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Established 1882

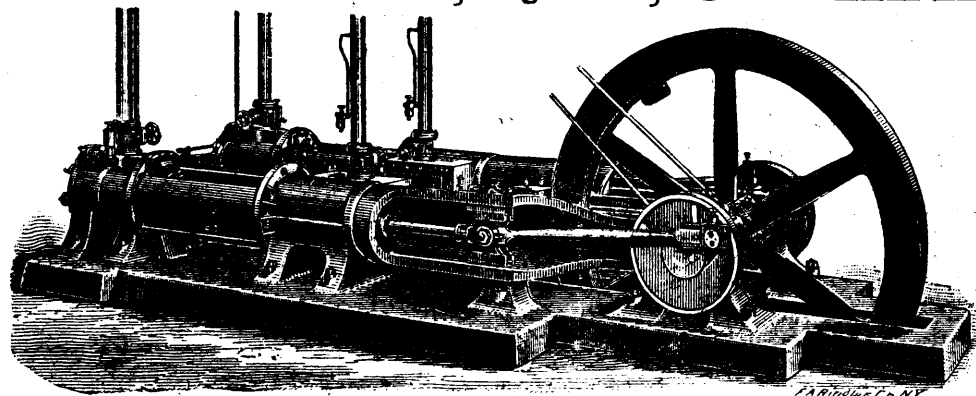
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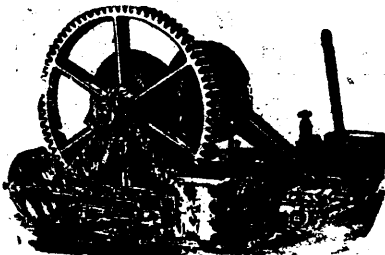
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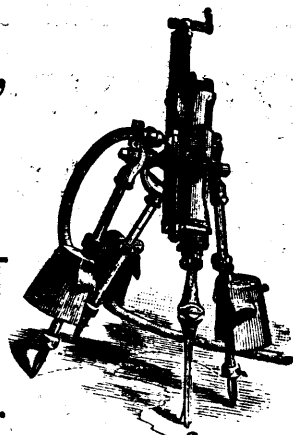
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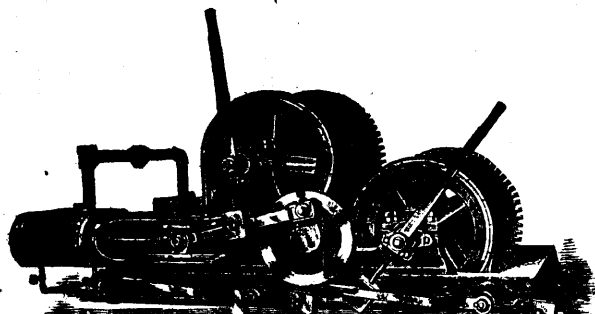
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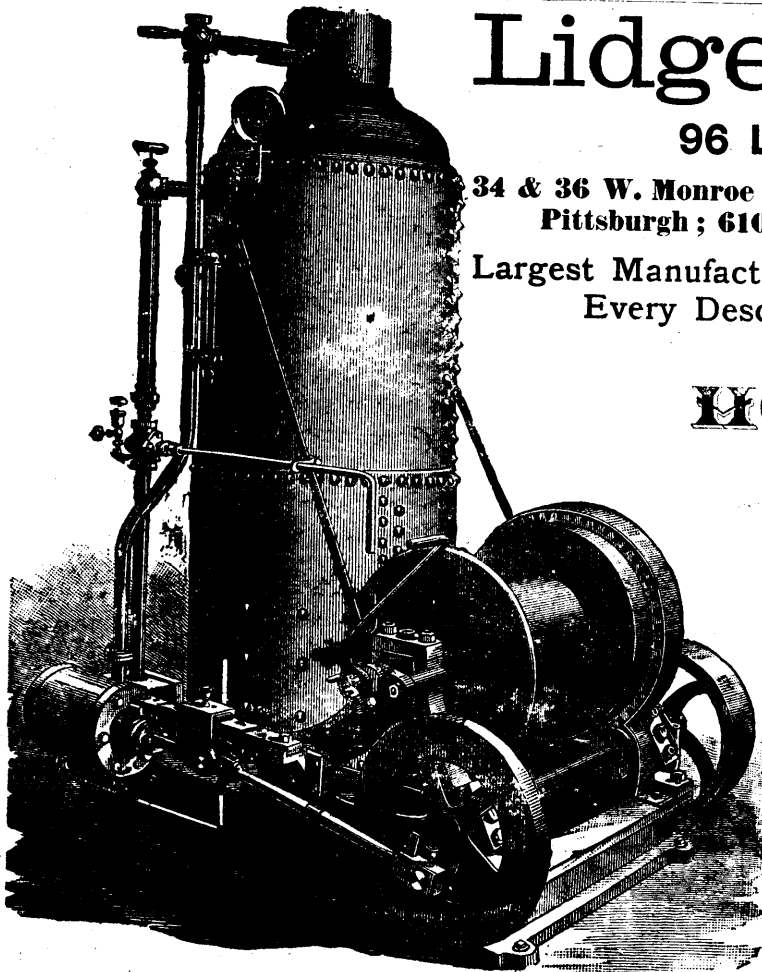
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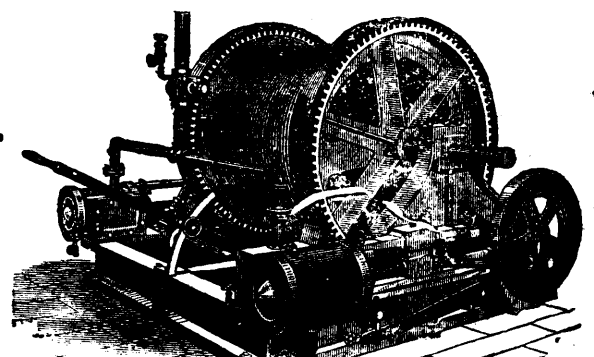
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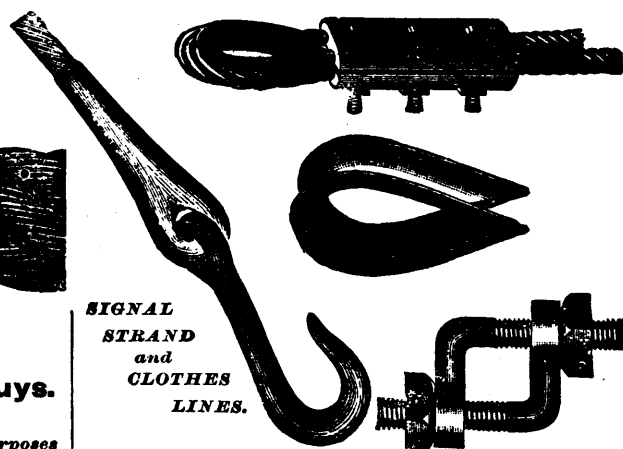


