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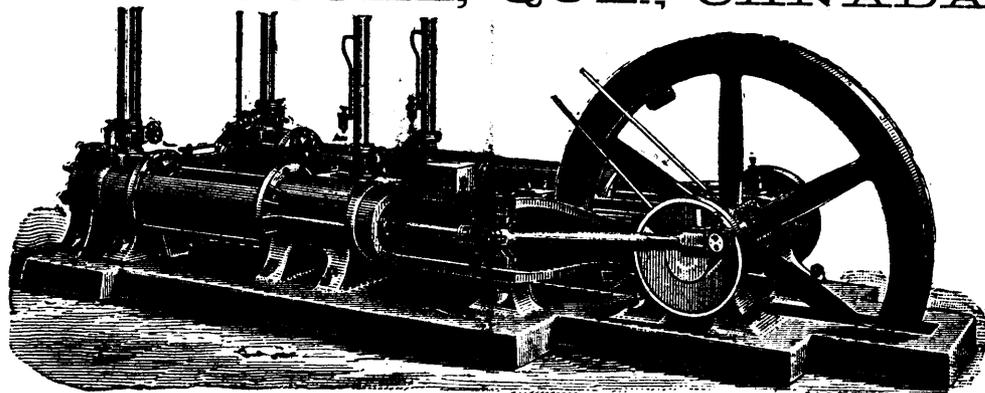
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1892—OTTAWA, SEPTEMBER—1892.

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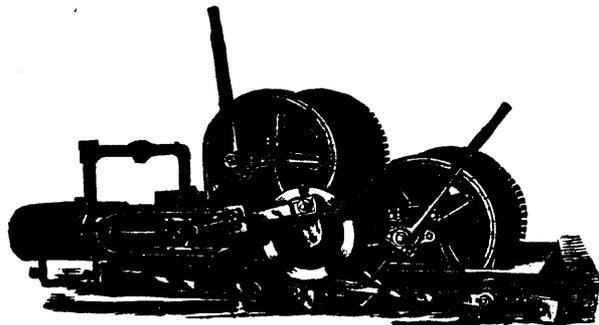
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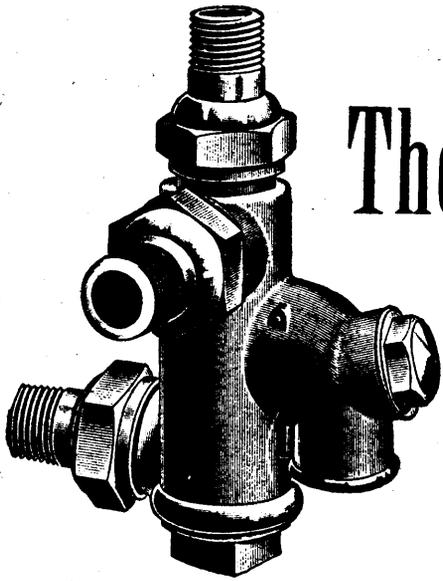
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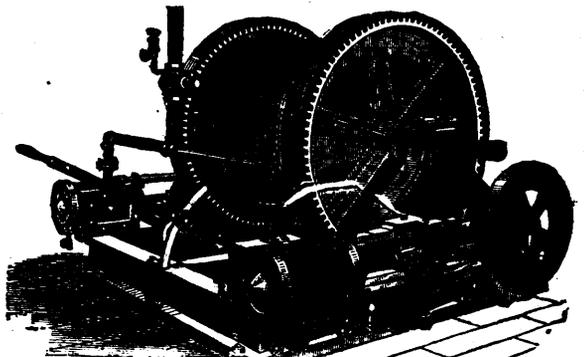
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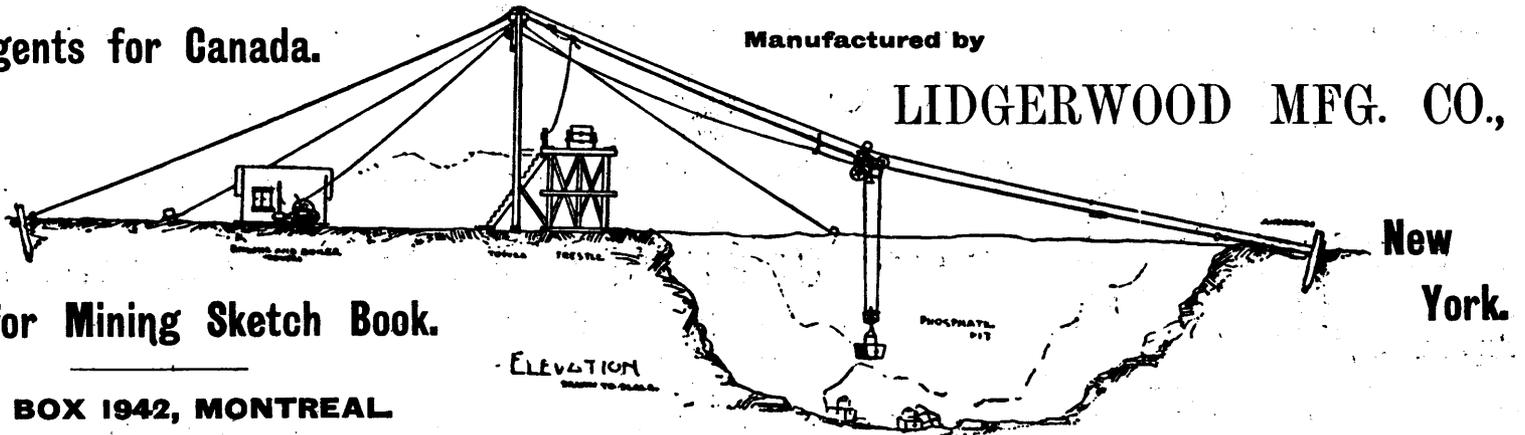
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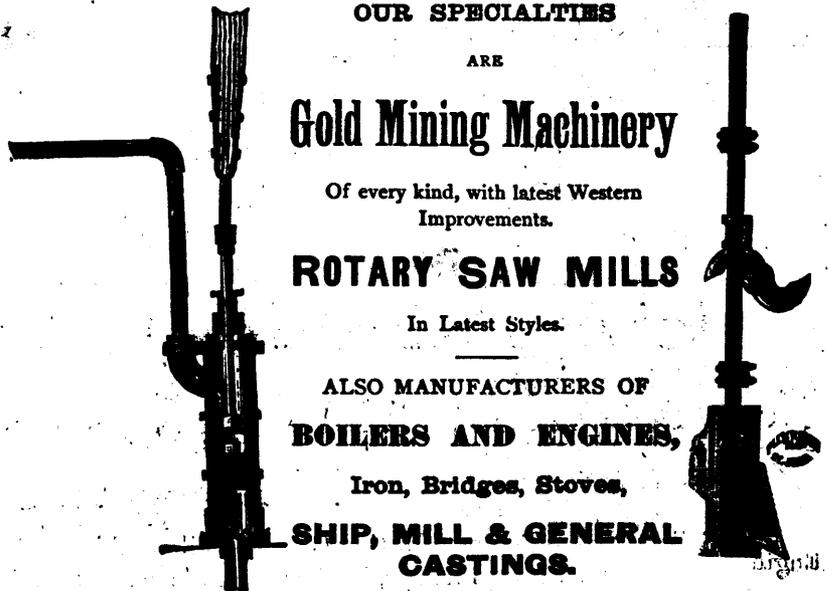
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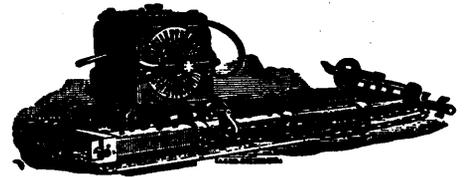
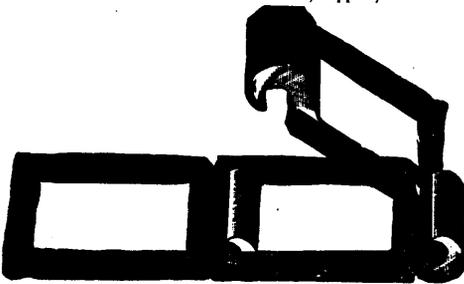
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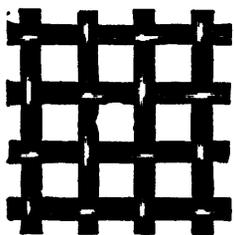
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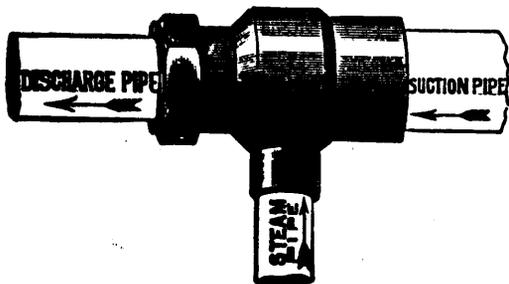
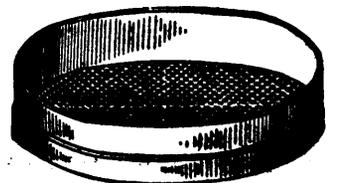
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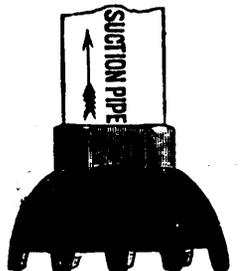
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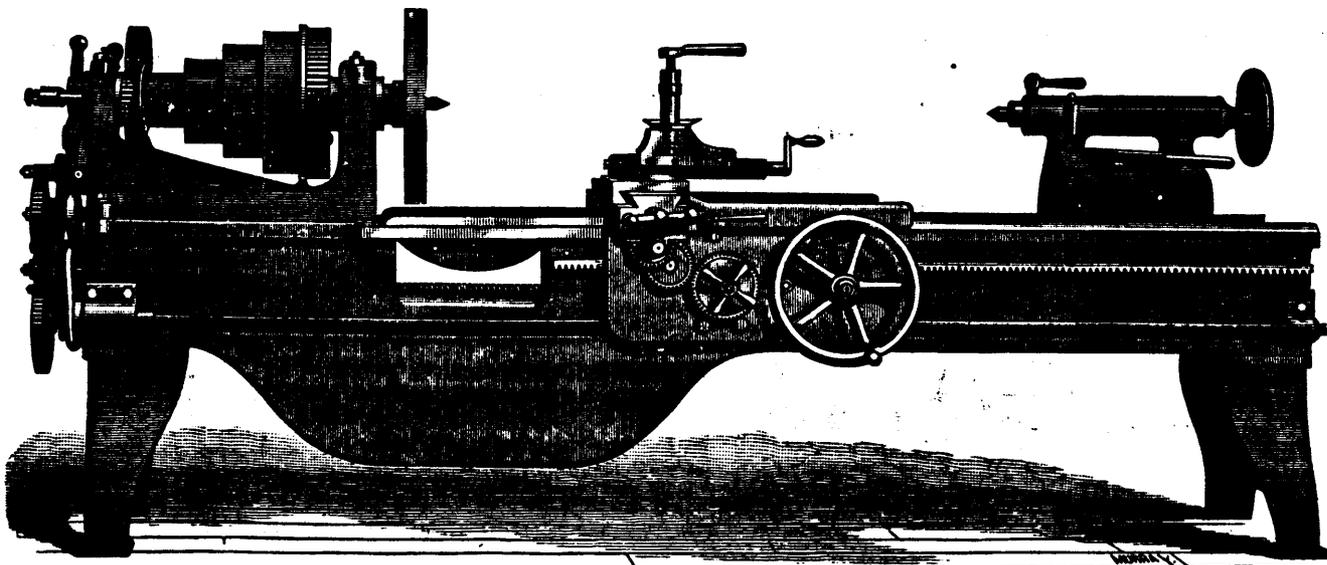
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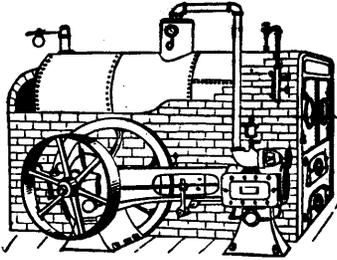
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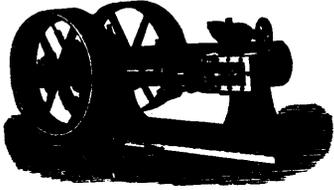
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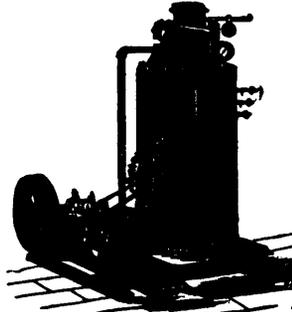
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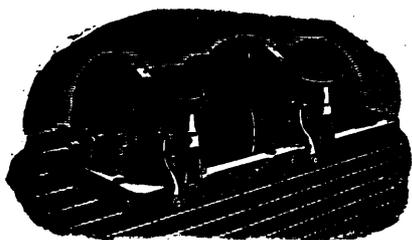
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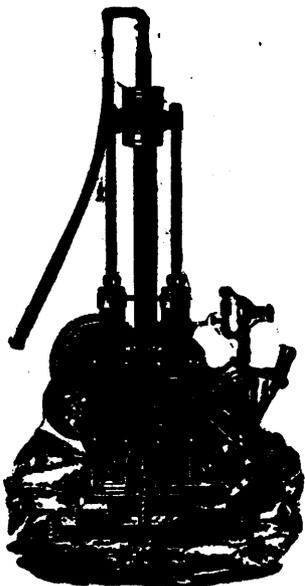
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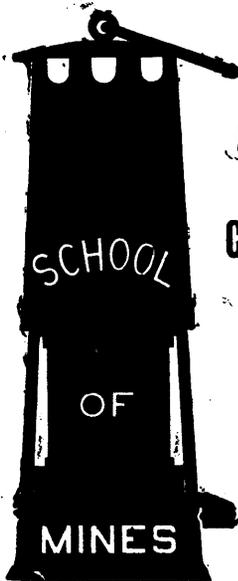
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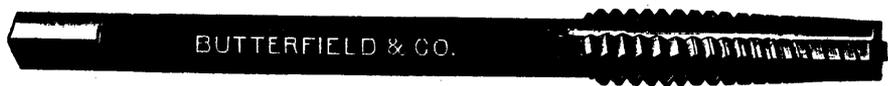
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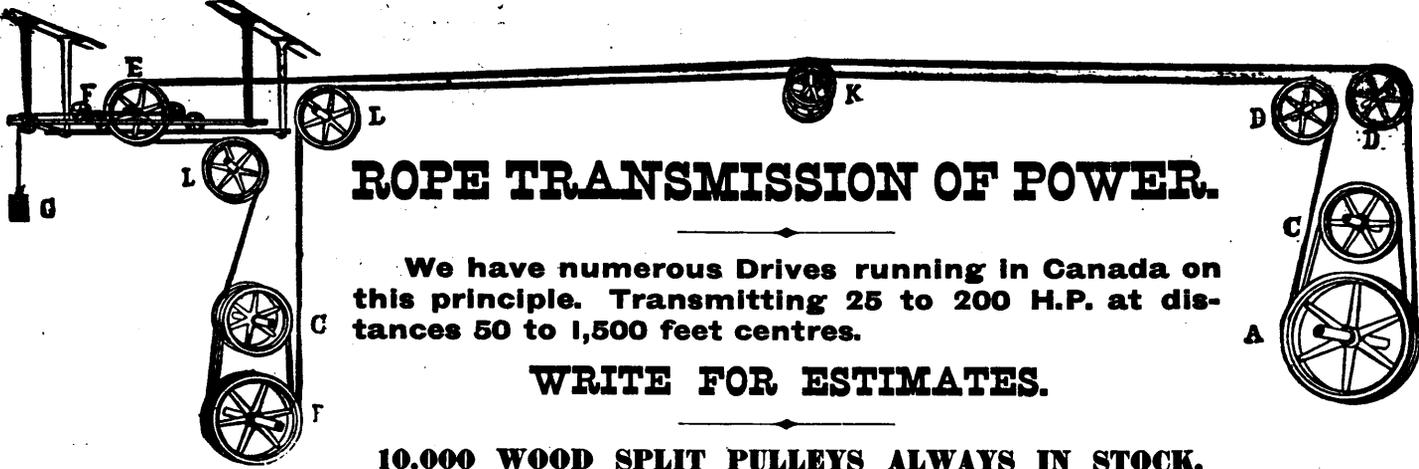
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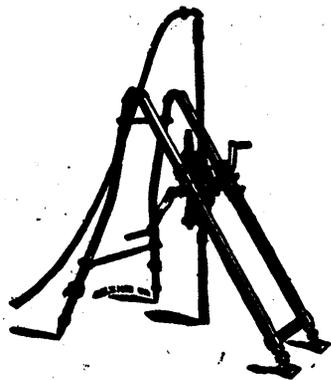
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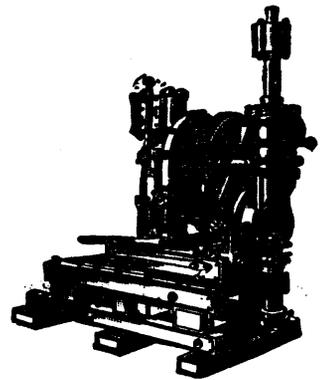
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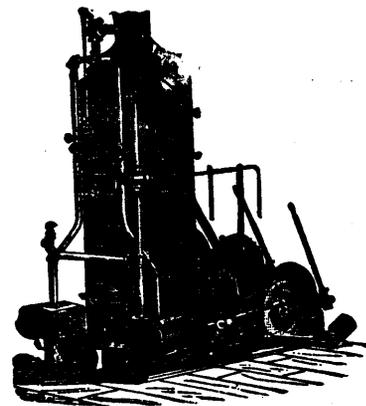
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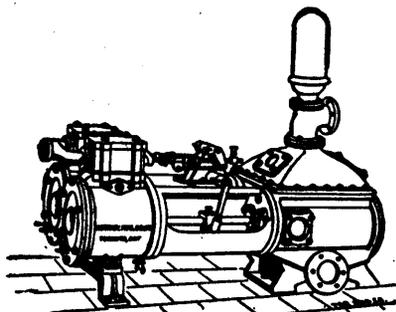
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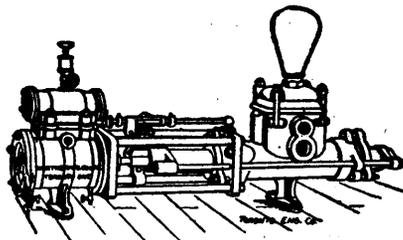
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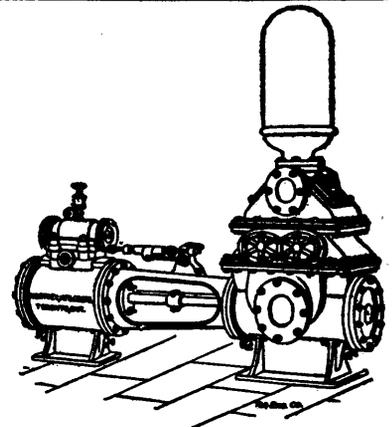
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THE following Resolutions of Council indicate beyond a peradventure the status of THE REVIEW as the exponent of the Canadian Mineral Industries:—

