpable apathy and neglect of the most important of them all—her mineral lands and mines.

Mr. Joseph Richardson submitted in felicitous terms "The Mayor, Aldermen and Citizens of Montreal," which was responded to by the acting Mayor, who spoke of the great improvements which have been effected in recent years.

Sir Donald Smith also acknowledged the toast referring to the fact that it was very little Englishmen knew of the resources of Canada until a few years back, and said we had not only a country of which we might be proud, but a country of which England and the whole Empire might be proud. He assured the visitors that what they had seen of Canada was only the threshold of the country, as, unfortunately, they had not been to the great North-West, which was a very great country indeed, and one to which hundreds of thousands of our fellow subjects on the other side of the water might come and do great good for themselves.

The remaining toasts were "The Ladies," and "The Press," proposed by Ald. Rolland and Mr. J. J. Curran, M.P., respectively, and responded to by Mr. W. D. Phillips and Mr. Richard White.

On the St. Lawrence.

The first feature on the programme for Tuesday was an inspection of the city's celebrated fire brigade on the Champ de Mars. Notwithstanding the bitterly cold morning and the very early hour at which the parade was held, the members turned out in full force, and were greatly pleased with the very fine exhibition given. This over, the party hastened to the Grand Trunk depot where, through the courtesy of Sir Joseph Hickson, a special train had been provided to convey the visitors to Lachine where it was intended to shoot the rapids and return to Montreal by boat.

Everybody was in good humor and enjoyed the short run to Caughnawaga, where all hands went ashore and took possession of the town. It is not to be wondered at that the aborigines viewed with distrust the first coming of the white man to America, if he acted with the lordly air of owning the earth which the visitors assumed in Caughnawaga. They invaded every part of the prim-

ative old town, and awoke the echoes of past centuries by their evanescent modern chatter. The natives received the party with modest courtesy and self-possession, but with no great manifestations of joy. The invaders advanced in procession up the main street of the struggling village, some entering the church and listening to the last sad rights of the church over one that had passed away, while others passed on to witness an entirely different scene.

AN INDIAN WEDDING.

A young brave named Joe Boover had that morning obeyed the scriptural injunction, and with the blessing of the church had taken unto himself a wife from one of the dusky daughters of the tribe. The happy couple happened to pass up the street and were espied and congratulated by the visitors. Joe accepted these congratulations with becoming dignity, while "Mrs. Joe" looked conscious but happy. His slim, lissome figure showed to advantage in the conventional frock coat and dark, wide trousers, the only point in which his dress differed from an ordinary city man being in the white felt hat he wore. His wife looked quite neat and charming in a brown satin dress, with her dusky hair done up in a neat coil at the back of her head and secured by a glass diamond pin. This, and a gold chain around her neck, were the only ornaments she wore. The marriage feast was being celebrated in a house near by, and whether invited or not all hands flocked in until the room was so packed there was no room for the dancers. Like a true gallant Ald. Roll and saluted the bride, and appeared to enjoy this always pleasant duty, and his example was followed by a large number of the gentlemen of the party. After a liberal collection had been taken up by one of the gentlemen, the party returned to the steamer and a move was made down stream.

The run through the rapids was greatly enjoyed, the visitors crowding on deck while the boat tossed and heaved in its passage through the foaming and turbulent waters. It was close upon two o'clock before the party landed at the wharf, each and everyone expressing their deep appreciation of the thoughtfulness of the Board of Harbor Commissioners in providing such a delightful outing on the old St. Lawrence.

Valuable Souvenirs.

A few minutes before six o'clock the members assembled in full force in the ladies' parlor to participate in a ceremony which will linger long and pleasantly in the recollections of the Canadian Reception Committee. In a few words Mr. Snelus gracefully referred to the part these gentlemen had taken in connection with their excursion, and then proceeded to hand each a handsome souvenir of their visit. Dr. Selwyn received a handsome tea service; Messrs. Small and Macfarlane silver plate; Mr. Bell a costly dessert service. Mrs. Snelus also presented Miss Selwyn and Miss Gisborne, the ladies who had accompanied the party, with beautiful gold bracelets. The recipients, who were not a little astonished at these unlooked for tokens of esteem and good will, each fittingly expressed their acknowledgements, and the gathering dispersed.

The party left Montreal the same evening, per special train, for Boston, where it was intended to spend a day visiting the Thomson-Houston Electric Manufacturing Works.

Good-Bye to the Iron and Steel Institute.

BY DR. R. W. RAYMOND, NEW YORK.

What! You're already going away?
Where is that ancient virtue, then,
We used to hear so much of, pray—
The "staying power" of Englishmen?

Your sires and ours were different stuff—
They didn't cleave the ocean foam
For one short month, then cry "Enough!"
And set their yearning sails for home.

Well, Science has made ocean trips
So trivial that you came with ease;
And now, alas! too many ships
Invite you to recross the seas.

Yet we take comfort, since we know,
Whatever else remain unknown,
We cannot lose you now; for though
You sail away, you'll not be gone.

When folks in such a hurry pack,
They make mistakes; and you will find
It is our hearts you carry back
And yours that have been left behind.

Yet both shall gain and neither lose,
Meum and Tuum, once apart,
In Friendship's furnace simply fuse
To make one "homogeneous" heart!

Such be our union—ductile, strong,
Well tempered, proof to shot or shell,
Elastic, beautiful, as long
As steel endures! Dear friends, farewell!

Proposed Taxation of Quebec Mines.

The Speech from the Throne on the occasion of the recent opening of the Legislature at Quebec, clearly foreshadowed the intention of the Quebec Government to enrich its depleted treasury by some taxation to be levied on provincial mines. The clause fell like a thunder clap upon the mining community in every section of the Province, for it was felt that any incubus at the present time would certainly retard, if not strangle the promising development and progress made in recent years. Speculation was soon ripe as to what form the proposed taxation would take, but enquiries made at Quebec failed to elicit any satisfactory explanation. A prominent Conservative paper ventured to predict a royalty tax on the output of phosphate to the extent of four dollars per ton—a most ridiculous proposition; while a gentleman understood to be well conversant with the movement at headquarters, intimated that no such royalty on any output was ever intended, the probability pointing either to an increase in the price of unsold mining lands, or a system of disposing of these lands on the lease and royalty system adopted and in vogue in Nova Scotia and elsewhere. The question, however, was of too grave a moment to be allowed to pass without a public expression of opinion upon it, and steps were at once taken to call meetings at Sherbrooke and Montreal. The first of these was the

Public Meeting at Sherbrooke,

which took place in the Art Rooms, on Wednesday afternoon, the 12th instant, at two o'clock.

There was a large gathering of mining men and mine managers. The following companies and mining firms were represented:—

Moulton Hill and Howard Mines, F. J. Falding, M. E., manager; G. H. Nichols & Co., Capelton, Messrs. Penhale and Spafford, managers; Eustis Mining Co., Capelton, John Blue, manager; Johnson Asbestos Co., Thetford, R. G. Johnson, M.P.P., manager; King Brothers & Co., Quebec, Mr. James King, manager; United Asbestos Co., Black Lake, Mr. J. J. Penhale, manager; American Asbestos Co., Black Lake, Mr. Wertheim, manager; Lucke & Mitchell, representing the Beaver Asbestos Co.; Memphremagog Mining Co., Brome, Capt. Warne, manager; Central Asbestos Co., Black Lake, W. A. Hale, manager.

In addition to these there were also present Messrs. Wm. Farwell, General Manager, Eastern Townships Bank; J. A. Chicoyne, Mayor of Sherbrooke; J. S. Broderick, J. R. Woodward, F. P. Buck, Major Wood, Robert N. Hall, M.P., W. A. Moorehouse, G. G. Bryant, Sherbrooke; Hon. Henry Aylmer, Richmond; Wm. White, Q.C., H. R. Brown, Q.C., Lieut.-Col. Felton, S. W. Jenckes, general managers Jenckes Machine Co., Col. King, R. D. Morkill, G. H. Bradford, James Addie, H. W. Mulvena, F. C. Thompson, J. H. Walsh, H. D. Lawrence, and many others.

Mr. Robert N. Hall, M.P., was elected chairman of the meeting, and F. C. Thompson honorary secretary.

The CHAIRMAN, in explaining the object of the meeting, said it was held in response to the circulars sent by the mining men of the Province, requesting them to meet at Sherbrooke and discuss the rumoured legislation about to take place at Quebec, as foreshadowed in the Speech from the Throne, as regards the intention of the Government to place a special tax on the product of the mines.

It was thought that such a tax would be injurious to the best interests of the Province, as the mining industries are yet in their infancy. We had a vast amount of mineral wealth in the Province, and this important industry, at all events in its present stage, required fostering rather than any burden placed upon it. The present meeting was, therefore, called for the purpose of taking the necessary steps to represent the matter fairly and impartially to the Government, so that they would have a true appreciation of the importance of the mining industries in the Province.

MR. H. B. BROWN, Q.C., explained at some length the injury the imposition of such a tax would cause upon any efforts to introduce foreign capital into the Province, which, after all, was mainly what we had to rely upon. He gave his own experience with a large American mining company whom he represented. They closely enquired into the question of taxation before investing the large amount of money they have since expended in the eastern townships, and the effect of this tax, if carried out, would most seriously embarrass their operations.

Mr. Wm. White, Q.C., referred to the permanent injury the imposition of this tax would cause to the labouring population employed in mines; in the eastern townships alone, he stated that there were something between three and four thousand men in employment in the various mines in the district, and the proposed legislation would undoubtedly have a most serious effect upon their general welfare—probably resulting in many of them being completely thrown out of employment, owing to the mass of the mines being obliged to close down, and the wages of those who might be retained being consider-

ably reduced. He could not but consider the policy as most detrimental to the mining interests of the Province, and felt confident that if the matter were properly represented to the Quebec Government that they would, no doubt, give it that serious attention which its importance demanded.

Speeches were also made by Capt. Warne, Mr. Penhale, Mr. Wm. Farwell, Mr. Johnson, M.P.P., Mr. James King (Quebec), Mr. Chicoyne, Mr. Wertheim, and others, all strongly condemning the proposed legislation.

The following resolutions were proposed and unanimously adopted:—

First. Resolved: That in the opinion of this meeting the proposed taxation of mining properties, as foreshadowed in the speech of the Lieutenant Governor at the opening of the present session of the Legislature of the Province of Quebec, is a serious menace to the mining industries of this Province, and cannot fail to have a disastrous effect on the development of our mining industries, either by foreign or home capital.

Second. Resolved: That the taxation of our mining industries, now in their infancy, is a suicidal policy, and totally at variance with the true interests of the Province. That most mining industries in this Province are not yet firmly established, and any excessive taxation will cause their discontinuance, thereby throwing some three to four thousand men and their families out of employment, and at the same time will tend to make those still carrying on operations reduce wages.

Third. Resolved: That it is extremely desirable that the exemption from municipal taxation, as contained in Article 1544 of the Revised Statutes of Quebec, should be continued in force for a further period of ten years, and that petitions urging the re-enactment of these exemptions be submitted to the Local Legislature.

Fourth. Resolved: That in order to bring the subject prominently before the public, it is desirable that a representative meeting of all mining men, and of all others interested in the development of the mining industries of the Province, should be held in Montreal at an early date, to take such steps as may be thought necessary to endeavour to influence the Provincial Government to favour the continuance of mining exemptions and to refrain from the imposition of any additional burden in the form of taxation, as intimated in the address of the Lieutenant Governor.

Fifth. Resolved: That an executive committee be formed, with power to call a general meeting of persons engaged or interested in mining in this Province, at an early date, to be held in Montreal, to make all necessary arrangements for such meeting, and to circulate petitions against the proposed legislation, and in favour of the exemption from municipal taxation as contained in Article 1544 of the Revised Statutes of Quebec.

The HON. HENRY AYLMEYER (Richmond) then spoke, condemning any legislation which would in any way tend to embarrass the mining interests of the Province. He expressed great surprise at a measure of this kind being contemplated by a Liberal Government, as, of course, that party was always identified with progress, and he questioned it, when the matter was properly represented to the Government, that they would entertain the idea of imposing an unjust or excessive tax, which would imperil the mining interests of the Province. At the same time he would exert himself, and would use what influence he possessed, against any legislation which he considered in any way detrimental to the interests of mining.

Letters of regret were read from the Hon. J. G. Robertson, M.P.P., Mr. B. T. A. Bell, Editor CANADIAN MINING REVIEW, Ottawa; A. W. Stevenson, Lomer, Rohr & Co., Dickson Anderson, Montreal; the Richmond Quarry and Asbestos Co., Theodore Hamel, Quebec; Prof. J. T. Donald, McGill University, Montreal; R. H. Tylee, Mayor of Ascot, and G. E. Rioux, M. D.

A large committee was at once formed, to complete the necessary arrangements for holding a general meeting of mining men from all sections of this Province at Montreal at early date. The committee is as follows:—

Richard Penhale, G. H. Nichols & Co., Capelton; F. J. Falding; H. B. Brown, Q.C., Moulton Hill and Howard Mines; Capt. Warne, Memphremagog Mining Co.; Hon. H. Aylmer; Jas. King, King Brothers, Quebec; Wm. White, Q.C., John Blue, Eustis Mining Co.; A. S. Johnson, Johnson's Asbestos Co.; A. S. Hurd, for Bell's Asbestos Co.; W. A. Hale, Mayor of Orford; J. S. Mitchell, Beaver Asbestos Co.; F. C. Thompson; L. Wertheim, for American Asbestos Co.

At a subsequent meeting it was decided that the general meeting of all mining men of the Province be called at the St. Lawrence Hall, Montreal, on Friday, the 21st inst., at 2 p. m.

There appears to be the utmost unanimity of feeling with regard to the proposed tax. The matter is looked upon entirely in a business light, the question of politics being absolutely excluded, and the representatives of both parties taking a prominent part in the movement.

Meeting of Ottawa County Mine Owners and Operators at Montreal.

Meanwhile the phosphate miners, and others interested in mining operations in the western portion of the Province, were not idle. In the Lievres district, at Ottawa, and elsewhere, the proposed taxation excited much speculation and a good deal of severe criticism. A hurried and informal meeting was held at Buckingham, from which a circular letter was issued calling a general meeting in Montreal.

This meeting was called for half-past eleven o'clock in the forenoon, and notwithstanding that it was the closing of the shipping season, and consequently a very busy time at the mines, the attendance was fairly good.

There were present: S. P. Franchot, Managing Director Ottawa Mining Company, Buckingham; F. Hilton Green, of Messrs. Wilson & Green, Montreal, representing the Phosphate of Lime Company; Capt. Robt. C. Adams, Managing Director Anglo-Canadian Phosphate Company, Montreal; Ed. Wertheim, Managing Director American Asbestos Company, Black Lake, Que.; F. J. Falding, M. E. Moulton Hill and Howard Copper Mines, Capelton, Que.; E. V. Wright, Lake Temiscaminge Silver-Galena Mines, Ottawa; Angus Cameron and Wm. Macintosh, mine owners, Buckingham, Que.; G. Capel, A. M. Perkins, A. W. Stevenson, Montreal; James Cooper, President of the Ingersoll Rock Drill Company of Canada, Montreal; Mr. B. T. A. Bell, Editor CANADIAN MINING REVIEW, Ottawa, and about half a dozen other.

Capt. R. C. Adams was called to the chair, and Mr. Bell asked to act as secretary.

After a general discussion, it was unanimously agreed to support any resolutions to be passed at the meeting in the afternoon, which would urge upon the Government the desirability of continuing the exemptions from municipal taxation as contained in Article 1544 of the Revised Statutes of the Province. The meeting expressed a very decided opinion that any royalty tax upon phosphate, however small, would seriously cripple active mining work, and would be entirely prohibitory to the investment of foreign capital in the lands and mines of the Province. A suggestion was made by Mr. Bell, that the time was now ripe to form a General Mining Association for the Province of Quebec. He pointed out that if such an association, representing the whole mining and quarrying interest of the Province, was formed, and operated judiciously and energetically, much good would unquestionably ensue to these industries. Such an association would always be prepared to cope with any emergencies that might arise in the future. The proposal was most favorably received. The meeting then proceeded to draft a Constitution for such an association. It was resolved to bring the matter before the meeting in the afternoon. The company then adjourned to unite with the other mine-owners and operators in the

Large Gathering in the St. Lawrence Hall.