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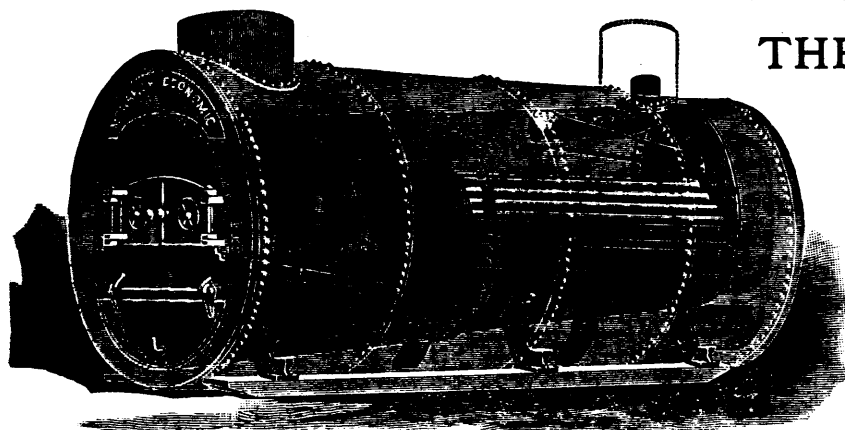
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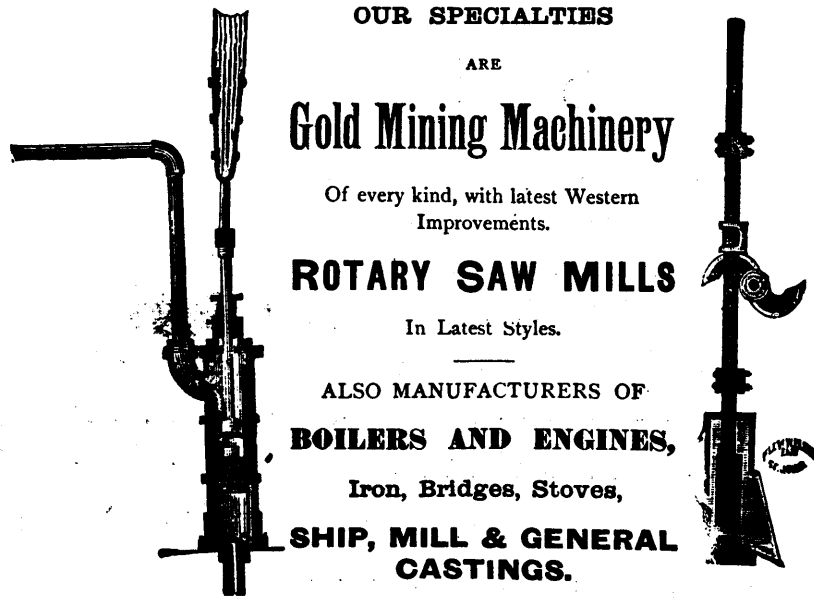
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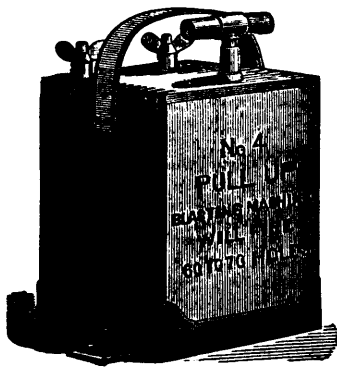
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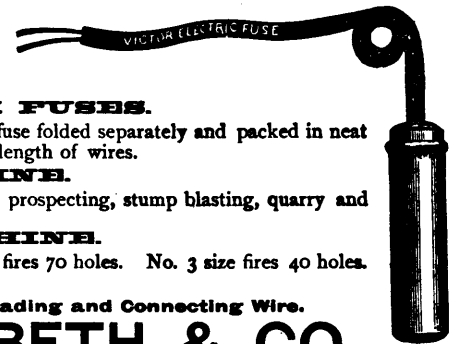
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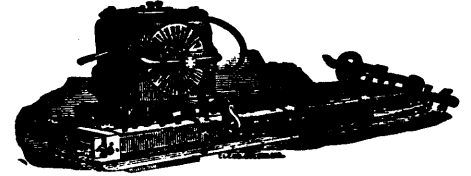
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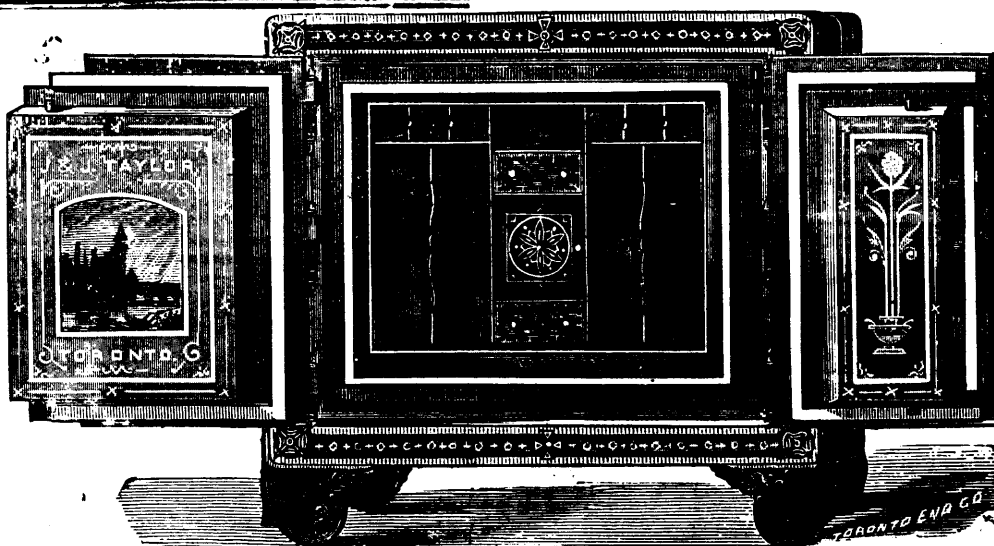
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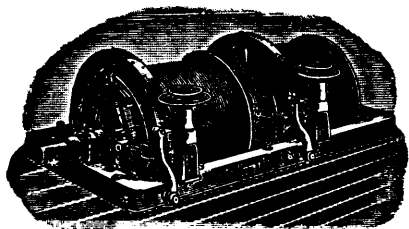
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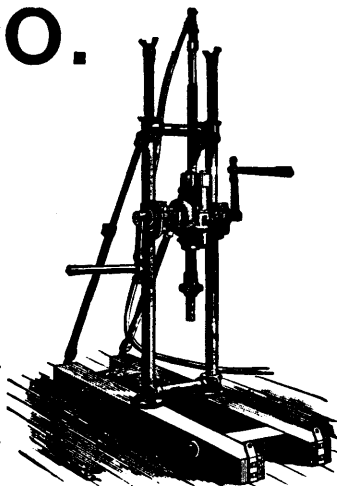
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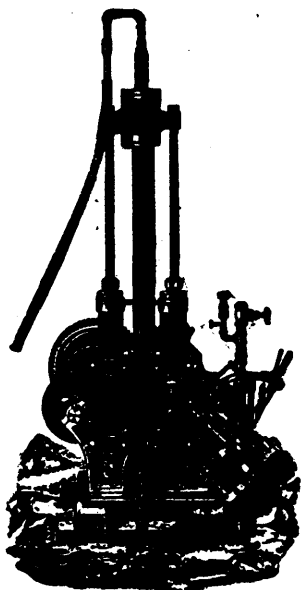
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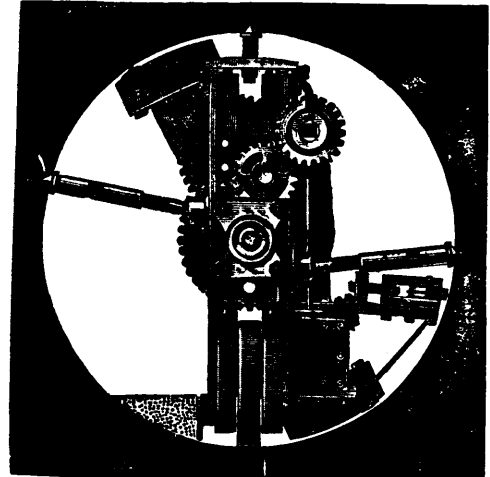
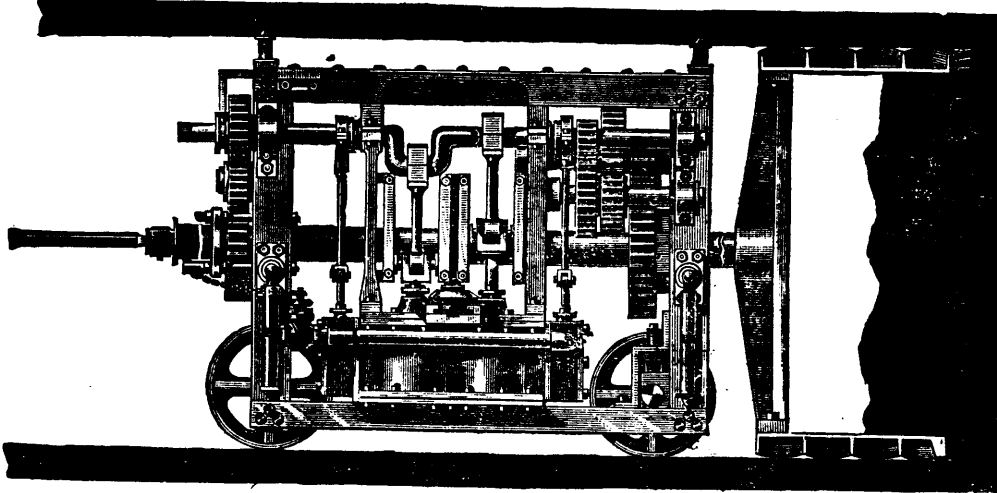
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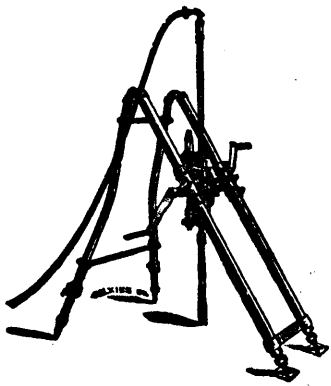
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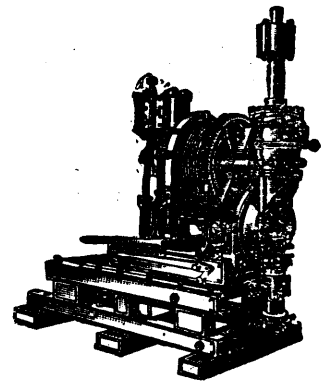
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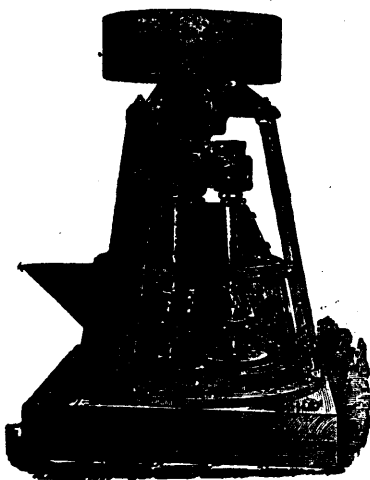
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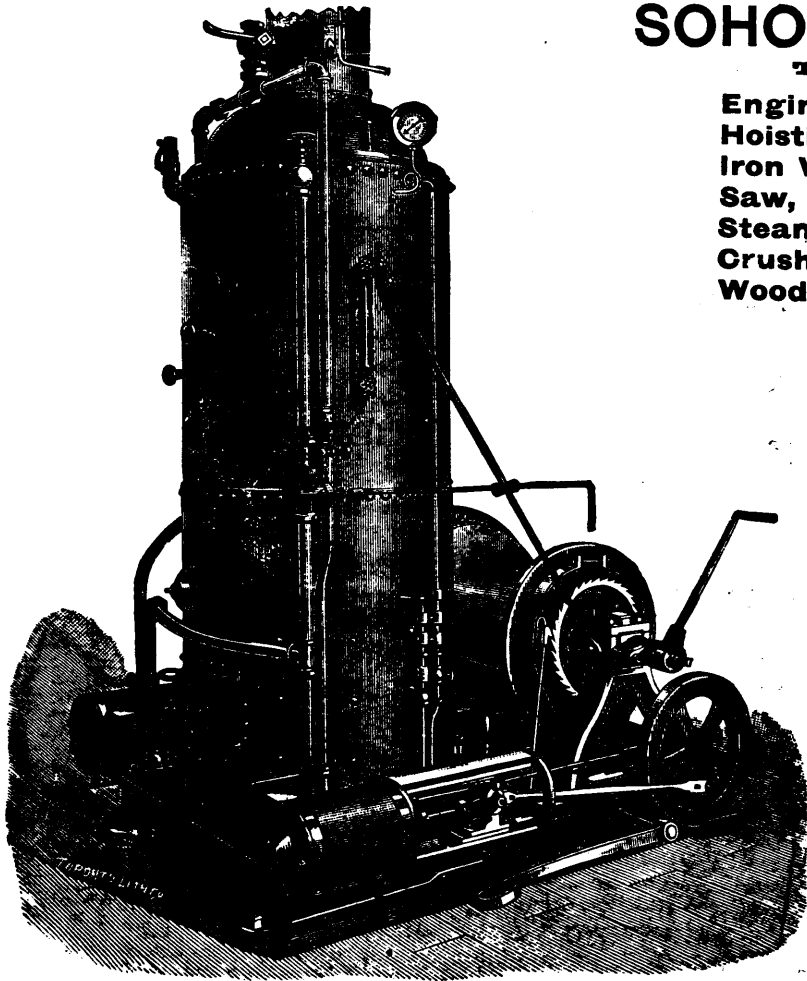
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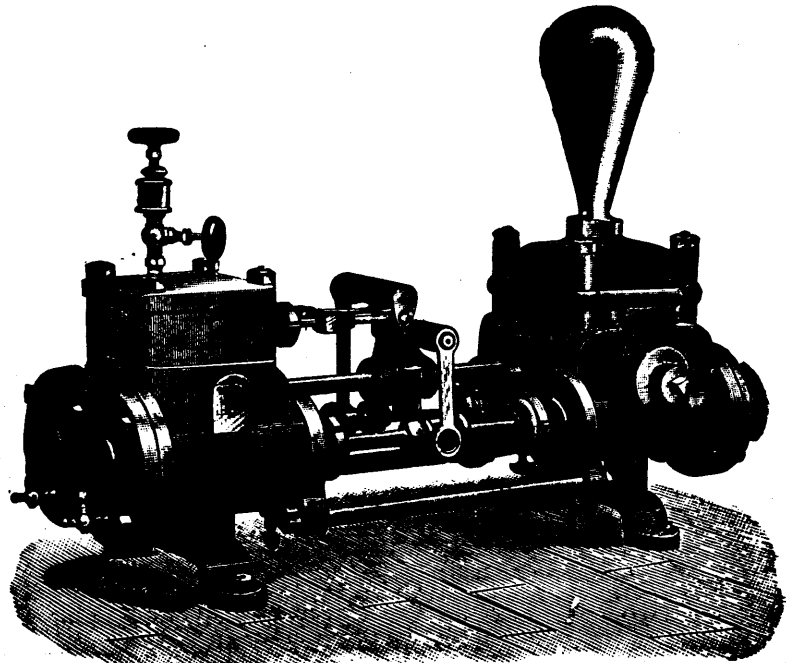
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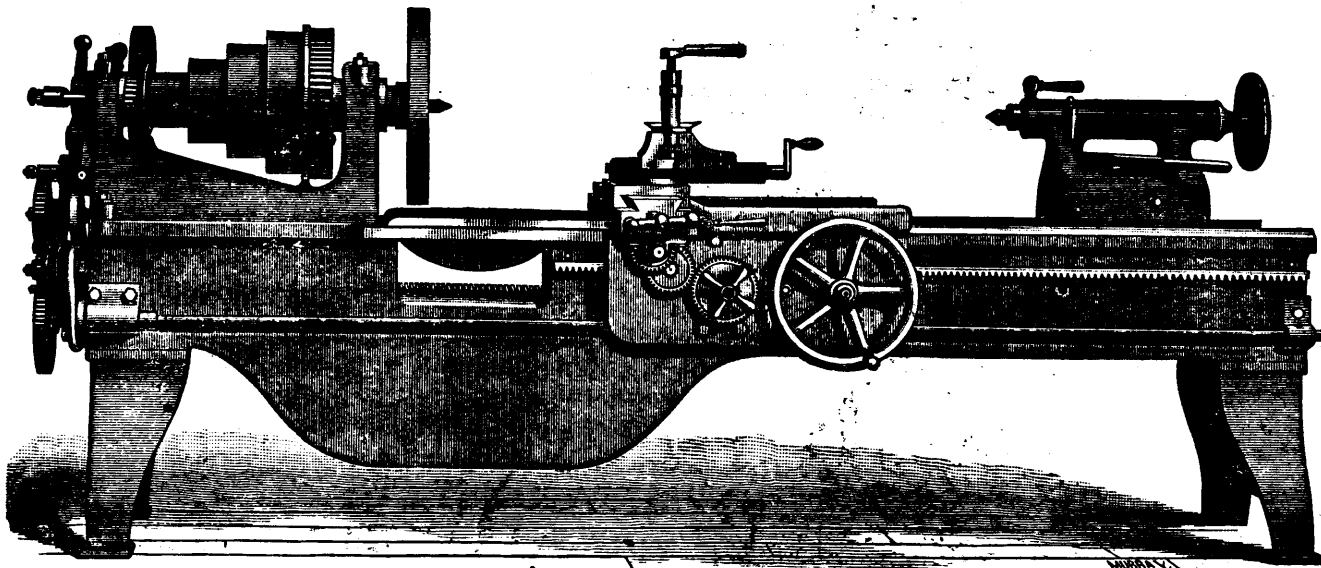
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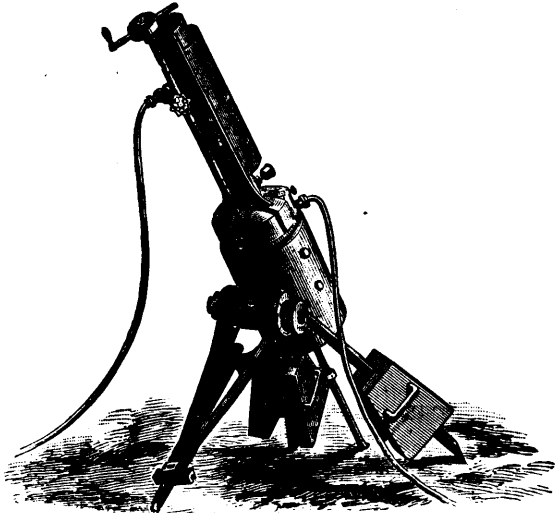
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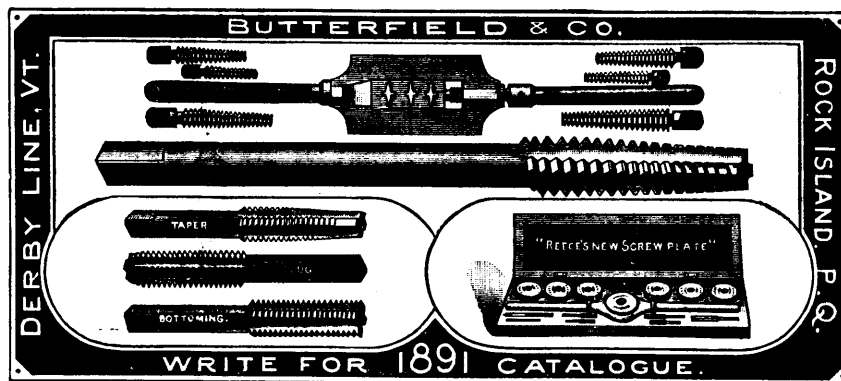
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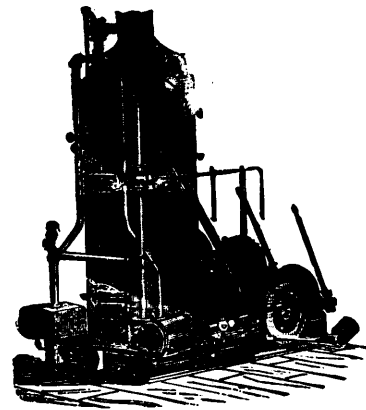
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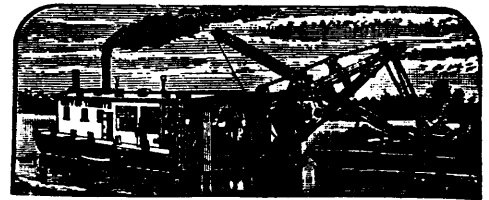
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Vol. XI. JANUARY, 1892. No. 1.