The Gold Miners' Association of Nova Scotia.

"At the annual meeting of the Gold Miners' Association of Nova Scotia, held at Halifax on 6th March, 1899, THE CANADIAN MINING REVIEW was adopted the official organ of this Association.
(Signed),
B. C. WILSON, President,
G. J. PARTINGTON, Secretary.

The Mining Society of Nova Scotia.

"Moved by Mr. R. G. Leckie, seconded by Mr. C. A. Dimock, That the thanks of the Society be tendered to Mr. H. T. A. Bell for his kind offer placing the columns of THE REVIEW at the disposal of the Society; and that THE CANADIAN MINING REVIEW be hereby appointed the official organ of the Society."
(Signed),
H. S. POOL, President,
H. M. WYLAND, Secretary.

The Asbestos Club, (Quebec.)

"Resolved: That THE CANADIAN MINING REVIEW be, by authority of the Members and Council, hereby appointed the official organ of the Asbestos Club."
(Signed),
D. A. BROWN, President,
A. M. EVANS, Secretary.

The General Mining Association of the Province of Quebec.

"At a meeting of Council held at Montreal on Friday, 6th May, 1899, it was moved by Captain Adams, seconded by Mr. R. T. Hopger, and resolved: That THE CANADIAN MINING REVIEW be the official organ of the Association.
(Signed),
GEORGE IRVING, President,
H. T. A. BELL, Secretary."

OFFICES:

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Vol. XI. SEPTEMBER, 1892. No. 9.

Iron Making in Nova Scotia.

The advancement of this important industry in the Province of Nova Scotia during the present year, has afforded a pleasing contrast to the general dulness in mining matters. In the coal, iron and gypsum industries, little gain has been made up to the present date, although it is expected that greater activity will be seen during the remainder of the year.

The announcement of the successful blowing in of the New Glasgow Iron, Coal and Railway Company's furnace at Ferrona, in Pictou County, is a welcome one. This is an important step ahead and a legitimate one. Nowhere on the Atlantic coast are varied iron ores, fluxes and fuel, found in the same juxtaposition and under equally favourable natural conditions for transport, access and facilities for mining, smelting, and local markets. It is yet too soon to state accurately the regular yield of the furnace, but already local foundries and other works are utilizing a good and cheap pig iron smelted at their doors. There is now a foundation along the East River of Pictou, for a score of iron, metal, shaping and moulding factories, to deal with the varied requirements of the farmer, shipbuilder, coal miner, etc. The new railway of the company intersects the band of ferrous

strata extending for fifty miles from the French River, and which is crossed by the Intercolonial railway at each end.

The operations of the company have disclosed large and valuable veins of brown hematite, from which, if desired, over 400 tons of ore can be raised daily; the present output being about 200 tons. Their fluxes are quarried alongside the iron ore. In this large territory there are several valuable properties as yet untouched, among which may be mentioned the Bartlett areas covering some twelve square miles of several varieties of iron ore, and the Holmes property, similar in extent and in the variety of its ores.

The development of this wonderful repository of the most valuable of the ores of iron has not been confined to the New Glasgow Company. The Pictou Charcoal Iron Company has acquired several tracts of excellent brown hematite ore on the line of the new railway, and having erected the necessary furnace, buildings, foundries, etc., is entering upon the manufacture of charcoal-iron, car wheels, etc.

There is room at present for another furnace here, and for plants to make bar, sheet, and other iron, and for another steel works similar to that at Trénton, near New Glasgow. So much for the present; there can be no doubt that in five years' time there will be an opening here for many times the present production of pig, steel, etc.

There are large tracts in this district still unexplored and at the disposal of the Government, and the owners of the leases and other properties proved to contain iron ore, are willing to assist in every way the further introduction of capital. During the present year interested parties have surveyed a line of railway about sixty-five miles in length, to connect the railway of the New Glasgow Company at Bridgeville with Country Harbor, one of the best ports on the Atlantic. This road runs for its greater length through a fertile river valley past several important gold mines, and when completed, will form a ready outlet for every industry in Pictou County, and indirectly promote the iron business.

At Londonderry work has been continued with more satisfactory results. At Torbrook, in Annapolis Valley, the iron mined is of excellent quality (the ores are fully described elsewhere in this issue), and has been much appreciated at the Londonderry furnaces which take the output of the mine. This property is well equipped with modern machinery and can furnish 200 tons a day. There are several other veins of good quality in this district, and they may be utilised for mixture with the East River limonites for the New Glasgow Company's furnace.

Enquiries are also being made by parties who contemplate re-opening the Clementsport mines in Annapolis County, and commencing the manufacture of charcoal iron. These encouraging facts warrant the hope that the iron industries of the Province are beginning to grow steadily if slowly.

EN PASSANT.

The Department of Crown Lands, Toronto, has just issued, in handy pamphlet form, the Mining Act of the Province.

We regret to record this month the death of Mr. John Weir, Underground Manager at the Caledonia Colliery, Cape Breton. Mr. Weir was in the prime of life and was highly esteemed by the coal men of Nova Scotia.

At the meeting of the Asbestos Club, to be held in the Club House, at Black Lake, Que., on Thursday, 29th instant, Mr. J. Obalski, Government Mining Inspector for the Province, will read a paper on "The History of Mining in Quebec."

The members of the Mining Society of Nova Scotia who turned up at Londonderry on 7th instant were rewarded with a thoroughly interesting and enjoyable outing. Charming weather favored the event, and the attendance was creditable. The proceedings included a visit to the smelting works of the Londonderry Company, a number of valuable papers descriptive of the new plant in place, and the nature and occurrence of the ores mined and treated in the neighbourhood. Through an unfortunate misunderstanding the visit to the East and West mines was very reluctantly abandoned in order to permit the party returning by an early train to Truro. Too much praise cannot be given to Mr. R. G. Leckie and his co-workers on the local committee for the very excellent arrangements provided for the reception and entertainment of members while in Londonderry.

The following account of the process invented by Drs. Readmann and Parker for obtaining phosphorus in an electrically heated furnace, is taken from the *Electrotechnische Zeitschrift* through the *Chemiker Zeitung*. The furnace is made of refractory materials in a rectangular trough shape 1.5 metres long, 0.5 metres wide and 0.9 metres deep, a cast iron tube being built in each side, through which pass the carbon electrodes. The electrodes are compound, consisting of a bundle of 9 thin carbons, 1.2 metres long and 6.3 mm. thick, and can be moved forward as consumed by a screw. In reducing the metaphosphates, peat is used instead of fine coal. The crude material is introduced through a funnel which prevents the loss of heat ores or escape of phosphorus vapor. The vapor of the phosphorus is conducted to copper condensers. The phosphorus produced by this method is so pure that little or no refining is required, and in consequence the profits are large.

The gold and silver and other mineral exhibits at the Chicago World's Fair will probably aggregate in value several million dollars. In exhibits of this description it is expected that Colorado will take front rank. It is announced that the gold and silver nuggets to be shown by that State alone are worth 250,000 dollars. There has been made a splendid collection of

native gold specimens from all the rich mining districts. A single collection valued at 60,000 dollars, has already been secured. This will be supplemented by the finest collections secured as loan exhibits. The exhibit will be both technical and economic in its character, showing a scientific classification of the mineralogy of Colorado and a correct presentation of its geology. At the same time a popular and massive display of ores, building stone, commercial clays and other mineral products will be made. Models, maps and diagrams will be employed to show the progress made in mining. These will be accompanied by historical data and reliable information regarding the product and formation of veins in the mining districts. In the display will be the "Silver Queen," a beautiful statue of an ideal female figure executed in silver, and valued at 7,500 dollars to 10,000 dollars.

Dr. David T. Day, Chief of the Division of Mining Statistics and Technology, United States Geological Survey, has issued his annual report on the "Mineral Resources of the United States," for the calendar years 1889-90. The volume covers about 700 pages, and, as usual, contains a vast amount of valuable information respecting the mineral industries of our progressive friends across the line. We often wonder, in referring to this work, how long it will be before our own Survey becomes alive to the necessity of a yearly publication that will give the public something beyond a mere compilation of antiquated and useless statistics.

A most encouraging outlook for the mica industry is its connection with the increasing use for the scrap product, which accumulates in about the proportion of ten pounds of waste to one of cut sheets, even when the cut sheets take in the smaller size used for stoves. By mills located at different points in the United States, notably in Denver, Richmond, New York and Boston, a large proportion of this is now ground and used for making lubricants, for insulators, and in wall paper.

According to Dr. Day's report, the States producing mica in 1889, were New Hampshire, North Carolina, Virginia, and South Dakota. The total product in that year was 49,500 pounds, valued at \$50,000 at the mines in the condition it was first sold. In addition to this, 196 short tons were sold for grinding purposes, with a value of \$2,450. In 1890 there was an improvement. The product amounting to 60,000 pounds, worth \$75,000 at the mines. The sale of scrap mica, sold for grinding purposes, increased also to 300 tons.

No new deposits of nickel of proved value, writes Dr. Day, have been found in the United States, although discoveries have been reported in North Carolina, the Black Hills of South Dakota, and in Idaho; the Gem mine, in Fremont County, Colorado, was developed slightly. The Canadian mines, therefore, continue as the chief

factor in the supply of the world. Dr. Day estimated the total yield of metallic nickel from Canada in 1889, at 2,500,000 pounds contained in matte, which formed the article of export; and in 1890, 1,336,627 pounds.

The New Caledonia mines still continue to furnish a proportion of the world's supply, although the deposits are pockets of uncertain extent. Dr. Day reports the cost of mining as being considerable, the labor uncertain and the transportation facilities poor.

We clip the following from a recent issue of the *Australian Mining Standard*:

"Our contemporary, the *Canadian Mining Review*, is evidently at one with ourselves in the exposure of mining swindling and swindlers. In its April issue summary justice is dealt out to a Mr. Charles M. Dolson, who, it appears, has been victimising leading merchants and capitalists in various parts of the Dominion by posing as a mining expert, an Associate of the Royal School of Mines, &c. The *Review* now denounces him as a 'fraud, dead beat, and imposter of the very worst character'—an 'unscrupulous and wholly unprincipled person, entirely devoid of any mining knowledge or ability, proved to be a liar almost without parallel in the mining language, but we repeat it because it is just possible that Mr. Charles Miles De Tracy Dolson may visit Australia, now that America is too hot to hold him. In the May issue of the *Review* a portrait of Dolson is given. Unfortunately for the public who put their trust in unscrupulous mining experts in these colonies, the action of the press, which often has the information necessary to enable them to issue specific warnings, is trammelled by absurd and unjust libel laws, and we admire outspokenness such as that now referred to, but we are not able to follow such a courageous example without incurring ruinous penalties."

Some interesting facts respecting the gold mining industry is given in the report of the Queensland Department of Mines. There has been a shrinkage in the total yield of 34,148 oz., the figures for 1890 and 1891 being, respectively, 610,587 oz., and 576,439, but increases are recorded on twelve fields as against nine on which there has been a falling off. In the total production Queensland heads Victoria in the inter-colonial race for first place by only 40 oz., while New Zealand comes out as a respectable third with 251,335 oz., and New South Wales with 153,335 oz. Nearly all other branches of mining show a decrease, but as the report says: "The true cause of failure of mining enterprises in so many instances hitherto must not be sought in the poverty of the ground, but, no doubt, the true explanation lies in the fact that the areas tried to be held are so frequently out of all proportion to the capital of the entrepreneurs, and which in only too many instances must be set down as *nil*. I am glad that the old idea, that land applied for to-day for mining purposes by some enterprising individual becomes from that fact alone worth thousands and tens of thousands of pounds to-morrow, is fast exploding, and I trust that but very seldom it will be heard of hereafter. This system has been and I regret to say is even now, retarding the progress of the mining industry, and we shall have to look to the investing public to effect a radical cure in this direction, simply by looking closely into the *bona fide* values of the properties, and also quite as much into the expenditure of their money afterwards. I cannot see any reason why money put into mining in the great majority of cases should not become as safe an investment as any other."

Some time ago a reduction works was erected at Rat Portage from which great things were expected for the ores from the Lake of the Woods district. But the ignorance and incapacity of the mining quack has again wrought another dismal failure if one may judge from the following remarks of a correspondent: "One hates to be continually on this subject, but it is a difficult matter to keep quiet and see the sinful manner in which good time and money has been wasted through criminal ignorance and incapacity. It is not right to lay the whole of the blame upon the shoulders of the present management, as the costly machinery which has proved so woeful a failure was placed in position by their predecessors. The trouble is that the place has been over-run by adventurers from the other side, who, possessed of a few glib geological phrases and mining terms sufficient to conceal for the time being their abject and total ignorance of everything connected with practical mining, have posed as experts and authorities, and have assisted with their valuable advice in retarding and destroying mining developments in this neighbourhood."

It is stated that the German Government has ordered that in future all official statements on temperature are to be made according to the centigrade scale. In this case the Réaumur scale will probably fall entirely out of use. The three thermometrical scales in general use are those of Fahrenheit, Celsius, and Réaumur—the first used in Britain, the second in France, and the third in Germany. The scale of Celsius is called the centigrade, from the fact that the difference of temperature between the freezing and the boiling points of water is divided into 100 degrees. Fahrenheit divided the same space into 180 degrees, probably with reference to the number of angular degrees in a semi-circle, and in Réaumur the same space is divided into eighty degrees. The centigrade is considered the most scientific. The Fahrenheit has the drawback that it fixes zero at a point, namely, 32 degrees below the freezing point of water, which has no special warrant in nature. It is supposed that this was the greatest degree of cold he had himself observed producible by means of some freezing mixture. In the centigrade the freezing point is made at zero, not in the sense of its being the lowest temperature reachable, but as a convenient starting-point, temperatures below that point being expressed by the addition of the minus sign. In this scale - 32 denotes the zero of Fahrenheit. The Fahrenheit thermometer has obtained so firm a hold in this country that it will be difficult to displace it, but it would certainly be an advantage to have the centigrade scale in universal use.