Prompt at two o'clock the large company which had assembled in the rotunda of the Hall moved downstairs to the commodious meeting place provided by Mr. Hogan. Among those present were noticed: J. N. Greenshields, Q.C., Excelsior Copper Co., Montreal; W. H. Nichols, Capelton Chemical and Fertilizer Works, Capelton; W. E. C. Eustis, President, Eustis Mining Company, Capelton; Hon. George Drummond, President, New Rockland Slate Co., Montreal; A. Desjardins, M.P., Brompton Lake Asbestos Co., Montreal; S. P. Franchot, Managing Director, Ottawa Mining Co., Buckingham, Que.; R. N. Hall, M.P., Sherbrooke, representing Dominion Phosphate Co.; E. Wertheim, Managing Director, American Asbestos Company, Black Lake; W. Irwin, Anglo-Canadian Asbestos Company, Black Lake; O. M. Harris, Canadian Phosphate Co., Montreal; James King, Messrs. King Bros., Quebec; Thos. Trimble, Templeton and Blanche River Phosphate Co., Montreal; James Cooper, Ingersoll Rock Drill Co. of Canada, Montreal; E. V. Wright, Ottawa; A. Cameron, W. Macintosh, Buckingham; Hon. Wilfrid Laurier, Laurier Mining Co., Black Lake, Que.; F. J. Falding, M.E., and H. Brown, Q.C., Sherbrooke; A. W. Stevenson, G. Capel, F. D. Taylor, M.E., Montreal; Lucius Boyd, M.E., Sherbrooke; Mr. Penhale, Scottish Canadian Asbestos Co., Black Lake; W. A. Hale, Sherbrooke; John Blue, Supt. Eustis Mines, Capelton; Jas. S. Mitchell, Sherbrooke; Dr. James Reed, Reedsdale, Que.; A. Lomer, Messrs. Lomer, Rohr & Co., Montreal; and about fifty others.

On the motion of Mr. R. N. Hall, M.P., Mr. J. N. Greenshields, Q.C., was called to the chair, Mr. A. W. Stevenson, acting as secretary to the meeting.

MR. GREENSHIELDS briefly explained the objects of the meeting, which, he pointed out, was called to discuss a suggested taxation on the mining industry, contained in the Speech from the Throne at the recent opening of the Quebec Legislature. This was not the first time that such a tax had been mooted. In 1868 the Minister of Agriculture had proposed a similar tax. But it having been pointed out to the Premier at that time that the proposition was a most un-

reasonable one, and would, if carried into effect, militate seriously against the mining interests of the country, it was allowed to drop. He trusted that as a result of their deliberations representations of such gravity and weight would be made to the government as would induce them to forego the intention with which they had been credited—namely, to impose a tax upon the mines.

HON. GEO. DRUMMOND, President, New Rockland Slate Co., claimed that the question had no connection with politics, and politics should not in any way be called into their deliberations. The Government, like all other governments, wanted money, and they had picked upon the miners to supply their demand. It would be agreed upon all hands that the placing of a tax upon mineral products would act prejudicially upon the interests of the Province. Everyone knew that the Provincial Government was hard up for money; but to endeavor to obtain funds by taxing the mines would be simply to kill the goose in order to get the golden eggs (Cheers and laughter.) He warned the Government against the consequences of incurring the displeasure of so large and influential a body of men as the mine-owners of the Province. The imposition of this tax would not only affect one or two classes of people, but would recoil upon several classes, particularly the workingmen; and he urged that this point should be pressed upon the attention of the Government.

MR. R. N. HALL, M.P., for Sherbrooke, referred to the meeting of mine owners recently held in his town, at which he himself had been chairman. The unanimous feeling of that meeting was that it would be a great misfortune to place any burden upon the mining industries of the Province. (Applause.) It would prevent the introduction of foreign capital, and it would also injure the laboring classes, as Senator Drummond had pointed out. There could be no doubt that the future prosperity of the Province depends largely, if not wholly, upon the development of the mineral resources with which nature has so bountifully endowed the Province. We are so situated that we require foreign capital to aid us. He was afraid that damage had already been done by the very suggestion of this tax. He concurred in the view that the representations to be made to the Government should be free from political bias.

HON. WILFRED LAURIER having been called upon by the Chairman, said he had just dropped into listen, and had no intention of making a speech. He was personally interested in mining operations in the Province, and although he would not go so far as to say that after mines had reached a certain stage of development they should not be made to yield some public revenue, still he felt that to impose any new burden upon what was yet a new industry would not only be detrimental but fatal. (Cheers.) He deprecated the introduction of politics into the matter. He need not tell them that he was a supporter of Mr. Mercier (laughter and applause), but he was nevertheless ready to join those present in demanding that an industry in which he was to some extent interested should be safeguarded. He fully believed that when the bearings of the subject were placed fairly and justly before the Government they would shrink from the adoption of legislation injurious to the interests of the Province.

MR. B. T. A. BELL, Ottawa, agreed with the Hon. Mr. Laurier that it would be well to make haste slowly. The Government had not intimated any outline of its policy other than the vague and uncertain suggestions conveyed in the Speech from the Throne, and until it was known what form Mr. Mercier's proposition was to take, he thought great care and prudence should be exercised in any criticism. He thought the time had come for the organization of a representative mining association, which could be organized on a basis to cope with this or any other emergencies that might arise in the future. He hoped to submit a resolution to this end at a later stage, when the discussion on the proposed taxation had been ventilated.

MR. W. H. NICHOLS, of New York, operating the Albert Mines, and the Capelton Chemical and Fertilizer Works, said that as a stranger in a strange land it would be presumption for him to suggest to the Provincial or Dominion Government how they should raise their revenue. He could not, however, conceive it possible for a civilized Government in the northern portion of this continent to impose a tax upon the products of mines. He could understand such a proposition emanating from the Government of Bolivia or Ecuador. The firm with which he had the honor to be connected was engaged in copper mining in the Eastern Townships, and in the phosphate business in the Ottawa Valley. They were trying to bring both industries together, so as to be able to provide the farmers with a cheap fertilizer (cheers). Mr. Eustis and himself were operating on each side of Capelton Mountain, and he considered they conferred some benefit upon the people there. He hoped also that an effort would be made to secure a continuance of the exemption of mines from Municipal Taxation. Mine

owners wanted no bonus, but he thought they should receive some encouragement in other respects. Who opened up a new country? The farmers? The lumbermen? No; it was the miners (hear, hear and cheers). He had recently started to open up the old Huntingdon mine, but if he had heard about this tax he would have hesitated before doing so.

MR. W. E. C. EUSTIS, President Eustis Mining Company, Capelton, said that the mines at Capelton produced a copper ore of low grade, entailing every economy, and any increased taxation, either Municipal or Government, would unquestionably be prohibitory to further operations by his company.

MR. S. P. FRANCHOT, Buckingham, declared that the imposition of a tax upon the mines would simply mean ruin. The phosphate industry on the Lievres River alone employed thousands of laborers, and the result of the tax would be that these men would have to seek employment elsewhere. The development of the industrial resources of the Province was still in its infancy, and it would remain in that condition if legislation were passed which would have the effect of keeping foreign investors out of the country.

CAPT. ADAMS, Managing Director of the Anglo-Canadian Phosphate Co., Montreal, asserted that mine-owners had no disposition to evade contributing a just share to the revenue of the country. He was in favor of the principle of leasing mines on royalty, which obtained in Nova Scotia and other parts of Canada. Mine owners deserved great consideration from the Government, for theirs was the only industry which had stood manly and independent, and had never asked for any Government support. People engaged in other industries were rolling in wealth through cunningly devised legislation obtained in their favor from the Government. All they wanted was a fair field and no favor.

MR. R. W. HENNEKER, Sherbrooke, advised that great care be taken in approaching Mr. Mercier's Government. The Premier was a far-seeing, clear-headed man, who would listen patiently to any representations made to him in the interests of the country. If it were shown to Mr. Mercier that his ideas on expatriation would be seconded by the mine owners, who give employment to French-Canadians and thus keep them at home, he would pause before he imposed this tax. Mining was the forerunner in the opening up of a new country. This was apparent in that long stretch of country lying between Quebec and Sherbrooke, once a "howling wilderness," but now, under the pioneering influence of the miner, becoming a settled country.

MR. ED. WERTHEIM, American Asbestos Company, contended that if all the mines were worked at a profit, there might be no objection to the imposition of a reasonable tax, but the industry was young yet and many of the mines were only beginning to get their heads above water. Any taxation just now would be prejudicial to the best interests of the industry of the Province.

CAPT. R. C. ADAMS proposed the following resolution:—

Resolved, That it is extremely desirable that the exemption from municipal taxation, as contained in article 1544 of the Revised Statutes of Quebec, should be continued in force for a further period of ten years, and that petitions urging the re-enactment of these exemptions be submitted to the Local Legislature. Carried unanimously.

The following committee was appointed to watch any legislation affecting the welfare of the industry, and if necessary to wait upon the Hon. H. Mercier:— J. N. Greenshields, Q.C., Montreal; R. N. Hall, M.P., Sherbrooke, Que.; Hon. Geo. Irvine, Quebec, Que.; Capt. R. C. Adams, Montreal, Que.; Robert Blackburn, Ottawa, Ont.; S. P. Franchot, Buckingham, Que.; Wm. King, Quebec, Que.; W. E. C. Eustis, Capelton, Que.; W. H. Nichols, Capelton, Que.; Hon. George Drummond, Montreal, Que.; B. T. A. Bell, Ottawa, Ont.

MR. BELL then submitted his resolution, urging the organization of a General Mining Association. He contended that if this were done questions such as those dealt with at this meeting could be handled much more efficiently than at present. Apart from all questions of legislation, such an Association would greatly benefit the members by an interchange of knowledge and ideas, and much good to the Province could be accomplished by the dissemination of authentic information respecting the extent and value of its resources.

MR. W. H. NICHOLS, while agreeing with Mr. Bell that an Association would be a good thing, thought the matter deserved more consideration than could be given in the limited time at this meeting. He thought the matter should be held over until another meeting.

After some further discussion it was decided to leave the matter in the hands of the Committee, and the meeting adjourned after a vote of thanks to the Chairman and Secretary.

Proposition to Erect Nickel-Refining and Steel Works in Ontario,

The following is the full text of a letter from Mr. S. J. Ritchie, of Akron, Ohio, President of the Central Ontario Railway, and one of the leading promoters of the Canadian Copper Company, Sudbury, to Sir John Macdonald, praying for a Government bonus for the completion of the Central Ontario Railway, from Coe Hill to the Sudbury mines:—

OTTAWA, November 10, 1890.

To the Right Honorable Sir John A. Macdonald, G.C.B.,
Minister of Railways, Ottawa:

On numerous occasions during the last six years I have asked the Government to aid the Central Ontario railway in extending its line from Coe Hill to Sudbury. During the greater portion of the period there were many questions in connection with the metal interests of the country to be traversed and to be reached by the completion of this line which were only partially solved, and the success of the line when built thus rendered somewhat problematical; and to this cause I have attributed the failure of the Government thus far to comply with my request. Happily now, all these obstacles have been overcome and mastered, and the development and manufacture of these minerals in Canada has become a question second in importance to no other commercial question in the Dominion.

By cheap and simple processes even very low grades of magnetic iron ores can be converted into the highest and purest grade of ores which are offered in any of the markets of the country, and they are thus well adapted to the manufacture of the very best quality of steel. In addition to this you doubtless are well aware of the great revolution in metallurgy recently made known to the public by the alloying of nickel with steel, the product being known as nickel steel.

Nothing in the manipulation of metals since the discovery of Sir Henry Bessemer has created such widespread interest among the steel manufacturers of the world as the results obtained from the nickel steel. Wherever it will be possible to obtain this material the war vessels of the world, together with their armament, will doubtless be made from it. This statement I have from the highest officials having these matters in charge.

Its extensive use for commercial purposes where a metal of superior excellence is required is equally well assured. Canada possesses probably five-sixths of the world's supply of nickel. Such being the case she can control the markets of the world and the uses to which this metal shall be applied. She also has inexhaustible supplies of iron ore, which, until the invention above referred to, were neither available for manufacture at home nor saleable abroad.

The comparative close proximity of these iron ores to these nickel deposits, both of which are inexhaustible and almost incomputable supply, would seem to render any argument unnecessary as to the proper use to which they should be put. That they should be manufactured in Canada, and the manufactured material shipped to the markets of the world, instead of only the crude materials being produced in the country and shipped to foreign markets, would seem to be a question susceptible of only one answer.

After having mastered a solution of all these metallurgical questions and processes, after their importance has been acknowledged and passed upon by the highest authorities in the world, including, among hundreds of others, the owners and managers of the great steel works of Schneider & Company, of Le Creusot, France; the great works of the Steel Company of Scotland; of the world-wide known works of William Jessop & Sons, of Sheffield; of the results obtained by experiments and tests made in the interests of the French, German, Austrian, British and American Governments, I again come to you and ask your aid, not only for the completing of this line of railway, but also for the building up of a great steel plant which shall produce an article which can be shipped to and find a purchaser in every market in Europe. It may be said that the natural advantages here should be sufficient inducement for other investors or manufacturers without any Government aid, but you must remember that Canada is without any industry of that kind, and that her facilities and resources are not well understood by people of other countries where these industries are developed on a great scale, and no matter what her advantages are or may be it would be impossible to induce capital sufficiently large to engage in an enterprise of this kind without some Government backing. If the same opportunities, even in a small degree, existed in the United States, Great Britain, Germany or France, capital in any amount required could at once be had to utilize and develop them. But the conditions here at present are different, and if

Canada is to take her place among those countries which are producers of manufactured articles instead of a producer of raw materials, the Government must take the initiative and help those who are willing to engage in and push through this enterprise.

I therefore ask of your Government, on behalf of the Central Ontario Railway, a bonus of six thousand dollars per mile from Coe Hill to Sudbury, a distance of about two hundred and six miles; and that you grant a bonus of thirty-two hundred dollars per mile on the portion of the line already completed between Trenton and Coe Hill, a distance of about seventy-two miles; this last sum to be used in the building of blast furnaces upon the line of railway.

2. For the purpose of erecting and carrying on a large steel plant upon the line of railway for the manufacture of nickel steel from the iron ores along the line of road, and from the nickel ores of the Sudbury district, I also ask your Government to guarantee the interest at the rate of three per cent. per annum on a capital stock of five millions of dollars for a period of ten years, and in order that we may at once perfect our negotiations for carrying out this enterprise I would most respectfully ask that your Government pass an Order-in-Council granting this aid, under such safeguards as shall insure to the Government their successful completion and carrying out.

If the Government shall be pleased to make these concessions to the interests I here represent, a great industry will at once be built up in Canada, and she will sell to the markets of the world a manufactured article instead of raw materials. She will find a market for her labor at home, with a growth of all the varied interests which spring up around such large manufactures. To illustrate the possibilities of a great steel plant I may say that the business of Carnegie & Co's firm at Pittsburg during the present year is much larger than the combined business, during the same time, of every mile of railway and steamship owned or operated by both the Grand Trunk and Canadian Pacific Railways both in Canada and the United States. Yet the sources from which this great firm derives its supplies of raw materials are in the aggregate but a small percentage of extent to those to be opened up, connected and made available by the extension of this line of railway. The several interests in this railway and in the iron, nickel and copper mines which it will bring together will all be pleased to heartily cooperate with your government in building up a great industry in your country, if by your aid you will make it possible for them to do so. This whole subject in all its bearings and connections is quite well understood by your Government, but in order to place the matter in at least approximately definite form before you, I submit the following figures as illustrative of the importance of the enterprise for which I ask your aid:—

1. Line of Central Ontario—110 miles already completed with equipments	\$2,500,000
2. Line to be built, say 210 miles with equipment	6,000,000
3. Capital for steel plant	5,000,000
4. Capital for working the copper and nickel mines with a capacity of ten furnaces, and about thirty miles of railway to connect all the various deposits with the central smelting plant, together with all the necessary machinery, houses and plant of every kind adapted to a capacity of ten furnaces, as well as to provide for the working of the iron mines, at least.	5,000,000
	<hr/>
	\$18,500,000

To recapitulate, then, I ask of your Government first a direct bonus to the railway of say (about 320 miles when completed) \$1,500,000

This would involve to the Government an annual interest charge of about \$ 50,000

The guarantee of five millions of stock for steel plant at three per cent. per annum for ten years—this would involve an annual interest charge upon the Government of 150,000

Or a total interest charge for ten years of \$200,000
And of \$50,000 per year thereafter.

From such knowledge as you have of the importance of like industries in other countries, I submit whether your Government has ever incurred an obligation of like magnitude which promises so much in return for the development of your country, and I most earnestly urge your speedy and favorable action that we may be enabled to close our negotiations and to proceed at once in building up and carrying out this whole enterprise.

Very truly yours,

S. J. RITCHIE,
President Central Ontario Railway.

The Canadian Phosphate Industry.

The Chemical Manure Manufacturers' Association held a meeting in London last month, Mr. Hermann Voss, the president, occupied the chair. There was a good attendance. Mr. W. H. Hutchinson read the following paper on "The Canadian Phosphate Industry":—

"A few weeks ago, when the president of the Chemical Manure Manufacturers' Association, knowing that I had been in Canada in the autumn of 1889, with the object of examining the phosphate industry, paid me the compliment of asking me to read a paper on the subject before your Association, I consented after a little hesitation to do so, in the hope that my paper, short and incomplete as it might be, would prove of interest to some and serve to evoke discussion, in which those who have greater experience and knowledge would give us the benefit of their views.

Not more than twenty years ago, the Canadian phosphate districts, which are now alive with the many signs of active mining operations, remained in a condition of almost perfect tranquility. Here and there were a few small scattered farms, but the district being, for the most part, little suited for agriculture on account of the sterility of the thin soil overlaying the rocks, its solitude was disturbed only from time to time by the ring of the lumberman's axe and the occasional visit of some enterprising member of the Geological Survey. The latter had previously led to the discovery of apatite, and after further investigation and study had shown that there was every ground to calculate on the ore being present in quantities; mining operations were begun on a tentative scale, with results affording such good prospects of success, that gradually the district became transformed into its present state of activity. Now, during the busy season, the rattle of trams and carts hauling phosphate, the puffing of the small steamers passing up and down the Du Lievre river, and the frequent reports of explosives create a sense of bustle which would vex the soul and call forth expressions of strong disapproval from any disciples of Mr. Ruskin, if, perchance, any of them find their way to the neighborhood.