## Nova Scotia Coal Mining in 1891.

During the year 1891 the coal business has been steady and satisfactory. This pleasing statement is marred only by the unfortunate explosion at the Springhill mines in the early part of the year, which destroyed over one hundred valuable lives. The coroner's jury, largely composed of practical miners, exonerated the Company from blame, and it would appear that the direct cause was a want of judgment on the part of the men having charge of the blasting. Mr. Cowans, the manager, set to work at once to repair the damages, and in a few weeks the mines were running as briskly as ever. In Pictou County work was fair, but not as brisk as expected. Cape Breton, on the contrary, had a very busy year. Pending the issue of the official figures of the Mines Department, an estimate of the total production places it at 2,046,000 tons, against 1,984,000 tons in 1890. The increase was divided between Quebec and Nova Scotia markets. The accident to the Springhill collieries shortened the output by some 35,000 tons.

In Cape Breton two mines have been reopened; the Sydney and Louisburg having reopened and remodelled the Lorway mine, and the Burchell Brothers having leased the Gardner mine from the Merchants' Bank. These two pits will yield about 800 tons a day. At the latter the Jeffrey electric coal cutter has been introduced with success, and at the former it is reported that a large plant of air-driven coal cutters will be ready for the spring trade. It is reported that this example will be followed by the Caledonia Colliery. There can be no doubt that the general adoption of mechanical coal cutters will lead to the introduction of long-wall methods of working, to the saving of coal and its improved quality when shipped. At several of the mines mechanical ventilators have been built, as the furnaces with shallow upcasts were found too weak to cope with the long airways. The International Company's railway now operated as a part of the Cape Breton (Government) Railway, has greatly improved its equipment, and has added two new locomotives to its rolling stock, one of which bears the name "Louisburg," as prophetic of the near extension of the road to this all-winter shipping port.

In addition to the regular work at the mines, much prospecting and preliminary work has been carried on. The Sydney and Louisburg Company have leased about six square miles,

covering, it is reported, the outcrop of a new and valuable seam. An American company is sinking on a seam of coal at East Bay, reported to be a good quality of anthracite. The Terminal City Company and others have done a good deal of work in the River Inhabitants district, and at Mabou Col. Snow has opened a bed of good coal for local sales.

In Pictou County the Acadia Company has continued the work of reopening the Foord pit, and have put up steel pit head and pulley frames, and have introduced a belt for cleaning the coal on. They have also put up a new winding engine at their Westville colliery. The Intercolonial Coal Company has also erected a large winding engine, built in Sherbrooke, Que., and have shown that coal miners need not go outside the Dominion for winding engines of the largest size and the best construction. The work of extracting the pillars from the Black Diamond Mine, nearly completed, will be finished by the Acadia Company, which has absorbed it. The New Glasgow Iron and Coal Company expect to make coke containing not over 12 per cent. of ash, by washing the culm from the Pictou collieries, and are now building a block of thirty Coppé ovens at their furnace site at Eureka.

In Cumberland County the Joggins mines have been put in good order, the wharf has been extended into deeper water, and the incline from the slope to the shoot improved. Extensive explorations have been carried on in the Maccan district, which have proved the extension of the seams a considerable distance east of points they were hitherto known to exist. At Springhill a new self-acting bank-head has been built at the west slope. All three slopes have been retimbered, air-ways enlarged, etc. Although many parts of the mine are not known to give off gas, safety lamps of the most approved type have been introduced all over the mine and the use of gunpowder done away with. In this connection it may be remarked that in Pictou County gunpowder has been almost entirely supplanted by roburite, as affording much greater safety. Other safety explosives are being experimented on, and in a short time it is expected that the more gaseous of the Cape Breton mines will be obliged to discard gunpowder. Extensive shipments have been made from Springhill, via Parrsboro, to St. John, Portland, etc.

The mining legislation of the past year has been novel and important, and again places Nova Scotia in the lead of other mining countries. The use of gunpowder has been forbidden in gaseous mines, and regulations made for the introduction of flameless explosives. Fortnightly pays to miners have been made compulsory. Coal miners are now required to have certificates showing their knowledge of mining, gas, etc., before they will in future be allowed to work on their own responsibility. Engine men, entrusted with the duty of raising and lowering men in the mines by machinery will be required to hold certificates of competency. Boys will not be allowed to work over fifty-four hours in any week, unless over sixteen years of age, nor

shall any boy be allowed to commence working in a coal mine unless he be able to read, write, and has an elementary knowledge of arithmetic. As the overmen and underground managers are required to pass examinations before obtaining positions, and are provided with instructors by the Government, and the same power provides for the institution of night schools wherever wanted in the coal districts, it may readily be believed that with steady work and fair pay the coal miners' occupation in Nova Scotia should be a happy one.

## Nova Scotia's Gold Industry in 1891.

From the best data at hand at this writing, the product of gold in Nova Scotia for 1891 was in round numbers 21,500 ounces, or \$420,000. The product for 1890 was 24,350 ounces, or \$475,000.

This falling off was anticipated (see our issue of January, 1891), but proved fortunately to be less of a decrease than was at that time threatened. The two districts of North Brookfield and Central Rawdon alone show a decrease of over 3,000 ounces. This was due, as regards Brookfield, to a cessation of work, caused by internal troubles of the company operating; as regards Central Rawdon, to the exhaustion of the pay chute, which had been much overrated.

Nine districts yielded over 1,000 ounces each, and four yielded over 2,000 ounces each. Of these, Malaga is easily first, producing over 4,000 ounces as the product of three mines, viz: the Boston Gold Mining Co., the Malaga Mining Co., and the Parker-Douglas Co.

The Oldham district comes second, with a production of nearly 3,000 ounces, of which 2,400 was produced by the Standard Gold Co. alone.

Uniacke (which includes the older district of "Mount Uniacke," and the new one of "South Uniacke,") and Fifteen Mile Stream, come about even, the product of each being about 2,500 ounces. The principal producer in Uniacke was the Thompson-Quirk mine, and in Fifteen Mile, the Egerton Co. This latter company has made an enviable record during the past two years, its grade of ore being much lower than that of any of the other companies mentioned.

It is possible that Montagu may reach the 2,000 ounce mark, but from the returns made to date it will fall short.

Amongst the more prominent mines showing a decrease for the year, besides Brookfield and Rawdon already noted, is the Salmon River mine, showing a decrease of over 500 ounces.

Waverley District repeats the story of last year. A big lot of money has been spent, and a very small return has been made. Another big plant has been built, but has not yet got to producing. There are rumors locally of the introduction of a tremendous English capital and a big consolidation, which rumors gain credence from the fact that a consolidation of the five principal properties in Montagu has been united with a property in Waverley, and the whole floated with a big capital (£120,000) in London. The

Montagu properties are valuable, and if properly managed will change the experience of English capital in Nova Scotia gold mines, which has hitherto been uniformly disastrous, to a successful exception.

Sherbrooke district has remained practically idle. During the last few weeks of the year, however, some slight stir has been felt, and several efforts, backed chiefly by local capital, are being made to once more exploit what was once the principal district of the Province. It is confidently expected that 1892 will see Sherbrooke brought forward again into the ranks of a steady producer.

The year has been marked by the collapse of the "conglomerate" boom. Gay's River has been equipped with a fine 50-stamp mill, and some 500 tons of conglomerate have been milled with the average result of about \$1.50 to the ton. The result was not unexpected by those competent to judge, but their opinion was never asked by the company, with the single exception of a New York expert, who was too honest for the company, for he predicted failure. The collapse of the Brookfield and Stewiacke conglomerates was also fore-ordained, and occasioned little comment. The extent of these crazes may be judged somewhat when it is stated that the receipts of the Mines Department for leases and licenses was some \$5,000 less in 1891 than in 1890, which decrease is almost entirely due to the subsidence of the conglomerate craze. The partial lunacy now prevailing, as to the existence of alluvial gravels bearing gold in paying quantity, will disappear, we predict, before our review for 1892 makes its appearance.

Much new machinery of modern type has been put in by different companies, and the use of air drills is spreading rapidly. One concern has been venturesome enough to put in (conditionally), an electric percussion drill. The new mills built are, with few exceptions, of the best modern type, one water-mill having reduced its cost of stamping to 30 cents per ton.

The field for good investment afforded by our gold mines is obvious to the honest critical observer and engineer. But such investments of capital must be carefully proportioned to the actual demonstrated value of the properties acquired and the necessary working capital, economically administered. The reasons why so many foreign investors have come to disaster here are patent: lack of intelligent management; the substitution of foreign engineers for local men of equal knowledge and vastly more experience in these particular deposits; over-capitalization, and extravagant ideas of the necessary plant. All these and others are sign posts along the road which foreign capital has traversed in the past.

Our American cousins are bad enough in this way, but our British brothers are more careless yet.

"It is always the unexpected which happens," yet we think the year 1892 will not see a very much increased production over 1891, the steady producers are getting deeper every year, and those working on shallow pay chutes will have a season of dead work, which will diminish the output somewhat \*.\*

### An Important Decision.

The judgment of the Supreme Court in the case of Holland Bros. vs. Ross Bros. is one which may have far reaching consequences. It virtually decides that the Department of Crown Lands has in thousands of cases exceeded its powers in confiscating properties purchased prior to the passage of the first Public Lands Act by the Provincial Legislature after the confederation of the provinces.