Captain Samuel S. Brown, a colliery owner, of Pittsburgh, a short time ago found it desirable to introduce into his mines electrically-operated coal mining machines. Not finding at that time on the market a machine that he considered perfectly suitable for cutting Youghiogheny coal,

he had designed a machine of the under-cutting type to suit the peculiar requirements of the case. A peculiar feature of the operation of the machine is that it advances on its own level, making a perfectly smooth floor without any off-sets, which are peculiar to some under-cutting machines. The particular advantage of this machine will be understood when it is stated that it can cut in a solid "breast" of coal without "partings," which are necessary when certain other machines are employed. The machine consists essentially of two parts, viz., a bed and a movable portion. The last-named part of the machine consists of a supporting frame, a motor, sprocket wheel, feed gearing, and a chain carrying cutting-bits. In operation the bed rests immovable upon the floor of the mine, and the portion carrying the motor and cutting chain is fed forward against the coal. The motor, running at a speed of only 150 revolutions per minute, drives the cutting chain directly through a sprocket wheel attached to the revolving field shaft. There is no immediate gearing beside the sprocket wheel between the motor shaft and the cutting chain. The manufacturers, it should be stated, call particular attention to the fact that the only gearing employed on this machine, outside of the sprocket wheel on the armature shaft, is that employed to drive the feeding nut on the screw. The motor for the Brown coal-cutting machine is a 220-volt 15-horse power machine, and weighs about 500 lbs. As before stated, it runs at only 150 revolutions per minute. This motor is of the multipolar field type, and the field revolves with its shaft in a vertical position while the armature remains stationary. The dimensions, over all, of the coal cutter, are 8 feet when the machine is closed up, or telescoped, as it were, and 30 inches in height. When the cutting mechanism is projected to the fullest extent it will make an undercut 5 feet deep by 3 feet wide by 3 inches high. As to the operation of the machine it may be said that it has been working in the mines in the Youghiogheny coal, which, next to the limestone, is extremely hard, since the 3rd of March last. Cuts by this machine are being made in this grade coal in the time of 2½ minutes per cut.

Profit sharing in the coal trade has been the subject of some newspaper discussion in the north of England lately. It has been initiated by Mr. Geo. Wm. Spence, an accountant, of Newcastle, who has had for some time under his consideration a plan for adjusting wages, which, having received the favor of many interested persons, he now places before the public. His scheme is based upon the principle that capital is entitled to receive in all states of trade some return for its employment. He therefore sets aside a part of the coal fund—that is, the money derived from the sale of coal—as interest on capital and for the return of sunk capital. Another portion is deducted for current expenses, and the remainder is taken as the fund out of which wages should be paid in a certain proportion to the other expenses, and

the surplus, if any, divided between capital and labor, this surplus being distributed in the case of labor by a percentage added to the wages fund during the next period. He supposes a case. Ten per cent. is set aside as interest on capital, all the other expenses are deducted from the coal fund, and the remainder is left to meet wages and profit. There is, say, a surplus of £50,000; he divides this sum one-fourth to labor, £12,500—an addition of about 2½ per cent. to wages, and allots the other three-fourths, £37,500, to capital—equal to about 3¾ per cent. These percentages would vary, of course, with each alteration in average selling prices. In his calculations he assumes a capital of £1,000,000, and sales of 3,000,000 tons of coal, at an average price ranging from 4s. 8d. to 10s. per ton. The periods for regulating wages would be every six months. The actual net profits upon the capital employed would be treated as the average profit of the district, and if the returns were disputed by the workmen the results could be proved before any board of arbitration. Mr. Spence thinks such a system would reduce the number of strikes, if it did not prevent them altogether. In the discussion which has taken place considerable objection has been offered to the scheme. The interest on capital and the proportions in which the profits are to be divided between capital and labor are declared by one writer to be empirical. He states that Mr. Spence has neglected brains altogether—i.e., the share of the management in profits whether the manager be the capitalist or his employé. A similar objection is taken by another writer signing himself "Accountant." In his letter, evidently based upon a firm knowledge of the trade, this writer points out many difficulties. He asks whether the expenditure on plant, shafts, railways, &c., would be allowed? Then he contends that the question of the capital employed would raise contention, inasmuch as many collieries have in good times wrote down the apparent capital from the profits, while others have allowed their capital to remain unreduced while all the time their leases have been running out or their mineral deposits have been diminishing. More than this, he says—and says truly—that a few years ago an average of the principal Northumberland collieries yielded a loss year by year. It would be natural, he thinks, for the owners in more prosperous years to wish to recoup themselves for the previous losses together with the interest on capital which they had not been able to obtain, and all this he imagines would lead to dissatisfaction. A county average, however, he believes is the most serious objection to the scheme. It would place the old collieries and the new, the deep and the shallow, the wet and the dry, all on one level. The profitable and the unprofitable are to be made alike, and the result would be that the poor collieries, with their distant workings, old and thin seams and expensive pumping, stand a chance of having their expenditure in wages increased because their more fortunate brethren have yielded good profits, and have, therefore, run up the

average. In the opinion of this correspondent a new sliding-scale agreement is to be perfected to the scheme proposed. Mr. Spence, replying to his critics, states that the salaries of officials are included in the general expenses other than labour. Collieries losing money would be taken into account in ascertaining the average net receipts of the district, but the profit or loss of any individual colliery would not be disclosed. The whole of the accounts of any district would be, he says, condensed into one account for the purpose of settling the proportions of surplus profit to be allotted to capital and labour after payment of "all other expenses," but all the points he says are matters of detail to be considered and worked out before trying the plan he suggests.

Dr. Vortmann, in *Chemiker Zeitung*, gives a method of electrolytic separation of metals which may prove of considerable metallurgical value. According to his experiments, substances held in suspension in an electrolytic bath, such as hydrate of iron, or the sulphides of copper or lead, do not exercise any influence upon the separation of the metals dissolved in the bath; thus, nickel and cobalt could be quantitatively separated by an excess of ammonia from the solution in which iron is precipitated and held in suspension. His experiments show that zinc cannot be separated from iron in this manner, but the same result is obtained by transforming the iron into a ferrocyanide by the addition of cyanide of potash and an alkali. It was found that such a solution with an excess of alkali was not decomposed by an electric current even though this continued to act during several days. In the electrolytic estimation of zinc, cobalt and nickel, it is best to add alkaline carbonates and a little tartrate of potash to the solution. In the presence of caustic alkalies, the nickel cannot be separated in the metallic state; it remains dissolved or is precipitated as oxide or as carbonate. Upon this fact Dr. Vortmann has based a process for the separation of cobalt from nickel. In order to avoid the formation of hydroxide of cobalt at the positive pole, a small quantity of iodide of potash is added to the solution; the iodination obtained is complete. Iron can be separated completely from its alkaline solution, to which tartrate of potash has been added, but, as has been remarked by Mr. Edward Smith, the metal deposited always contains a little carbon, as when iron is precipitated from a tartrated ammoniacal solution; consequently, the results obtained are a little too high, say, from 0.05 to 0.25.

The record of accidents in Canada this month is a heavy one. The fatalities include five men killed and one seriously injured by fall of roof at the Blezard nickel mine, Sudbury, Ont.; three men killed in the Pictou collieries; one man badly hurt in the asbestos country, Quebec; with several minor casualties in British Columbia. We are pleased to learn that Mr. A. Blue, Director of Mines for Ontario, is investigating the Sudbury affair. No blame is attachable to the management for the others.

Successful Excursion Meeting of the Mining Society of Nova Scotia at Londonderry.

The second Quarterly General Meeting of the Mining Society of Nova Scotia was held at Londonderry on Wednesday, 7th September. There were present: H. S. Poole, F.G.S., A.R.S.M., Acadia Coal Co., Stellarton; David McKeen, M.P., Caledonia Coal and Railway Co., Sydney, C.B.; John F. Stairs, M.P., New Glasgow Coal, Iron and Railway Co., Halifax; John E. Hardman, S.B., Oldham Gold Co., Oldham, N.S.; B. C. Wilson, Waverley, N.S.; T. R. Gue, Acadia Powder Co., Halifax; A. Kent Archibald, Dufferin Gold Co., Truro; J. R. Lithgow, Glace Bay Mining Co., Halifax; J. H. Austen, Lawrencetown Gold Co., Halifax; Capt. G. MacDuff, Waverley, representing Crawford Milling Process; G. E. Francklyn, General Mining Association, Ltd., Halifax; G. F. Moncton and T. L. Jenner, Sherbrooke; Duncan McDonald, Truro Foundry and Machine Co., Truro; D. W. Robb, Robb Engineering Co., Amherst; James Baird, Canada Coal Co., Maccan; H. P. Brummell, Geological Survey, Ottawa; W. H. Huggins, Halifax; Frank Cawley, Ingersoll Rock Drill Co., Halifax; H. M. Wylde, Secretary of the Society, Halifax, and B. T. A. Bell, Editor CANADIAN MINING REVIEW, Ottawa. The main party having arrived by the morning train from Halifax was received by the following gentlemen, composing the local reception committee: Mr. R. G. Leckie, General Manager Londonderry Iron Co., Ltd.; Mr. E. Welsh, Mr. George Ronans, Mr. W. F. Jennison, Mr. L. H. Buck, Mr. Wm. Small, Mr. Boueillier, Superintendent of the West Mines; Mr. F. Park, Superintendent of the East Mines, and the Rev. Dr. Walsh.

The proceedings opened at 12 o'clock in St. Bridget's Hall, the President, Mr. H. S. Poole, being in the chair. On the platform, which had been tastefully decorated for the occasion, were seated, besides the chairman, Mr. David McKeen, M.P., and Mr. John E. Hardman, Vice-Presidents of the Association, and Mr. R. G. Leckie, General Manager of the Londonderry Iron Co., (Ltd.)

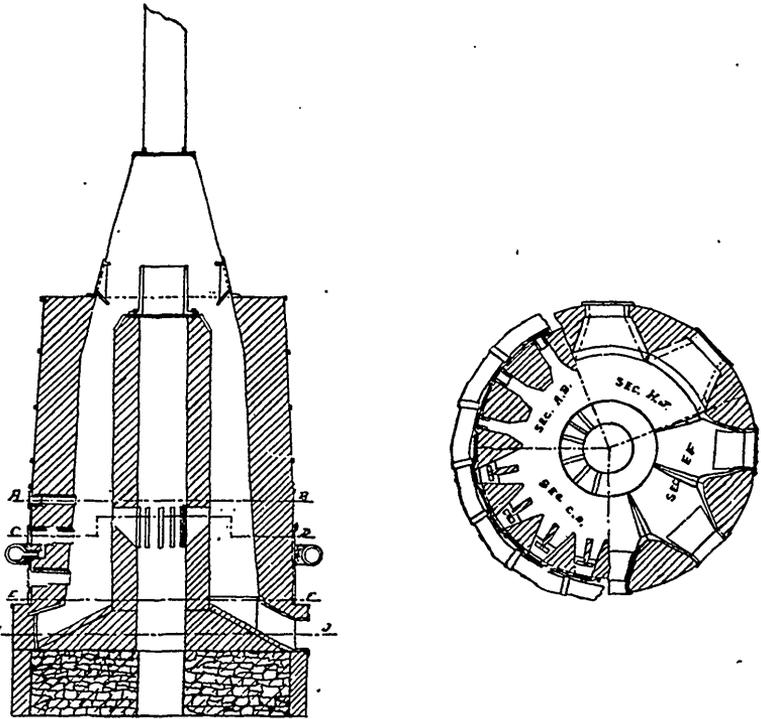
Mr. E. WALSH—Mr. Chairman and members of the Mining Society of Nova Scotia: Allow me to tender you on behalf of the citizens of Londonderry, a very hearty welcome. Every one in this community is interested in the welfare of your Society, and look forward to its advancement. You have a lengthy programme to go through, so I will make my remarks short, merely bidding you all a hearty welcome to Londonderry.

THE CHAIRMAN—Mr. Walsh and gentlemen of Londonderry: I am sure that the Mining Society cannot be but deeply gratified at the reception given its members today, supplemented as it is by the knowledge that behind it is to come an excellent programme of instruction and entertainment. I will now call upon Mr. R. G. Leckie to read his paper, leaving the routine business of the Society to follow at a later session.

Roasting and Smelting Plant at Londonderry Iron Works.

Mr. R. G. LECKIE—This paper is merely a description of the plant erected here during the last two or three years. I may say the furnaces have given every satisfaction, the best average being 566 tons, of which 90 per cent was No. 1 pig:

The ore deposits of Londonderry have been frequently described, and the paper to follow this will enter fully into their nature and composition. The oxidised ores unquestionably result from the decomposition of the carbonate ores, which form large but irregular masses in the mountain range which traverses Colchester County from west to east, continues through Pictou County, and bears in the same formation



CALCINING AND BLASTING PLANT OF THE LONDONDERRY IRON CO., LTD.

in Guysborough County the specular ores which to some extent have been worked near the Atlantic coast.

Samples of specular ore from Five Islands, the westerly boundary of the County, are identical with those mined in Guysborough Harbour, but the deposits are usually small and irregular. The deposits known as limonite or brown hematite are the most extensive, and vary in richness as much as they do in colour and form.

The carbonate ores are not fit for furnace use, but have to be reduced to the condition of oxides. Hence the attempt to accomplish to some extent in an artificial way what nature has been slowly but thoroughly doing through an unknown length of centuries.

The kilns in which the carbonate ores (a mixture of sider-opelsite and ankerite) are calcined, are a modification of the gas roasting furnace first introduced by Westmann in Sweden. Both vertical and horizontal sections are shown in accompanying drawings. The total height of kiln from floor to charging door is 28ft.; diameter at top 13 ft.; diameter at base 18 ft. In the centre is a circular brick wall 13 inches thick, enclosing an air space 36 inches in diameter. This opens at the top into the chimney and assists in drawing the gases and products of combustion, laterally through the ore by twelve ports 12" x 2 1/2", situated a little above the line of gas ports. The gas ports are 16 in number, and in front are 10" x 8", but flare back so that in the interior there is but a point of fire brick 3" wide separating them.

This is divided by a fire-brick partition so as to give a more uniform distribution of gas and flame. The gas is admitted by a double opening in bottom of port, covered by a loose plate of cast iron, which can be readily moved so as to regulate admission of gas. Formerly gas was made in producers, but now waste gas from blast furnace is brought over in wrought iron pipes 18" in diameter, and distributed around the kiln by a cast iron pipe, containing openings for cleaning and removing dust carried over in gas current.

The carbonate ores are used not alone for the iron contained, but also on account of their earthy constituents, which form a very desirable flux. The raw ore, when charged into the kiln,

contains on an average about 23% metallic iron, and when thoroughly calcined carries about 33% after carbonic acid (CO₂) has been expelled.

Under normal conditions, each kiln can treat daily (24 hours) 60 tons of raw ore, but over 80 tons have been put through and perfectly calcined when good gas was employed.

Two men are employed per shift on each kiln, one charging on platform and one attending to gas and drawing ore.

The ore is wheeled direct to the scales and is charged into the furnace whilst still hot.

The blast furnace was rebuilt in 1890, and in April of that year was blown in. It is of the ordinary type, having a height of 75 ft.; bosh 18 ft.; diameter of hearth 9 ft.; diameter at stock line 14 ft.; and of bell, 10 ft. 6 in. It is blown with 7 tuyeres, 4½" diameter. The gas down-take is 4' 6" in diameter, and the dust catcher is a circular iron chamber 25 ft. high by 10 ft. diameter. Inside it has two diaphragms, between which the gas passes downwards and then rises up behind these diaphragms to a gas conductor which on one side leads to boilers and kilns and on the other to the hot blast stoves. The gas in its travel through the dust-catcher deposits a large amount of dust, which enables the stoves to run for nine months without cleaning, instead of for three months, as was the case before its introduction. The bell of furnace is also novel. Instead of being a plain cone, the periphery is indented—that is a space 8" wide alternates with a plate 12" wide, which enables a more regular distribution of the fine and coarse ore to be made. Although the bell is 2 ft. larger in diameter than the hopper it was put in without removing it. The bell was cast in two pieces, that is, a section was cut off by an interposed slip, and after main portion had been swung into place, the cut out portion was replaced and the two bolted together by raised flanges on upper side.