The phosphate-bearing districts cover a wide extent of ground, lying chiefly in the provinces of Quebec and Ontario, the more important being in the former, situated north of the Ottawa river and comprised principally in a broad belt of from twenty to twenty-five miles wide, passing through the townships of Templeton, Buckingham, East and West Portland, Bowman, and still further north. A lumberman told me that he had seen outcrops of the ore 150 miles further up country, but the more outlying districts are very wild and have still to be properly explored.

Phosphate is also found in other districts, for instance, in Wakefield, Hull, and Denholm townships, Ottawa County, but at present, not in such important quantities.

In the Ontario district the phosphate lies in the townships of Loughboro', Hinchinbrook, Olden, and Bedford, County Frontenac, and in the township of North Burgess, County Lanark, where, I believe, it was first mined.

Geologists point out that the phosphate districts particularly in the Quebec province are included in the belts or zones of pyroxenic rocks, which occur in the Laurentian rock formation—the oldest known formation. Pyroxenic rocks may therefore be termed the mother rock of the apatite, which occurs in it in veins, sometimes enlarging into pockets of great magnitude, sometimes "pinching in" to almost invisible strings, and sometimes dislocated by rocks thrown across by later formations. On the map—which is enlarged from one made by Mr. J. Lanson-Wills, of Buckingham, the mining expert—the supposed extent of the pyroxenic belt is shown. In the Province of Ontario apatite is also found in gneiss or similar rocks, which, however, often include crystals of pyroxene.

Apatite exists in almost all stratified and crystalline rocks in minute quantities, but has been found in commercial quantities only in Canada, Norway and in Spain; but in neither of the latter countries, owing to the difficulties of mining and transport, has the industry assumed large proportions.

How the apatite got into the rocks is a question which has exercised the minds of geologists, who, however, have not yet been able to arrive at a unanimous conclusion. Various theories have been put forward. Professor Dawson, in an interesting note on the origin of phosphate deposits, in a paper read by him before the Ottawa Field Naturalists' Club, in 1884, expresses the opinion that the apatite occurs as sediment, deposited in the earliest seas of which we have any trace, and which originally resembled those of later seas, but have become so completely altered that their materials have entered into new combinations, and have, by igneous action become entirely crystalline, resembling now the original deposit as little as do the crude ingredients of glass the finished product. In opposition to this, which may be termed the "sedimentary rock" theory, Dr. T. Sterry Hunt

also a great authority, at the conclusion of some technical remarks on the subject, says:—

"I am disposed to look upon the apatite as true beds, deposited at the same time in the enclosing rocks."

While Mr. Wurzburger, an eminent mining expert who was with me in Canada, has formed the opinion that:—

"As chemical analyses show in the pyroxenite rock itself a small percentage of phosphate of lime, it may be considered as probable that the apatite in the veins and pockets have been extracted from the pyroxenite by hydro-chemical action."

There is yet another view, that the apatite is the result of purely volcanic action, having been thrown up from the bowels of the earth.

Where doctors disagree who shall decide? But although doubt may exist as to the origin of the ore, there is no uncertainty as to its quality and characteristics. Apatite is the purest form in which phosphate of lime is found to exist in quantities—containing when of the first quality from 80 to 87 per cent. of tribassic phosphate of lime and only 1 to 2 per cent. oxide of iron and alumina.

In a perfectly pure form it is composed of—

Phosphoric acid 42·26=tribassic phosphate of lime 92.26

Lime (oxide of calcium) ..	50·01
Calcium ..	3·96
Flourine ..	3·76
	99·99

The average analysis of "first" quality shipped may be recorded as—

Phosphoric acid 37·88=tribassic phosphate of lime 82.72.

Carbonic acid ..	1·80
Lime ..	54·65
Iron oxide and alumina ..	2·72
Silicious matter ..	0·62
Moisture ..	0·21
Flourine, sulphur, etc. ..	2·12
	100·00

Any gentleman who would be interested in more detailed analysis will find a table of eight full analyses appended on the placards.

Shipping samples of a parcel now *en route* from the Aetna Mine show 85·05 phosphate of lime with respectively 0·95 and 0·90 oxide of iron, but this must be considered an exceptionally good quality.

The ore is generally, as shown by the samples in the table, of a heavy, close-grained character, but sometimes it is forthcoming of a looser nature, when it is technically known as "sugar phosphate." In some mines it exhibits a more distinctly crystalline character, some of the crystals being of very striking dimensions. There is one almost perfect in form in the Ottawa Museum. It measures 32 in. in length; the diameters being 22 in. and 17 in., and weighs, probably, about 7 cwt. On the Aetna Mine a crystal more than twice the size, estimated by Mr. Wurzburger to weigh six tons, and measuring 7 ft. high, with a diameter of 4 ft., was found. Unfortunately, owing partly to its great weight and to its surface being cracked from exposure to the frosts, it was found impossible to preserve it intact. A sample taken from it yielded 88.43 per cent. tribassic phosphate of lime.

The colour of apatite is usually dark green, but some mines, notably in the Ontario district yield large quantities of excellent phosphate of a red and reddish-brown colour. It is also found almost black, and again of pink and violet tints. The shades of colour appear to depend on the chemical composition of the mineral, the usual green tint being probably due to flouride of calcium, but the colouring matter is so minute that, when phosphate of different shades is ground, it is hardly possible to distinguish one from the other, all being of the whitish tint. The shade of colour is no indication of quality, which can be only ascertained by analysis.

It requires an eye, taught by considerable experience, to distinguish with certainty apatite from the surrounding rocks. In this respect it is very true to its name, which is derived from a Greek word meaning "deception." I heard of one farmer who, having discovered, as he fondly thought, a deposit of apatite on his property, worked at its extraction with all his energy until he had raised some hundreds of tons, when, wishing to turn it into cash, he discovered, poor fellow, to his intense chagrin, that he had wasted his time in raising a pile of the country rock, somewhat resembling apatite in appearance.

As might be expected from the high character of apatite, it is found to be a most excellent material for conversion into superphosphate. When treated with acid it yields a higher percentage of phosphoric acid, soluble in water, than any other raw phosphate material with, perhaps, the exception of Curacao phosphate. The first quality dissolved in acid of 140 deg. gives a superphosphate with 18 to 20 per cent. of phosphoric acid equal to 40 to 45 per cent. soluble phosphate of lime.

The condition, although dampish at first, becomes in a month's time dry, friable and everything that could be desired.

Although the existence of apatite in the phosphate districts had been long known to some geologists, it was not until about 1872 that mining operations were begun in Ontario, and about a year later in the Ottawa district. I have not been able to ascertain to whom belongs the honour of opening up the industry. In Ottawa city there seem to be several elderly gentlemen who claim the credit. Soon after I arrived there, an old gentleman introduced himself and explained that he was the first man to bring to Ottawa samples from a quantity extracted on his property. I was naturally much interested, and noted the circumstance. A few days later, another old gentleman informed me he was the first, and yet another old farmer impressed on me that he was really *primus inter primos*. There are probably more men who lay claim to the honour than there were Greek cities which claimed to be the birth place of Homer. In the first years of the industry, especially in the Ontario district, the raising of the apatite was conducted in a very primitive fashion. It was the custom to contract with local farmers to pay them a fixed sum per ton of apatite raised in a lot of land without stipulating how the work should be done. As a consequence, the farmers raised only the ore easily got at near the surface, and when it became necessary to expend more labour on its extraction, the working would be abandoned for a fresh surface outcrop; neither was sufficient care taken to keep the ore clean, the object being to raise the maximum quantity of ore with the minimum labour, apart from all other considerations. The contract system is still in vogue to a certain extent in the Ontario district, and is found, under careful supervision, to work well.

In the Ottawa district, however, where the phosphate occurs in larger masses, the contract system has never taken hold, the mines having been worked by the proprietors, at first, chiefly as open pits or quarries, but in the last few years, in the most important mines, where the phosphate has been followed some hundreds of feet down, by regular shafts and underground workings and galleries. The *Canadian Mining Review*, so late as 1885, writes: "The system at present in vogue at almost all mines is much akin to open quarrying, and it is argued by scientific miners that this cannot be the most economical way of raising the ore, as it entails the removal of an unnecessary amount of rock. The nature of our phosphate deposits is, however, so different to that of other mineral veins, and their character so irregular, that it requires close and careful observation of the immediate vicinity to determine how the deposits can be worked with most advantage. At the present time powerful machinery and regular mining apparatus is brought to bear in the most important mines in the extraction of the mineral. It is still found, however, as year after year adds fresh experience and greater knowledge, that apatite mining is certain only in uncertainty. The deposits are so extremely irregular in extent and breadth, so liable to "pinch in" to a mere streak, to disappear altogether for some space, to be interrupted by a dyke of trap rock, or fault, as it is technically called, that it is hazardous to calculate on a regular large output from any one pit. One week the manager reports prospects of the rosier character, the following mail brings news that the vein which promised so well is looking *black*, and instead of opening out into the hoped for pocket of some thousands of tons, has pinched in to almost nothing, perhaps disappeared, and before it can be again recovered a large amount of dead work must be done, involving some weeks of heavy, unremunerative outlay. As Captain Adams graphically described the phosphate occurrence in the words of an old miner: "It is long, and it is short; it is wide, and it is narrow; it is deep, and it is shallow; it is thick, and it is thin; it is here, and it is there; you have got it, and you haven't; you see it, and you don't see it." To counteract the effects of this uncertainty, the careful manager must therefore have several pits working at the same time, so as to keep up a good average permanent output."

In order to present to you a clearer idea of the Ottawa mining district and the mining process, I would ask you to mentally accompany me on a visit to one of the principal mines. Leaving Ottawa by an early train we arrive, after a railway journey of about an hour and a-half, at Buckingham station on the main line of the Canadian Pacific Railway, where an engine and a few carriages are waiting to convey us by a branch line about four miles long (constructed about five years ago and opened early in June, 1885, by Lord Lansdowne, on his way to pay a visit to High Rock Mine), to Buckingham Village wharf, where we jump into the little mail steamer, *Agnes*, probably 23 horse-power, which, after having taken in some packages for the mines, starts up the du Lièvre River. On board there are a few other passengers for the mines, and a party of lumbermen going to a timber limit up-country. Rather a rough set are they, chiefly French-Canadians, who beguile the time by singing choruses in patois. They will remain in the woods until the following spring, sleeping in a wooden shanty to be first erected by them, and living principally on salt pork, beans and

tea. In the spring time they return, fatter and stronger in health than they go up, in spite of the severe climate, hard work and not tempting food. This proves the healthfulness of the dry cold of the Canadian winter.

After leaving Buckingham wharf the steamer proceeds up the river for about thirty miles. When I was there in the autumn, the water in the river was so shallow that when we came to the Little Rapids, about twelve miles up the river, we had to disembark, make a *detour* on foot, and embark on the other side of the rapids in another steamer. On the way up the gorgeous and brilliant colours of the foliage on each bank of the river, and the beauty of the views on either side, have filled us with admiration. At the wharf we are met by the manager of the mine, who gives us a warm welcome, and we go by a tramway drawn by a horse up an incline to the manager's house, about two miles distant, where we are vociferously greeted by a chorus of dogs. After having, through the hospitality of the manager, satisfied our hunger, sharpened by the exhilarating air, we are introduced to the pets of the place, consisting, beside the dogs, of three large bears, raised from babyhood by hand, very sleek and tame, a fox and a squirrel. We are then shown over the building, strongly built of timber, and comprising a cook house, savoury at the time with the odour of cooking joints, the sleep house, &c., and afterwards proceed to the workings. We descend the pit either by a ladder, which is rather difficult climbing to a Londoner, or by the bucket attached to a derrick, and, arrived at the bottom, find miners at work loading the phosphate into the tub to be hauled by the derrick to the pit mouth. The manager guides us by the light of a candle along a side gallery, where the miners are at work with the rock drills, preparatory to the use of explosives, and we are shown the thick vein of ore, from which it is hoped to win some thousands of tons. It is, in fact, a rich pocket of fine quality. The shaft is down about 150 feet, and is one of several being worked on the mine. There is very little water drainage to the pit, the surrounding rock being of too hard a nature to admit of much percolation. After examining the mining process and admiring the fine quality of the extracted ore, we are hauled to the top again, where we see how the mineral is loaded into the cars running along a narrow tramway. Jumping into one of these, we are conveyed to the cobbing house, where the important process of separating adhering bits of foreign rock from the apatite takes place. We remark how the apatite is first passed through an inclined circular sieve, worked by machinery, the finest part of the ore passing through the $\frac{3}{8}$ in. mesh of the upper half of the sieve, while the more granular particles pass through the coarser mesh of the lower half of the sieve. The finest portion is first and second quality, and the coarser thirds. This simple classification is practicable, because the apatite, being more friable and easily broken than the harder associated bits of rock, the finest portion is freer from impurities than the more granular. The lumps and larger bits rejected by the sieves pass into the hands of boys who cob it—that is, with small hammers knock off the impurities and separate the practically pure ore from pieces of associated rock. By the process of sifting and hand-cobbing, three qualities are prepared—1st quality, 80 to 85; 2nd, 70 to 75; 3rd, 60 to 70 per cent.

We are then shown how the ore is loaded again into tramcars, which convey it rapidly down the incline to the wharf, where scows are waiting into which it is loaded direct from the wharf. There we leave the mine, having spent a pleasant and instructive day. From the wharf the ore is conveyed by scows—flat-bottomed barges—to the wharf at Buckingham, where the ore is loaded into the railway cars and forwarded either to Montreal for shipment to Europe, or—and especially the lower grades—to the mills at Buckingham, to be ground for the American market. In the autumn, when the water in the river is low, one steamer brings the scows to the Little Rapids, and another steamer to the wharf at Buckingham. Sometimes the water is so low as to seriously inconvenience the passage of the scows.

The cost of mining, cobbing and transporting to the wharf, varies according to the character of the deposit and purity of the ore, depth of working and local circumstances, from 5 dols. to 10 dols., say average 8 dols.=£1 12s., and the cost of shipment to Europe from the mine wharf, say £1, thus first cost delivered in Europe, £2 12s. per ton, but of course this does not include anything for interest on capital, management, machinery, roadmaking, and wharf-building, other development work, amortization, neither does it take into calculation the possibility or rather probability of the mine sometimes looking black, and the necessity of doing a great deal of dead work, upon which items the success of the mine really depends.

The value of apatite at the present time in the United Kingdom may be noted at for the respective qualities of—
84 per cent., 1s. 4d. per unit, with 1-5th d. rise, equal to..... £5 17s. 6d.
80 per cent., 1s. 3½d. per unit, with rise, equal to..... 5 3s. 4d.

70 per cent., is. ½d. per unit, without rise, equal to 3 12s. 11d.
60 per cent., 10d., equal to 2 10s. 0d.
per ton in bulk, unground, ex-ship, sampling on discharge, and analysis, the mean of two well-known chemists, agreed upon at time of sale.

The wages paid in the district are approximately:—

Foreman \$ 2.50 per day with board.
Miners 1.25 “ “
Cobbing boys 50—70 “ “

At several of the mines the miners are paid 30 dols. per month, from which 11 dollars are deducted for board and lodging. During harvest time labor is scarce and difficult to obtain.

The principal mines in Canada are now:—

In the District. Belonging to.
Du Lievre. High Rock, Phosphate of Lime Co. . .
North Star, Dominion Phosphate Co.
Union Mines, Canadian Phosphate Co
(Star Hill, Crown Hill, Ruby and William.)
Squaw Hill and Aetna, Anglo-Continental Guano Works.
Emerald and Central Lake, Ottawa Mining Co.—Not being pushed.
Little Rapids, W. A. Allen.—Only slightly worked.
Templeton. Blackburn, East Templeton District Phosphate Mining Co.
Ontario. Foxton, Foxton Phosphate Mining Co.
Otty Lake, Bobbs Lake, &c., Anglo-Canadian Co.
Eagle Lake, St. George's Lake, Captain Boyd Smith.

And the total quantities raised were approximately as follows:—

1880	7,500 tons.	
1881	10,307 “	Including 2,402 to U.S.
1882	15,556 “	“ 2,080 “
1883	17,160 “	“ 220 “
1884	20,461 “	“ 32 “
1885	24,876 “	“ 745 “
1886	20,440 “	“ 532 “
1887	23,152 “	“ 733 “
1888	23,290 “	“ 1,000 “
1889	28,198, of which 4,176 exported to U.S.	
1890, estimated	22,000, including a large quantity of second quality.	

The average prices of Canadian apatite, 80 per cent. quality, have been:—

1882 . . 17d. with 1-5th rise	1887 . . 11¼d. with 1-5th rise.
1883 . . 16	1888 . . 11½
1884 . . 13	1889 . . 12½
1885 . . 13	1890 . . 15¼
1886 . . 12½	

the lowest having been in 1888, 11¼, and the highest 16½ in this year.