The case arose in this way: The late Mr. W. L. Holland was one of the original settlers in the Priest Creek Valley of the Township of Portland West, Ottawa County. He purchased 200 acres for himself and 200 acres for each of his two sons. The two lots bought in the name of his younger son were situated at some distance from his own, and he obtained permission from a representative of the Department to make the improvements for all the lots on the homestead where he resided. Acting on this understanding, the Department granted the patent for the lots in the name of the elder son as soon as all the purchase money was paid. Some years later the younger son completed the payments for his lots and transferred the title to his father. The transfer was duly registered in the books of the Department and the registration fee of \$5 was demanded by the Commissioner and paid by the owner. Shortly afterwards the late Mr. William Holland forwarded to the Department an application for his patent, accompanied with the usual patent fee. To this application he received no reply, but sometime afterwards was astonished to learn that a notice appeared in the Quebec Gazette confiscating the lots, Nos. 11 and 12, in the 4th Range of Portland West. He at once protested against the cancellation, and appealed to the Department to give him an opportunity to establish his good faith. The Department refused to grant him a hearing. He then gave notice that he had proceeded to the property in question with a force of men and was engaged in making such improvements as the Department might require. Again the Commissioner refused to recognise his right to the ownership of the property. An expensive appeal to the Governor-in-Council was equally futile. The following winter, under authority from the Department, Messrs. Ross Bros. of Quebec, cut the pine timber on the land, the owner protesting and threatening an action. In 1880, Holland Bros. entered a suit against Ross Bros. for the value of the timber cut and removed from the property. Ross Bros. set up the plea that the lots, having been confiscated by the Department, and having been restored to their limits, they were the owners of the timber. The Superior Court decided against their contention and awarded damages and costs to Holland Bros. From this decision the Quebec Government, in the name of Ross Bros., appealed to the Court of Queen's Bench, which, by a unanimous decision, on a false representation of the facts, reversed the judgment of the court below. From the Court of Appeals the

case was taken by Holland Bros. to the Supreme Court at Ottawa, and in November last that court decided with but one dissenting voice that the Department had exceeded its powers, and sustained the original decision, with costs in all the courts. The case has been settled, the Department having decided to carry it no further.

As thousands of acres in the phosphate district of the Ottawa Valley were confiscated, under very similar circumstances, during the Joly regime, it is highly probable that a prolific crop of lawsuits will arise out of this important decision. Many of the confiscated properties have since been sold at high prices as mineral lands, and on some of them valuable phosphate beds have been discovered and worked. With the decision in the case of Holland vs. Ross to guide them, the original owners can demand damages from the Department for the losses they have sustained through the confiscation of their lands. We know of many instances in which lands purchased prior to Confederation, and on which payments had been made, were confiscated because, in the opinion of some irresponsible employé of the Department, the improvements were not up to the standard called for by the original location tickets. In all those cases the only ground on which cancellation was possible, as stated in the location ticket, was "violation" of the conditions of settlement. Mere failure to comply with the conditions of settlement was not, until long afterwards, made a ground for despoiling the owner. All the cancellations took place under legislation of the Province of Quebec subsequent to 1867. The view held by the Supreme Court in the case of Holland vs. Ross, was, that the registration of the transfer from the original purchaser to Mr. Holland senior constituted a waiver of any claim that the Department might have against the owner for failure to comply with the settlement conditions. There were other grounds on which the case was decided against the Department, but the court held that this last was sufficient to annul the order of cancellation.

Whatever the ultimate consequence of the decision in this important case may be, everyone who has had anything to do with the Crown Lands Department of Quebec will rejoice to know that the petty tyrants who, by virtue of their official positions, have power to annoy and blackmail the unfortunate public with whom they come in contact, have at last received a check which may make them a little more cautious how they push their official powers to an extreme in the future. In the general cleaning out of the Augean stable at Quebec, the Crown Lands manager, which has been foul with corruption from the very dawn of Confederation, requires special attention. It is hard to conceive how an improvement can be made while the existing heads of the several offices, who have grown old in vicious practices, remain: a complete change of the older officials is indispensable to the efficient and honest working of the Department. This, let us hope, will be one of the first tasks to which the new Government will address itself after the general elections.

## Nova Scotia Explosives Commission.

Reference was made some time ago in our columns to the appointment of a Commission by the Government of Nova Scotia, to examine into the question of replacing gunpowder by an explosive equally effective but less dangerous in the presence of gas and dust. The question was forced upon the Government owing to the inquest upon the Springhill disaster proving that the immediate cause of the explosion was due to the flame of a charge of gunpowder used in blasting. The Commission, with the Inspector of Mines as chairman, has had several meetings and has experimented with the most promising explosives in the Pictou and Cape Breton mines. The results are not yet known, but it is understood that two explosives have proved satisfactory so far. One of these is roborite, already well known in England, although not yet officially endorsed by the British Government; the other is understood to be similar to the mixture of dynamite and nitrate of ammonia approved of by the French Government as having, when detonated, a temperature less than that of the ignition of fire damp. As the exact compositions of these explosives calculated to be safest for coal mining have not yet been settled, the labors of the Commission are still unended. This subject is one of great importance, and has been studied by many of the leading chemists of the present day. The report of the French Commission is considered the most valuable contribution to the literature of modern explosives. They started out to find an explosive which, when fired in a mine, would not produce heat enough to ignite fire-damp. After researches and experiments extending over several years, they have announced four such compounds. Two of these have hitherto appeared desirable to the Nova Scotia Commission. If the further investigations of this Commission, which appear to be deliberately and carefully conducted, result in giving the public a safe explosive, the Nova Scotia Government will have rendered a great service to the coal mining industry of the continent. Undoubtedly public opinion in the United States will follow that of Nova Scotia and demand that where gas is found in coal mines a safe explosive must replace gunpowder, and as the difference in cost of these explosives as compared with gunpowder is found for pound, inconsiderable operators will not be able to raise the cry of increased cost of production. It is understood that as soon as a definite conclusion is reached by the Commission, the miners of British Columbia who have suffered from explosions will demand at the hands of their Provincial Government a similar measure of protection.

Mr. Haggie, a young colliery manager at Rotherham, in Yorkshire, has had his certificate suspended for twelve months, for having allowed an air pipe to be cut in two, thus destroying ventilation at a time when several persons were in the mine.

## EN PASSANT.

At a recent meeting of the mining section of the London Chamber of Commerce, the imposition of the royalty system was condemned. One of the speakers contended that the principle should be adopted of paying royalties out of profits, or by tonnage, or by some other fair means.

In another place our readers will find a very complete report of the proceedings of the Second Annual General Meeting of the General Mining Association of the Province of Quebec, with all the official correspondence between the two Governments and the Petition to disallow the Quebec Mining Act; verbatim reports of the papers read, and the other features of a very successful and memorable occasion. The Association has proved itself an important factor in promoting good fellowship among the members, and its record as a worker is distinctly creditable. It entered upon its second year equipped with an efficient board of officers, a satisfactory balance sheet, a healthy increase in membership, and the hearty good will of every one interested in the advancement of the industry in Quebec.

We have to acknowledge from the publishers, the Scientific Publishing Company, New York, a copy of Dr. Sterry Hunt's latest book, "Systematic Mineralogy." The aim of the author in this treatise has been to reconcile the rival and hitherto opposed chemical and natural-historical methods in mineralogy, showing that when rightly understood, chemical and physical characters are really dependent on each other and present two aspects of the same problem which can be solved only by the consideration of both. He has, moreover, devised and adopted a Latin nomenclature, and arranged the mineral kingdom in classes, orders, genera and species. The price of the book is \$5.

The increasing interest in mining in Canada is illustrated by the number of companies formed during the past year, which is ninety, against sixty-one in 1890. The total capital for 1891 being \$30,794,000, as against \$19,637,750 in 1890. The material interests of the several provinces are advanced—In Ontario by thirty-three companies whose capital is \$15,433,000; next comes British Columbia with twenty-five new enterprises, having capital to the extent of \$10,535,000; Nova Scotia has fourteen companies with a capital of \$7,700,000; Quebec has gained thirteen with a total capital of \$2,740,000; New Brunswick has three new enterprises with \$116,000 capital in all; and Newfoundland has two companies with £450,000 stg. capital, which is not included in the total for the Canadian Provinces. These figures are satisfactory and encouraging, and show the steady annual increase in mining enterprises of all kinds, although the past year cannot be said to have been one of great commercial activity. A complete list of all companies formed in each province will be found on another page.

Mr. O. M. Harris, Montreal, who has been for a number of years back the Canadian representative of Messrs. Millar & Co., London, and the Canadian Phosphate Co., has opened out on his own account as a shipping agent and general mineral broker. Pushing, enterprising and popular, possessing an intimate acquaintance with the requirements of the trade, and backed up by a good connection, Mr. Harris should do well. O. M. is a good fellow, who carries with him the best wishes of the *Kazivew* in his venture.

Mr. G. D. Jennings, of the Anglo-Canadian Phosphate Company, London, having noticed the comments of Mr. W. J. Morris on his letter to us, on the position of the European phosphate market, and which we noted at some length in our last issue, writes: "Evidently the sanguine Mr. Morris deals rather in probability and in prophecy than in facts, and the controversy is, therefore, hardly an equal one. The facts of the market are as stated. Manufacturers will only use what they think they want, and no reasoning will make them buy 80% Canadian when they want 60% Bull River. Still our interests are altogether in Mr. Morris' being right and it is only because I am not a licensed prophet, and therefore do not prophesy until I know that I do not indulge in the sure and certain hope of a fortune next June."

Our exchanges from the Western States, give very glowing accounts of the ruining convention which took place at Denver, Col., lately. Miners from all over Colorado walked in procession in company with mine owners and mine brokers, with bands, floats, etc., all representative of the mining industry. The procession was nearly a mile long. The Inter-State drilling contest was the feature of greatest interest to the working miners. There were 23 teams entered for the double-handed contest, nearly all from Colorado camps. One team from Butte, Montana, carried off the prize. There were 23 teams in the single-handed contest. In the double-handed contest the Butte boys each handled the hammer for a minute and then changed to turning the drill and only lost two strokes during the entire fifteen minutes. They put down a hole 29 13-16 inches in the allotted time, and the audience was enthusiastic when the result was announced. The rock selected was Gunnison gray granite, which is being used in the capitol building, and is counted the hardest obtainable in the State. In the single-handed contest, one man drilled 18 11-16 inches, the next man getting only 13 3/4 inches in the same time.

As showing the enormous sums of money which have from time to time fallen into the hands of individual Cornish families owning land upon which mines have been sunk it may be of interest to state that for a considerable period the Basset family took up, by way of dues, between £30,000 and £40,000 per annum. This family still have all the dues from five of the most important mines in England.



The Belleville Natural Gas and Oil Company, after spending some \$2,200 in a futile endeavor to strike gas or oil in the city of Belleville and district, has abandoned the project as a bad job. This is but another instance of the misguided and ill-directed application of capital unfortunately too prevalent in this country. Enquiry at the Geological Survey, or the opinion of a mining engineer conversant with the geology of the district, would have prevented this very foolish venture.

The National Association of Colliery Managers has lodged a strong protest with the British Government against the practice of appointing working miners, whose only qualification is experience in some of the detail manual labour underground, as inspectors over certificated managers. The Association points out with truth that such persons should at least be equal to the managers in practical and scientific knowledge in all departments of the mine; otherwise inspection must be abortive. Appointments of this kind inflict not only a serious injustice upon the managers, but, by reason of the incompetency of the inspectors, introduce grave dangers in working the mines.

The sale at auction of the Estates of the White's Asbestos Company, announced in another place, is the last act in a notorious swindle. Originally bought for a few hundred dollars, then unblushingly unloaded on the credulous Englishman, away up in the thousands of pounds, we are curious to know the ultimate figure to be realized for these lands—or if a bid will be made for them at all. It is certainly a misnomer to call them "asbestos lands," for, as the unfortunate investors learned to their cost, the property contains as much of the mineral as "Paddy shot at." Intending purchasers should read up the history of the case in back issues of the Review.

Mr. C. F. Scott lately read a paper before an engineer's society in Pennsylvania, in the course of which he instituted a comparison between hand labour and electric machine labour for coal mining. In machine mining the stalls can be made much wider, because of the greater rapidity of mining, so that the roof will have to stand a shorter time with fewer pillars. The direct effect of coal cutting machinery is to reduce the cost of undercutting from 1s. 8d. to 5d. per ton of 1½-in. coal in the Pennsylvania district. Taking into account the other expenses, Mr. Scott says there is a saving of 25 per cent. Another advantage of machine mining is that perfect pillars are left and can be recovered, as there is no temptation to rob them. The reduction of the number of stalls for the same output, due to machinery, also effects a great saving in the timber used, the number of roads, and the tramways that have to be maintained. The saving in coal, due to the introduction of electric machinery, is said to be great. An estimate is given of the saving in expense by using a plant of seven machines, run ten hours a day, and cutting 233 tons. The cost of these would

be £29 11s. 3d., while the cost of hand mining for the same number of tons is £38 6s. 8d., a considerable difference in favour of the use of machines.

From returns furnished officially, the exports of silver ore and bullion from Port Arthur mines during the past year were:—

	ORE.	BULLION.
January .....	\$ 15,000	—
March .....	39,000	\$10
May .....	13,000	—
July .....	44,113	—
August .....	37,050	—
September .....	27,050	—
October .....	35,370	—
November .....	9,800	—
	\$220,383	\$10

Of this, ore to the value of \$220,200, went to the United States.