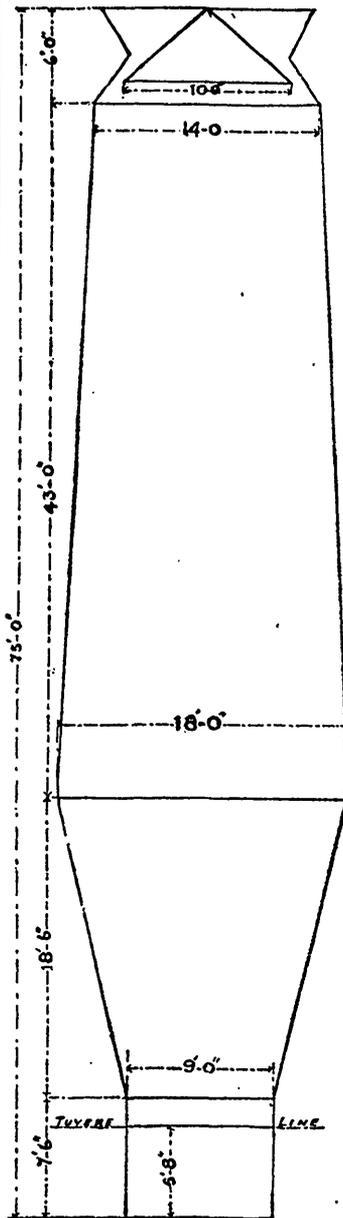
Since the introduction of this bell, the hanging and slipping which had previously given so much trouble and caused irregularity in working, ceased. The tuyeres also, which had been frequently destroyed, now give little trouble.

The removal of slag is an important item in cost, and the experiment now in operation appears to answer well. It is simply an adaptation of the tail-rope system to the slag car. Further improvements are in contemplation, which will make the discharge of slag automatic, and so reduce to a minimum the handling of slag.

Visit to the Londonderry Iron Works.

At the conclusion of his paper, Mr. Leckie invited the company to have a look round the works of the Londonderry Iron Co. On arrival, the first feature to attract attention was the new system adopted of hauling the slag to bank by tail-rope instead of by the heavy locomotive formerly employed, an improvement which effects a material saving in fuel and labor to the Company. The ore sheds with their extensive stocks of ores, red and brown hematites, from the East and West mines, and the red hematites from Torbrook in Annapolis County,

were next visited; the nature and occurrence of these ores are fully described in the papers read at the meeting by Mr. R. G. E. Leckie and by Mr. Smail, chemist, to the company. Passing upwards, some time was spent by the visitors at the new roasting kilns, built on the West



CALCINING AND BLAST FURNACE PLANT OF THE LONDONDERRY IRON CO., LTD.

mann principle, and the features pointed out by Mr. R. G. Leckie in his paper were duly noted. The hot blast stoves, blowing engines, boiler room and casting shed were each visited in turn. Time did not permit a visit to the rolling mills and the mines.

The Luncheon.

On returning to the hall it was found that considerable trouble had been taken by the good folks of Londonderry, and particularly by the ladies, to give the visitors an agreeable surprise. The commodious room on the ground floor was found to be gaily decked out with national flags and emblems, while here and there peeping out of the bunting might be seen tastefully executed designs, reflecting sentiments suited to the occasion. The tables, profusely decorated with flowers, fairly groaned with good things provided for the entertainment of the inner man. After ample justice had been done to the collation, Mr. John Hardman, in a few well chosen remarks, conveyed to the reception committee, and more particularly to the ladies who had gone to so much trouble on their behalf, the unanimous and hearty thanks of the visiting members of the society. Mr. Walsh and Mr. R. G. Leckie suitably replied.

Afternoon Session.

Lunch over, the members returned to the hall upstairs, where Mr. William Smail, chemist to the Londonderry Company, resumed the proceedings by reading some carefully prepared notes, descriptive of the occurrence and composition of the iron ores of the district. Mr. Smail illustrated his subject by a very fine collection of specimens, but his remarks and the subsequent discussion are, of necessity, held over for publication in next issue.

Mr. R. G. LECKIE then read the following paper by his son:—

Iron Deposits of Torbrook.

By R. G. E. LECKIE, TORBROOK, N.S.

In bringing before you the subject of the iron deposits of Torbrook it will be as well to first give a general idea of the geological formation of the surrounding country and a rough sketch of the iron deposits of Annapolis and Kings Counties generally.

Skirting the northern edge of the counties, and forming a portion of the south shore of the Bay of Fundy, is a range of hills called the North Mountain. This range rises to a height of from four to five hundred feet above sea level, and is of Triassic trap formation. Considerable magnetic iron ore is found in this trap, occurring in parallel veins, running longitudinally with the axis of elevation and varying in thickness from six inches to four feet. Some splendid crystals of magnetite may be obtained from this locality. Unfortunately the iron veins are filled with a large number of quartz nodules, which make the ore practically valueless.

The South Mountain range is from six to eight miles south of the North Mountain and runs parallel to it. According to Dawson this latter range was caused by an upheaval of granite during the Upper Devonian period. Here we find the slates and quartzites of the lower Devonian strata, folded into synclinals and anticlinals, and finally dipping into the granite as if it had subsided, at the time of eruption, into the plastic mass. At the junction the

ore is a red hematite in composition, being the sesquioxide Fe_2O_3 , and called specular on account of its structure. This has not the structure of specular ore.

No. 3 vein is about three-quarters of a mile south of No. 2, the outcrop of which appears half way up the side of the South Mountain. This vein is the same in width and structure as No. 1, the only difference being that it is somewhat magnetic in character, and has a darker streak—a reddish brown colour. The dip of this vein is almost vertical, but, if anything, dips slightly north.

It almost looks as if it were a second outcrop of No. 1 vein, on account of the similarity. It would seem as if it were the southern outcrop of a synclinal, but as yet no vein corresponding to the shell ore vein has been found north of it, without which we could hardly prove the correctness of the assumption. However, the point cannot be proved without a thorough geological survey being made of the district. The workings in the Torbrook mine are not yet deep enough to throw much light on the subject, although the dip seems to flatten a little even at the comparatively slight depth of 120 feet.

No. 4 vein in all probability lies about a quarter of a mile south again of No. 3 vein. It has been opened on Messenger's property, almost on King's County line, a distance of 2 miles east from the Torbrook mine, and following the strike, it would bring the vein much farther up the mountain than No. 3. Boulders have been found all along its probable course, which is almost conclusive evidence that it exists there. On opening up the vein it was found to be of the following dimensions:—

	Feet.
Ore.....	2
Slate.....	3
Ore.....	1

The walls are the same as No. 1 in composition; being a talcose slate.

Description of Working at Torbrook Mines.

The Torbrook mine is situated at the foot of the South Mountain, 3 miles from Nictau River, and 2 from the King's-Annapolis County line.

Many have confused this mine with the Nictau mine, which is on the western side of the

Nictau River. The workings there are in a magnetic ore bed, 8 feet wide, which is high in both phosphorus and sulphur. Over two years ago, leases of all the available property in the Torbrook district were taken up by the Torbrook Iron Co., and work was commenced in the fall of 1890. Active operations did not, however, really begin until the spring of 1891, when steam hoisting plant was put in and ore raised from two shafts (now No. 2 and No. 4). One of these was worked by back-stopping the ore, while the other was worked "underhand." At the same time a survey was made from the mine to the Windsor and Annapolis Railway at Wilmot station, so as to connect the mine by rail. The Torbrook branch line was completed in the autumn, and immediately two more shafts were opened

(No. 3 and No. 5). No. 3 shaft worked underhand and No. 5 shaft back stopping. A four drum hoisting plant was put in during the winter of 1892 (last winter), and now does the hoisting for Nos. 3, 4 and 5 shafts. No. 2 shaft has a separate engine and boiler, it being the intention to soon hoist from that shaft with steel skips having the capacity of over a ton.

The mine has lately been equipped with an air drill plant, which enables the output to be materially increased:—

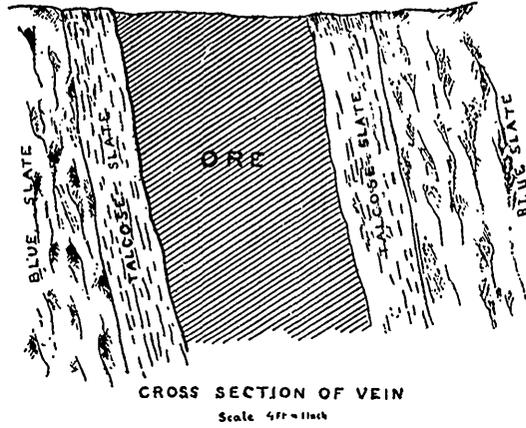
	Tons per day.
Output, Spring 1891, about..	20
Output, Spring 1892, about..	70
Output at present.....	130

There is a Cornish "plunger pump" placed in No. 2 shaft. No. 4 and No. 5 shafts are kept dry by small steam "Blake" pumps.

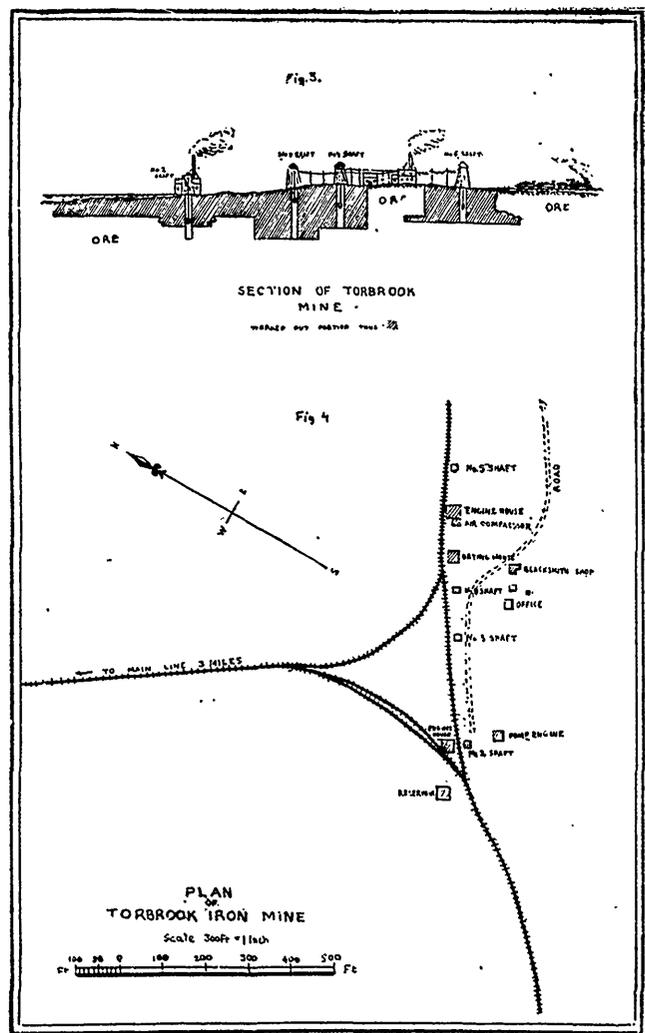
The following are some analyses of various samples of ore, taken from the mine:

No. 1	No. 2	No. 3
Protoxide of iron.....	27.09	.....
Sesquioxide of iron.....	49.52	.....
Oxide of manganese.....	.60	.....
Silica.....	13.46 10.22 10.28	.....
Lime.....	7.00	.....
Alumina.....	1.90	.....
Magnesia.....	1.80	.....
Sulphur.....	trace	.....
Phosphorus.....	trace	.....
Metallic iron.....	55.74 59.76 60.72	.....

THE CHAIRMAN—You will all agree with me that these papers are a very valuable addition to the mining literature of Nova Scotia. At our next meeting, as is customary, members will be given an opportunity to discuss them.



CROSS SECTION OF VEIN
Scale 4 ft = 1 inch



PLAN OF TORBROOK IRON MINE
Scale 300 ft = 1 inch

Mr. H. M. WYLDE, the Secretary, having read the minutes of the previous meeting, the ordinary business of the Society was taken up.

Revision of Constitution.

Mr. HARDMAN said: It is the opinion of the sub-committee that the present time is not opportune for a revision of the Constitution and By-Laws, and they therefore recommend that any such be withheld for the present. They would recommend that the following lists be adopted as the classification of members and associate members. (Names submitted.)

Mr. J. F. STAIRS, M.P.—The distinction seems to me to be one without any difference.

Mr. I. T. A. BELL, gave notice of motion to amend Section III. of the Constitution and By-Laws, by classifying the membership into (1) Honorary Members, (2) Members, (3) Associate Members; and (4) Associates.

Mr. J. H. AUSTIN moved, seconded by Mr. J. R. Lithgow. "That the report of the sub-committee be confirmed."

Mr. HOWARD CLARKE—As this is not a full meeting, I would move in amendment "That the classification of the list as reported by Mr. Hardman be deferred until another meeting." Mr. Clarke's motion not being seconded, Mr. Austin's motion was put to the meeting and adopted.

The Mining Convention in Montreal.

THE CHAIRMAN—Is there anything further to report in this matter.

Mr. B. T. A. BELL—I might say that the General Mining Association of Quebec has applied for some government aid, but no reply has been received yet, there is nothing new to report. Our Association hopes to be able to submit its report to your Society sometime in October.

The Society's Transactions.

Mr. B. T. A. BELL submitted in proof form a volume of the Transactions at the First Quarterly General Meeting for approval.

Mr. HARDMAN—The Council has already approved of the get up of the Proceedings, as submitted by Mr. Bell. It only remains for this meeting to ratify their action.

On the motion of Mr. J. F. Stairs, M.P., the form of publication was adopted.

The Society's Seal.

The question of a seal for the Society was discussed at some length. Several sketches of designs were submitted. The matter was ultimately left for final adoption in the hands of the Chairman and Mr. Hardman.

The World's Fair.

The Secretary read the following letter from Dr. E. Gilpin, Jr., Inspector of Mines:—

NOVA SCOTIA, August 23, 1892.

H. Wylde, Esq.,

Secretary Mining Society of Nova Scotia.

DEAR SIR, I enclose you what I Chicago exhibit, and beg to draw your attention more particularly to the "gold" exhibits. As the matter is one of direct importance to your members as individuals, I feel that I may venture to address you officially. My time is so fully occupied by my dual duties of Inspector and Deputy Commissioner, that it is almost impossible for me to do justice to our minerals in this connection. Would your

institute feel disposed to assist me in the collection of a good representation of gold ores. I want to show at least \$10,000 worth of gold ore, and as much more as I can get.

If your Institute feels disposed to view the subject with favor, I would be pleased to give any information I have at present as to forwarding, etc.,

I remain yours, etc.,
E. GILPIN,
Inspector of Mines.

On the motion of Mr. Hardman, Dr. Gilpin's letter was referred to Council.

New Members.

The following gentlemen were elected to membership: J. C. McDonald, Country Harbor, N.S.; J. W. Clendenin, New York; J. A. Fraser, New Glasgow, N.S.; Frederick Taylor, Lowell, Mass.; John Daw, London, England; J. Pratt, C.E., Halifax; Dr. Falconer, Sherbrooke, N.S.; Frank Cawley, Halifax, N.S.

Report of Coal Royalty Committee.

Mr. J. R. LITHGOW submitted printed copies of Petition on behalf of the Glace Bay Mining Company, to the Governor-General-in-Council. He also presented the following report of the sub-committee, which was adopted:

Report of the Committee on the proposed Memorial to the Governor-General-in-Council, asking for Disallowance of the Bill passed by the Nova Scotia Legislature increasing the Coal Royalty.

LONDONDERRY, 7th Sept., 1892.

To H. A. Budden, Esq.,

Chairman Committee on Coal Royalty.

The undersigned feel that report that early in July last they informed Mr. R. L. Borden that the Cape Breton Colliery Association and others interested, desired him, in concert with Messrs. Hugh McD. Henry and Arthur Dyball, to draft a memorial as above.

The learned counsel named, after consultation, and after that two or three memorials would be advisable in order to more clearly present the somewhat diverse cases of the memorialists, as some of their leases or renewals contained different terms and provisions.

Herewith, we beg to submit half a dozen printed copies of a memorial received yesterday from Mr. Henry, suited, he said, for such memorialists as held renewals in which was the "increase or diminish" clause. Another form of memorial slightly different, had been determined on, but not yet printed, suited to the case of those whose leases contained the "revise and alter" clause.

The Glace Bay Mining Co.'s case being different from that of other lessees, they will have a separate memorial, a draft of which is herewith submitted.