Having now given a cursory review of the Canadian phosphate mining, we have finally to consider whether we, as consumers of phosphate, can look forward to receiving regular and permanent supplies from the colony, and, in connection with this question, what are the present position and prospects of the industry.

During the year 1888 there was a growing feeling on the part of some of our more important chemical manufacturers that the prospects for our future supplies of raw phosphatic material were not so reassuring as could be wished, and this feeling found expression in a paper “On our Supply of Phosphate for the Manufacture of Super-phosphate,” read before you on December 10th, 1888, by the present president of your Association.

This paper attracted considerable public attention, and served to stimulate enquiries and search after phosphate throughout the world. Canada participated strongly in this awakened feeling. Phosphate lands came rapidly into active demand, and, passing from hand to hand, rushed up in value. Options of even quite undeveloped lands were eagerly sought for, and mine owners were urged to place their properties for sale in the hands of company promoters, who promised to secure for them a high price.

The *Canadian Mining Review*, in its review of the season for 1889, described the position pithily as follows:—“Cables began to pour into Canada asking for offers of land, and in a little while a good portion of the phosphate district was for sale in the London market. Some of the leading mine owners and business men went to the scene of the excitement. Even eminent statesmen started for England with bonds of lands in their trunks, though the reporters were told to announce to the newspapers that the visit was ‘purely a pleasure trip.’ Prospectuses were soon drawn up offering Canadian land to the public at from two to five times the prices asked by the holders, which were generally quite the full value to begin with. An evening paper attacked these schemers, exposing the inflation, and the issues

fell flat. The summer came and the boom collapsed to the sorrow of many landowners, who had been repeatedly told by letter or cable, ‘The thing is done; the scheme is placed; your lands are sold. The company is fully underwritten; it is certain to go.’”

The abortive projects to float several ill-advised extravagant schemes will be within your recollection. This occurred in the spring and summer of 1889. When I was in Canada, in the autumn of that year, although the boom had subsided, the holders of lots still retained exaggerated notions of their value. The belief seemed to prevail among them that Canada is destined some day to furnish the bulk of the world's supply of phosphate, that other sources are dying out, and therefore that the key of the position rests with them. As an illustration of the prevailing idea, I may mention that some days after my arrival at Ottawa, a lady quite unknown to me telephoned to me at the hotel, requesting an immediate interview. As a married man I hesitated, and under pretence of being fully occupied, asked her to write me. It turned out she had a phosphate property, not developed, which she was anxious I should purchase for £4,000, payment on the following day.

It is the custom to speak of Canadian phosphate mining as being quite in its infancy, or as having just got on its legs, but it must be remembered that operations commenced nearly twenty years ago, about the same time that operations commenced in South Carolina, where now about 800,000 tons are annually raised.

In the Somme district, in France, the mining commenced only in 1887, and last year's extraction reached over 200,000 tons.

The Belgian phosphate was first excavated about ten years ago, and over 100,000 tons have been raised annually for some years.

In the Liege district it was started only this year, and over 20,000 will be raised.

In Florida, which, so far as phosphate is concerned, was, in 1888, almost a *terra incognita*, between 20,000 and 30,000 will probably be shipped this year.

In Canada, on the other hand, the output during the past six or seven years has not very materially increased. There are several companies engaged in the industry, with ample capital, using powerful machinery, and having the advantage of some years' experience; but, nevertheless, each mine seems to find it exceedingly difficult to beat previous years' record of 6 to 7,000 tons, and I believe no company has yet succeeded in raising 10,000 tons of cobbled apatite in one year. Indeed it is estimated that the total quantity raised this year, in spite of the high price stimulating the highest possible production, will not much exceed 20,000, of which a large quantity will be second quality.

These considerations lead to the conclusion that the uncertainty and irregularity of the apatite veins and deposits are most serious obstacles against any material augmentation in the whole output, and that, although larger supplies would be very welcome, we can hardly calculate on receiving them.

No doubt very large quantities of the ore exist hidden and buried in the bosom of the rocks, but the difficulties of raising it are very great. It is sometimes necessary to remove hundreds of tons of rock to get at the wished-for phosphate. This difficulty in apatite mining is not confined to Canada, because both in Spain and Norway, where ore of equally high character exists, mining operations were begun more than twenty years ago, but the difficulties have hindered any decided development of the industry.

As you are aware, a new enterprise of some magnitude in connection with Canadian phosphate mining has recently been launched, and it is hoped that it will lead to a rapid and extensive development of the industry. The phosphate placed on the market by it will be welcome, but we must not calculate upon it before it is raised and shipped. If the new concern buys up mines in full working order, the quantity raised will remain approximately the same, because experience has shown that the production of phosphate cannot be forced. Only a few men can work in each pit, and the mining must proceed methodically, carefully and patiently. If undeveloped properties are taken, then some time must elapse before phosphate from them will be shipped, because the development of a mine takes time, particularly in Canada, where the long winter throws such great impediments in the way. Wharves have to be built, roads and tramways planned and constructed, buildings put up, miners engaged—and during summer they are scarce—and machinery transported, &c.

Even if large quantities could be raised, then other obstacles to delivery would intervene. There are already difficulties in getting to Montreal during the short shipping season the quantities raised, and freights across the Atlantic show a tendency to go up. But if, instead of having 20,000 or 30,000 tons to ship, there were double the quantity, the difficulties would become most serious, and the freight across the Atlantic would jump up to a limit which would seriously interfere with the margin of profit.

I will not enter into the financial side of the question

as the success of a Canadian mine depends so much on the amount of capital invested, good management, and favourable position for transport. Some gentlemen in the room can give us interesting and reliable information on this important subject. If the tendency of my paper is to discourage over sanguine hopes, and encourage steady progress in sound undertakings, I shall be satisfied.

To sum up: while we may expect to continue to receive moderate, and, perhaps, slightly increasing supplies of valuable phosphate from Canada, we cannot look for any great increase. When people talk of Canadian shipments reaching 100,000 tons, or other enormous quantities, we remain sceptical, and continue to base our calculations on much more moderate figures.

We all wish success to the Canadian phosphate industry; we hope it will continue to progress steadily, soberly, and satisfactorily—not at one time inflated by wild schemes, resulting in serious prejudice to its real interests, and not unduly depressed; but advancing, year after year, as an industry standing on a solid basis, and meriting the success which we hope it will achieve, and, therefore, I may fittingly conclude my paper in giving expression to the wish—Success to the Canadian Phosphate Industry.

The Chairman expressed the thanks of the Association to Mr. Hutchinson for his well-prepared and interesting paper, delivered, as it had been, under some difficulties. (Mr. Hutchinson was suffering from a severe cold which somewhat affected his voice.) As president of the Association he expressed regret that the prospects of increased supplies of phosphate from Canada were not more encouraging. When asked by Colonial and Continental buyers to supply superphosphates with 18 to 20 per cent. soluble phosphoric acid they must look for raw materials of corresponding quality, and at one time they hoped that Canada would be able to supply large quantities of beautiful high grade phosphates. From a national standpoint it was desirable we should be drawing supplies from our own colonies. The prospects were not so bright as could be wished; still, with sufficient energy and sufficient capital, no doubt a decent supply of Canadian phosphates would always be forthcoming. The paper to which they had just listened had been so exhaustive that it would be difficult to add anything to it, but he hoped some gentlemen present who had just come from the country would be able to supply some additional information.

Mr. Henry F. Moore, editor of *Bell's Weekly Messenger*, said he appeared there rather at a disadvantage, having arrived in London from Canada only the previous day, and having as yet not had time to look at any notes or papers collected during his visit to the phosphate mines. He had brought back some of the latest figures with regard to the industry, and must confess that they hardly agreed with the estimates given by Mr. Hutchinson. In the Lievre district the output for this year was estimated at 30,000 tons, and the figures given him for the same district for last year were 23,000 tons. Mr. Hutchinson's figures, however, were for both the Ontario and Quebec mines, and his were for the latter only. He thoroughly agreed with all Mr. Hutchinson had said in description of the mines; in fact his description had been so complete and accurate that there was nothing more to be said. He also agreed with him in the caution given with respect to Canadian phosphate lands. “Phosphate lands” might mean anything. No doubt many useful mines would be found; but at present many of the so-called “phosphate lands” were mere bush, destitute of any commercial value for mining until they had been explored thoroughly, and likely spots “developed.” Before lands were bought they should be properly developed and the mine started. He thought there was a future before the Canadian phosphate mining industry, but did not see that it would be helped in any shape or form by investments in mere so-called “phosphate lands,” unless the land was developed, and had, in the manner stated, its commercial value ascertained. In addition to that the mines will be economically managed, and by men having a knowledge of the district. Mr. Hutchinson had asked a question as to the discoverer of Canadian phosphate. The discoverer, so far as was known, was an officer of the 15th regiment, Lieutenant Engalls, who was in the district in 1829, and was the first to publicly announce that these were phosphate lands.

Mr. Pickford (Pickford and Winkfield) said his firm sold the first parcel of Canadian phosphate that came to this country, about 1872, and five-sixths of all that was imported until 1880. He could endorse everything said by Mr. Hutchinson, who had exhausted the various points referred to in his paper. He was personally very much opposed to those who held exaggerated views about the future of Canadian phosphate, as, although some parcels shipped have analysed as high as 86 per cent., the average of high quality cannot be estimated over 80 per cent., and in the quantity of Canadian phosphate at present shipped, say 25,000 tons, not more than one-third is of high quality. In 1880 Mr. Pickford first visited the “High Rock” property, at which time there was no regular means of transport; he was rowed in a small

boat against a strong current by three men, and landed on the bank at the edge of a forest, with scarcely a track to guide one to the phosphate shown on the top of the mountain. From that time working the phosphate gradually progressed, although only by hand labor, chiefly surface work which was raised by horse labor and derrick to a depth of 20 ft. to 30 ft., when the various pits were temporarily abandoned for want of machinery which was not introduced until 1884, though only then to a limited extent. Up to that time the only means of transport was by sleigh over the snow in winter, but no possibility of transport in summer, until a steamer was introduced in the river Lievre, to tow the scows (barges) to Buckingham village, a distance of three miles from the Canadian Pacific Railway over very bad roads. Representations were made to the railway company, and in view of facilitating the transport the company constructed the branch line, which, as stated by Mr. Hutchinson, was opened in June, 1885, by His Excellency Lord Lansdowne (the then Governor-General of Canada), accompanied by Dr. Sterry Hunt and Dr. Grant (now Sir Jas. Grant) and Mr. Pickford, as noticed in the *Montreal Gazette* of June, 1885, when on a visit of inspection to High Rock Phosphate Mine, where they were enabled to examine in detail the well systematized operations carried on. At that time the phosphate had to be carted a distance of about two miles to the scows, but since then a tramway has been made, and the transport is organized as well as possibly can be. The difficulty of transport is the great drawback to various properties, many of which can only forward the phosphate on sleighs in winter. Mr. Pickford said he had visited the Canadian phosphate district annually since 1880 (some years twice), having made about twelve journeys, and, being thus conversant with all details, would point out how disastrous may be the incorrect statements put forward in regard to properties that have been offered to the public during the last five years, and what an injurious effect it has had in the Canadian phosphate industry.

Mr. Hunter (Andrew Hunter & Co.) said he had listened with the greatest pleasure to the paper read by Mr. Hutchinson. In the short time at his disposal he had given a particularly interesting and graphic account of the Canadian phosphate industry from its commencement to the present time. At present, primitive modes of working had to a large extent been superseded by more scientific methods, but there still existed considerable difference of opinion as to the most economical method of working the mines. Some could be worked best on the old, and others on the new methods of mining. With regard to the future of Canadian phosphate mining, he must say the remarks made by Mr. Hutchinson were very much to the point. The success of any new enterprise depended on the capital employed and the ability and honesty with which its affairs were managed, and, as far as the Canadian phosphate industry was concerned, any really good mine, fairly and honestly managed, and having a fair slice of luck, would always show profitable results to its shareholders. To manufacturers the most important point was to know what prices would rule next year. An old proverb said: "Never prophesy unless you know." He would not venture upon any rash prophesy, but he thought it was likely that high-grade rock would about maintain its price. The greater supplies from Florida would be counter-balanced by decreasing shipments of high-class phosphate from France.

Dr. Newton (Cannon and Newton) wished to refer to a point in connection with the analysis of pure apatite quoted by Mr. Hutchinson. He thought the figures given for calcium and fluoride, 7.70 per cent., were too high. Pure crystals of apatite contain a little over 93 per cent. of tribasic phosphate of lime, and a little over 4.25 per cent. of calcium and fluoride, the balance being made up of calcium oxide, a singular fact which was first discovered by Mr. Landsdell, of Messrs. Nesbitt, Landsdell, and Co., and afterwards independently carefully worked out by Dr. John Voelcker. Mr. Hutchinson may have been misled by some analysis in which the phosphate of lime was determined, and the calcium fluoride put in by difference.

Mr. H. H. B. D. Shepherd, referring to the question of analysis raised by Mr. Newton, remarked that the pure Canadian apatite crystal was formerly supposed to consist of three molecules of calcium phosphate to one of calcium fluoride, whilst pure Norwegian apatite was held to contain three molecules of calcium phosphate to one of calcium chloride. Subsequent investigations, however, showed that in both descriptions of the mineral calcium chloride and fluoride were found together, and might in fact, be considered to some extent to be interchangeable, though the fluoride preponderated in the Canadian variety and the chloride in the Norwegian, and in all cases the proportion was as three of phosphate to one of fluoride and chloride. Dr. J. A. Voelcker had, however, recently shown that this formula required still further modification, inasmuch as there is present an excess of lime over and above that required by the acids, the chlorine and the fluorine present. The percentages of calcium phosphate and fluoride quoted by Dr. Hutchinson as the composition of apatite in a perfectly pure form were

clearly not intended to represent the actual analysis of any particular shipment, but the theoretical composition of the pure mineral calculated upon the basis of three molecules of calcium phosphate to one of calcium fluoride.

Mr. B. E. R. Newlands (Newlands Brothers) had used Canadian phosphates a great many years ago in the manufacture of superphosphate, and had then considerable trouble in getting the acid to decompose the phosphate. This was owing to the fact that the phosphate was not sufficiently finely ground. Improvements since made in grinding machinery had apparently removed all difficulties connected with the solubility of these phosphates.

Mr. Crowder confirmed the statement of the preceding speaker, and said no difficulty now existed in dissolving Canadian phosphate. The chief difficulty was in getting it into condition when dissolved. The stuff was very apt to become greasy, and would remain in that state a considerable length of time. By using strong acid, however, they could get fairly dry material. It was in bad condition when it first came out of the den, but after a time the condition improved. He might point out the difference between apatite and ordinary phosphate. Ordinary phosphates, such as Somme, Bull River, &c., were sedimentary deposits; that is, they resembled mud in regularity of deposition and distribution. Apatite, on the other hand, resembled various mineral ores, such as copper, &c.; it was found in veins and "pockets," and was most uncertain. A deposit of sedimentary phosphate was, more or less, calculable as to quantity, but a vein of phosphate was quite incalculable. The search for apatite would always be subject to the same uncertainty as the search for minerals that are found in veins, and is quite different from sedimentary deposits. The structure of apatite differs from phosphates, formed by sedimentary deposition, inasmuch as it is crystalline, having distinct lines of cleavage, whereas the sedimentary deposits are generally some kind of hardened mud, without lines of cleavage, and which is tough in grinding (for example, Bull River phosphate). The consequence is that when submitted to blows or pressure, it breaks up with greater facility than Bull River in the milling operations. Comparing apatite with Bull River, we can grind one ton of apatite against only 15 cwt. of Bull River per hour.

Mr. G. M. Bauer having been asked by the chairman to give his experience of Norwegian and Spanish phosphate, said that the mining in Norway seemed to be very similar in character to that in Canada. The Norwegian mines also produce apatite of a crystalline nature, and also rock. The only mine in Norway able to produce largely was the "Bamble," which he believed had worked in the past sometimes at a profit, and sometimes at a loss, but was now yielding good profits. The present outturn amounted to about 6,000 to 8,000 tons of high-class phosphate, analysing 82 to 90 per cent. tribasic phosphate, nearly the whole of which was shipped to Germany, where it commanded extraordinarily high prices. In addition to the high grade phosphate, they obtained about 5,000 tons about 65 per cent. to 70 per cent., which contained only about 3 per cent. iron and alumina, and was workable. Besides that they obtained another quality 55 per cent. to 60 per cent. Considering that a very good gross profit was realized on the high-class phosphate, it looked for the present like a very remunerative enterprise, but the former outlay in deadwork machinery and on means of transport to place of shipment, if not amortized, must of necessity sensibly influence net profits. With regard to Spanish Estremadura phosphate his experience had been of a doleful character. The average analysis of these phosphates was about 50 to 60 per cent. He had heard of cargoes testing 80 per cent., but the quantity of such high-grade material in Spain was extremely limited. When the very low prices of Charleston prevailed, viz., about 7d., the mines with which he had been connected had been obliged to stop mining, and they were not working at the present moment. He believed that in Estremadura there were deposits of high-class phosphate which it might pay to work if there was a surety of a large quantity, but so far the quantity had failed. There were two distinct qualities in Estremadura, one in which nearly all the impurities consisted in carbonate of lime, and the other in which silica formed the chief impurity. The phosphate was generally very free from iron and alumina, and very workable, and would doubtless be used freely provided it could be obtained in sufficient quantities, and this depends on prices remunerative to raisers. All shipments were made from Lisbon, and during some years were very considerable, and exceeded 50,000 p.a. There are phosphates in Spain which have been put on the market as Spanish phosphates, but should not be confounded with Estremadura, inasmuch as they contain a rather large percentage of iron and alumina, which, as already stated, is not the case with Estremadura. These inferior deposits are in the south, and shipments are made at Seville, and are likewise not worked at present.