In a paper entitled "Notes on Recent Accidents from Blasting in Coal Mines," read before a recent meeting of the Manchester Geological Society, Mr. James Ashworth, M.E., offered the following suggestions: "(1.) That every explosive now in use in mining operations should be tested by ignition with a bare fuse without a detonator, safety cartridge case, or water cartridge, and with coal or carbonaceous tamping in a dusty atmosphere. The bore-hole to be (a) of 2 inches diameter, and (b) of say 1 inch diameter, or of such diameter as give the area of the hole proportionate to the strength of the explosive as compared with ordinary blasting powder. (2.) That a similar course of experiment should be conducted with a current of air of high velocity, not less than 30 feet per second impinging directly on the bore hole. He made these suggestions because the use of high explosives in coal getting has resulted in their being applied without any attention to the question of leverage—that is to say, when a 2 inch diameter hole has been used for blasting powder, a 2 inch diameter hole has been continued for high explosive, hence, instead of occupying say eight or more inches of the length of the hole, the high explosive occupies say one or two inches, and the pressure exerted is as great or greater on the tamping than on the side of the hole where the removing should take place. He therefore advocated: (3.) That high explosives should be applied in bore holes of a diameter proportionate to their strength as compared with blasting powder, because, as he observed in an earlier part of his paper, 7 inches of tamping in a 1 inch diameter hole is as effective as 18 inches in a 2 inch hole. He pointed out that the worst disasters from blasting have always occurred from shots which faced ventilating currents of high velocity. A detonating vibration appears to be created under such conditions, whereas if the force of the shot goes with the current, it is not created. (4.) That no explosive is safe for use in a dusty or gaseous mine, if its detonating vibration is like that of a mixture of coal dust, fire damp and air."

"They are aye in a hurry that the devil phases," was the apt quotation of a canny Scotch colliery manager in commenting upon the eagerness of the producer of to-day to make large outputs. He remembered when

the Benhar Coal Company, Limited, paid their first dividend of 15 per cent., the managing director said to a fellow director, a most noble, worthy man, now deceased, that he was going to raise his output, and do better next time. His fellow-director replied that if he would drive a "wee cannier" he would pay 30 per cent. next time. When we consider the falls of roof, the breakages of haulage ropes, the breakages of pumps and machinery, the want of waggons, sudden changes of the barometer and what it implies, the want of order, indifferent workmen, and the thousand and one things that cause stoppages about a colliery, then we see the necessity of reducing these to a minimum, and we may safely infer the greater the pressure the greater the risk of stoppage. He did not think that anyone would contradict him when he said, for the sake of illustration, that a colliery working twelve days a fortnight, and producing, say, 3,600 tons in that time, will be a more profitable concern than one producing that quantity in ten days, for various reasons. First, because fewer oncostmen will do for twelve days than for ten, less area of working face will provide the output, the work will be better done, and the salesman will have twelve days to dispose of the output instead of ten, the waggons will be running all the time instead of standing two days idle per fortnight, and anyone with a large number of waggons will know what that means at the end of the year. Instead of requiring from 700 to 720 waggons in ten days the same number will do for twelve days. Besides all that, look what an advantage it would be to our nearest and best allies, viz., the railway company, who take away our traffic. When we consider all this, what an enormous waste of capital expenditure is exhibited—first, to the colliery company for extra houses, for extra workmen, for extra waggons, for extra plant of every kind; and then consider the railway company for extra engine power, for extra waggons, for extra time. The more he thought of this subject the more convinced did he become that workmen should have more consideration for these things, as it would be sure to redound to their credit if they would do so. When we think of the extra danger that is incurred in opening out a gaseous seam of coal too rapidly without giving the gas proper time to drain, when we think of the enormous stir and bustle at the top and bottom of the shaft and on the haulage roads, the lightning speed of the cage in the shaft, double, and in some cases treble, shifts, and the great rush everywhere about the colliery, the risk of accident is greatly increased. The first and primary duty of every colliery manager is safety, and he should do everything in his power to co-operate with anyone who can instruct or help him in any way to make his colliery more safe, and reduce the number of accidents to a minimum. Greater knowledge and greater experience have considerably reduced the number of accidents for the past few decades in proportion to the output raised; and he for one was of the opinion that a little less hurry to produce a large output would still further reduce them.

**Our Portrait Gallery.**

[A series of portraits and biographical sketches of Canadian mining engineers, mine managers, inspectors, geologists, explorers, etc.]

**No. 15.**

**Mr. J. Burley-Smith, M. E., Manager of the Squaw Hill and Aetna Phosphate Mines, Buckingham, Que.**

Mr. J. Burley-Smith, the subject of this brief sketch, is the Canadian representative of the Anglo-Continental Guano Works Co. of London and Hamburg, one of the largest miners and manufacturers of phosphates and phosphate manures in the world. He was born in the mining and quarrying districts of Derbyshire, one of the smallest of the English Counties, yet containing in its limited area, perhaps, the most varied and prolific mineral zone of Great Britain, the ancient lead, calamine and ochre mines of the Peak, with its fringe of limestone and marble quarries, being but a few miles from the great coal and ironstone measures of the North Midland and Erewash valleys. Mr. Smith was educated both as a mechanical and civil engineer, gaining valuable training and experience in the drawing office and workshops of Messrs. Andrew Handyside & Co., Limited, at Derby, a prominent establishment, whose chief work at that period was the construction of heavy pumping and winding engines for colliery and other mining work. On the completion of a six years' indenture as apprentice, Mr. Smith received an appointment from this firm as outside superintendent, and for some time had charge of many of its most important undertakings.

As a civil engineer Mr. Smith was employed in the Central Engineer's Bureau of the Kaschon Oderberg railway at Pesth, in Hungary, and later on was sent out as assistant engineer in the actual construction of their 300 miles of railway in the Carpathian Mountains; a line including in its route some of the most difficult tunnelling work in the world and opening out into a rich mineral district.

In 1871 Mr. Smith returned home to England, and after devoting some short time to study, received an offer of an appointment as engineer with the Bilbao hematite iron mines in Spain which, however, he refused, in preference to an appointment as manager of the Buscombe hematite mines in Somersetshire. After having opened out the properties and placed them in good working order, he received the position of manager of the Kingswood iron mines in the same district, at which he remained for a period of some five or six years, during which he made several important discoveries of lead, iron and yellow ochre, as well as a very rare deposit of

terra-cotta clay, lying in a recess of the limestone covered by a mass of dolomite conglomerate, in the Mendip hills.

At the end of this period Mr. Smith was sent out by Messrs. Lane Bros., Bristol, to examine and report on the mineral resources of the south west of Ireland, where he remained for some eighteen months and opened out for the firm an important slate quarry at Rossmore, Dunmannon Bay.

On returning to England he received the appointment of consulting mining engineer to the Ingersoll Rock Drill Co. of London, and for several years Mr. Smith had an interesting occupation in first introducing this well known machinery in many of the leading mines and quarries of Europe.



*Yours very truly*  
*J. B. Smith*

About this period Mr. Smith invented and patented a channelling machine for rock cutting, chiefly for use in marble and slate quarries, and by which the blocks were cut out of the solid without blasting. This machine he exhibited in operation at one of the exhibitions in London, afterwards selling his rights to an American firm. As Mr. Smith says, he may very reasonably be claimed to be the originator of the

gadding and channelling machines now so largely used in the United States and elsewhere.

A few years ago, at the request of the Countess Elise, he prospected her estates at Ventinuglia, in Italy, for minerals, and made several very important discoveries of mineral thereon.

On the expiry of this work Mr. Smith was engaged to survey and plan the estate and works of the Copper Miners' Tinsplate Co., Croin-Avon and Neath, in South Wales.

Mr. Smith was a member, some years ago, of the Bristol Geological Society. He studied chemistry and metallurgy at the Onslow College, London, and attended the evening classes at King's College, London. He gained a first-class certificate in the University Extension examination in Electrical Science, having studied under Professor Laut Carpenter, of the Electrical Engineering College, Hanover Square, London.

In 1889, Mr. Smith had arranged a small prospecting party to go out to South Africa, as a gold mining venture, but owing to the illness of one of the party it fell through.

In 1889, the Anglo-Continental Guano Works Company, purchased the Squaw Hill and Aetna phosphate mines at Genalmond, on the Lievres River, Que., and among many applicants for the position of manager, Mr. Smith was selected. He has been with us since that time, and has prominently identified himself with the mineral interests of the Province, being one of the most zealous and active workers in the General Mining Association, of which he is a highly esteemed member of Council.

Mr. Smith's geniality, gentlemanly bearing and generous hospitality, have won him many friends, all of whom join us in wishing him good luck and every prosperity in his present undertaking.

The following comparative statement gives the crushings of the Witwatersrandt gold mines up to the middle of November:—

	1888.	1889.	1890.	1891.
January.....	11,269	24,986	35,038	53,205
February.....	12,162	25,800	36,886	50,073
March.....	14,706	28,075	37,600	52,949
April.....	15,853	27,136	38,799	56,362
May.....	19,002	36,298	38,884	54,672
June.....	16,328	31,272	37,412	55,863
July.....	19,966	32,407	39,452	54,920
August.....	19,877	32,142	42,861	59,070
September.....	20,495	34,369	45,467	65,601
October.....	27,775	31,914	45,250	72,793
November.....	27,336	36,116	46,800	73,400
December.....	26,148	39,218	50,352	.....
<b>Total ounces..</b>	<b>230,917</b>	<b>379,733</b>	<b>494,801</b>	<b>648,908</b>

The total yield up to last reports figure 1,789,488 ounces.

Our correspondent reports the shipments of phosphate 75 80%, from the port of Fernandina, Florida, since last advice, as follows:—

	Tons.
Previously reported	44,990
Dec. 1, ss. Royal Welsh, Newcastle	1,100
4, ss. Oakdale, London	1,505
15, ss. Hallamshire, Godalming	1,451
23, ss. Ermine, Liverpool	1,600
31, ss. Alarich, St. Louis du Rhone	1,844
31, American schooner Jennie Hall, Richmond, Va	580
31, ss. Samuel Tzachi, London	1,100
<b>Grand total for 1891</b>	<b>54,270</b>

An Australian paper publishes the following:—

"Mr. Bingley, the well known dentist, has brought to this office the lower jaw of a sheep containing four teeth, which are covered with a thick deposit in the form of a dark conglomerate, upon which there is a thin layer of gold. This jawbone was obtained from Mr. Ker, of Fremantle, who states that the sheep from which the remarkable bone was taken was one of a mob from the Muchison district. Mr. Bingley's opinion in connection with this curiosity is that the gold became affixed to the teeth while the animal was grazing newly grown herbage, the roots of which had come into contact with the precious metal."

Pretty steep?

Sir William Dawson, the esteemed Principal of the University of McGill, whose reputation as a Canadian geologist is world-wide, will be the subject of our next portrait sketch.

The value of the phosphate exported to the United States during the past year, as per Consular returns, was:

Ottawa Valley	\$12,600
Kingston District (351 tons)	1,346
<b>Total value of phosphate</b>	<b>\$14,446</b>

The exports of mica to United States so far reported, were:—

Kingston District	27,692 lbs., or \$ 6,970.00
Ottawa Valley	23,817.17
Brookville	77,775
Belleville	272 1/2
	4,925.83

Exports of nickel matte to United States were:

Via Prescott, of a value of	\$363,000.00
" Carleton Place, of a value of	569.17
<b>Or a total value of</b>	<b>\$361,569.17</b>

Exports of iron ore from Bristol mines, Pontiac County, Que., as reported by Consul-General Lay:—

March quarter	\$2,930.14
December quarter	660.00
	\$3,590.14

There was also a shipment of asbestos from Ottawa of a value of \$250.

The exports of mineral from Belleville, other than reported above, were:—

Actinolite, (bags)	320
Gold quartz, (lbs)	28,800

## CORRESPONDENCE.

The Sale of Attic-Okon Lands to a Belgian Syndicate.

OTTAWA, January 9th, 1892.

SIR, I have the honour to acknowledge receipt of the letter dated the 7th inst., by which you make inquiries as to the reported sale of the Attic Okon iron range near Fort Arthur.

Although I am under the impression that the real facts connected with this reported sale will fail to interest you, I take much pleasure in complying with your request.

On the occasion of the presence in Canada of engineers connected with a large banking corporation in Belgium, whose main object is to foster mining industries and railways, some of the owners of the iron range above mentioned expressed the desire that their property should be examined with a view to the working of the locations, and the construction of a railway connecting the latter with the main-line of the C. P. R. This desire having complied with, upon my own instructions, the im-

mediate consequence was the completion of a series of agreements which will imply the execution of the programme as originally proposed by the owners, providing the thorough exploration work which would have to be proceeded with next season, in the Belgian interest, gave the satisfactory results anticipated. I may add that the lease of some of the best locations in the range to Americans actively engaged in the iron trade within the United States, very neatly causes my countrymen to abandon further consideration of the matter, as a distinct undertaking with respect to the *bons fide* working of these locations was thought to be indispensable before making any investment for railway construction. But further consideration of the subject has convinced me personally that one would not be warranted in attributing to the said Americans, who have been extremely courteous throughout all negotiations, any intention of "locking up" the property; and, further, of their inability to carry out such intentions should they really be entertained.