H. S. LITHGOW,

J. R. LITHGOW,
Committee on Memorial.

This terminated the business of the Session, and the members adjourned to the Station. While waiting for the Truro train, Mr. John F. Stairs, M.P., took occasion in a graceful speech, to return the hearty thanks of every member of the Society to Mr. Leckie and his able executive, for the exceedingly handsome manner in which they had been received and entertained. The meeting had been thoroughly successful, everyone had greatly enjoyed the outing, and he was sure they would all look forward to the time when the Society would visit Londonderry again. Mr. R. G. Leckie, and the Rev. Dr. Walsh replied. As the train steamed out of the station the members raised a hearty cheer and joined in Auld Lang Syne with great gusto. At eight o'clock the members dined together at the Prince of Wales hotel, Truro. The proceedings were of an entirely informal nature.

Dr. R. W. Ellis is making an investigation of the occurrence of phosphates in Ottawa County, for the Geological Survey.

Nova Scotia Gold Yield.

Memo. showing quartz crushed and yield of gold from the following districts for the six months ended June 30th, 1892, as per returns received by the Department of Mines:—

Name.	Location.	No. of tons of Quartz Crushed.	Yield of Gold, ozs. dwt. grs.
*Goldenville.....	Sherbrooke.....	201	35 14 0
Miners.....	.....	123	22 7 10
Millers.....	Salmon River	2095	553 10 0
Oldham Mfg. Co. Oldham.....	.....	1101	1460 19 12
*W. Waverley Co. Waverley.....	.....	1218	263 6 0
Moose River Co. Carleton.....	.....	804	67 17 0
*Dumas Tonquay's.....	.....	2361	393 17 0
Herbert Dixon's.....	.....	370	577 10 0
Withrow's.....	South Unicola	247	202 10 0
Estaville.....	.....	95	992 0 15
Anderson's.....	Lake Catcher	297	241 19 6
New Highton Co.	.....	.....	.....
Mfg. Co.'s.....	15 Mile Sirin	1400	665 0 0
Rockland.....	Stormont.....	241 1/2	238 1 0
Copeland.....	.....	1700 1/2	1219 6 4
*Moose Land G. Co.'s Moose Land	.....	193	86 10 0
Malaga Mfg. Co.'s Malaga.....	.....	754	1039 2 18
*Boston.....	.....	757	679 1 19

The Souris Coal Field.

Mr. A. G. Yates, President of the Buffalo and Rochester Coal Company (one of the shareholders of the Dominion Coal Company), with a party of American capitalists, visited the new coal field at the Souris district, Southern Manitoba, during the month. In an interview Mr. Yates said:

"The quality of this lignite coal and the extent of its territory was a surprise. We find the seam about eight feet thick, covering a large area, and with remarkably favorable natural advantages for mining operations; there is an abundance of height or covering above the seam to assure good quality. The town of Estevan is certainly most favored, not only in these vast deposits of coal, but in having a superior quality of clay for the manufacture of brick. The best street pavements now being put down in our eastern American cities are made of hard burned vitrified brick, conceded to be more durable than asphalt or even granite block, making a smooth roadbed, not slippery, and more noiseless than any other hard material, easily taken off and renewed, and is practically indestructible. We saw samples of this clay that had been burned years ago by the lignite taking fire at the outcrop of the hills, making the best quality of brick, and demonstrating without a question the great value of this property to the City of Winnipeg as the future basis of material for the best of street pavements. The Dominion Company is developing the mine at Estevan upon the best and most approved modern plan, and arranging for a large output of coal. The burning facilities, from our observation, indicate that it is a vast superior mine, and must prove to be a great boon to this country, where fuel is so difficult to obtain, and particularly to the farming population. The town of Estevan, although less than a month old, has a large number of buildings completed, and is many more under construction. The location is very picturesque, as there is an extensive view of the great Souris Valley, and we predict that with the usual advantages of the junction here, the coal, clay, and other mineral deposits necessarily making this a manufacturing and a mining town, there must follow a phenomenal growth of the town of Estevan."

Mr. Yates then introduced the scribe to Mr. Elliott, who replied to his interrogations as follows:

"As night closed upon us before we reached Estevan, I saw no evidences of coal until the end of our journey; but when morning came there was plenty to be seen for twelve to fifteen miles along the Souris river, the most marked evidences of a large deposit. This coal find is an intensely interesting one. Belonging to the tertiary age, it is an infant as compared with the great carboniferous deposits from which the immense coal supply of the continent was drawn. In fact, it is not a tertiary coal; it is lignite. What it may become the far distant future can be discerned only by comparison with those fields which were deposited in the carboniferous age. But in most respects, this lignite is, for practical purposes equivalent to coal. It does not possess the high percentage of pure carbon that the famed Anthracite of Pennsylvania carries, nor the hydro carbon-volatile matter—to be found in the bituminous coals of that age; but for all that it has less ash and waste than most of the true coal; and if the water which is held in it, in purely mechanical conditions, could be eliminated, its calorific energy would, for many purposes be equal to them. Properly cared for it should be a good domestic fuel, and no doubt is. The deposit evidently covers a large area. There are several seams, one of which is from seven to eight feet in thickness. This appears to be persistent over a large area. It is the one worked at the Hazard and also Price mines, twelve miles east of Estevan, as well as at the latter place. A careful examination at both places shows the seam to be identical and the quality to be on a par. The Estevan coal is a shade or two darker in color and hence more attractive in appearance. The Dominion Coal Company's mines at Estevan do

*Dump Slate and Quartz.
April, May and June only.
†January, February, March and April.

not have as much covering as at Hazard's and Price's. If this were a highly bituminous coal carrying from thirty to thirty-six per cent. of volatile as do the Pennsylvania and Ohio coals, matter which would evaporate on exposure, then the question of covering would be an important one; but it does not prevent that condition of things. Moreover, the dense impervious stratum of fine clay overlying this body of coal shuts out any possibility of the escape of any appreciable amount of valuable substance."

Underground Haulage by Electric Locomotives.*

The drawbacks of chain haulage are that: The first cost is high; they encumber the roadway, so that an accident may interrupt the output; and they generally require a double line of way, thus forming an obstacle to the passing of the men. Electric haulage has made great progress during the last few years. The installation is "very simple; the way may be single; and, in case of breakdown the locomotive may be at once superseded by horses, kept on the spot for other work. While the electric locomotive is more economical than horse traction, it conveys the men to their working places without loss of time or fatiguing them, so that coal may be got within a considerable radius of the shaft."

A visit to the Zaukeroda mine, in Saxony, decided M. Rambaux, Administrateur Délégué (Managing Director) of the Marles Colliery Company, who was already favourable to the system, to make an actual trial, though on as reduced a scale as possible. The locomotive was designed by M. Neuf, engineer to the Edison Company, in conjunction with the electric engineers.

The installation of a line of supplying current to two locomotives, one only of which was made first, so as to permit of modifications, suggested by practice, being introduced into the second. Each locomotive was to exert a useful work of 10 horse power; the motor was to give out 70 per cent. of the power available on the shaft of the generating dynamo; and each locomotive was to expend 30 amperes, at a tension of 100 volts, all of which conditions were realized. The installation for haulage, and also lighting, was applied to pit No. 4, the north roadway of which is admirably adapted for haulage, while the conditions were unfavorable in the south roadway, so that a good test of the system was afforded.

The engine, with cylinder of 40 cm. (16 in.) diameter, and stroke double that figure, with expansion variable by the regulator, makes 24 revolutions and drives the dynamo by a belt, the ratio of the pulleys being 12:55, so that the dynamo makes 840 revolutions. The covered conductors, formed of copper ropes 9 mm. in diameter, are carried by porcelain insulators every 30 metres. The conductors are led to a switch board which permits of sending the current to the north and south roadways, the conductors in which consist of big flange rails hung from the roof and insulated by rubber washers.

The locomotive consists of a dynamo in series, with a power of 15,000 watts, mounted on a wrought iron underframe with two axles, the motion of which it transmits by an intermediate shaft and gear, the dynamo shaft being parallel with the rails. The current is taken from the conductors by two small trucks drawn along by the locomotive, and as the circuit is driven by the dynamo wheel, permits a variable excitation of the magnetic field of the dynamo, so that the electromagnetic force and the electric power of the engine, which is well under control, may be varied at will. Two interrupters, with variable disengagement, arranged at the front and back ends, serve to close or open the circuit on the locomotive, which is also provided with reversing gear, acting by change of direction in the current. The outside length of the locomotive is 2.3 m. (under 8 ft.), width 0.72 m. (2 ft. 5 in.) and height 1.5 m. (5 ft.). The weight was originally 1.8 metric ton; but, as the adhesion was insufficient on the south roadway, the wheels were cast full and supplemented by counter-weights, so as to bring the total weight up to 2.3 metric ton (2 1/2 tons).

There was no loss of current along the line. A series of careful experiments in the south roadway, with a gradient of 1 degree, showed the power of the electric haulage, and of the mechanical yield obtained; the results, with all corrections made, are summed up in the following table:

No. of experiments.	No. of corves drawn.	Speed of train in metres per second.	Work in horse-power.	Useful effect, including locomotive.	Useful mechanical effect.	Commercial useful effect.	Corve metres.
				Per cent.	Per cent.		
1	0	2.50	10.86	3.06	27	.....	.....
2	15	2.38	19.33	11.3	58.5	43.38	35.7
3	15	3.46	18.21	14	77	54.38	41.5
4	15	2.50	17.37	10	57.5	40.70	30
5	0	3.20	13.99	7.37	52.7	12.46	6
6	0	3.20	16.14	10	61.95	35.56	25.6

The moderator limits the number of amperes expended, but does not regulate it; in the first and fifth experiments it was kept closed, and yet the current passed from 16 to 20 amperes. In the second and third, when it was wide

open, the expenditure was the same, the difference of work done being due to the voltage. In the fourth and sixth, when it was three-quarters open, the quantity descended from 30 to 25 amperes. The reason of this is that the electric locomotive carries its own regulator, which, for the same position, the moderator, varies the quantity of current given out in accordance with the work to be done.

From this fact may be deduced three practical hints: (1) It is important that the gradient should be uniform, so as never to exceed the number of amperes which the rheostat is capable of supporting, (2) with too light a load the useful effect would be slight, so it is with all engines, on account of the great loss of useful work through friction and resistance; (3) a comparison of the second, third, fourth and sixth experiments shows that it is better to increase the speed rather than the load (although dead weight enters for a large part) electric engines being made for high speeds.

With respect to the third and fourth experiments, for the same number of corves drawn, on opening the moderator full instead of three-quarters, an increase of 40 per cent. in speed was obtained, while the amp-volts showed an increase of only 5 per cent. The maximum useful effect was obtained in the third experiment, with twelve corves, at a speed of 3.46 m.; but, if that speed were adopted constantly, the engine might run off the rails at the points, since a speed being only practical in a straight line and with a considerable length of way. Under existing circumstances it was found best to run with the moderator open, the locomotive drawing a train of fifteen corves at a speed of 2.38 m. (7 ft. 10 in.) per second. The useful mechanical effect was 58 1/2 per cent., which might be improved by changing the ratio of the gear, so as to maintain the same speed in the locomotive while giving the armature a higher speed, which would permit of drawing twenty corves in a train.

As regards the cost price, with fifteen corves in a gang, at a speed of 2.5 m. (over 8 ft.) per second, or 9 kiloms. (five and a half miles) per hour, the locomotive could do a work of 2.43 kilometres, for which four horses, with one in reserve, would be required. The two locomotives would therefore, if running constantly (a necessary condition of economical working) take the place of ten horses, though in that case it would be advisable to have a third locomotive in reserve. The installation cost:—

Steam engine	Fr. 10,562.50
Steam pipes, fittings, erection, etc.	6,093.45
Dynamo	4,934.50
60 m. insulated conductor	1,817.50
Erection of electric plant	3,500.31
Total for fixed plant	26,714.26
1,400 m. of electric permanent way at 5.70 fr.	7,980
Three locomotives	19,500
General total	54,194.26

The current daily expense is as follows:—

Interest on capital of 54,194.26 fr. and sinking and say ten years, and 500 day in the year, per day	18.06
Fuel, 2 kilogs (4 1/2 lb.) per horse p. or per hour, say 800 kilogs, in ten hours.	5
Wages—two engine drivers at 3.50 fr., two firemen at 2.50 fr., two guards at 1.50 fr., and 20 per cent. allowance for saving.	18
Total	41.06

which takes the place of a daily expense for horses of:

Amortissement of ten horses, 200 fr. x 10 ÷ 300 days	6.66
Feed, 27 x 10 x 7 days ÷ 6 days	31.50
Wages—eight drivers at 3.50 fr. + 20 per cent. allowance	33.60
Total	71.76

which shows, in favour of the electric locomotives, a daily saving of 30.7 fr. (24s. 6d.) or 42 1/2 per cent.

Per ton kilometre the cost of haulage by locomotive is 0.84 fr. and by horse 2.18 fr. Drawing trains of 12 corves at a speed of 3.46 m. (over 11 ft.) per second, or 12 1/2 kiloms. (7 1/2 miles) per hour, the locomotive is capable of performing a work in coal hauled of:—

$$450 \times 12 \text{ corves} \times 12.5 \text{ kiloms.} \div 8 \text{ hours} = 270 \text{ ton-kilometres.}$$

Per ton-kilometre the cost of electric haulage will thus be 0.84 ÷ 270 = 0.076 fr., or 50 per cent. of the cost of horse transport.

In the above figures the incidental expenses connected with both locomotives and horses have been neglected, as they balance one another; but during holidays and stoppages, and especially during strikes, horse keep is a serious item, while, with electric haulage, a horse epidemic would be less disastrous in a colliery.

As regards the advantages afforded by electric haulage for conveying the men to their work, when the coal is being got at a distance of 3 kiloms. (1 1/2 miles) from the shaft, a man takes half an hour to go to his work, and half an hour to return.

At a speed of 9 kiloms. (5 1/2 miles) per hour (which it is hoped will be exceeded), the 2 kiloms. will be traversed in two-minutes of an hour; for going and returning, therefore, each man will save 1 x 2, or half an hour, and will be fresher for his work. This saving of time multiplied by 500 men, represents 4 1/2 hours or fifty days, which at the rate of 4 fr. (3s. 3d.) constitutes a daily saving of 200 fr. (28), to which must be added an increased production of 1/2 hour = 1/8, or 6 per cent.

The conclusion the author comes to is that, in non fiery mines, haulage by electric locomotives is commercially practical and advantageous; but great care must be bestowed on all the details of the installation.

The Influence of Ventilation on Explosions of Fire-damp.*

Several engineers of the Loire basin have called attention to the fact that great explosions of fire-damp have appeared to take place concurrently with a high system of ventilation. A discussion followed on the subject at the meetings of the coal industry at St. Etienne, and statistics were furnished on the accidents from fire-damp which have taken place during different periods.

Now, it should be understood that the figures shown by these statistics do not permit us to come to any absolute conclusion in reference to the subject under consideration. If from 1854 to 1891, 74 per cent. of the total number of deaths from fire-damp in France took place in the Loire basin, while an earlier period shows only 50 per cent., we may confidently conclude that the Loire basin suffers from conditions of working which are less safe than those of more defective. The question arises, however, to what causes this inferiority is to be attributed. If we believe that there is a possible agreement between the occurrence of great explosions, and thorough ventilation, we must examine the statistics from that point of view, so as to show the comparisons that may be evoked therefrom. It would be necessary in this case to consider that the explosions may be divided into two categories: the small explosions or local explosions which do not exceed, except perhaps to a small degree, the limits of a heading; and large explosions which invade the whole mine.

Now, if statistics demonstrate that before the establishment of thorough ventilation in the mines of the Loire the proportion of the number of serious explosions to that of the total ones was much smaller, then, if we refer to certain years, it would seem that we should be justified up to a certain point in giving more extensive ventilation as the cause. And yet this would only be an indication not carrying with it any absolute certainty, for it must not be lost sight of that the evolution produced in the Loire basin during recent years has not only been in reference to improvements in ventilation. It has met with much deeper and more fiery beds than formerly. Their rate of output has also developed at the same time that their methods of working have been improved, and as the concentration of the wo kings became greater, this offered a larger number of victims to explosions. If, moreover, we take into account the part played in all great explosions by calcium, it would seem to be undoubted that the actual conditions of the mines, and the nature of the workings, augmented in a large measure the danger created by the presence of this dust, which in most of the mines of the Loire, and especially in the fiery mines, is in very great abundance. Whatever may be the sum total of the causes to which these recent catastrophes may be assigned, which by repeated blows, and in an unexamined manner, has accumulated in the Loire basin, it does not seem to me ought systematically to shut ourselves up to one point of view, and it should therefore be interesting to search for the reasons which may be urged in favour of the concurrence upheld by some engineers.