The Chairman said that as manufacturers they were ready to receive any quantity of high-class phosphate from Canada. They could grind it, and, as they had heard, there was no difficulty in making it into super-

phosphate, and he was quite sure the chemists were prepared to analyse it. One thing to which, as manufacturers, they objected was the 1 1/2 d. rise per unit in price. Another thing was the uncertainty as to time of delivery of Canadian phosphates. It was generally sold for shipment during the shipping season which extended from about May to November. He thought that in all contracts the time of shipment should be more closely defined. Another point was that if 80 per cent. was sold, 80 per cent. should be delivered, not 78 or 79 per cent.

Mr. Hutchinson briefly replied. With regard to the quantity of Canadian phosphate which will be raised this year, his estimate of which was queried by Mr. Moore, he had derived his figures from shipping agents in Montreal, who were more likely to be right than the mining captains, who are usually of a sanguine temperament. As to the analysis of pure phosphate, he took his figures from a work on phosphates by George Jones, F.C.S., and gathered from Mr. Shepherd's remarks that the analysis was theoretically correct.

Mr. Anderton moved and Mr. Pickford seconded a vote of thanks to Mr. Hutchinson, which was carried with acclamation, and the proceedings then terminated.

MacArthur-Forrest Process of Gold Extraction.

(Mr. J. S. MacArthur in the Journal of the Society of Chemical Industry.)

The author describes briefly a number of the different mechanical and chemical processes hitherto in use, by which the metal has been separated from the ore. After experimenting on ores from all parts of the world, the inventors adopted the following process, which may be stated in the author's words:—"The ore is ground to about the fineness of sand. If, instead of ore, we are working tailings from the amalgamation process, these are generally not re-ground, but treated as delivered. The finely-divided material is mixed with a solution of cyanide, say cyanide of potassium, containing on an average 0.4 per cent. of cyanogen as the cyanide of potassium or other alkali or alkaline earth. The ore and solution are stirred together for six hours, more or less; and when the gold is known to be dissolved, the pulp is discharged into an ordinary filtering tank, where the filtration may, if necessary, be assisted by suction, and where the ore is washed by water or by the waste cyanide solution from a previous operation. The ore, after treatment with cyanide solution, is unchanged to the eye, as almost nothing but the imperceptible proportion of gold present has been removed. The gold now being in solution, the next object is to get it precipitated, and here we encounter a serious difficulty. Gold and cyanogen have such a strong mutual affinity that it is difficult to get any substance that will separate them. The gold cannot be precipitated by any ordinary method, such as the use of ferrous sulphate or oxalic acid; even sulphuretted hydrogen and sulphide of sodium will not precipitate gold from its cyanide solution, though they precipitate silver. We had noticed, however, by experiment, that zinc precipitated gold very feebly, and tried this in the same way that copper is precipitated from its ordinary solutions by scrap iron, but scrap zinc had no effect; then granulated zinc was tried, with a most imperfect and disappointing result; then heating in presence of scrap and granulated zinc, but this had only the effect of forming urea, and assisting the precipitation very little indeed. Further, we tried zinc dust, but still there was no success. Finally we prepared some zinc in a form like saw-dust, porous, and with a large surface of bright metal. On allowing the cyanide of gold solution to trickle through a mass of the zinc we found that it trickled out gold free, and, better still, we found that the action became more vigorous and pronounced after a portion of the gold had been precipitated on it, doubtless as gold and zinc formed together a more powerful electro-chemical precipitant than zinc by itself. An arrangement of a porous mass of zinc like a sponge formed a chemical filter, which at once precipitated and collected the precious metal; indeed, so like an ordinary water purifying device was this zinc filter that many non-technical visitors formed and held tenaciously to the idea that the gold was in suspension in the cyanide solution, and the zinc was used merely because of its durability. Improvements in detail were made in the direction of increasing the surface, and decreasing the weight of the zinc, till now we have it in threads, 1 lb. of which occupies about two gallons measure. The zinc in this form is possessed of enormous chemical activity of which the strongest and most direct evidence is the fact that it burns in the air like thin shavings of wood. When the gold has been deposited, it is necessary to separate it from the excess of zinc present. The filiform structure of the zinc, and the exceeding fine powder, as which the gold is deposited, render this an easy matter. The filiform mass of zinc, with gold powder adhering, is vigorously shaken in water, and the gold falls off, and the fibrous particles of the zinc may be collected in a sieve. The gold settles easily, is collected, and fused directly into bullion."



MINING NOTES.

Nova Scotia.

The Local Legislature are preparing a representative exhibit of the minerals of the Province for the Jamaica Exhibition.

The Canadian Smelting and Refining Company is the name of a new concern seeking incorporation. Capital \$100,000. Head office: Yarmouth, N. S.

Another new company, the "Canadian Smelting and Refining Company," is also seeking incorporation. Directors: E. K. Spinney, J. R. Wyman, E. F. Clements. Authorized capital, \$100,000. Head office, Yarmouth, N.S.

Application for incorporation under the Joint Stock Companies' Act has been made by the "North Star Mining Company." Capital \$40,000. The incorporators are: H. K. Fisher, Isaac's Harbor; R. Macdonald, W. G. Brookfield, W. H. Johnson, W. M. Cameron, all of Halifax; George Whitelake, Mason, N.H.; and G. W. W. Churchill, of Hantsport, N.S.

The coal miners of Nova Scotia are endeavouring to secure the eight-hour system. In accordance with resolutions passed at a meeting of the Grand Council, at Pictou, recently, it has been decided to apply at the next meeting of the Legislature of Nova Scotia for a law providing that eight hours per day be the fixed time of labor in all the coal mines of the Province. Another subject of discussion by the Grand Council was the "boys and education." The result of the discussion was the adoption of the following resolution: That the Legislature be asked to enact that, "No boy under the age of twelve years shall be permitted in or about a coal mine, and no boy of 12 years or over shall be permitted to go to work unless he be able to read, write and count as far as fractions." The passage and enforcement of such a law would do a great work for the sons of miners. Under its operation every father would be compelled, by self-interest, to send his sons to school.

Pictou County.

Mr. T. Turnbull and others are opening up the old Haliburton mine, near the Vale Colliery.

Messrs. John Muir & Sons have fully recovered from the effects of their recent fire, and are raising coal again at East River.

The Food pit is slowly being repaired and opened up. Preparations are being made to erect coke-ovens here, the coal from the pit having a very high reputation for coking purposes.

The drift from the Douglas Slope to the Cage-Pit Seam is almost completed, and we may expect to see coal coming from this seam by the Douglas Slope early in the new year.

At the Drummond Colliery the foundations are being put in place for a new and powerful winding engine on surface, which will enable them to raise all their coal to bank in one lift instead of two as at present.

The New Glasgow Coal, Iron and Railway Company has purchased a site at the Forks of the East River, for its blast furnace.

Gold Mining Supplies.

The principal depot in Nova Scotia, carrying the most complete assortment of first class goods, is

H. H. FULLER & CO'S
41 to 45 Upper Water St., Halifax, N.S.

Our line comprises Explosives, Fuse, American and English Mill and Hammer Steel, Bar and Bolt Iron, Steel Wire Hoisting Rope, Hemp and Manilla Rope, Rubber and Leather Belting, Miners' Candles, Oils and Lamps, Miners' Tools, Machinists' Tools, Blacksmiths' Tools, and every requisite for the gold miner.

H. H. FULLER & CO.,
Halifax, NS.

Cumberland County.

The shipment of coal from the pits of the Cumberland Railway and Coal Company aggregated fully 50,000 tons, while the gross output, including quantity used for colliery consumption, will carry the amount to at least 54,300 tons. It is noteworthy that whereas the number of men employed in 1887 to get about 43,000 tons was over 1,500, there are only about 1,200 men and boys employed at present, so that this increased output means considerably more to each person employed than formerly. Springhill is recovering rapidly from its late troubles.

Long-wall working was commenced at the Jiggins colliery six or seven weeks ago, and it is apparent to all concerned that the system might have been introduced with benefit long ago. The output from the mine has largely increased and the quality of the coal has improved. A number of improvements and repairs are being made to workings here.

Waverly District.

The Windsor Junction Mine, operated by "The Nova Scotia Syndicate, Limited," has just put in a new twenty horse-power engine and boiler. Mr. G. Macduff, the manager, states that it is the intention of the syndicate to sink the shaft when the new plant has been located to a depth of from 400 to 500 feet, and test the ground by cross-cuts and drifts. Little else than development work will be done this winter.

The Lake View Company cleaned up for the first time on the 31st October. No weights of the material crushed were kept, but the Superintendent, A. A. Hayward, estimates 1,000 tons passed through the mill. The resulting gold bar weighed only 97 $\frac{3}{4}$ ounces, or an average per ton of about \$1.90. Considerable vibration is observed in the mill when running, and is due to the design of the structure, which is modelled after a mill built in Maine during the silver excitement there some years ago. Whether the vibration is sufficient to cause any material injury is a matter for time to tell. The structure is said to be the finest mill ever built in Nova Scotia, and to have cost over \$16,000.

Cape Breton.

The Bras D'or Marble Company is making a large outlay on channelling and other quarry machinery. It expects to begin shipping marble in the spring. Its lime works have been enlarged during the past season, but have not been able to meet the demand.

Assays of average ore samples from late developments at the Coxheath Copper mines show the following results: Sample from 250 feet level of vein B, on hanging wall side, copper 12 per cent., gold 0.21 ounces per ton, silver 2.75 ounces per ton. Sample from middle of vein B, copper 6.4 per cent., gold 0.10 ounce per ton, silver 1 ounce per ton. Sample from foot wall, vein B, copper 14 per cent., gold 0.23 ounces per ton, silver 2.5 ounces per ton. Sample from bottom of shaft No. 3, new vein, copper 13 per cent., gold none, silver none. No. 3 shaft was only down 21 feet when sampled, and the precious metals are not looked for until further depth is attained.

Killag District.

Advices from this district are to the effect that the property of Mr. Stuart, et al, has been sold to an American syndicate; the price is not made public.

South Uniacke.

This district is very quiet. The Withrow property is not working to any extent, and no returns have been made from the Thompson property for some months.

Oldham District.

The mill of the Oldham Gold Company is building slowly; all the machinery is on the ground excepting the water-wheel, and the management do not set any date for completion. The old mill is still in commission and will be until the new one starts up.

The Standard Gold Company have their new hoisting engine at work and everything is in readiness for the Rand compressor, which is nearly a month overdue. The new pumping plant will be put in in December, and the management hope to have all the new machinery in operation January 1st, 1891.

Whiteburn District.

It is reported that the mine owned and operated by Evans & Parker has been closed down on account of ore being too low grade to pay.

The accounts of the "Graves" mine have been settled in full, and some work is now being done under the direction of Mr. Geo. J. Partington, formerly with the Oxford Co. at Lake Catcha.

Malaga District.

The mill of the Boston Gold Mining Co., Mr. Baldwin, superintendent, is rapidly being completed, and the stamps are expected to be dropping in December. The quartz upon this property is reported as richer than upon the other properties in the district, but as few mill tests have been made the statement may be premature.

The Parker-Douglass Co. have curtailed work and discharged twenty men; the mine has been working for over two years, but upon very low grade ores and the results have been discouraging.

Wine Harbor District.

The mill now building by Mr. McNaughton upon the Caledonia property is nearly ready to run. The "Middle Lode" property, leased from Mr. Harding and associates, by Mr. McNaughton, yielded 128 ounces last month from 300 cart loads, an average of over \$12 to the ton. As the belt worked exceeds eight feet in thickness the margin for profit is a large one.

Mr. Harding is now doing some development work upon the "Judge Henry" property at the eastern end of the district.

Quebec.

We hope in our next issue to be able to publish full returns of the exports of Canadian phosphates.

A special general meeting of the shareholders of the Templeton and Blanche River Phosphate Company has been called for Monday, 1st December.

The Phosphate Corporation, Limited, has commenced active work on the Stewart properties. We are indebted to Mr. J. Lanson Wills, manager of the company, for a very unique and handsome little photographic souvenir of the recent opening of the High Falls property. This tastefully designed little booklet contains the following views:—1. Group seated on debris of first blast; 2. Passenger boats on the Lievres; 3. Government works at the "Little Rapids;" 4-5. Long Rapids; 6. The High Falls.

The Montawa Gold Mine Company is the latest company seeking incorporation under the Companies Act of the Province. The authorised capital is \$24,000, divided into shares of a value of \$10 each. The first directors are: Ed. Guilbault, A. Magnan, A. Cabana, J. Rivard, J. H. Renaud, Hon. J. A. Ouimet, J. A. Renaud, J. H. Ostigny, all of whom, excepting the Hon. J. A. Ouimet, are of the town of Joliette. The chief place of business will be at Joliette.

Coke-Making in Australia.

At Fori Pirie, on Spencer's Gulf, South Australia, the manufacture of coke for smelting silver from the Barrier silver mines has become a well established and growing industry, and the quality of the product compares favorably with that of the English cokes heretofore used for the purpose. The town owes its advancement in manufactures to the completion of the narrow gauge railway recently built from it to Broken Hill, there being now in the town the smelting works of the British Broken Hill Company, the refining works of the Proprietary Company, and the coke works above referred to owned by the British and Australian, and the Westport companies.

The coal used in making coke at these works is all crushed by being passed through a Carr's disintegrator before being taken to the ovens. As the coal leaves the disintegrator it is carried by an ordinary conveyor belt to a series of elevated bins, having a capacity of some 230 tons; from these bins it is drawn through chutes into larries running along over the tops of the coke ovens. There are at present 42 ovens in operation, 30 by the British and Australian Coke Company, on the Intercolonial wharf, and 12 at Solomontown by the Westport Coke Company, the monthly output being between 300 and 400 tons, an amount too small to meet the present demand.

No attempt has yet been made to use any of the by-products. The ovens are not of uniform size, and have been built at different times. The original ovens were twice blown down and had to be rebuilt, while the latest additions erected under the management of Mr. F. J. Jones, are of greater size than those put up at the start. Ten of these ovens carry charges up to 10 tons, though the average charge is about 8 tons, the time occupied in burning being about 48 hours. The necessary iron work and bricks for 10 more of the same size are on the spot, but so far the work of construction has not been commenced. The remaining 20 ovens carry from 3 to 5 tons and take about three days to finish the process, the 12 ovens at Solomontown being of the same size. The coke

made at these works is admitted by practical men to be of a very superior character. The coal coming from New Zealand, contains about $\frac{3}{4}$ per cent. of dust, while the coke averages 2 to $\frac{1}{2}$ per cent. of ash. This compares very favorably with the English cokes, that made in Newcastle averaging 4 per cent. of ash, some of the Lancashire 2.70 per cent, and the Welsh 3.26 per cent. while some of coke which is imported in the colony runs from 4 to 7 per cent of ash.

Alloys of Nickel.

Hitherto in the manufacture of the binary alloys of nickel and iron, known as ferro-nickel and steel-nickel, either metallic or pure nickel, or the crude nickel or nickel mattes, derived from the smelting of oxidized nickel ores carried on only up to the point where the elimination of the iron would begin, are employed. The first of these is, however, expensive, and, on the other hand, crude nickel contains a considerable amount of foreign matter, which is not desirable.

An invention by H. Marbeau, of Paris, consists in the manufacture and employment for the production of ferro-nickel or steel-nickel of a carburetted alloy containing nickel, iron and manganese obtained by the reduction of oxidized nickel ores with iron ores and manganese ores, preferably in a blast furnace. This alloy, which might be called nickelo-spiegel, is cheaper than pure nickel, and is purer than crude nickel. The proportion of the three ores will vary according to the percentage of the three metals required in the carburetted alloy. The following may be given as an example: Nickel ores (10 per cent. nickel), two tons; iron ores (50 per cent. iron), 12 cwt.; manganese iron ores (10 per cent. manganese and 40 per cent. iron), one ton. In the employment of this nickelo-spiegel for the production of ferro-nickel or steel-nickel the nickelo-spiegel can be treated in a converter so as to obtain steel-nickel or ferro-nickel containing the required percentage of nickel. The presence of the excess of manganese in the nickelo-spiegel permits of obtaining the heat necessary for the good working of the operation in the absence of silicium.