A sufficient market for the ore transported over the lakes could apparently be secured in the United States; but I look upon the scheme as one which may give Belgian iron masters and capitalists an opportunity of erecting in Canada steel works similar to those which they have established in many European countries, and more recently, in Russia. With this ultimate object in view, I have taken more than ordinary interest in the overtures and arrangements already made; but it is only fair to my countrymen that I should conclude by making the distinct statement that, up to the present time, no one in Belgium, beyond the directors of the bank already referred to, has ever heard of the Attic-Okon iron range.

Hoping these explanations may suit your purpose, I am,

Yours truly,

FERD. VAN BRUYSEL.

## The Duty on Lead Ore.

CALGARY, 30th Dec., 1891.

SIR,—There is no question of more pressing importance to the mineral interests of Canada than the question of a market for lead. Your remarks in the current number of the CANADIAN MINING REVIEW, in favor of raising the duty to \$30 per ton, will be received with universal approval throughout the mineral districts of Canada; but there is one point in your article to which I desire to draw your attention. You say that the home market consumes now about 18,000 tons of lead. I would respectfully ask you to test the accuracy of this figure as you will, I think, find that 5,000 tons, instead of 18,000, is the truth.

The imports into Canada of lead and lead manufactures amounted in 1889, to \$284,350, and in 1890, to \$369,864, which, at market prices, represent about 4,000 and 5,000 tons respectively.

Yours truly,

GEORGE ALEXANDER.

[The value of the imports of manufactured lead and its products into Canada during 1890, as per official statistics, were:—

	Quantity.	Value.
Lead & manufactures of, (cwt)	101,587	\$284,246
Bars, blocks and sheets (cwt)	17,303	54,166
Pipe (lbs)	70,333	3,585
Shot (lbs)	89,650	3,357
Nitrate and acetate of lead, not ground (lbs)	252,652	12,062
Manufactures of lead not otherwise provided for		15,805
		\$373,221

## By Products—Paints and Colours.

Colours, dry (lbs)	511,835	12,761
" " ground in oil		73,682
" " black (lbs)	12,275	15,748
Dry, white and red lead, etc., (lbs)	10,859,672	381,959
White lead in pulp		250
Oxides raw (lbs)	1,381,266	13,751
Paints mixed in oil		10,591
		\$518,042

—EDITOR.]

## The History of the Dufferin Gold Mine, N.S.

HALIFAX, January 9, 1891.

SIR,—The account of the finding of the famous Dufferin or Salmon River lode, as given by Mr. G. F. Moncton, in your issue for December, is in some respects not quite correct. This article and the recent suit of Stewart vs. Mott, have recalled vividly the circumstances attending the early history of this mine, perhaps the most famous gold mine of the Dominion, and a synopsis of the exact facts in its history may be of interest to many of your readers.

In the early spring of 1880, Mr. Geo. W. Stuart, (who has been identified with the gold industry of Nova Scotia from its beginning), had put men to prospect in the dense forests of hard and soft wood which are found surrounding the lakes from which Salmon River is fed. Much good drift and other satisfactory indications were found, but work was temporarily suspended owing to wet weather. Shortly afterwards, Mr. Stuart told Mr. Alex. Kent Archibald, now the largest shareholder in the Dufferin Co., of the good indications he had obtained, and the two arranged to have further prospecting done later in the season. Some little time after this interview,

Mr. Archibald one day heard that an Indian, "Dandy Peter" by name, had some specimens of gold quartz, and upon interviewing the Indian, ascertained that the specimens had been obtained upon the tract which he and Mr. Stuart had arranged to prospect. As the specimens the Indian had were very fine, showing coarse gold, and many persons saw them, Mr. Archibald became alive to the fact that soon there would be brisk competition, and that immediate action was necessary. Having just "blowed his bottom dolt" into another mining venture, Archibald was "strapped" as miners usually are, furthermore, his friend Stuart was away, and as good as inaccessible so far as time was of value. So he borrowed twenty dollars, and with it hired "Dandy Peter" to go with him and show him the spot where the specimens came from. Other people were watching Peter, hoping to get the desired information without paying for it, so it was necessary to be cautious in starting out.

Under cover of midnight and total darkness Archibald and Peter started off, taking with them a lantern, which they took good care not to light until well into the woods.

Peter's memory and woodcraft served them well, and long before day dawned he had encountered the whereabouts by saying, "Sit down, now, smoke a pipe, daylight is 'sow plenty quartz, plenty gold," and he kept his word.

After paying the Indian his \$20 and making his boundaries for the location of a large area of ground, Archibald returned to Salmon River settlement, got a horse and wagon and started for Halifax, some ninety miles away, to secure rights from the Mines Office. Just after starting he learned that the mine coach (which had preceded him), had on board a man bound on the same errand. "Now" a mail coach stopped for the night at Tangier, but Archibald, after eating his supper and having a quiet smoke, slipped out of the inn, hitched up his horse and, driving all night, arrived in Halifax early in the morning and many hours ahead of Her Majesty's mails.

Here he met the difficulty as in dealing with "Dandy Peter" and Stuart, the mine coach (which had whom Archibald felt in honour bound to associate with himself, was absent in a distant part of the province. There was no time, however, to be lost, so Archibald went to Charles F. Mott and stated the facts. Mott refused to recognize Stuart in any way, but hastened to the Mines Office with Archibald, and a large block of areas was taken out. Shows were held, the mine itself was found and work began, which has continued uninterrupted, ever since. As soon as the lode was found, suits were begun by other parties, claiming the ground on one pretext or another, and for nine years this valuable mining property could not show a clear title. At one time suits were so numerous and claimants so vigorous that Archibald and the other owners erected a light board fence, sixteen feet high, enclosing their works, and openings had sentinels posted all around the stockade and at various points along the road to Salmon River village, a distance of five miles.

Archibald recognized his moral obligation to Stuart and conveyed a portion of his share to Stuart. Mott also promised Stuart a portion of his share if he (Stuart) would give him the benefit of the entire mine and capex. Mott, however, never kept his word, but the courts have recently decided that he must pay to Stuart the proportion promised him.

At the death of Capt. Edward Archibald, an owner, the property was sold at public auction to settle the estate, Capt. Archibald having died intestate. The sale took place March 14th, 1889, and was bid in by the former owner, the executor of the estate of Mr. F. Mott, who was left out in the cold. The price obtained was \$141,000, but was no index to the value of the property.

This, briefly, is the history of the biggest gold mine Nova Scotia has yet produced; after more than eleven years of continuous production, it is still at work and bids fair long to be.

"DURHAM."

## The Spokane and Great Northern Mining Co.

SPOKANE, Wash., Jan. 18, 1892.

SIR,—Referring to your issue of December last, you express the hope that "The Spokane and Great Northern Mining Co. will spend money for other development than in printing certificates of stock."

I will say in this connection that the company mean business, having secured control of five fine milling gold and four high grade silver properties on Boundary Creek, British Columbia. We have let a contract to extend the lower tunnel on the "None Such" mine about three hundred feet of development has already been done on this property. In addition to this, arrangements are now being made to erect a steam mill on Boundary Creek for the purpose of working the gold ore from the "None Such" and "Mountain Chief." As the contract calls for the mill to be in operation by September 1st, you can readily see that the company is not a paper one. What we propose doing is fully set forth in our circular.

The proceeds of all sales of treasury stock will be devoted to the development of the mines.

Not an officer of the company draws a salary, and all expense aside from development is reduced to the minimum. It can safely be said that inside of a year the stock of the company will approach par. I take pleasure in sending you this in order to correct an erroneous impression which might be gathered from the reading of the concluding paragraph of your mention of the company.

Very truly yours,

ARTHUR B. KELLER,  
Vice-Pres.

## A Mushroom Mineralogist.

SUBURBY, December 25th, 1891.

SIR,—In a paragraph in an issue of *REVIEW* you express a curiosity to know if Robert H. Ahm, who used to be a sort of wandering jeweller through the "h" in his name, is the same party who has recently blossomed out into a "mining expert and mineralogist" here, as the legend reads on his card. The very same man. He came to this district about two years ago, representing that he was backed by millions of capital, and with more schemes on paper, or rather on his tongue, than Col. Sellers had ever dreamt of. To test a separator of his own invention, he began to build reduction works at Nickel City, with funds supplied by some Toronto innocents and thereby hangs a tale. The works were erected on the know-nothing plan, the separator would not clean itself, much less take the mineral out; the company lost at least 50 per cent. of the money they put into the concern. His unpaid debts no one can number; and the poor workmen employed by him, after waiting in idleness all summer, had to take seventy-five cents on the dollar for their wages. In short, he has, locally, done more injury to the mining interests of the district than any other man who has ever struck the range. But he checks it out, and is still to be seen in the large saloons, as of late, and telling a new set of plausible stories, calculated to astonish the natives if nobody else. A habitant at Whitefish gives the best description of the fellow: "Some one say to me he was good for five day watch, but he is no good for de mining business; no head, all talk, that's noding." Very true.

Yours, etc., A. McCHARLES.

TORONTO, 12th January, 1892.

SIR,—Your reference to a certain gentleman (?) in last *REVIEW* is much appreciated here. Unfortunately you were right regarding him, as I and several others know to our cost.

Yours, etc., R. A.

SUBURBY, 20th January, 1892.

SIR,—Your persistent endeavor to expose the mining quackery that unfortunately lads and blossoms too prominently in young mining countries like our own, has created a very favorable impression in this neighbourhood. The party you referred to in last *REVIEW* deserves no pity. His schemes and chimeras have done this district much injury. May we power to your elbow save us.

Yours, etc., A MINER.

## LEGAL.

## Stuart vs. Mott.

This case was tried in Halifax, N.S., December 3 to 5, before Mr. Justice Townshend, without a jury. The action was for a one-eighth interest in the defendant's share of dividend and sale profits of the famous Salmon River gold mine, said one-eighth amounting to \$12,000.

A similar suit was instituted in 1883-84, and won in the lower courts, but lost on appeal to Ottawa, under the provisions of the statute of frauds, no written contract having been made.

In the present suit the plaintiff, George W. Stuart, relied upon the defendant's (Chas. F. Mott's) own admissions made in the first trial, and adopted defendant's view as to the contract made. This, as sworn to by Mott in the first trial, was that Stuart the eighth part of the proceeds of what I got from my share of the mine when it was sold, whatever it (the proceeds) was from the beginning. I told him he was not entitled to anything until after the mine was sold."

The mine was sold on the 14th of March, 1889, to wind up the estate of Capt. Edward Archibald (who died intestate) and brought the sum of \$14,000.

Although Mott signed the agreement for the public sale, yet after the sale he refused to sign the transfer, and it was not until the spring of 1890 that he accepted his share of the money, plus a bonus which he demanded, and then signed the documents.

The conditions of the agreement, as testified to by Mott, now being made a sufficiently reasonable time having elapsed, the plaintiff, Stuart, brought the present suit, and judgment was given in his favor. The following is the full text of the judgment:—

I have considerable difficulty in coming to a conclusion in this case, due chiefly to the peculiar relation of the parties to the evidence on which plaintiff decides to sustain his position.

The first question I am called upon to decide is one of fact. Did the parties make the agreement set out in the statement of claim?

In proof of this agreement, plaintiff puts in evidence a portion of defendant's sworn testimony in a previous suit between them, in which defendant says: "I promised Stuart the eighth part of what I got out of my share of the mine when it was sold, the eighth of whatever it was from the beginning." He adds: "There was no consideration for my promise to Stuart. He was not to do anything or render any service in return for it." At another place he says: "My promise to him was a free gift. He paid me nothing for it, and I did not ask him anything for it." The plaintiff has sworn the consideration of the agreement to be: (1) The putting in of mines of certain machinery at very much less than its value; (2) The abandonment of a lucrative position in Mexico at defendant's express request; (3) The giving of his time and skill in management and working of the mines, and in defending the title of the property, at that date in litigation; (4) the lending to defendant of

certain money to assist in carrying on operations in the mine, and says that, in pursuance thereof he carried out all his part of the agreement. This agreement he asserted was duly concluded on the 5th day of May, 1881. The defendant denies specifically the fact that any one of these alleged considerations had to do with his promise.