In the first place, in the presence of the inflammable mass set in motion by the activity of the working, a mass composed in part of the fire-damp liberated in a continual manner by the heat of the working, and either concealed in the cavities of the roof and in the timbering which supports it, and also partly of the dust which, like a fog, obscures the atmosphere of the mine, can we be surprised if an explosion, however slight it may be, should be propagated throughout the entire mine, if when the inflammable mass is, so to speak, indefinite, the ventilation is of such a quantity of oxygen, that it does not sustain and render active the combustion? Is it not superfluous to remark that a latent fire may become active if air be furnished, and even be disastrous under the action of a violent wind?

But it will be objected. Is it not necessary to furnish air to a fiery mine in order to drive out the gas produced, since that is the only remedy that is known? The reply to this cannot be doubtful, and it is not necessary to conceive the idea of regretting the old state of things, even while admitting that the air, more or less oxygenated, which then reigned in the workings, was an efficacious barrier to oppose to the propagation of explosions of fire-damp. It must be remembered that the miner who worked in this atmosphere was most injuriously affected, and that in general he was reduced, above the age of forty-five years, to dragging out his life, and that in twenty years left him to die. How numerous then were the obscure victims of mine working! Even if the dangers appeared to be less great, if frightful catastrophes struck public opinion more rarely, the mining population were

* Translated specially for the Colliery Gazette from: L'Echo des Mines et de Metallurgie.

* Abstract of paper by Clement Bailey, engineer at the Marles Colliery, read before the Charleroi Committee of the Hainaut Engineers.

none the less cut off in all the vigour of life, but under conditions which escaped administrative statistics.

Good ventilation in all cases is indispensable, and it is therefore necessary that the mines should be largely and sufficiently ventilated, not only to remove the fire-damp, but also, and especially, so that the miner shall be placed in hygienic surroundings. If ventilation is indispensable to fiery mines it is no less so for others for which it would be known to possess only slight inconveniences, against which it would be easy to guard, if its intensity became a trouble or even created a peril in case of fire. But the necessity of sufficient ventilation being admitted, we must not close our eyes to the part that this ventilation may play from the point of view of propagation of explosions of fire-damp, and if it has been proved or only suspected that the activity of the air current has not been unconnected with the great explosions which have desolated the St. Etienne basin, the workers of fiery mines are under obligations to make fresh efforts in view of avoiding in a manner as absolute as is, humanly speaking, possible, all accumulation of gas, either by augmenting their vigilance, or by organising new means for effecting a more complete diffusion of the fire-damp in proportion to its production.

Already some have praised in this respect the secondary ventilation employed in the Blanzay mines, where its efficacy appears to be well established. Would it not be opportune to extend it to the mines of the Loire, only considerably modifying the conditions of application to the exigencies of working, which differ essentially from those of Blanzay, as much by the methods employed as by the nature of the coal and the encasing strata? Does not there arise also, in every case up to the present, the necessity of establishing in all the fiery mines a canalisation of compressed air which permits, either directly or by the intervention of mechanical arrangements, of dislodging the fire-damp from the numerous cavities which may secrete it, and which makes it possible for it to escape a diffusion, to which it always manifests an aversion?

Beside the canalisation of air, would it not be equally indispensable, or at least eminently opportune, to establish another parallel canalisation furnishing water under pressure to sprinkle the coaldust, if not continuously, at any rate at very frequent intervals, and to dislodge it, concurrently with the fire-damp, from the cavities where it tends to accumulate?

To sum up, has the improvement of the ventilation of the mines of the Loire, by the creation of rapid currents of air, exercised in recent catastrophes an influence on the propagation of explosions of fire-damp? If this question can be answered in the affirmative, or if this influence may be only suspected, then there is room for occupying oneself with devising suitable methods for augmenting the diffusion of the fire-damp by the establishment of a secondary ventilation adapted for the interior parts in which this gas liberates itself, and completing the action of what may be called the primary ventilation, which is insufficient, however excellent may be its distribution, for entirely effecting this diffusion. If finally we admit, and it appears to us to be difficult not to admit it, that coaldust plays an important part in great explosions, there is equally a need for other installations than those hitherto employed, and remaining almost entirely inefficacious, such as a canalisation of water.

Safe Blasting.

In the *Colliery Guardian* for 11th March last there was a short notice of some safety wadding for shots in dusty and fiery mines, that was reported to have been used with efficient results on the Continent, especially in the Centre district of Belgium. The wad was said to have consisted of solidified, or rather gelatinised water, the elasticity due to the gelatinous consistency permitting the wads being used in all shot holes, no matter what the diameter or inclination. It was further stated that the use of these wads permitted the men to return at once to the face, and also that they lessened the violent effect of dynamite, thus rendering its action more efficient in collieries.

This safety wadding appears to bear considerable resemblance to the so-called gelatinous cartridge, or thickened water tamping, of Messrs. Heath and Frost, which is used with equal safety and efficiency at their colliery. This latter cartridge consists of 94 per cent. of water, with 6 per cent. of foreign matter—viz., 4 parts of soap, 1 part of starch, and 1 of glue, all three melted together. As not one of these substances is capable of extinguishing flame, the water alone is relied on for this purpose. The same result is obtained in the Continental wadding, which is stated to be water solidified, or rather gelatinized, by the addition of $\frac{1}{2}$ per cent. by weight of foreign matter; and a judicious proportion of boiled glue or size would, no doubt, impart the elasticity with which the wad is credited. It is evident that in both cases water is the real extinguisher of the flame, which circumstance vividly recalls the Macnab water cartridge, introduced in 1876.

Notwithstanding the many attempts to produce a flameless explosive, this has been found practically impossible; and water, with the addition of some substance or another to give it a certain amount of consistency, is still found to be the safest and most trustworthy friend in fiery and dusty mines. In the description of the Continental wadding there has evidently been some misapprehension with regard to the water cartridge, when reference is made to the necessity for putting in the shots vertically, as if the water were to be poured in, instead of being enclosed in a case so that it may be placed in any position.

Again, it is stated that the water is liable to be projected forward in a single mass; but, so far from this being the case, the latest form of Macnab cartridge, when tested in the light, and under great pressure, was seen to "sweat" just like a steam boiler subjected to great hydraulic pressure, the water in both cases exuding in the form of a thick mist. The latest form of the Macnab water-cartridge has a casing of remarkably strong and yet flexible Japanese paper which prevents the water from becoming dissipated in fissures of the rock; and this cartridge may be inserted in a hole in the roof, filling up any irregularities in the hole so as to leave no air space whatever.

Some practical experiments, or rather demonstrations, were once made with this cartridge at the Khiwbach slate quarries, Festiniog. Ordinary shots with dynamite charges having only made a cavity—a hole filled with dust—but without cleaving the rock, a 2 inch hole was put into the slate, 8 feet deep. The last six inches was filled with dynamite, and then 18 inches of blasting powder was charged in on top of it. A 24 inch water cartridge was then inserted, and the remainder of the hole was filled up by tamping, first with clay and then with slate dust. A mass of rock weighing 150 to 200 tons was lifted up bodily and thrown into the quarry below, the action of the dynamite, modified by the water, having cut the hard rock, which is known as "felspathic ash," in a perfectly flat plane, just as soap might be cut by a wire. This action was probably due to the enormous friction exercised by the water on the rock, wedging itself into the fissures, describing straight lines of force and preventing the tamping from being blown out.

In a recent article on the ignition of safety fuse abstracted from a paper by M. L. Janet, in the *Annales des Mines*, several methods are described for so igniting the fuse as to prevent flame from being communicated to air impregnated with fire-damp; but no mention was made of the Macnab firing tube, which has been found very handy and effectual, especially in cases where it has been desired to fire several shots simultaneously, and an electric shot-firer not available. This little appliance consists of a brass tube about 3 inches long and $\frac{1}{8}$ in. in diameter (surrounded by tamping), having a percussion cap at the end placed deepest in the hole, with a striker, which explodes the cap on a spiral spring, stretched by a cord, being suddenly released. A slight explosion ignites the threads placed for that purpose in the powder core of the safety fuse, but is not sufficient to communicate flame through the small tube to an explosive mixture. This firing tube is used most effectually in connection with Messrs. Bickford Smith & Co.'s multiple instantaneous fuse, which is now coming so largely into use for firing several shots simultaneously.

What is now wanted in collieries is a comprehensive system of safe blasting, which shall, at the same time, bring down the coal in as large lumps as possible, while not commencing any disintegration of the substance, to be continued by primitive and barbarous loading arrangements, and thoroughly completed by the vibration to which coal is subjected during long railway journeys, considerably reducing its commercial value. When coal shall be got and raised in large lumps, and sent to its destination by cheap water instead of expensive land carriage, for which former American engineers are now casting about to find a good method of canal-boat propulsion, then will our black diamonds be delivered to the consumer with a less percentage of loss due to breakage and a less heavy charge for carriage.

Safety Lamps and Miners' Eye-Sight.

There is at last good reason to hope that the much debated question as to the cause of the disease known as miners' nystagmus will speedily and finally be settled. All who have to do with mines and mining operations know that the one great obstacle to the universal adoption of the safety lamp in mines is the scantiness of the light it affords compared with that emitted by candles, flambeaux, and other illuminants commonly used by miners. Not only are mining operations rendered more difficult by reason of the gloom in which they are performed, but—and this is the more weighty consideration—it has been stated by miners and those who profess to represent them that the strain upon the eye-sight, the constant peering through the darkness, is responsible, if not wholly at least in a great measure, for the prevalence of the ocular disease already referred to, and from which so many miners suffer. Of course, such an assertion has not been allowed to pass unchallenged, and in the interest of employers no less than in the interest of the employed, searching investigations have been made from time to time, though, up to the present, opinion in favor of the theory being about evenly balanced by that which is opposed to it, the question remains undecided. Dr. J. Court, of Staveley, who, before commencing his observations, was of opinion that the injury to the eyes was caused by the position the miners had to assume in getting the coal, after the examination of 1,000 men, 500 of whom worked with naked lights and 500 with lamps, arrived at the conclusion that the lamps were at the bottom of the mischief. Quite recently he has carried out additional investigations, and in order to further elucidate the matter he has had photographs taken of the men actually engaged in the task of winning the coal. The result of Dr. Court's observations are embodied in a paper on the subject, read by him in the ophthalmological section of the British Medical Association, at Nottingham, on July 28. An abstract of the paper is given below. Upon its conclusion, at the suggestion of the president,

Dr. Priestley Smith, a committee was appointed to further inquire into the subject, and the outcome of its deliberations will be, we hope, the final settlement of the question if not in one direction, then in the other.

Dr. Court said the subject was one of very great interest in that locality. In the Midland district there were over 50,000 persons employed underground, and the total number of coal miners employed in Great Britain was over 500,000. If, therefore, the proportion of men suffering from that miners' disease was anything like what he had found to exist in that part of the country, a government enquiry into the subject was demanded. Referring to his report upon the prevalence of the disease among Derbyshire miners, Dr. Court said it had been urged that influence had been brought to bear upon the men, so that all whose eye-sight was affected put in an appearance, thus unduly raising the total average. To meet this objection he had taken fresh evidence. At two of the Staveley collieries he had examined the whole of the men, numbering 735, down in the pits. The coal-getters, which included stallmen, holers, loaders and headers, numbered 597, and of these 207 were affected, or 34 $\frac{3}{4}$ per cent., which was a higher average than was given in his report, the comparison being made with the same classes of miners. Among those who actually won the coal—the stallmen and holers—numbering 376, he found 172 cases of nystagmus, or an average of 45 $\frac{3}{4}$ per cent. It was a curious fact that the average in the house coal colliery was 53.37 per cent., whereas in the steam coal mine it was 34 per cent. In the soft coal holing it was in the middle, in the hard coal it was at the bottom. Those facts, he thought, more than confirmed the average got out in his previous investigations. Coming to the question of the alleged causes of the disease, Dr. Court said the evidence he produced was entirely opposed to the theory that position was the cause. The true cause of the disease was the insufficient light of the safety lamp, which required the miner to strain the eyes to peer into the darkness. The disease was rarer where the illumination was from a candle. Where a torch lamp, giving two and a quarter times the light of a candle, was used, there was no trouble at all. The light of the lamp, too, had an irritating effect, and miners carried a shield on their lamp, to shield their eyes from what they called the glare of the lamp. The bonnet and pedestal cut off a great deal of the light, and there had to be incessant accommodations of the eyes and body to the light. With candles there was no shadow. He was opposed to the theory first advocated by Dr. Dransart in France, and adopted by Dr. Snell, of Sheffield, that the position of the miner was the prime cause of the disease, and denied altogether that whilst undermining or holing the coal, the eyes were turned obliquely upwards. Dr. Snell's description of the position of the man, he contended, was not a true one. In 1890-1 he found that out of 524 men using safety lamps 164 had nystagmus, 127 night-blindness, and sixty-one photophobia, while among 573 men using naked lights only thirty-two had nystagmus, twelve night-blindness and one photophobia, and of these thirty-two men, twenty-nine had previously worked with the lamps. If the position theory was the correct one, the results ought to have been the same with the candles as lamps. As to the upward and oblique direction of the eyes, he found in all the Derbyshire collieries he had been down, that when a man began to hole, the eyes were directed downwards and forwards, and he produced photographs of men actually engaged in holing. In Durham in September last, he found not a case of nystagmus among the men who had always used candles, while nearly a third of the Durham men using lamps were suffering. The Durham men, too, it was important to notice, never lay upon their sides to work, nor were their eyes ever turned obliquely upwards. Dr. Court further showed that the disease was also to be found among the men who load coal into the corves, also the deputies and others. Another strong argument against the position theory was the fact that numbers of miners had gone from safety lamp pits into pits better illuminated, and their eye-sight had improved although the occupation and the position were the same. Dr. Snell said cases of nystagmus were to be found among the men who used candles, but it must be remembered that they might have worked with lamps. Then it was urged that if a holer suffering from nystagmus changed his work he got better. That no doubt was true, but it was not the alteration of position at work that caused the improvement, but the fact that with the new occupation he had less strain upon his eyes. Stallmen and holers had less light than other men. Coming to the question of lights used in the mines, Dr. Court said the Marsaut lamp was a fair sample. It was perfectly safe, but as to the light it gave there was much to complain of. He had measured the light in a direct or horizontal line and found it to be equal to .75 of a miner's candle, which candle was only equal to $\frac{3}{4}$ of a standard candle. Then the total light of the lamps was reduced to less than half that of a miner's candle by the very large shadows cast by the bonnet and pedestal. He produced drawings which showed that the bonnet of the safety lamp cut off nearly $\frac{1}{8}$ th of the actual light given by the lamp, while the pedestal cut off still more, and in addition to this the brass pillars reduced the light another tenth. The light was lessened still more by the regulations respecting its position while the miner was at work. In naked light collieries the men could place the lights to suit their convenience. The candle did not vary in the light it gave, but a dirty safety lamp at the end of a working day gave only three-quarters of the light of a clean lamp. The result of his investigations showed that the greater the light used the less disease was to be found. In concluding this paper, the

author made some remarks upon the pathology of miner's nystagmus.

Dr. Snell, in the course of the discussion which followed, maintained that it was not the lamps but the position of the men at work that caused the trouble.

Dr. Tatham Thompson, Cardiff, said before he went to reside in South Wales he held the belief that the position was the cause of the disease, but he had opportunities of examining the Welsh miners, and further experience had convinced him that Dr. Snell's theory was not the correct one. The men in that district who worked with safety lamps never did any holing, or lay upon their sides to win the coal, and yet nystagmus was common among them. That was in the steam coal pits. On the other hand, the miners who used naked lights and worked the house coal always did holing, and lay upon their sides, but the disease was absent from among them.

Dr. Pegler, London, and formerly of Stournewton, said he was present at some of Dr. Court's examinations, and they were strict and accurate. The results were against Dr. Snell's theory.

The president said they must look upon the disease from a wide point of view, and added that nystagmus might occur by continued effort to fix the sight under difficult conditions of light.

Breaking of a Steel Wire Rope.