Apatite in Sweden.—The apatite discoveries in Northern Sweden, especially in the Gellivara district, continue to attract much attention, and have of late been examined and reported upon by a special committee. The members of this committee have now completed their report, but do not agree on all points. One of the experts holds that the apatite is in general so closely combined with magnetic iron ore, that it will be necessary to grind the ore, and separate the iron magnetically, but it is a question whether crushed iron ore is fit for the production of pig iron, at least so far as large and high blast furnaces are concerned. The largest deposits of iron ore and apatite contain from a few per cent. up to 10 or 11 per cent. of the latter; there is, however, also an ore in considerable abundance which contains 19 per cent. of apatite, and, finally, one which contains as much as 60 per cent. of apatite, but as to the extent of which no definite information has as yet been obtained. Another member of the committee is of opinion that the apatite itself is sufficient to make the breaking and further handling remunerative. The residue can, however, be subjected to further treatment, either a further crushing and separation, or smelting down with lime or quartz for the purpose of obtaining Thomas slag and phosphoric iron for the basic Martin process. The question of the apatite and other resources of Northern Sweden will, however, not be allowed to drop, and a large party of Swedish M. E.'s have lately visited these districts to examine matters for themselves.—*Engineering.*

Brickmaking in Bagdad.—The British Consul General at Bagdad, in his latest report, states that there are about twenty-five large and small kilns at work at Bagdad in the hands chiefly of Jews and Christians, but the turnout is far behind the demand. The kilns are dotted over the desert outside the city. The usual prices of bricks at the kiln side are £1 16s. per 1,000 of 12 in. square, and 18s. per 1,000 of 7 in. square. The bricks are carried from the kiln on small donkeys, each taking not more than ten large or twenty-five small bricks. In the course of transit they get much broken, as the best, though good to look at, and of a chrome yellow color, are very brittle. Another great promoter of the demand for bricks is the absorption of water every winter, bricks suffering equally with the mortar in which they are laid, owing to their porousness. Thus, there is hardly a house, or wall, or brick pathway in Bagdad which does not constantly call for patching or rebuilding with new bricks. The old city walls, thrown down about 1870 by Midhat Pasha when Governor-General, remain still, in spite of years of burrowing and abstraction, a mine of broken bricks. Under a late regime it was said that the right of taking these away and selling them was conferred as a substitute for pay on the soldiery; but at present all classes seem to help themselves to them. These remarks serve to show what a good opening there is in Bagdad for brickmaking after some simple but scientific method.

Annotated List of Canadian Minerals.*

G. C. Hoffman, F. Inst. Chem., etc.

Continued from page 145.

63. CERUSSITE—Has hitherto been met with only in small earthy masses and incrustations, associated with the galenite of certain localities in British Columbia.

64. CHABAZITE—Is found in large and very perfect crystals at Swan Creek (Cumberland Co.), Mink Cove and Sandy Cove, Digby Neck, and Williams' Brook (Digby Co.), and Pinnacle Island (Colchester Co.), in the Province of Nova Scotia. See also note to "Acadialite."

65. CHALCEDONY—Is found in many parts of the trap district of Nova Scotia, where, according to Dr. How, an almost unique blue chalcedony is found on the coast between Capes Split and Blomidon (King's Co.), and a very fine milk-white chalcedony near Trout Cove, Digby Neck (Digby Co.). It occurs of an olive green colour, in small veins, on Belanger's Island, lying off the entrance to Richmond Gulf, eastern coast of Hudson Bay; in thin bands or veins, with jasper, on the River Ouelle (Kamouraska Co.), in the Province of Quebec. In veins in the amygdaloidal traps of Lake Superior, Province of Ontario, and elsewhere in Canada.

66. CHALCOCITE—Is found, most frequently in association with chalcopyrite, or chalcopyrite and bornite, in the townships of Leeds and Halifax (Megantic Co.), Brome, Sutton, (Brome Co.), Shefford, Stukeley (Shefford Co.), Melbourn, Cleveland, Brompton (Richmond Co.), Acton (Bagot Co.), and Tingwick (Arthabaska Co.), in the Province of Quebec—at the Canada West mines on Lake Huron, and Prince's location, Lake Superior, in the Province of Ontario.

67. CHALCOPYRITE—Is widely distributed throughout many of the Eastern Townships of the Province of Quebec. In some of them it is occasionally met with unaccompanied by other ores of copper, but it is more frequently associated with chalcocite or bornite, or both. The more important localities lie in the townships of Bolton, Brome, Sutton (Brome Co.), Leeds, Halifax (Megantic Co.), Stukeley (Shefford Co.), Ascot (Sherbrooke Co.), Acton (Bagot Co.), Cleveland, Melbourn (Richmond Co.), Chester (Arthabaska Co.), and Ham Wolfe Co). Other noteworthy localities are—the township of McKim, and adjoining townships, in the District of Nipissing; the West Canada mines, Lake Huron, and Point-aux-Mines and other places on Lake Superior, in the Province of Ontario.

CHIASTOLITE—Occurs in a fine grained micaceous schist at Moore's Mills, Charlotte County, Province of New Brunswick; and in the somewhat micaceous argillites on Lake St. Francis in Beauce County, Province of Quebec.

CHLORITE (PENNINITE)—Occurs, most frequently, in admixture with other minerals, forming beds of chloritic slates as in Bolton (Brome Co.), Shefford (Shefford Co.), Ascot (Sherbrooke Co.), Cleveland and Melbourn (Richmond Co.), and other Eastern Townships of the Province of Quebec. In some of these townships, however, as for instance those of Pottou and Bolton (Brome Co.), and Broughton (Beauce Co.), beds of pure compact chlorite are met with, and occasionally, as in Cleveland (Richmond Co.), the chloritic slates are traversed by thin well defined veins, which are filled with pure scaly chlorite. Anal., T. S. Hunt, Geol. Can., 1863, p. 607.

70. CHLORITOID—Is of common occurrence in the micaceous schists of the Eastern Townships, in which it is disseminated in small grains and crystalline plates, or small lamellar and spherical masses. It is thus found in the townships of Leeds (Megantic Co.); Brome and Sutton (Brome Co.), in the Province of Quebec. Anal., T. S. Hunt, Geol., Can., 1863, p. 498.

71. CHONDRODITE—Is often met with in the crystalline limestones of the Laurentian series. It is found, in grains, in the limestones of St. Jérôme (Terrebonne Co.); in a magnesian limestone in Aldfield (Pontiac Co.), Province of Quebec—and, with small scales of graphite, in a white crystalline limestone near Newborough in North Crosby, also in South Crosby (Leeds Co.), in the Province of Ontario, and elsewhere in these provinces.

72. CHROMIFEROUS GARNET—A very beautiful emerald-green chromiferous garnet occurs, in granular masses and minute crystals, thickly disseminated through a vein of white cleavable calcite, on the east side of Brompton Lake, in the township of Orford (Sherbrooke Co.), and a very similar garnet is found, associated with apatite, pyroxene, calcite, orthoclase, tourmaline and idocrase, in the township of Wakefield (Ottawa Co.), Province of Quebec. Analyses, T. S. Hunt, Geol., Can., 1863, p. 497; B. J. Harrington, Can., Nat., 2 ser., vol. ix, p. 305, 1881.

73. CHROMITE—Is found in pockets, scattered through serpentine, at Mount Albert, Shickshock Range (Gaspé Co.), and in considerable quantity, in connection with serpentine and other magnesian rocks of the Quebec group in the townships of Bolton (Brome Co.), Ham and Wolfstown (Wolfe Co.), and Leeds (Megantic Co.),

in the province of Quebec. Analyses, T. S. Hunt, Geol. Can. 1863, p. 504.

74. CHRYSOCOLLA—Is found sparingly amongst some of the copper ores of Lake Superior, province of Ontario.

75. CHRYSOLITE—Occurs in the form of grains, and occasionally as ill-defined crystals, in a dark grey dolerite, near South Lake (Antigonish Co.), province of Nova Scotia. In well defined green crystals, and olive or amber colored imperfect crystals, and small honey-yellow grains, in the eruptive rocks of Rougemont (Rouville Co.), Montarville (Chambly Co.) and Montreal (Hochelega Co.): in red angular masses in a dyke at St. Anne's (Jacques Cartier Co.), and of a pale yellowish to greyish-green color, forming rock masses at Mount Albert, Shickshock Range (Gaspé Co.), in the province of Quebec. Olivine has also been detected in several of the eruptive rocks of British Columbia. Analyses, T. S. Hunt, Geol. Can., 1863, p. 464; B. J. Harrington, Rep. Geol. Can. 1877-78, p. 39 G.

76. CHRYSOTILE—Often constitutes seams, sometimes nearly seven inches thick, in the serpentine of the Eastern Townships of the province of Quebec: the more important localities comprising—the townships of Thetford and Coleraine (Megantic Co.), Shipton and Melbourn (Richmond Co.), Ham (Wolfe Co.), Broughton (Beauce Co.), and Bolton in Brome county. Analyses, E. G. Smith, Am. Journ. Sci., 3 ser., vol. xxix, p. 32, 1885.

77. CINNABAR—Occurs, *in situ*, sparsely disseminated through a fine crystalline granular limestone, at the Ebenezer mine, Hector (Kicking Horse) Pass, Rocky Mountains, British Columbia.

78. CLAY IRONSTONE—Is found everywhere in the Coal Measures of Pictou county, Nova Scotia, in irregular beds from five to forty inches thick. Occurs in layers and nodules, in connection with a small seam of coal at Gaspé, province of Quebec. Is widely distributed in the North-west Territory, in some localities in considerable abundance, in the form of nodules and nodular sheets. Analyses, G. C. Hoffmann, Rep. Geol. Can., 1880-82, p. 8—12 H.

79. COCCOLITE—A greenish-grey granular pyroxene or coccolite, occurs in the township of Portland, and the same mineral, of a pale green color, is met with in adjoining township of Buckingham (Ottawa Co.), province of Quebec.

80. COOKEITE—A micaceous mineral having all the blow-pipe characters of, and which may prove to be identical with, Cookeite was found sparsely disseminated through a specimen of galenite from Otter Tail Creek, province of British Columbia. Annual Rep. Geol. Can., vol. 2, p. 10 T., 1886 (where, however, the locality is erroneously given—read as above).

81. COPPER—NATIVE.—Is found, in the form of grains and irregular shaped masses, occasionally several pounds in weight, in veins and fissures traversing the trap at Cape d'Or and Spencer's Island (Cumberland Co.), Five Islands (Colchester Co.), Margaretville (Annapolis Co.), Briar Island (Digby Co.), and many other places in this section of Nova Scotia. More abundantly, however, in the province of Ontario, occurring in fine particles, filaments, grains or masses, the latter sometimes more than one hundred pounds in weight, in amygdaloidal traps and greenstones, in veins and fissures traversing these, and in sandstones associated with the same, in many localities on the north and east shore of Lake Superior, some of the more important of which are—Battle Island, the Islands of St. Ignace and Michipicoten, also at Mamaine and Cape Gargantua.

82. CORACITE—Is said to form a vein about two inches in width, at the junction of the trap and syenite, at Mamaine, east side of Lake Superior, province of Ontario.

83. CORUNDUM—Has been found in small light blue crystals imbedded in crystalline Laurentian limestone, also in rose-red to sapphire-blue grains, disseminated through a rock made up of felspar, quartz, calcite, mica and sphene, in the township of Burgess (Lanark Co.), province of Ontario.

84. COVELLITE—Occurs in nodular form, with nodules of more or less altered chalcocite, at New Annan (Colchester Co.), province of Nova Scotia. Analyses, H. Louis, Trans. N. S. Inst., vol. iv., p. 427, 1878.

85. CRYPTOMORPHITE—Is found, in conjunction with ulexite, Howlite, mirabilite, halite, Arragonite, calcite and selenite, in gypsum deposits at the Clifton quarry, Windsor (Hants Co.), province of Nova Scotia. Anal., H. How, Am. Journ. Sci., 2 ser., vol. xxxii, p. 9, 1861.

86. CUPRITE—Has been found, in association with a little native copper and blue and green carbonate, in quartz, at Spencer's Island (Cumberland Co.),—the collector, Mr. C. W. Willmott, informing me that it occurs, *in situ*, at Bennet's Brook, one mile east of Horse-shoe Cove, and at intermediate points between that and Cape d'Or, one mile west of Horse-shoe Cove (Cumberland Co.), Nova Scotia. Also occurs, but in small quantity only, in some of the copper deposits of the Eastern Townships of the province of Quebec, as at Acton (Bagot Co.), where it has been observed in the form of cinnabar-red stains upon blackish shales.

87. CYANITE—Occurs in the form of radiated colum-

nar aggregates of a pure blue, light bluish-grey and greenish-grey color, imbedded in a granular quartz, on the North Thompson River, British Columbia. Anal., G. C. Hoffmann, Rep. Geol. Can., 1878-79, p. 1 H.

88. **DAWSONITE**—Occurs in the joints of a white felspathic dyke, cutting the Trenton limestone, near the western end of McGill College, Montreal (Hochelaga Co.), province of Quebec. Anal., B. J. Harrington, Can. Nat., 2d ser., vol. vii, p. 305, 1875; see also vol. x, p. 84, 1883.

89. **DIALLAGE (HYDROUS)**—Small masses of a pearly, translucent, celandine-green diallago, occur in a rock in the township of Orford (Sherbrooke Co.), and a coarsely cleavable, bronze-colored variety of diallage, forming a rock, is met with in the township of Ham (Wolfe Co.), province of Quebec. Analyses, T. S. Hunt, Geol. Can., 1863, p. 469.

90. **DIOPSIDE**—See note to "Malacolite."

91. **DOG-TOOTH-SPAR**—Large scalenohedrons of calcite have been found at the Bruce and Wellington mines on Lake Huron, also at the Silver Islet and Duncan (formerly Shuniah) mines (at the last named, Professor Chapman observed, in a *vug*, a bunch of crystals many of which measured upwards of eighteen inches in length), Thunder Bay, Lake Superior, province of Ontario. Good specimens of dog-tooth-spar are also found at Tenny Cape (Hants Co.), Black Rock (King's Co.), Partridge Island and Two Islands (Cumberland Co.), etc., in the province of Nova Scotia.

92. **DOLOMITE**—In the form of rock-masses, is of very common occurrence in Canada. Besides forming great beds among the Laurentian limestones, dolomites make up the chief part of the so-called Calciferous formation, and are developed on a great scale in its geological equivalent, the Quebec group. The so-called limestones of the whole of the Middle and Upper Silurian series in Ontario are, with few exceptions, dolomites, including the Clinton, Niagara, Guelph, and Onondaga formations. See also note to "Pearl-spar."

93. **DOMEYKITE**—Has been found, in admixture with niccolite, in a vein cutting a bed of amygdaloid on Michipicoten Island, Lake Superior, province of Quebec. Analyses, T. S. Hunt, Geol. Can., 1863, p. 506.

94. **ELAEOLITE**—Is mentioned, by Dr. Hunt, as occurring in orange-red grains, with black hornblende, in a white felspathic rock, which is found in boulders on Pic Island in Lake Superior, province of Ontario.

95. **EPIDOTE**—Characterizes large portions of the metamorphic rocks of the province of Quebec, in many parts of which occur beds which are entirely made up of quartz and epidote; sometimes in distinct grains, at other times forming a homogeneous, generally pale green, very tough and sonorous rock. Characteristic specimens of this rock are met with in the township of Melbourne (Richmond Co.), but beds of the same occur in numerous localities in this section of the province. This mineral has been met with in the crystalline form, in a concretionary epidotic rock, at St. Joseph (Beauce Co.), province of Quebec; also in some of the amygdaloidal traps and greenstones of Lake Superior—as at Mamainse, where crystals of the same are found implanted upon mesolite—in the province of Ontario.

96. **EPISTILBITE**—Is found with stilbite on ledges of trap at Margareville, about seven miles east of Port George, Annapolis county, province of Nova Scotia. Analyses, H. How, Am. Journ. Sci., 2 ser., vol. xxvi, p. 33, 1858.

97. **EPSOMITE**—Occurs at the Clifton gypsum quarry, Windsor, Hants county, province of Nova Scotia. As an efflorescence on the black shales of Utica formation near Montreal (Hochelaga Co.), and upon the black shales of Quebec (Quebec Co.), province of Quebec. As an efflorescence on a serpentine rock near the iron-ore bed of Crow Lake in Mariora (Hastings Co.), and as a crystalline incrustation upon sheltered surfaces of the dolomites at various points along their outcrop from Niagara Falls to Lake Huron, and near Niagara is said to be found, with gypsum, in geodes in the rock—province of Ontario. Also occurs, in association with mirabilite, as an incrustation upon the cliffs of shale at Fort St. John, Pease River, British Columbia. Anal., G. C. Hoffmann, Rep. Geol. Can., 1875-76, p. 421.

98. **ERYTHRITE**—Is found as a rose-red incrustation on calcareous spar, at Prince's mine on Lake Superior, province of Ontario.

99. **ESSONITE**—Occurs, in small crystals with crystals of idocrase, pyroxene and zircon, in calcite at Grenville (Argenteuil Co.), and both massive and crystallized, in the townships of Portland and Wakefield (Ottawa Co.), in the province of Quebec.

100. **FAHLUNITE**—Is mentioned, by Prof. How, as occurring in granite on the road between Windsor and Chester, Hants county, province of Nova Scotia.