The peculiarity of the plaintiff's position is this, that in a previous suit he alleged, and swore, that in consideration of the above the defendant had agreed to transfer to him one-eighth of his interest in the mine when the then pending litigation was ended. It is not in writing, and therefore no action could be brought upon it by reason of the statute of frauds. The mine has since been sold, and he now contends that he is entitled to adopt the defendant's version of the contract, even though not in the terms as he understood it. The defendant contends that if his version of the contract is to be taken as true, it must be taken as a whole, and if so, it is *ad idem factum*, and plaintiff cannot succeed. I think, however, it is my duty to consider the whole evidence, and I derive from it the real contract between the parties; the fact that plaintiff understood one term of the agreement is not to preclude him from recovery, provided I am satisfied that a proposition was made to him, and that he accepted it, and that the contract was intended the effect of it when made. Having regard to the whole evidence, I have come to the conclusion that defendant made the promise, as sworn to himself, for the considerations, or some of them, set up by the plaintiff, and they are sufficient in law to uphold it. I do not feel it necessary to explain all the reasons which led me to this conclusion, but I may say that I have given every weight to the arguments pressed by Mr. Borden, viz., that there is no evidence to show that the parties were as one in respect to what the agreement was. I cannot adopt it, as the same might be said of every transaction where the parties differ as to its terms. It then becomes a subject for judicial determination to decide what the true terms of the agreement were. As the question of estoppel is here, I think it is necessary to have evidence before me that there is nothing to prevent the plaintiff from recovery because of the former litigation, if in other respects his claim is well founded.

The present action is for an alleged right not then in existence and which, therefore, could not have been the subject of litigation and consequent estoppel. No judgment, as I understand, has ever passed on this particular claim.

The statute of frauds, set up as a defence, presents a question of greater difficulty, but after consideration I have come to the conclusion that the contract on which plaintiff now seeks to recover, not being any interest in lands or mining rights, does not come within this statute, and my judgment is therefore in favor of the plaintiff. As to the terms of the order and further directions to be settled on motion for that purpose.

## S. J. and Sophronia Ritchie vs. The Canadian Copper Co.

Answers were filed on 10th ulto. in the suit brought recently by Samuel J. Ritchie for the dissolution of the Anglo-American Iron Company and the Canadian Copper Company. In the Anglo-American Iron Company's answer the incorporation is admitted. It says that after organization, the Company was re-organized by a special act of the Dominion Parliament and was "hereby given all rights and privileges of the corporations in Canada." It denies that Mr. Ritchie is the owner of any of the capital stock in his own right, but it is admitted that Mrs. Ritchie is the registered owner of 3,004 shares which were pledged to secure an indebtedness equal to or greater than the market value of the certificates. The answer further states that on October 8, 1891, James B. and George W. McMullen brought a suit in the United States Court against Samuel J. Ritchie and others to collect a judgment of \$265,307, and that Thomas W. Cornell and others were made parties in the case. It also alleges that the company was organized chiefly by Samuel J. Ritchie, and that, with others, he acquired a three-quarter undivided interest in 80,000 acres of land in the wilds of Ontario, William Coe, who has since died, being the owner of the remainder interest. It further states that by Mr. Ritchie to the corporation he was given stock to the amount of \$1,500,000. Soon after this, contention and litigation sprang up between Messrs. Ritchie and Coe, which wholly prevented the company, it is alleged, from using the lands. It is also alleged, that on the date of the re-organization of the company at the present time Mr. Ritchie has had chief control of the three-quarters interest and he is still a director and vice-president of the company. It is charged that the proceedings to dissolve the corporation were instituted to injure the stock pledged as security and that because of the property being tied up by the litigation, between Messrs. Coe and Ritchie, the company was unable to make any earnings. It is also stated that the company, at one time took steps to adjust the difference between Messrs. Ritchie and Coe so that the timber and lumber on the land could be utilized, but that a letter was received from Mr. Ritchie in which he said he held a claim against the estate of Mr. Coe for \$500,000 that must first be settled.

The answer to the suit against the Canadian Copper Company is to the effect that the plaintiff is the owner of securities and the McMullen suit, as the answer in the Anglo-American Iron Company case. It also states that the defendant believes the suit to have been brought for the purpose of injuring the stock and to prevent the McMullens from collecting on their judgment. It further

alleges that the company was organized by Mr. Ritchie, who for the first few years assumed practical control of it. At first the company's property consisted of what is now developed copper and nickel mining lands in Canada. The answer recites that since Mr. Ritchie ceased to dominate in the company, three large mines have been developed. They were equipped with machinery; fifty houses have been built for workmen, two smelters have been erected for the reduction of ores, and a Bessemer plant for the refining of nickel and alloys of iron and copper is nearly completed at Brooklyne, a suburb of Cleveland. The total construction account to the present date has been \$1,200,000. The answer concludes by saying that the earnings of the company have been over 6 per cent and that the suit was brought by Mr. Ritchie for the purpose of depressing the stock.

## The Canadian Copper Company's Suits—Mr. Stevenson Burke, the President, Talks of the Trouble.

Mr. Stevenson Burke, President of the Canadian Copper Co., on being interviewed with reference to the suits of S. J. Ritchie and Sophronia J. Ritchie, to dissolve the Anglo-American Iron Co. and the Canadian Copper Co., said:

"There is as much chance of a dissolution of the Anglo-American Iron Company and the Canadian Copper Company as there is of Samuel J. Ritchie being struck by lightning in January. It is the veriest nonsense. He has an idea that he can coerce us into paying money for thin air. Many years ago, as the good book tells us, there was a woman who was so wicked that she was said to be the mother of a child. The judge, after hearing both sides, took a novel way of deciding the case. He ordered the child cut in two and half given to each woman. One woman assented but the other said: 'No no, let the other woman have it,' whereupon the judge decided that she was the real mother because of the motherly affection she showed for the child. It was with Samuel J. Ritchie. He does not own a dollar's worth of stock in either one of the corporations, for if he did he would not take this means of depreciating the stock. The whole thing is easily explained, however. Saturday I filed three answers in garnishee proceedings begun against ex-Senator Payne, Thomas W. Cornell, and myself to recover certain stock which was sold to me, and it was alleged to be belonged to Ritchie. The proceedings were begun by the Messrs. McMullen, who recovered a judgment some time ago for \$265,000 or thereabouts. These answers show the ingratitude of Ritchie. I set up in my answer that Ritchie has owed me \$150,000 for over 20 years. On this amount he has not been able to pay me any interest, even for five years. It is necessary for me, for him, and every six months I am compelled to pay over \$5,000 interest for its use, or for the use which Ritchie has made of it. Besides this he owes me \$80,000 borrowed money which he has been unable to pay. This doesn't look as if I am trying to press him. As security for these loans I hold \$75,000 in Canadian Copper Company stock, which is worth par value, and \$400,000 in stock of the Anglo-American Iron Mining stock, which is worth between \$30,000 and \$40,000. If Ritchie can get anybody to take these securities and pay his debt to me I will make him a present of \$10,000 and agree to the dissolution of the two corporations. He owes Senator Payne about \$25,000, and the Senator has been as indulgent with him as I have. This money was obtained long ago, in 1875, and held by Senator Payne as security for the Canadian Copper Company stock as security. He agreed to redeem it in either thirty or sixty days. I, of course am not speaking for Senator Payne, but I will venture to say that the Senator will pay him \$10,000 if he will bring a man who will take the stock and pay the debt, and he will also agree to the dissolution of the corporation. Thomas W. Cornell is the wealthiest citizen in Summit county, and he has, in years past, been a great friend of Ritchie's. In his answer to the garnishee proceedings, it is set forth that Ritchie owes him \$200,000. It is secured by \$80,000 in Canadian Copper Company stock and between \$200,000 and \$300,000 in Anglo-American Iron Mining stock. I will also venture to say that Mr. Cornell will pay him \$10,000 if he will bring a man who will take the stock by paying the debt, and that he will also agree to the dissolution of the corporation. This is the stock Mr. Ritchie claims to own. I do not consist of, however, that he owns a cent's worth, for he is bankrupt. We have carried him for six or seven years, and he has not at any time owed us less than \$500,000, and to-day he is indebted to us for \$200,000. His only way of bringing in the suit was to injure the securities we hold for his debts. He has boasted that he would smash the concerns if we did not do as he wished. He wants us to consolidate the Copper Company and the Mining Company with the Central Ontario Railroad, of which he is president. That would be impossible, however, and we wouldn't do so if we could. Ritchie speaks, as I see, of the earnings of the Anglo-American Iron Mining Corporation being enormous, paid the officers. I, as president, never received a farthing for my services, and I don't know of an officer who is prominently identified with the companies who has. I also hold \$225,000 in stock of the Central Ontario Railroad for money Ritchie owes me. The road hasn't paid the interest on the money it owes, let alone dividends. Probably the only money we have ever borrowed from the Canadian Copper Company has made money enough recently to pay a dividend of 10 per cent., but we have been using the money in improvements. We have spent \$1,200,000 in construction. Our copper works in South Brooklyne, just completed, cost \$100,000."



**Second Annual General Meeting of the General Mining Association of the Province of Quebec. Report of Privy Council on Quebec Mining Act, etc.**

The Second Annual General Meeting of the General Mining Association of the Province of Quebec was held in the new club room, Windsor Hotel, Montreal, on Wednesday, 13th January, commencing at eleven in the forenoon. There was a large attendance. Among those present we noticed: L. A. Klein, American Asbestos Co., Black Lake; C. Circkel, Templeton Asbestos Co., Templeton; D. A. Brown, Bell's Asbestos Co., Boston; S. P. Franchot, Buckingham; Col. Lucke, Beaver Asbestos Co., Sherbrooke; O. M. Harris, Canadian Phosphate Co., Montreal; John J. Penhale, United Asbestos Co., Black Lake; A. S. Johnson, Johnson's Asbestos Co., Thetford; Hector McRae, Electric Mining Co., Ottawa; George R. Smith, Macgregor Lake Phosphate Co., Montreal; F. Hilton-Green, Phosphate of Lime Co., Montreal; R. T. Hopper, Anglo-Canadian Asbestos Co.; Dr. R. W. Ellis, and E. D. Ingall, Geological Survey of Canada, Ottawa; Prof. B. J. Harrington, Prof. W. C. Carlyle and Sir William Dawson, McGill University; H. A. Budden, Intercolonial Coal Co., Montreal; H. S. Poole, F.G.S., Acadia Coal Co., Stellarton, N.S.; J. T. Donald, M.A., Wm. Sclater and Theo. Doucet, M.P., Montreal; W. A. Allan, Little Rapids Mine, Ottawa; W. T. Gibbs, Buckingham; Capt. R. C. Adams, Anglo-Canadian Phosphate Co., Montreal; A. W. Stevenson, Montreal, and B. T. A. Bell, Ottawa. Hon. George Irvine, President of the Association, in the chair.

The Secretary having read the minutes of previous meetings, the following resolutions were adopted:

(1) Moved by Mr. John Penhale, seconded by Mr. D. A. Brown, that the Council be authorized to publish for distribution among the members a volume of the Transactions of the Association during the year 1891.

(2) Mr. D. A. Brown, moved, seconded by Col. Lucke, that the President, Mr. R. Prefontaine, Q.C., M.P., and Mr. Wm. White, Q.C., Sherbrooke, be a standing committee during the coming year to deal with all questions of legislation affecting the welfare of the mining industries of the province.

(3) Moved by Mr. S. P. Franchot, seconded by Mr. Wm. Sclater, that a sum of fifty dollars be donated by the Association to the Asbestos Club.

The Secretary then read the following correspondence with reference to the petition to disallow

**The Quebec Mining Act.**

DEPARTEMENT DU PROCUREUR GENERAL,  
Quebec, 11th July, 1891.

*The Honourable  
The Minister of Justice,  
Ottawa, Ont.*

SIR,—I am directed by the Honourable the Attorney-General to acknowledge the receipt of your letter of the 8th July inst., enclosing for his information copy of a petition addressed to His Excellency the Governor General, having reference to an Act passed by this Legislature at its last session, entitled "An Act to amend and consolidate the Mining Law," and in which you state that you would be glad to give all possible consideration to any observations which the Attorney General may think proper to make respecting the said petition.

In answer the Attorney General requests you to kindly grant him a delay until the 31st instant within which to file an answer to the said petition, as the matter is an important one, and he will unavoidably be absent until the 18th instant.

I have the honour to be, Sir,  
Your obedient servant,  
(Signed), L. J. CANNON,  
Assistant Attorney General.

DEPARTEMENT DU PROCUREUR GENERAL,  
Quebec, 12th August, 1891.

*To the Honourable  
The Minister of Justice, Ottawa.*

SIR,—I am directed by the Honourable the Attorney General to send you for your consideration a memorandum having reference to a petition addressed to His Excellency the Governor General relating to an Act passed by the Legislature of Quebec, entitled "An Act to amend and consolidate the Mining Law."

I have the honour to be, Sir,  
Your obedient servant,  
(Signed), CHARLES LANCTOT,  
Law Officer.