M. Jacobi, engineer in the French Corps des Mines, has made a communication to the *Annales des Mines* for July on the breaking of a steel wire rope on an incline at the Lavie Works, Constantine, Algeria. He opens the subject by observing that this accident brings prominently forward the rapid disorganisation of wire ropes passing over pulleys of too small diameter, and owing to successive windings in different planes. The incline, nearly underground, was 11,775 yards long, with a uniform gradient of 0.153 m. per yard (or 1 in 6.33), except near the stations, where it is 0.2 m. per metre (or 1 in 5) for a short length. It has only one line of way, of metre gauge, with pass-by for the automatic crossing of the trains, each of which consists of a truck weighing 1.4 ton, and carrying three trains, weighing together 0.52 ton, the total useful load being 1.75 ton. The rope consists of a hemp core with 16 strands round round, each strand being formed of eight steel wires 1 1/2 mm. in diameter, and of a core consisting of four iron wires 1 mm. in diameter. The diameter of the rope is 20 mm., and its weight 1.4 kilog. per metre—say 2 1/2 lb. per yard. The indicated strength being 100 kilog. per square millimetre (63 1/2 tons per square inch) of steel wire. The endless rope is arranged on either side of the line of way, where it is carried by cast iron rollers. At the bottom of the incline it takes two and a half turns round a pulley, 1.4 m. (4 ft. 7 in.) in diameter, driven by turbines with tele-dynamic transmission of power. At the top the rope passes over a pulley of the same diameter, with tension truck, the pulley being arranged in a vertical shaft with guide pulleys of 1 m. (3 ft. 3 1/2 in.) in diameter. All the pulleys are of cast iron, and their grooves have no lining.

The rope broke when the two trucks fully loaded were near the pass-by. The automatic brakes did not act, and the two trucks ran down the incline. After passing the crossing point, where the gradient is 0.2 m. per metre the first truck left the rails and ran against the mouth of the tunnel, the side frames being twisted or broken. Immediately afterwards, the second truck collided with the first and completely destroyed it, the pieces being thrown to a distance of 40 m., while the rails and sleepers were torn up.

The causes to which the fracture of the rope is attributed are: Wear of and strain on the rope added to bad quality of the metal. The steel wires broke under a tensile strain of 100 kilog. per square metre (67 tons per square inch), and also after seven double bends in a 5 mm. radius, while the iron core broke under a load of 66 kilog. per square millimetre (42 tons per square inch).

The maximum tension in a state of rest on the upper portion of the rope is 1,000 kilog., or 1 metric ton, being determined by the weight of the tension truck, which is 2,000 kilog., and the tension of the lower half of the rope, which is outside 1,000 = 540 + 460 kilog. Now, in the state of motion, this distribution of strain is modified. Referring to a supposed diagram, let T_1 and T_2 represent the tensions on the upper and lower halves of the rope respectively, T_3 and T_4 the corresponding tensions in the other half, and R , the motive power at the rim of the pulley, representing the equivalent of the whole resistances to the motion. Then $T_1 + T_2 = 2,000$ kilog., $T_3 + T_4 = R$, $T_1 - T_2 = 2,000 - 540 + 250 = 1,710$ kilog., and $T_3 - T_4 = R$. Observation of the rope in motion shows that T_1 is very slight, whence it may be deduced that R is equal to about 400 kilog. The greatest tension in the upper portion of the rope will therefore be 1,200 kilog., or 14 kilog. per square millimetre (under 9 tons per square inch), if the iron core be left out of consideration, and 1 1/2 kilog. in the contrary case, these figures being high without being exaggerated.

The turn round the pulley causes increased tension in the rope, generally represented by $\frac{D}{d}$, D being the diameter of the wire and d that of the pulley. The reality this expression represents is the elastic tension of the wire, being passing over a pulley of the diameter D , so that this formula gives, at the outside, a

higher limit of the strain on the wires, and affording no very useful indication.

If a series of wires placed alongside one another in a parallel direction be taken, they will, together, have the same stiffness as a bar of the same substance similarly distended; but if the wires be arranged spirally, the suppleness of the rope will increase as the pitch of the spirals diminishes. It seems, therefore, that the determination of the diameter of the pulleys should depend as much on the composition of the rope as on the diameter of the wires; but, as a matter of fact, it is only the latter element which is taken into consideration. The passage of ropes over the pulleys not only gives rise to a supplementary strain, but it also sets up, in a similar sectional area, an unequal distribution of the working load, which may be considered as uniformly distributed in a straight portion. This fact is due to the deformation of the spirals, the pitch of which becomes elongated on the convex portion of the rope and lessened in the concave portion; and this deformation, which is caused by the displacements of the elements of the rope, gives rise to friction and consequently to inherent wear.

At the above named works, as the working loads of the two portions of the rope, and the conditions of their passing over the pulleys, were very different, the two portions of the rope showed a marked difference of appearance. The lower portion gave evidence of wear on the outside, appreciable, but not very pronounced. On the inside, at the first glance, the rope seemed intact; but on examining a single wire separately, small facets of wear might be observed, re-entrating at each spiral of the rope. These marks were first seen by inspection of the rope with a strand removed, were produced by the friction of the wires of one strand against those of a neighbouring strand; but in the same strand there is no sign of wear due to friction of the wires one against another. In the upper portion of the rope the outside wear is much more evident, attaining half the thickness of the wires over all the outer surface of rope, and showing that the latter were subjected to torsion movements, which brought all the points in the circumference, one after the other, into contact with the pulley grooves. The internal wear, also very considerable, takes the form of transverse furrows, due to the friction of the wires of one strand against those of the neighbouring strand, of longitudinal furrows due to the friction, one against another, of the wires of one strand against those of another, lastly, of a furrow resulting from the friction between the steel wires and the iron core of the strands. At these points the sectional area of the rope is much reduced, on account, first, of the wear, and secondly, of the permanent elongation of the wire, the metal of which had become brittle, while shortly before the fracture, an appreciable elongation of the rope had been noticed.

The relative displacements of the strands and the wires, on passing the upward landing, had, moreover, the effect of preventing the tar, with which the rope was often coated, from remaining attached, so that internal oxidation was very marked.

MINING NOTES.

(FROM OUR OWN CORRESPONDENTS.)

Nova Scotia.

Cape Breton.

Reports of the bonding of some of the leading collieries in Cape Breton are well founded. Amounts varying from \$5,000 to \$10,000 have been paid on options, which certainly looks as if the American syndicate meant business.

Work has continued fair during the season, and the steamers engaged in the Gulf trade are promptly loaded. Receivers at Montreal claim that receipts are 50,000 tons more than to this date last season, and are asking a halt in shipments. The new collieries, the Emery and Gardiner, are both in fair shape, and it is reported that the Low Point Company are shortly to make an opening on a recently discovered vein, said to be specially adapted for bunker. The 17,200-acre area and colliery, owned by the General Mining Association, is reported sold to the International Coal Company for \$100,000. The Sea Coal Bay Company are engaged in building a wharf, and expect shortly to commence shipping.

Cumberland County.

The sale of the Loggins mines is reported to some New York capitalists, and preparations are to be made for an increased output.

Work has been comparatively dull at the Springhill mines, the mildness of last winter having saved the coal stocks of the different railways. Screening and dumping at the north slope of these mines will shortly be done away with, as the loaves from it will run on self-acting inclines to and from the west slope screens.

The Cuckshank mine, two and a half miles from Maccan Station, has, it is said, a contract to supply 10,000 tons to the Government. An engine has been erected, and a large bankhead is nearly completed. Mr. Alfred Babine, late of Maccan, is manager. Thirteen men are presently employed underground. This force will be increased immediately.

Pictou County.

Except at the Intercolonial Colliery, which is engaged in filling large orders for the Intercolonial and Grand Trunk Railways, work is very dull.

The New Glasgow Coal, Iron and Railway Company made a fine display at the recent Toronto Exhibition. The exhibit consisted of car-load of pig-iron, the first produced at the recently erected Ferrona furnace, specimens of the ores and slates mined on the company's property, specimens of coke made, coals from the mines in the neighborhood, etc. The other specimens consisted of products of the Steel Company's works. Immense ingots of steel, weighing over a ton each, just as they were turned out of the moulds; an immense cogging roll twenty-six inches in diameter and weighing some seven tons; steel billets rolled or hammered down from the ingots, and ready for other processes of manufacture; heavy cast-iron and marine forgings; machinery steel in many sizes, made for many different purposes; carriage and wagon tire steel; sleigh shoes; a large assortment of shapes of sectional steel for structural purposes; angles, channels, plow beams, fish plates, etc.; mould boards, harrow teeth, hay rake teeth, harrow discs and cultivator teeth, as used in the manufacture of agricultural machinery, and a pyramid of bedding made to order for the Massey-Harris Company, Toronto, to be used in the manufacture of harvesting machinery.

At Ferrona the furnace stack is 65 feet high by 15 1/2 feet bush. There are three Massey-Crookes stoves each 60 feet high by 17 feet diameter. There is a coal washing plant with storage towers, and a battery of 36 coke ovens of modern design, raised on the site of the best coking plants in America. And there are the blowing engines, the casting house, and everything else necessary for successfully carrying on the business. The steam required to drive the blowing engines and all the other machinery is generated from a battery of eight multi-tubular boilers fired with the waste gases from the coke ovens. The capacity of this furnace is about 30,000 tons per annum. The plant is arranged so that the furnace can be added whenever desired, the number of hot blast ovens increased, etc. In fact, everything is arranged with a view to increasing the capacity of the works. The construction of this plant was begun only in August of 1891, and the first iron was made in August, 1892.

The steel company are increasing their works by the addition of a new machine shop 175 x 70 feet, in which some very heavy tools and machinery will be placed. Included in this will be a lathe 46 feet long with a swing of 112 inches between centres, intended for turning heavy marine work. There will also be a 24 inch slotting machine for slotting crank shafts. A new 350 x 120 feet rolling mill is about being built in connection with the steel plant.

Killag District.

The mill of the Old Provincial Co. in this district was reported on Sept. 1st, but no quartz available for crushing. The Company has experienced great difficulties in getting miners to work in the new vertical shaft on account of the large amount of water flowing in between the surface and bedrock, and falling down the shaft. Mr. H. S. Mackay is the managing owner of the Company.

Goldenville.

The Alexandra property in this district has been sold to Messrs. Stuart, Hamilton, et al., for the sum of \$5,000. The openings made have shown a three foot lode of quartz, supposed to run from half an ounce to one ounce of gold per ton. No other properties in the district are working, and the probabilities are that little or nothing will be done this winter.

Stormont.

The recent decision of the Privy Council, in the case of the Palgrave Gold Mining Co. vs. McMillan et al., in favor of the Palgrave Co., will lead to the re-opening of their property on Harriette Island very shortly. Mr. H. K. Fisher, President of the Company, is now making arrangements to that effect.

The North Star Co. is to erect a ten stamp mill of old pattern near the Burke lead. Mr. Rod. McLeod, formerly of Molega and Whiteburn, is the resident manager.

The owners of the Richardson gold mine, so-called, distant about a mile and a half east of Isaac's Harbour, have had a new road built, and contemplate the erection of a ten stamp mill of modern design. The lode, as openings on it are extended, shows a crevice about six feet in width, of which at least four feet is milling stuff. Occasional sights of coarse gold are seen; and if the rock will mill ten dollars a ton the property should become one of the largest gold producers of the province.

Country Harbour.

The Copeland mine continues to be a large producer, although the average per ton is somewhat diminished.

The McNaughten property is idle, and wages are reported in arrears.

Caribou.

The lessees of the Tinto Co.'s property in this district have struck it rich, the pay chute showing specimens

which are reported equal to any ever seen there. The mill return for August was near four ounces to the ton. The Company, when it closed operations last year, under the management of Mr. Whidden, did not earn expenses.

Oldham.

Some parties from Providence, Boston, and vicinity, have bought fourteen areas on the north side of the district for \$4,000. Some prospecting was done on these areas this spring by Edward Whidden (one of the vendors), and a bunch of quartz worth about an ounce to the ton was uncovered. Work on the property will be prosecuted this winter. Mr. H. F. Carpenter will be resident manager.

Montague.

"The Nova Scotia Gold Mines, Ltd.," is the modest title under which the syndicate which has purchased the Annand and other properties appears. The management are busily engaged perfecting plans for future work, and meantime are erecting some second-hand machinery taken from the syndicate's property at Waverley. Since the transfer of the property, on the first of August, the new owners have been fortunate in getting two exceptionally rich strikes of quartz, and the mine looks as well as it ever has done in the past.

The Salisbury Mining Co. will begin next month the erection of a five stamp mill. The mill will be built to accommodate ten stamps should the future working of the mine require them. The Company has three lodes opened, all showing pay ore.

South Uniacke.

The Witherow property closed down about the middle of September for an indefinite period. It is understood that this closure is due entirely to a difference of opinion among the owners regarding future policy.

The Thompson-Quirk mine reports 317½ ounces from 29 tons for August.

Darr's Hill.

The Dufferin mine reports quartz looking better than for many months. A new lode, eight inches wide, said to be worth an ounce to the ton, has been found by a cross cut in the north wall. Openings are now being made on this lode to determine its value and extent.

Quebec.

Ottawa County.

Some very fine shows of mica are uncovered at the Little Rapids mine, and a goodly quantity of excellent quality is now ready for the market. The demand for mica for electrical purposes continues to yield a good margin of profit to the operator, which greatly enhances the value of this mineral property. The phosphate uncovered continues to be of high test and plenty of it.

The British-American Phosphate Company continues to hold its place as the principal producer of this year's phosphate on the Lievres River. Manager Smith has his works in fine shape, and reports the outlook at his pit encouraging.

The Orange asbestos mine was visited during the month by Mr. D. A. Brown, of the H. W. Johns Manufacturing Company, Boston, and Mr. George R. Smith, of the Bells' Asbestos Company. Both gentlemen speak highly of the extent and quality of the mineral on the property.

The grinding mills at Buckingham have been treating large quantities of dump rock from the property of the Templeton Asbestos Company. The fibre extracted, though comparatively short, is of the finest quality, and Mr. Cirkel, the manager of the company, is so well pleased with the results that he will resume mining with a strong force. It is not unlikely, too, that a mill will be placed at the mine, an economy which would result in a material saving in handling alone.

The Weart plumbago mine continues to employ between twenty and thirty men. The results obtained give rise to the hope that we may see other properties in the district containing the mineral worked at an early date.

The force at the High Rock mine has been reduced to forty-five men.

The Ross Mountain and High Falls phosphate mines will, it is reported, resume active mining work shortly. Mr. Sando is back again in Canada, and talks hopefully of his project to establish super-phosphate works at Buckingham. When this company does go through it is hoped care will be taken to establish the works on a more business-like basis than that which so far has characterized the operations of the General Phosphate Corporation. With competent and energetic management, assisted by the substantial bonus given by the Dominion Government to the manufacture of fertilizers, there is a capital opening in Canada for the utilization and disposal to our own farmers of the product of our phosphate mines.

Wills vs. Stewart was up at the Aylmer Court during the month, but owing to the absence of important witnesses for the defence, the hearing was postponed to a later date.

No judgment has been given yet in the boundary suit of the Emerald Company vs. the Anglo-Continental Guano Works Company.

About 70 tons of good black mica are on the dumps of the Gemmill mine.

Eastern Townships.

The Johnsons Company has struck lately some very fine veins of unusually long fibre in their Thetford pits. Specimens shown us measured a little over four inches of fine silky quality.

The Reeds asbestos mine was closed for the season on 1st September. From four and a half months' work this year, 110 tons of the mineral, all grades, were mined, an average force of 15 men being employed. The air compressor plant put in by the Ingersoll people gave great satisfaction.

Dr. James Reed has a force of men working on contract on his Coleraine property at a point about 1,000 feet from main pits of his mine.

The H. W. Johns Company is opening Lot 20, Range A, Coleraine. An efficient plant, comprising boilers, steam drills, hoists, etc., is being put in place. Work will be carried on through the winter, under the management of Mr. James Sheridan.

All the other companies in the district, with the exception of the American Company, which is shut down, are in active operation.

Ontario.

A private letter from Rat Portage announces the sale of the Sultana mine to a company of English and American capitalists, who will put in the necessary machinery for developing and treating the output of this promising property. The price has not been made public, but it is reported that the owners have received a cash payment of \$125,000. Dr. Scovil has also disposed of one of his gold properties at a handsome figure. The property is undeveloped, but the surface prospects are reported rich, and warrant the expenditure of a large sum in opening it up and testing its ores.

During the month five miners were killed and one seriously, if not fatally, injured by a cave-in at the Blezard nickel mine, operated by the Dominion Mineral Company. The coroner's inquest returned a verdict of accidental death. We hear, however, nothing of an investigation by the Provincial Mining Inspector. Surely it is full time serious matters of this kind were taken in hand by the Government in order to minimize, as far as possible, a recurrence of these unfortunately too frequent fatalities in our mining districts.