101. **FASSAITE**—A black, occasionally blackish-green, pyroxene from the township of Templeton (Ottawa Co.), province of Quebec, would seem, from its chemical composition and other characters, to be referable to this variety. Anal., B. J. Harrington, Rep. Geol. Can., 1877-78, p. 17 G.

102. **FLUORITE**—Occurs, in green octahedral crystals,

with barite, lining fissures in porphyry on an island three miles east of Gravelly Point; in green cubes, associated with quartz and calcite, at Prince's mine; of a purple color, filling veins in syenite, on the main land opposite Pic Island, and also, with calcite, in amygdaloid three miles east of Cape Gargantua; in cubes two or more inches in diameter, associated with large crystals of amethyst, in *vugs* in the large irregular veins in the syenite at the mouth of McKenzie's River, Thunder Bay; in veins near Black Bay and Terrace Bay; on Flour Island in Neepegon Bay, and elsewhere on Lake Superior, province of Ontario.

103. **FREIBERGITE**—An argentiferous tetrahedrite, associated with some galenite and sphalerite, in a gangue of quartz, is found at Cherry Creek, thirty-three miles east of the head of Okanagon Lake, province of British Columbia.

104. **GALENITE**—Is very widely distributed throughout Canada: both in interstratified masses, veins, and small crystalline aggregations, etc., scattered through rocks of various kinds. Some of the most noteworthy localities of its occurrence are situated—in the counties of Carleton, Lanark, Leeds, Frontenac, Hastings, and Peterborough, and on the north shore of Lake Superior, as at Prince's Mine, Thunder Cape, and Point des Mines etc., in the province of Ontario. Extensive deposits of galenite exist in the Illecillewaet district,—at Mount Stephen (Tunnel Mountain), and at Hot Springs and Hendryx Camp's, Kootanie Lake, etc., in the province of British Columbia. Fine specimens consisting of more or less perfect octahedra, the axes of some of which were five centimetres in length, have been found, in *vugs*, at the Silver Islet mine Lake Superior.

105. **GARNET**—Is very frequently met with, and in nearly all parts of the Dominion. The following comprise some of the many localities of its occurrence. In the province of Quebec: small beds of granular red garnet occur at St. Jérôme (Terrebonne Co.), in Rawdon (Montcalm Co.), and at the north-east side of Bay St. Paul (Charlevoix Co.): white lime-alumina garnet, mixed with serpentine, is met with at Orford, (Sherbrooke Co.), and an apparently homogeneous rock composed in great part of a similar variety, occurs at St. Francis (Beauce Co.): red and yellowish-red varieties are met with in the townships of Chatham and Grenville (Argenteuil Co.); a rose-red iron-alumina garnet is found disseminated in small masses through gneiss on the Rouge River and vicinity in the township of Clyde, and dark red garnet in the townships of Villeneuve and Templeton, and large and handsome crystals of colorless, light brownish, pale olive-green, and brownish-yellow garnet in the township of Wakefield, Ottawa county. Magnificent crystals of red garnet occur, imbedded in micaceous schist, on the Skeena and Stickeen rivers, and a massive brownish-red manganesian lime-iron garnet is found near Foster's Bar, Fraser River—in the province of British Columbia. Analyses, T. S. Hunt, Geol. Can., 1863, 496. See further under "Almandite," "Andradite," "Chromiferous garnet," "Essonite," "Grossularite," "Spessartite."

106. **GENTHITE**—A mineral apparently identical with Genthite has been met with in a vein on Michipicoten Island, Lake Superior, province of Ontario. Analyses, T. S. Hunt, Geol. Can., 1863, pp. 506, 507.

107. **GISECKITE**—Dysyntrite occurs at Arisaig pier and Frenchman's Barn in Antigonish county, province of Nova Scotia.

108. **GLAUCONITE**—Occurs in a sandstone of the Lazon formation, near Point Levis (Levis Co.), and on the Island of Orleans, in the province of Quebec. Analyses, T. S. Hunt, Geol. Can., 1863, p. 487.

109. **GRENVILLE**—Has been found at Cape Blomidon (King's Co.), and Two Islands and Five Islands (Colchester Co.), in the province of Nova Scotia. Analyses, A. C. Hayes, Am. Journ. Sci., vol. xxv., p. 78, 1834; A. C. Marsh, ib., 2 ser., vol. xlv., p. 362, 1867; A. B. Howe, ib., 3 ser., vol. xii, p. 270, 1876.

110. **GOLD**—The most important auriferous regions of Canada are situated in the provinces of British Columbia, Quebec, and Nova Scotia; the first on the Pacific coast, the last forming the extreme eastern portion of the Dominion. Gold is, however, also found in some of the rivers of the North-West Territory—in the Lake of the Woods and Lake Superior region, and in the district north of Lake Ontario, in the province of Ontario,—and is reported to have been found in a few localities in the province of New Brunswick. In British Columbia mining has been almost entirely confined to the placer deposits. In the vicinity of the Lake of the Woods, and of Lake Superior, gold occurs in veins associated with silver and other ores. In the counties of Madoc and Marmorra (province of Ontario), in auriferous mispickel. In the province of Quebec the placer deposits of the Chaudiere region and of the township of Ditton are the only ones in which much work has as yet been attempted. The gold of Nova Scotia is found in quartz, the alluvial gold so far discovered being quite inconsiderable in quantity.

111. **GOTHITE**—Is mentioned by Dr. Harrington, as occurring, in association with black oxide of manganese and calcite, in veins cutting the Lower Carboniferous

limestone at Black Rock, near the mouth of the Shubenacadie, province of Nova Scotia.

112. **GRAPHITE**—This mineral is met with in most of the stratified rocks of the Laurentian system; not only the limestones, but the gneiss, pyroxenite, quartzite and pyralolite beds sometimes hold disseminated graphite. It is also met with in the iron ores of the series, as in the township of Hull (Ottawa Co.), in the province of Quebec. Apart from its being met with in a disseminated form, it occurs in beds or seams from a few inches to two or three feet in thickness. These are often interrupted giving rise to lenticular masses, which are sometimes nearly pure and at other times mingled with carbonate of lime, pyroxene, and other foreign minerals. The most important deposits are in the townships of Buckingham and Lochaber (Ottawa Co.), and Grenville (Argenteuil Co.), province of Quebec; but it is also found in the townships of Burgess (Lanark Co.), Loughborough and Bedford (Frontenac Co.), province of Ontario, and in small quantity, in other localities in these provinces. It is also met with, in a disseminated form, at French Vale and Glendale, in the province of Nova Scotia; in the vicinity of St. John, province of New Brunswick; and at Alkow Harbor, Dean's Canal, in the province of British Columbia. Localities and general mode of occurrence, T. S. Hunt, Geol. Can., 1863, pp. 529, 793, and Rep. Geol. Can., 1863-66, pp. 218-223. Analyses, etc., of Canadian Graphite, G. C. Hoffmann, Rep. Geol. Can., 1876-77, pp. 489-510: analyses of disseminated graphite from Nova Scotia and New Brunswick, G. C. Hoffmann, Rep. Geol. Can., 1878-79, p. 2; ib., 1879-80, p. 1 H.

113. **GROSSULARITE**—Handsome specimens of a white lime-alumina garnet are found in the township of Wakefield (Ottawa Co.), province of Quebec (G. F. Kunz, Analyses, C. Bullman, Am. Journ. Sci., 3 ser., vol. xxvii, p. 306, 1884). The white lime-alumina garnet from Orford (Sherbrooke Co., P. Que.), referred to under "Garnet," is also referable to this variety.

114. **GYPSUM**—Occurs in connection with the Lower Carboniferous limestones in enormous deposits in the province of Nova Scotia. It is largely quarried at Windsor, Newport, Walton, Wentworth, Shubenacadie, and a number of other places. It is a very abundant mineral in the province of New Brunswick, the deposits being both numerous and extensive. They occur in all parts of the Lower Carboniferous district, in King's, Albert, Westmorland, and Victoria counties. Rock masses of granular and compact gypsum, more or less mixed with dolomite, characterise the Onondaga formation of western Ontario. They occur largely in the valley of the Grand River, more especially in the townships of Dumfries, Brantford, Oneida, Seneca, and Cayuga, etc.—It is also met with in the province of Manitoba. See also notes to "Alabaster," "Selenite."

115. **GYROLITE**—Is found on apophyllite in trap, about twenty-five miles south-west of Cape Blomidon, between Margareville and Port George, Annapolis county, province of Nova Scotia. Anal., H. How, Ed. N. Phil. Journ., new series, vol. xiv, p. 117, 1861.

116. **HALITE**—An important deposit of rock salt is known to exist along the eastern shore of Lake Huron, embracing the counties of Bruce, Huron and Lambton, in the province of Ontario. It was first met with at Goderich, in 1866, in a depth of 964 feet; in the year following at Clinton, at a depth of 1,180 feet, and in the succeeding year at Kincardine, at a depth of about 900 feet; subsequently at Seaford at 1,035 feet, and again at Kingstone's Mills in Warwick, at 1,200 feet. A boring made in Goderich in 1876, and which was carried to a depth of 1,517 feet, has shown the existence of no less than six beds of rock salt, one of which is close upon 31 feet, and another very nearly 35 feet in thickness. For geological details, records of borings, and analyses of brines and salt, see following reports by Dr. T. Sterry Hunt—"On Brine-Springs and Salt," Rep. Geol. Can., 1863-66, pp. 263-272. "On the Goderich Salt Region," ib., 1866-69, and pp. 211-242, and a second report on the Goderich salt region, ib., 1876-77, pp. 221-243.

117. **HALOTRICHITE**—Has been found in some heaps of shale and slack coal, at the Glace Bay coal mines, in Cape Breton county, province of Nova Scotia. Anal., E. Gilpin, Trans. N. S. Inst., vol. vi, p. 175, 1883-86.

118. **HELIOTROPE**—Reported by Prof. How, as having been found by Dr. Gesner in small nodules or fragments of rock on the beach of Chute's Cove (Annapolis Co.), has been found, *in situ*, by Mr. C. W. Willmot, at Two Islands (Cumberland Co.), province of Nova Scotia.

119. **HEMATITE**—Important deposits of red hematite are met with at several localities in Pictou and other counties in Nova Scotia. It occurs, in association with specular iron ore, among the Huronian strata of the Quaco hills, and more abundantly in those of West Beach and Black River, St. Johns county, province of New Brunswick. Forms an extensive bed in the township of McNab (Renfrew Co.), and is further found in the townships of Dalhousie and Beckwith (Lanark Co.), Palmerston (Frontenac Co.), Madoc (Hastings Co.), Leeds (Leeds Co.), etc.—at Gros Cap, north side of Michipicoten Harbor, and other localities in the Lakes Superior and Huron

region, province of Ontario. See also notes to "Micaeous iron ore," "Specular iron ore," "Martite." Mineral associations of hematite, B. J. Harrington, Rep. Geol. Can., 1873-74, pag. 212. Analyses, by various analysts, ib., pp. 223-226, and subsequent Reports.

120. HEULANDITE—Fine specimens of this mineral are met with at Isle Haute, Partridge Island, and Two Islands [Cumberland Co.], also at Black Rock, Hall's Harbor, Long Point, and Cape Blomidan [King's Co.], in the province of Nova Scotia.

121. HORNBLÉNDE—Black crystallized hornblende enters abundantly into the diorites of Yamaska Mountain (Yamaska Co.), and Mount Johnson (Iberville Co.), and occurs sparingly in the trachytes of Bromé (Bromé Co.), and Shefford (Shefford Co.) Mountains: beds of black hornblende, holding garnets are associated with the serpentines of Mount Albert in the Shickshock Mountains (Gaspé Co.), and black or greenish hornblende is very commonly disseminated through the felspathic rocks of the Laurentian series, giving rise to syenite and syenitic gneiss: also forming beds of hornblendic rock, as at Lake St. John (Chicoutimi Co.), Province of Quebec. Black or dark green hornblende, in cleavable masses, is found associated with the magnetite of Bathurst and South Sherbrooke townships (Lanark Co.), Province of Ontario. Anal., B. J. Harrington, Rep. Geol. Can., 1873-74, p. 201.

122. HORNSTONE OR CHERT—Occurs, in veins traversing syenite in the township of Grenville (Argenteuil Co.), in the Province of Quebec; in great abundance, in nodular masses and thin layers, in the Corniferous formation, and occasionally, in a similar form, in the limestones of the Trenton and Niagara groups; also, in layers, in the lower beds of the silver-bearing rocks of Thunder Bay (the lower division of the upper copper-bearing rocks of Logan), Lake Superior, Province of Ontario.

123. HOWLITE—Occurs, in the form of nodules which are generally about the size of filberts or pigeon's eggs, and occasionally, but rarely, as much as two inches in diameter, imbedded in anhydrite and gypsum at Brockville, and in gypsum at Winkworth, Newport Station, Noel, etc., in Hants county, Province of Nova Scotia. Analyses, H. How, Phil. Mag., 4 ser., vol. xxxv., p. 32, 1868.

124. HUMBOLDTINE—Has been observed as a sulphur-yellow incrustation upon the black schists at Kettle Point in the township of Bosanquet, Lambton County, Province of Ontario.

125. HURONITE—The Huronite of Dr. Thompson—an impure or altered form of anorthite—is found, *in situ*, near Sudbury (District of Nipissing, Province of Ontario), where it occurs in rounded or somewhat angular masses, in a dark green dyke of diabase. Anal., B. J. Harrington, Trans. Roy. Soc. Can., vol. iv., sec. iii., p. 82, 1886.

126. HYACINTH—Cherry-red, transparent crystals of zircon, are mentioned by Dr. Hunt as occurring in the crystalline limestone of the township of Grenville, Argenteuil County, Province of Quebec.

127. HYALITE—Good specimens of this mineral were obtained by Mr. J. McEvoy from cavities in a dark grey foliated basalt occurring near Hih-hum Lake, South of Loon Lake, British Columbia.

128. HYPERSTHENE—Occurs, in broad lamellar masses, with andesite and ilmenite, constituting a rock, at Chateau Richer (Montmorency Co.), and in the parish of St. Urbain near Bay St. Paul, Charlevoix Co., in the Province of Quebec, also Paulit at Paul Island, Nain, coast of Labrador. Anal., T. S. Hunt, Geol. Can., 1863, p. 468.

129. ICELAND-SPAR—Fine cleavable and transparent masses of calcite occur at Harrison's location on St. Ignace Island, Lake Superior, and in the township of Galway (Peterborough Co.), Province of Ontario.

130. ILMÉNITE—Occurs in vast beds or masses in anorthosite rock in the parish of St. Urbain, at Bay St. Paul (Charlevoix Co.), and in a similar rock in Chateau Richer (Montmorency Co.), and in Rawdon (Montcalm Co.) Large deposits, associated with labradorite rocks, have also been observed near the mouth of Rapid River (Bay of Seven Islands), on the Saguenay River, on the shores of Lake Kenogami, and it has also been met with in several other localities in the Province of Quebec. Analyses, T. S. Hunt, Geol. Can., 1863, p. 501, and Rep. Geol. Can., 1866-69, p. 260.

131. ILVAITE—A substance which, from its composition and physical characters, was regarded as a variety of lievrite, was found in the form of a boulder, in the vicinity of Ottawa (formerly Bytown), Carleton County, Province of Ontario. Description and analysis, T. S. Hunt, Geol. Can., 1863, p. 465.

132. INFUSORIAL EARTH—Is found occupying the bottoms of lakes in several of the counties of the Maritime Provinces. The deposits are not unfrequently of considerable depth, and the earth remarkably pure. Some of the more important localities are—Fountain Lake, Amherst (Cumberland Co.), Folly Lake (Colchester Co.), and Merigonish (Pictou Co.), in the Province of Nova Scotia, and Fitzgerald Lake, about seven or eight miles from St. John (St. John Co.), Pollet

Lake, Mechanic Settlement, and Pleasant Lake, about six miles to the south-west (King's Co.), in the Province of New Brunswick. Anal., G. C. Hoffman, Rep. Geol. Can., 1878-79, p. 4 h.

133. IRIDOSMINE—Occurs, as first observed by Dr. T. S. Hunt, in the form of small hard steel-grey plates, associated with the native platinum found in the gold washings of the Rivière du Loup, Beauce County, Province of Quebec.

134. IRON-OGHRE—Extensive deposits of iron-ochre (*var.* limonite) are met with in numerous localities in the Province of Quebec. A remarkable deposit of this material is found in St. Anne (Montmorency Co.), and very large beds of the same occur in Cap de la Madeleine (Champlain Co.), and in Pointe du Lac (St. Maurice Co.). Amongst other places, where deposits of more or less importance occur, may be mentioned the Counties of Bonaventure, Joliette, Laval and Vaudreuil. In the Province of Ontario, beds of ochre are met with in Walsingham (Norfolk Co.), Esquesing (Halton Co.), Sydenham (Grey Co.), Nottawasaga (Simcoe Co.), and other townships. Chemical examination of iron-ochres, T. S. Hunt, Geol. Can., 1863, p. 512.

(To be Continued.)



NOTICE

Re ONTARIO CROWN LANDS.

CROWN LANDS DEPARTMENT,
TORONTO, Nov. 29th, 1890.