"This," says the Rat Portage *Record*, "is about the position of Rat Portage reduction works: Had the present management started out to make a muddle, it could not be more complete than now. With a big mortgage, broken machinery, incompetency and a charge of larceny against the secretary, the thing is an offence in the nostrils of the people of the district. It has proven a blight to mining operation, and a curse to our prospects for interesting capital here for some time. The *Record* has withheld adverse criticism heretofore in the hope that the position might not be as bad as was supposed, and that order might be evolved out of what appeared chaotic. But it is useless longer to overlook the facts as they were brought out at the trial on Saturday last. The concern has shown a large capacity for swallowing up money. Thousands of dollars of the people's money have gone in shares; \$10,000 of a bonus has been dispelled to the winds, and those who brought thousands of dollars worth of ore to the concern have had no returns worthy the name, though there is abundant proof that the ore was of the richest kind. What the future is to bring forth is hard to predict."

British Columbia.

The Le Roi Mining Company invites tenders for sinking 120 feet of shaft on their Trail Creek property.

Some rich strikes of gold are reported in the Wild Horse district, about 60 miles west of Slocan Lake. The placer diggings are reported to have been unusually productive lately.

Reports from Kamloops announce that—Mr. W. T. Thompson, of Granite Creek, has just completed the sale to an English syndicate represented by Messrs. Attwood & Reynolds, of a group of mines, also the machinery, including a saw mill, stamp mills etc., situated at Fairhaven, in the Okanagan district, for a large amount.

The party left Penticton in the morning and arrived at Kamloops the same evening, got the necessary funds, returning the following morning, and before noon had paid over the full amount of the purchase money. It is understood that the new company will soon commence work at the mines on a large scale.

A gentleman lately returned from a trip to Yale, gives glowing accounts of the prospects on Siwash Creek and its immediate vicinity. All claims are steadily improving, and one has the pleasure of seeing as good pan-outs in the several placer clean-ups as was customarily witnessed

in the palmy days. Messrs Jack Roddick and Charles Hall, of the Hall and Roddick claim, lately exhibited some unusually fine nuggets, and the Dunn claim is passing all expectation. Besides the above companies there are the Macharens, who have four men steadily employed, the Whatcom Company and Rodney. The latter company is taking out coarse silver, while the Whatcom Company have excellent quartz prospects.

The shipments of coal by water from the Port of Nanaimo for the month of August were:

New Vancouver Coal Co.....	20,149
Wellington Coal Co.....	12,278
East Wellington Coal Co.....	3,435

Increased activity about the Nelson mines is noticeable of late, says the Spokane *Miner*. Work on the Grizzly Bear and Silver Queen is progressing rapidly, and a boarding house and offices for the latter are under construction. A new strike has been made south of the Silver Queen. Although the croppings were small, a large body of ore has been uncovered by stripping the lode, and in character the ore resembles that of the Silver King. The location has been christened the Anchor. The Slocan country is still absorbing much interest among mining men and prospectors. About 1,000 lbs. of ore has been shipped from the Washington, and work is being pushed. Very rich samples of dry ore have been taken from the Grand Republic at the head of Spring Creek. It is said that the ore runs very high in silver, and that a solid body has been encountered. The Blue Bird, lately purchased by John M. Burke and O. D. Garrison, is being uncovered. It is reported that several sales of properties in Jardine's camp have been made of late.

CANADIAN COMPANIES.

Creighton Gold Mining Co., Ltd.—Gives notice of application for letters patent of incorporation under the Ontario Joint Stock Companies Act. Capital, \$1,000,000 in 200,000 shares of \$5.00 each. The objects for which incorporation is sought are: (1) The carrying on of mining work and operations in the Township of Creighton, in the District of Algoma, and elsewhere in the Province of Ontario. (2) The buying, acquiring by grant from the Crown, purchase, locating, holding, alienating, or otherwise selling, leasing, exchanging, developing, and otherwise dealing in mines and minerals, and mining and other lands, claims, limits, etc. (3) The mining, smelting, treating, milling, crushing, etc., of gold, and other minerals. The first directors are: Alexander Burritt, Edward Seybold, Wm. McGillivray, M. G. Dickieson, M. C. Edey, Crawford Ross, John I. McCracken, James Davidson and W. S. Odell, all of Ottawa, Ont. The chief place of business is at Ottawa, Ont.

Beaver Oil Co.—This company applies for charter under the Ontario Companies Act. Capital, \$250,000 in 5,000 shares of a value of \$5.00 each. Head office: Toronto, Ont. Directors: S. M. Brookfield, Hon. S. H. Holmes, Donald J. Keith and Lawrence G. McKain, of Halifax, N.S., and Abner Nelson, Toronto, Ont. (1) Formed to buy, sell, refine, and generally deal in petroleum, paint oil, and all bye-products of petroleum, and other oils used for light and fuel. (2) To sink and work artesian wells, to procure oil, and to lay down and work pipe lines for carrying and conveying oils or other fluids, and to manufacture barrels, etc.

Toronto Chemical Smelting Co., Ltd.—Registered 31st August, 1892. Capital, \$100,000 in 2,000 shares of \$50.00 each. The incorporators are: A. B. English, O. B. Sheppard, C. G. Richardson, all of Toronto; T. H. Sheppard, Orillia; W. H. F. Russell, Waubashene, Simcoe Co., Ont. Head office: Toronto, Ont. Objects: (1) To purchase and treat ores and their bye-products; (2) to smelt and refine ores; (3) to purchase patents for the purposes of the said company; (4) to purchase mining properties, and (5) to hold real estate sufficient for a place of business and for the erection of dwellings, etc.

New Toronto Oil and Natural Gas Co.—Under the provisions of the R. S. O., 1887, Chap. 157, Sec. 35, L. G. Harris, Toronto, secretary of the company, gives notice of a by-law to increase its board of directors from five to seven.

La Prairie Pressed Brick and Terra Cotta Co.—Registered 8th September, 1892. Capital, \$150,000 in 1500 shares of \$100. The incorporators are: Hugh Cameron, Toronto; A. D. Taylor, Montreal; Dr. T. A. Brisson, Laprairie; Wm. Johnston, Montreal; T. H. Rothwell, Goderich, Ont. Formed to manufacture bricks, tiles, and all other articles made from clay or shale. Head office: Laprairie, Que.

North America Mining Co.—Gives notice of application for charter under Quebec Companies Act. Capital, \$200,000 in 2,000 shares of \$100 each. Head office: Montreal, Que. Directors: Alphonse Bayard, Arthur Yale, of La Cote Visitation; F. Bayard and A. Montreuil, Montreal; G. N. Ducharme, St. Cunegonde, Montreal. Formed for the purpose of carrying on a general mining business in the Province of Quebec.

The Pidgeon Fertilizer Co., Ltd.—Applies for charter under Nova Scotia Companies Act. Capital,

\$45,000 in 150 shares of \$100 each. Directors - Allen Haley, J. A. Russell, Robert Pilgeman, John E. Curran, Charles Hensley, all of Windsor, N.S. Formed to manufacture chemicals, including sulphurous and sulphuric acid, the impregnation of phosphate, rock, bone, nitrates and sulphates of ammonia, soda, and acids, etc., the manufacture of superphosphates and artificial fertilizers of every kind, etc.

Kamloops Coal Co. - This company has been incorporated with headquarters at Kamloops, in British Columbia, to acquire, by purchase or otherwise, coal lands and mines, and to carry on the business of miners, etc. Capital, \$200,000 divided into 40,000 shares of a value of \$5.00. The trustees who will manage the concerns of the company for the first three months are: Messrs. J. McIver, John E. Saucier and Jean B. Latremouille. The company owns 1,850 acres of good coal lands, with two seams of coal, one 42 inches, and the other 4 feet thick, which assays 62.34 fixed carbon and 70.69 per cent. coke.

Kootenay Lake Reduction Co. - Registered 23rd August, 1892. Head office: Pilot Bay, Kootenay District, B.C. Capital, \$250,000 divided into 2,500 shares of \$100 each. The objects for which the company is established are: To carry on the business of mining, milling, smelting, concentrating, reducing and refining gold, silver, copper, lead ores, and other ores and minerals in all its branches at Kootenay Lake, in Kootenay mining district, in British Columbia, and in other mining districts in British Columbia and the United States, and to own, buy, sell and deal in gold, silver, copper, lead ores, and other ores and minerals, bullion and refined metals, and to purchase or hire such real estate, and to purchase, own, work and develop such mines, mining claims and mining property as may be necessary and convenient for the transaction of said business, and to buy, sell and own all such machinery, tools and other personal property as is necessary or convenient for use in said business, and to the proper promotion and management thereof.

Kootenay Mining and Smelting Co., Ltd. - Registered 23rd August, 1892. Head office: Pilot Bay, Kootenay district, B.C. Authorized capital, \$50,000 divided into 1,000 shares of a value of \$50 each. The objects for which the company is established are: To transact the business of mining, milling, and smelting gold, silver, copper, lead ores, and other ores and minerals in all its branches, at Kootenay Lake, in Kootenay Mining District, British Columbia, and in the Territory of Idaho, and in other mining districts of British Columbia and the United States of America; also to purchase, own, work, and develop the mines, mining claims, and mining property known as the "Blue Icel," "Silver King," "Surprise," and "Black Hawk," lodes, located at Kootenay Lake, in Kootenay Mining District, British Columbia; and to purchase, own, work, and develop other mines, mining claims, and mining property at other places; to own, buy, and sell, and deal in gold, silver, copper, lead ores, and other ores and minerals; also to obtain, buy, and own the franchise and property of the toll road from Mud Slough to a point on Kootenay River near Bonner's Ferry, Idaho Territory, and to maintain and operate the same; to buy, own, and hire steamboats, and other boats, and to operate the same for the transportation of freight and passengers; to buy, own, and hire, and lease and operate water privileges; to buy and own, lease, and construct, and maintain buildings, roads, bridges, canals, flumes, and other water courses necessary or convenient for the prosecution of said business; to buy, and own, and hire real estate, machinery, tools, and other personal property necessary or convenient for the prosecution of said business; and generally to do all things incidental to said business, and to the proper management thereof.

Hinlota Mining Co. - This company gives notice of application for charter under the New Brunswick Companies Acts. Authorized Capital, \$1,000,000 in 100,000 shares of \$10 each. Head office: Lancaster, St. John County, N.B. The directors are: Herbert J. Olive, J. Herbert Wright, W. D. Beane, Frederick W. Baucher, and Charles B. Lockhart, all of St. John, N.B. The objects for which incorporation are sought are: To purchase, own, sell, and deal in mining rights, mines and lands, mining privileges and facilities in connection therewith, minerals and milling and other plant for the extraction of metals.

Alberta Railway and Coal Co. - The annual general meeting of this company will be held on Wednesday, 26th October next, at the head office of the company in London, Eng.

Ontario Mining Convention - Programme of Proceedings at Sault Ste. Marie on 5th October.

I. To encourage the construction of colonization railways in Algona, are you in favor of 12,800 acres, including pine and minerals per mile in alternate townships, being made to such railway companies? (12,800 acres is the area granted to the Winnipeg & Hudson Bay Railway in the North-West Territory?)

II. Are you in favor of reserving the remaining townships in such railway belts with the pine and mineral for the actual settler condition upon clearing 25 acres and five years residence on each 160 acres?

III. Are you in favor of the Government retaining timber tracts of \$1 per thousand on all pine granted to such settler and railway companies?

IV. If the North-West Territories with a population of 70,000 and an area of 293,900 miles of prairie land will shortly be not only one province, but several provinces, should not Algona be created into a province with its 54,000 people and 275,000 square miles, containing the gold of California, the silver of Colorado, the copper and iron of Michigan, the coal and petroleum of Pennsylvania, the Asbestos of Quebec, the pine of North America, the fertile valleys of Canada, unlimited fisheries, and the nickel of the world?

V. Are you in favor of reciprocity between Canada and the United States in all mineral and the manufactured product thereof for a term of 25 years or longer?

VI. Should the duty levied on all coke, coal and machinery used by mining and smelting companies be repaid to them?

VII. If the same protective liberal legislation had been accorded to mining interests as has been given manufacturing interests, would not Canada have reaped far greater benefits?

VIII. Should each of the judicial districts of Nipissing, Manitowish, Algona, Thunder Bay and Beatty River district council, having all the powers of a county council, with additional powers to deal with immigration and other matters, and composed of seven members, elected by the voters appearing on the Dominion list in the respective constituency, (which constituency might be fixed and changed from time to time by the judge or sheriff of the respective districts)?

IX. To induce capitalists and discourage speculators, are you in favor of granting to all municipalities in Algona the right to exempt all improvements from taxation?

X. If Northern Michigan is entitled to three executive officers, should not one of Algona's representatives be a member of the Ontario cabinet as the Minister of the Department of Mines and Commissioner of Crown Lands?

XI. Are you in favor of a Dominion Mining Convention being held in the City of Montreal in the winter of

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1893, and of the formation of a Dominion Mining Association at such Convention?

XII. Are you in favor of having all lands six months in arrears for taxes open to the actual explorer and settler, who would be entitled to a deed thereof upon residing thereon for six months and paying the taxes in arrears and all expenses?

Fire Hazard.

Prof. Charles B. Gilson of Chicago, in his special report to the insurance companies on the "Hazard of Steam Pipes" and upon "Coverings for Steam Pipes," says: "All organic matter, such as hair felt, becomes more or less charred by constant contact with hot steam pipes, even though the temperature be but a little above the boiling point of water; and by steam of 300° F. and above, so thoroughly scorched after a time as to become very fragile, and to crumble away rapidly. It is noticeable that the dust formed from this charred material is very combustible and will flash like gunpowder when thrown into the fire. "When steam of high temperature is used it is by far the safest to employ a covering wholly incombustible." As there is always room for improvement, we ask you to try our OLD CITY PLUG, or cut smoking tobacco, and we believe you will be BETTER satisfied. In any case a trial won't hurt you. Don't delay upon the order of buying, but buy at once.

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ARCHIBALD BLUE,
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TORONTO, April 27, 1892.



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Under the provisions of chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve 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. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 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 an ounce, and on smelted gold valued at \$18 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 areas 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 eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas 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 for a nominal fee, 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, 10 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.

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— If so, these facts will be of importance to you. —

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A machine that could diminish the cost of producing gold and largely increase the proportion extracted would necessarily revolutionize gold mining. These results have been secured by the Crawford Mill.

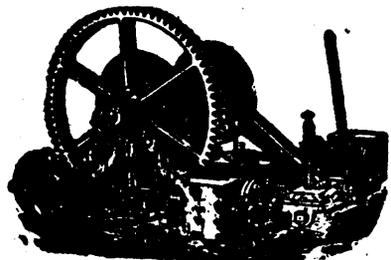
The Crawford Mill works more cheaply, and saves from 20 to 50 per cent. more gold than the ordinary stamp mill, while it also successfully treats at less than \$1.00 per ton many refractory ores otherwise impossible to treat save by costly chemical processes. It renders possible the working of abandoned mines. Even tailings can be profitably worked. By its use there are savings on every hand. First cost of purchase—about one half that of stamps. Less labor—one man can run ten mills with daily capacity of one hundred tons. Less water, less power, and less expense in transportation, owing to lighter weight and portable character. A machine of the smaller size can be carried in a farm wagon. Thus, mining regions heretofore inaccessible can be reached. The parts being interchangeable, no mechanical skill is necessary in repairing.

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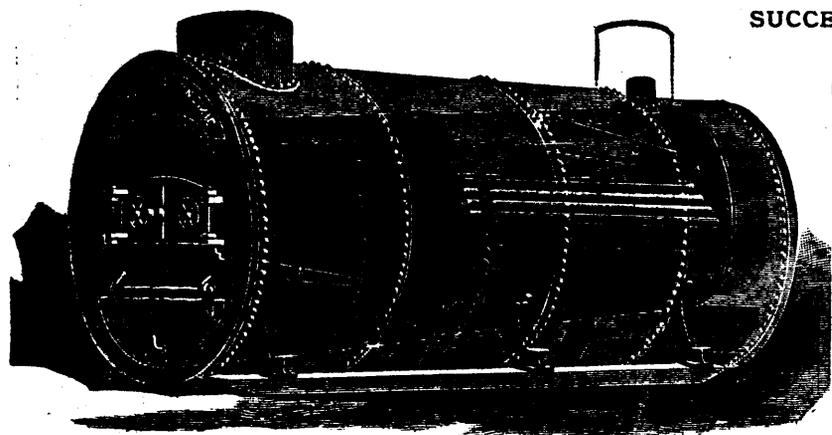
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