NOTICE IS HEREBY GIVEN that the lands lying between the east limit of the Township of Awrey, in the District of Nipissing, produced north and south, and the west limit of the Townships of Esten and Spragge, in the District of Algoma, produced north, are withdrawn from sale or location from, and including the first day of December, now next, and no further sales or locations will be made of lands within said limits until further notice, except in cases:—

1. Where application has been duly made and the purchase money has heretofore been paid into the Department; or

2. Where application has been made and a large proportion of the purchase money has heretofore been paid, and where a substantial expenditure of money has been heretofore made in developing or in completing a survey of the location.

No application heretofore made unaccompanied by the purchase money for lands in the said limits except as aforesaid, will be considered.

ARTHUR S. HARDY,

Com. Crown Lands.



SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Caisson," will be received at this office until Friday, the 5th day of December next, inclusively, for supplying, erecting and completing in place, a Wrought Iron Caisson for the Dry Dock now in course of construction at Kingston, Ont., in accordance with the plan on exhibition at this office, and at the Engineer's office, 30 Union Street, Kingston, and with the conditions and stipulations contained in a Form of Tender, copies of which can be obtained on application to the undersigned, and W. O. Strong, Esq., Resident Engineer, 30 Union Street, Kingston, Ont.

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

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

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

By order,

A. GOBEIL,

Secretary.

Department of Public Works,
Ottawa, 19th Nov., 1890.

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NOTICE TO CONTRACTORS.

SEALED TENDERS addressed to the undersigned and endorsed, "Tender for the St. Lawrence Canals," will be received at this office, until the arrival of the eastern and western mails on Wednesday, the 3rd day of December next, for the construction of a lift lock, weirs, etc., at Morrisburg, and the deepening and enlargement of the Rapide Plat Canal. The work will be divided into three sections, each about a mile in length.

A map of the locality, together with plans and specifications of the respective works, can be seen on and after Wednesday, the 10th day of November next, at this office, and at the Resident Engineer's office, Morrisburg, where printed forms of tender can be obtained.

In the case of firms there must be attached to the tender, the actual signatures of the full name, the nature of the occupation and residence of each member of the same, and, further, an accepted cheque on a chartered bank in Canada for the sum of \$6,000, must accompany the tender for Section No. 1, and an accepted cheque on a chartered bank in Canada, for the sum of \$2,000 for each of the other sections.

The respective accepted cheques must be endorsed over to the Minister of Railways and Canals, and will be forfeited if the party tendering declines entering into contract for the works at the rates and on the terms stated in the offer submitted. The cheques thus sent in will be returned to the respective parties whose tenders are not accepted.

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

By order,

A. P. BRADLEY,

Secretary.

Department of Railways and Canals,
Ottawa, 7th November, 1890.



Money Orders.

MONEY ORDERS may be obtained at any Money Order Office in Canada, payable in the Dominion and Newfoundland; also in the United States, the United Kingdom, France, Germany, Austria, Hungary, Italy, Belgium Switzerland, Portugal, Sweden, Norway, Denmark, the Netherlands, India, Japan, the Australian Colonies, and other countries and British Colonies generally.

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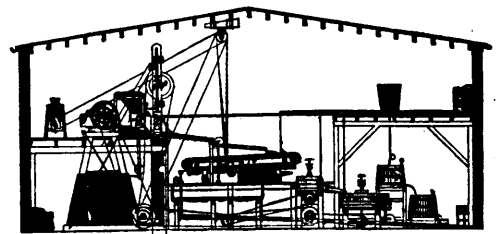
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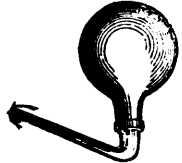
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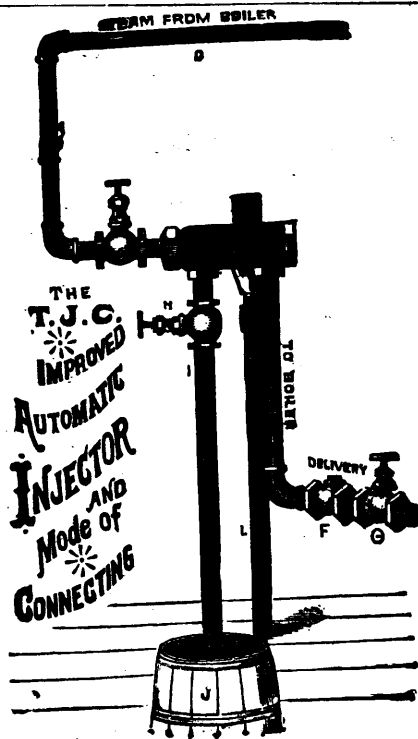
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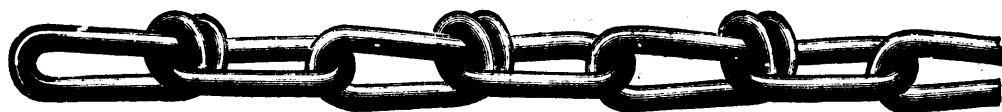
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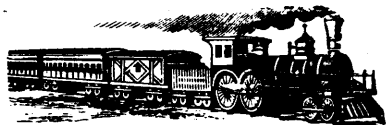
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Mining Regulations

TO GOVERN THE DISPOSAL OF Mineral Lands other than Coal Lands, 1886.

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

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

QUARTZ MINING

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

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

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

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

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

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

IRON.

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

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

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

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

PLACER MINING.

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

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

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

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

THE SCHEDULE OF MINING REGULATIONS

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

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

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

A. M. BURGESS,

Deputy Minister of the Interior



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— AND —

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GOLD AND SILVER.

Under the provisions of chap. 7, Revised Statutes, of Mines and Minerals Licenses are issued for prospecting Gold and Silver for a term of six months, which can be extended by renewal for another six months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. Up to ten areas the cost is 50 cents per area, for every area in addition in same application 25 cents. Cost of renewal one half the original fees. Leases of any number of areas are granted for a term of 21 years at \$2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at \$19.00 an ounce, and in smelted Gold valued at \$18.00 an ounce.

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

MINES OTHER THAN GOLD AND SILVER.

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

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

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

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

The royalties on the remaining minerals are :—Copper, four cents on every unit ; Lead, two cents upon every unit ; Iron, five cents on every ton ; Tin and Precious Stones, five per cent. ; Coal, 7½ cents on every ton sold.

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

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

THE HON. C. E. CHURCH,

Commissioner Public Works and Mines,

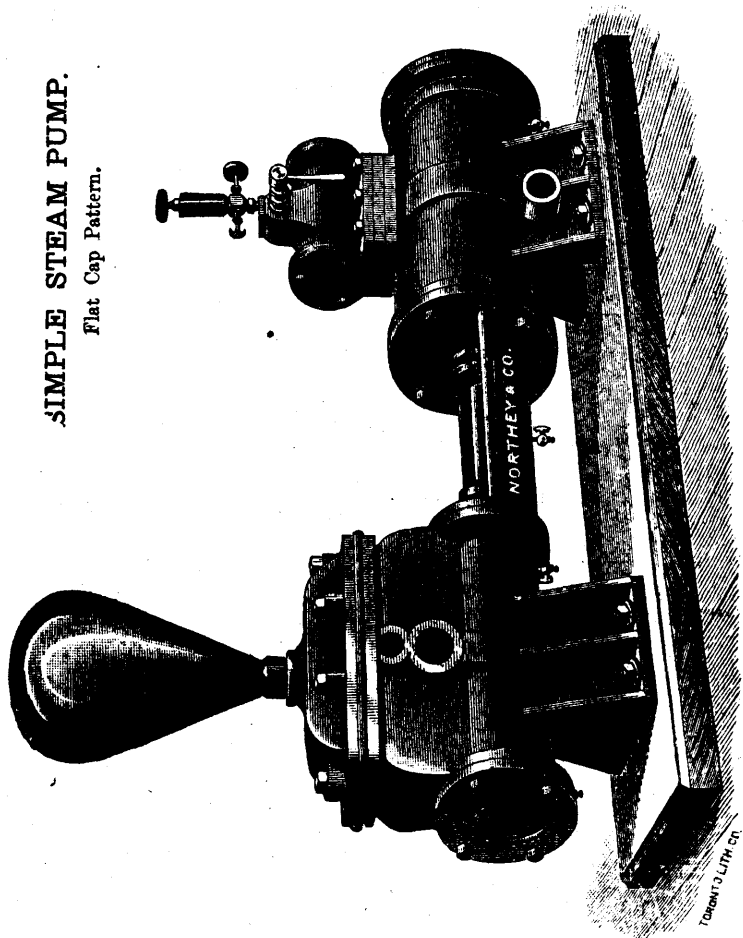
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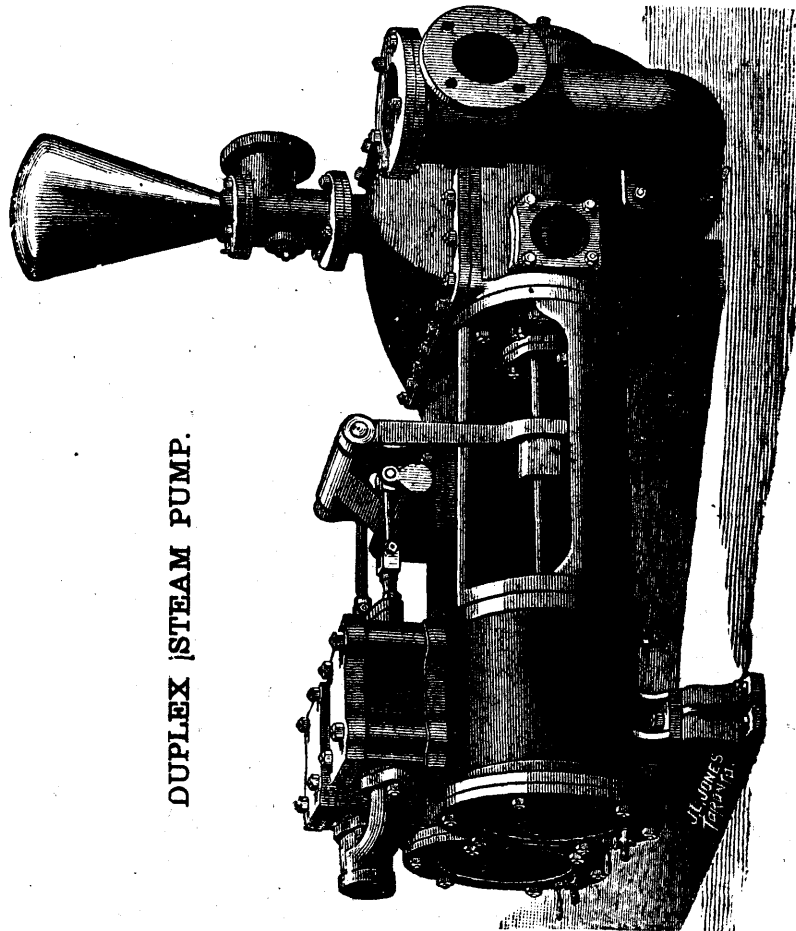
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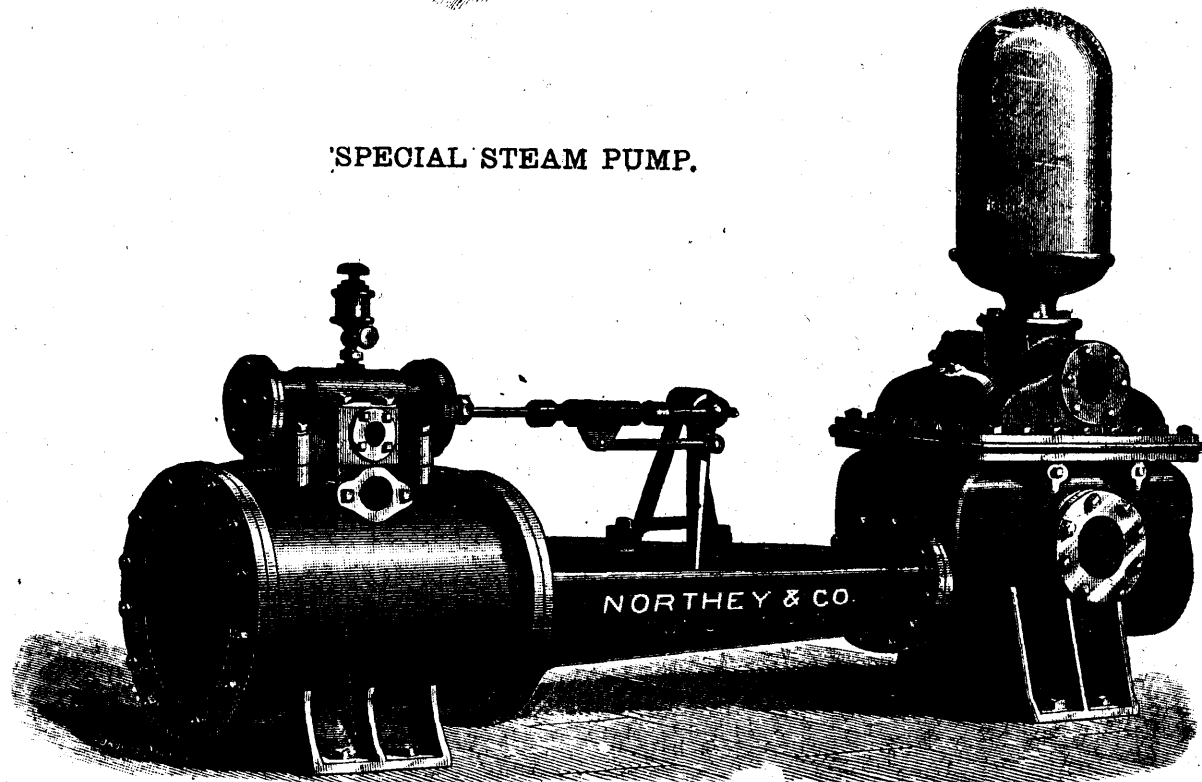
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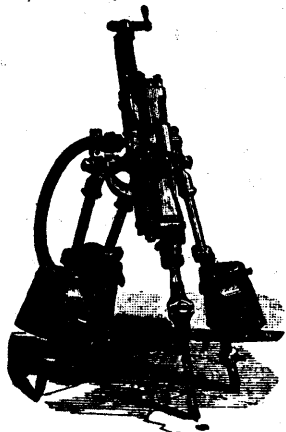


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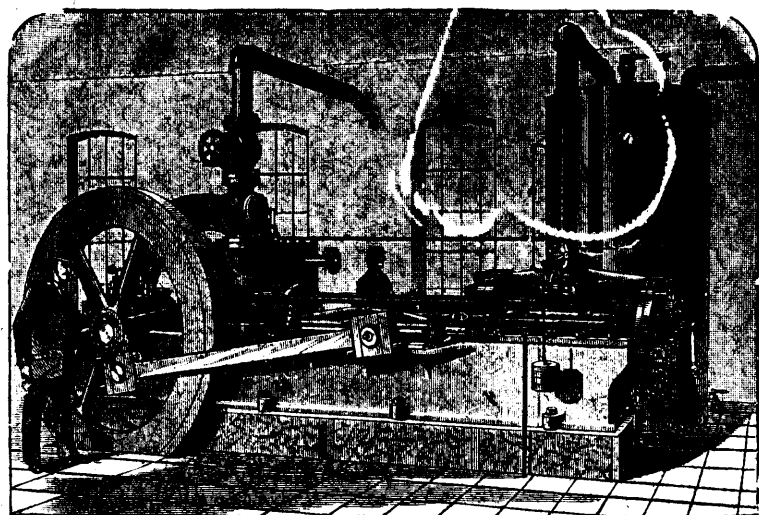
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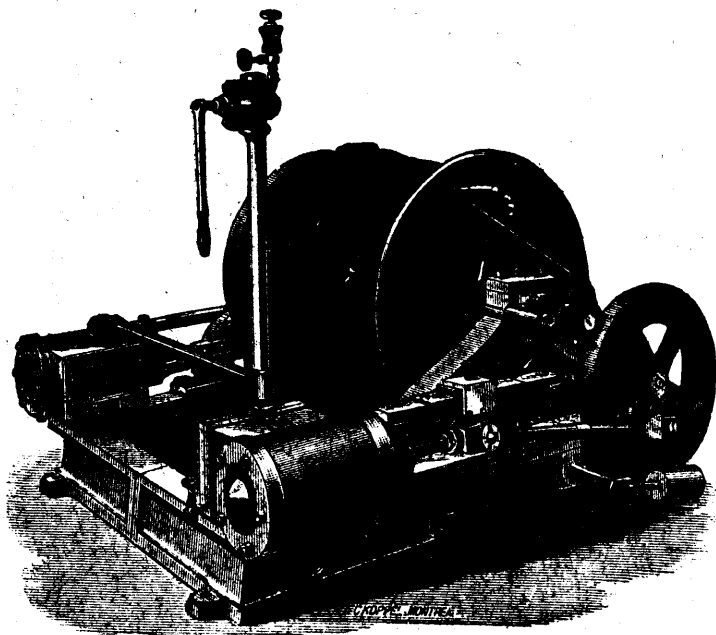
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