DEPARTEMENT DU PROCUREUR GENERAL,  
Quebec.

*To His Excellency the Right Honourable Sir Frederick Arthur Stanley, Baron Stanley of Preston, Etc., Etc., Governor General of the Dominion of Canada, in Council, Ottawa.*

The Attorney General of the Province of Quebec, in answer to the petition of A. Morrison and others, proprietors of mining lands, and persons interested in mines in the Province of Quebec, praying that Your Excellency will be pleased to disallow the Act passed by the Legislature of the Province of Quebec, at the session of 1890, 54 Vict., ch. 15, entitled the Quebec Mining Law, humbly represents:

The petitioners, in support of their said petition, allege several reasons, which may be briefly stated as follows:

1st. The Quebec Mining Law of 1890 interferes with private rights unjustly, and confiscates private property, first by repealing Article 1425 of the Revised Statutes of the Province of Quebec and replacing it by Sub-section 2 of Section 1 of the said Act, which takes away from persons who have obtained from the Crown, previous to the 1st of July, 1890, lots of land for agricultural purposes without reservation by the Government of the ownership of mines existing on their lands, which mines, according to the common law of the Province, formed part of the land of said landed proprietors.

2nd. By taking away from the purchasers of public lands patented since 1880, and of public lands upon which phosphate mines have been discovered patented since the 7th of March, 1878, the right of acquiring mines existing on their lands, on the condition mentioned in articles 1428 and 1429 R.S.P.Q., that is to say, by paying to the Commissioner of Crown Lands the difference between the price of agricultural lands and that of mines.

3rd. The law, which they ask to be disallowed, is contrary to the general interest of Canada and the trade policy of the Dominion, inasmuch as it imposes a tax or duty on an important industry.

4th. This law is ultra vires and unconstitutional.

The Attorney General of the Province of Quebec contends that these objections are unfounded, and cannot justify the disallowance of the said Act.

**I.**

The pretension that the repeal of Article 1425 of the Revised Statutes of the Province of Quebec takes away from the owners of the surface, whose titles are anterior to the 24th July, 1880, the ownership of mines situated on their lands is totally erroneous, inasmuch as these persons never were owners of the mineral estates (tréfonds minéral) which might be found under the surface of their lands, as the ownership of mines never was in the Province of Quebec an accessory of the ownership of the surface. According to the old French law, mines constituted a property distinctly from the soil which covered them, and this property belonged to the Crown, and did not become private property except by an express Act of the Sovereign.

Louis XI., Avril 1483.—Recueil des anciennes lois Françaises, vol. X., p. 911; id. tome XI., p. 97; id. tome XI., p. 666; id. tome XII., p. 771; id. tome XII., p. 196.

Henri II., Septembre 1548.—Id. tome XIII., p. 57; id. tome XII., p. 290. François II. en 1560.—Id. tome XIV., p. 41.

En 1677, 1700 et 1704.—Id. tome XIX., p. 175, et tome XX., pp. 428 et 443. Louis XV., 1705.—Id. tome XX., p. 467.

Louis XV., 1716.—Id. tome XXI., p. 79.

Louis XV., 1744.—Id. tome XXII., p. 166.

Ordonnances du 30 Mai, 1413, du 3 Novembre, 1416, du 1er Juillet, 1437, du 21 Mai, 1455, de Décembre 1461, du 10 Mai, 1463, du 19 Aout, 1467, de Septembre, 1471, d'Aout, 1483, de Novembre, 1483, de Février, 1483, de Janvier, 1488, de Juin, 1498, de Février 1506, et de Juillet, 1514.

Edits et ordonnances.—Vol. 1er p. 5; vol. 1er p. 45.

Edit, Juillet, 1705.

Edit, 17 Oct., 1520.

Choppin—Tome XI. du Domaine de la Couronne, titre XI. ch. 6, p. 14. Bosquet—Dictionnaire des droits domaniaux, vbo. Domaine de la Couronne, vbo. Mines et Minières. Guyot—Repertoire, vbo. mines. Merlin—Rep. vbo. mines, ch. 4. Ferrière—2 vol. grand commentaire de la Coutume du Paris, art. 187, ch. 10. Code Civil B.C., art. 414. Dalloz—Propriété des mines, tome 1er p. 34, et pp. 266, 306, 374, 413, 452, 455, 401, 612. Loqué—Législation de la France ou Commentaire des Codes Français, tome IX., p. 107. Dalloz, aîné—Repertoire de la législation (tome XXXI) vbo. mines et minières. Loqué—Législation des mines, p. 379 et p. 399.

The right of ownership in mines, which belonged to the Kings of France, passed at the cession to the British Crown. Such was the holding of the Court of Queen's Bench in a judgment rendered on the 7th of December, 1883, in the case of Regina vs. de Léry et al. The judgment of the Superior Court is reported in IX. Law Reports, p. 225, and that of the Court of Queen's Bench in VI. Legal News, p. 402. The heading of the Report reads as follows: "By the old law of France, which is in force in Canada, the right to minerals did not pass by a grant of lands to the grantee, without special words, but remained in the Sovereign. The King of England, at the cession, succeeded to this right. The Sovereign could grant the right to the minerals to whomsoever he pleased, and, in such case, the owners of the soil had no

right except to an indemnity for any damages they might suffer by the mining operations."

The British North American Act, Sec. 9, and the Civil Code of Lower Canada re-enact, on this subject, the principles of the old law. Article 414 of our Civil Code lays down the general principles that "ownership of the soil carries with it ownership of what is above and what is below it." But, at the same time, the third paragraph of this article makes an important restriction to the application of the above principle in the following terms: "The proprietor may make upon the soil any plantations or buildings he thinks proper. . . . He may make below it any buildings or excavations he thinks proper, and draw from such excavations any products they may yield, saving the modifications resulting from the laws and regulations relating to mines, and the laws and regulations of police;" that is to say, if allowed to give more precision to the reference which is here made by the legislator to certain special regulations, saving the application of the old French ordinances and of the principles of the French law, which declare that mines belong to the Crown.

The above is sufficient to show the falsity of the pretension of the petitioners that mines situated on lands patented previous to 1880, without reservation by the government of the rights of the mines, belong to the surface owners.

Consequently, it cannot be said that the Mining Act of 1890 deprives them of a right of ownership, which they never possessed.

2nd. The petitioners also pretend that the repeal of articles 1428 and 1429 R. S. P. Q., which allow purchasers of lands mentioned in these articles to buy the mines situated on said lands, by paying to the Crown the difference between the price of agricultural lands and the price of mines, constitutes a confiscation of private property. This pretension is as unfounded as the previous one.

The mineral estate (tréfonds minéral) belonging to the Sovereign, the Legislature, in the Mining Act of 1880, indicated the mode of acquiring such mines and causing them to become the property of the owners of the surface. All of these owners, who thought proper to take advantage of this clause of the law, became absolute owners of the mines on their lands, and the act of 1890 does not in any way affect them. On the other hand, such surface owners, who did not take advantage of this exceptional privilege granted them by the law of 1880, did not become owners of the mines which might be situated on their lands, and the Legislature, by changing the mode of acquiring such mines, did not confiscate anything belonging to them. Parliament is no more bound than a private individual to give perpetual existence to an offer which has not been accepted during a certain number of years.

It is also worthy of remark that the Mining Act of 1890 when fixing in articles 1463 and following the price of mines, only exercised the powers which belong to the Lieutenant-Governor in Council, under the article 1434 R. S. P. Q., and that under the previous law, the owners of the surface mentioned in said articles 1428 and 1429, could have been forced in order to become proprietors of the mines on their lands, to pay a much larger sum than the price required by the law of 1890.

Another objection to be disposed of, under the head of: 1st. The assertion by the petitioners that articles 1455-1512 inclusively, of the Mining Act of 1890 interfere with private rights and despoil private individuals of their property. This is utterly false. These articles despoil nobody and deprive no man of his property, since they are dealing exclusively with mines which have not yet become private properties.

Moreover, the mode of exploration of the soil and of working mines, laid down by these articles, existed in the statute of 1880 and in articles 1439 and following R. S. P. Q.

**II.**

The petitioners bitterly complain of the imposition of a tax or royalty of 3 per cent. on the mercantile value of the products of all mines and minerals enumerated in section 1426, and declare such tax unconstitutional and ultra vires.

The imposition of a tax or royalty on the products of mines cannot be a cause of disavowal of the law which imposes such tax, as the power of imposing a tax of this nature is of the competence and within the jurisdiction of the Quebec Legislature, which alone should judge of the opportunity of imposing it, and it is not because such a tax, at a certain standpoint, affects the commerce of the country that the law which decrees it should be disallowed.

Disavowal for this cause would render necessary the disavowal of almost all the laws under which provincial taxes are imposed. Liquor licenses, timber licenses, auctioneer licenses, the law imposing a direct tax on commercial corporations, and many other of our local statutes doubtless, have a certain restrictive effect on trade and commerce. However, nobody dreamt up to this of asking the disavowal of these laws on such a ground.

It must also be remarked that the Mining Act of 1890 makes no innovation when it imposes this tax or royalty. The old French law gave the King the right to levy a royalty of ten per cent. on the products of the mines.

Regina vs. DeLéry et al.—9 Legal News.  
Law Reports, p. 125 and following.

And Article 435 R. S. P. Q., which re-enacted the Mining Act of 1880, gave the Lieutenant-Governor in Council the power to claim at any time the royalty due to the Crown upon any land already sold, conceded, or otherwise alienated, or which might be hereafter sold.

III.

The last argument of the petitioners for disavowal is that the Mining Act of 1890 is ultra vires and unconstitutional. In what manner this act is ultra vires of the Quebec Legislature, and unconstitutional, the petitioners do not see fit to state.

However, nothing can be more self-evident than the constitutionality of this law. The British North American Act specifically gives to the provinces the ownership of mines, and Section 92 of the same act gives the legislatures of the provinces exclusive power to make laws concerning them.

To sum up the question to Your Excellency, the undersigned humbly submit that the Quebec Mining Law, 54 Vict., ch. 15, which was duly assented to on the 30th December, 1890, is constitutional, has not a retroactive effect, does not interfere with private rights unjustly, nor confiscate private property, nor is it contrary to the policy of the Dominion or injurious to a large and increasing industry, but that it merely affirms the principles which were always admitted in the Province of Quebec, imposes a tax or royalty evidently within the powers of the Legislature, and in no way violates the constitution.

Wherefore, the undersigned humbly prays that the petition of A. Morrison and others, praying for the disavowal of the Quebec Mining Law, 54 Vic. chap. 15, be dismissed.

(Signed), J. E. ROHDEAUX,  
Attorney-General.

QUEBEC, 31st July, 1891.

The Honourable  
The Minister of Justice,  
Ottawa.

QUEBEC, 9th November, 1891.

SIR,—I am directed by the Honourable the Attorney-General to inquire from you if any decision has been arrived at in the matter of the petition of A. Morrison and others, proprietors of mining lands, and persons interested in mines in the Province of Quebec, praying that His Excellency the Governor-General be pleased to disallow the Act passed by the Legislature of the Province of Quebec, at the session of 1890, 54 Victoria chapter 15, being the "Quebec Mining Law," and, if not, when such a decision may be expected, and if the interested parties are to be heard before the rendering of such a decision.

I have the honour to be, Sir,  
Your obedient servant,  
(Signed), L. J. CANNON,  
Assistant Attorney-General.

DEPARTMENT OF JUSTICE,  
Ottawa, 2nd December, 1891.

L. J. Cannon, Esq.,  
Deputy-Attorney-General, Quebec.

SIR,—Adverting to my letter to you of the 27th ultimo on the subject of the petition asking for the disallowance of the Quebec Mining Law of 1890, I beg to state that in considering the arguments of the Honourable the Attorney-General and the petitioners, it appears to the Minister of Justice that the contention of the petitioners deserves further consideration. It may be summarized as follows:

Whatever may be the law with respect to grants issued by the French Crown, before the cession in which the mines were not specifically granted, the substituted article 1425 does not correctly state the law with respect to the patents made by the British Crown subsequent to the cession in which the mines were not expressly reserved. Such grants, it is contended, would, under the English prerogative law which governs them, include the minerals and minerals other than gold and silver without their being expressly mentioned. In fact, it is contended that the whole jurisprudence of the country went to establish that where lands were granted without reserve of minerals, all baser metals became the property of the grantee.

Reading the substituted Article 1425 in connection with the definition of the words "private lands" given in the interpretation clause of the Act, it would cover all lands whether granted previous to 1880 or not, in the grant of which no mention is made of mines and minerals. It, therefore, virtually amounts to a confiscation of all mines or mining rights in such lands.

The Minister of Justice will be very pleased to receive any observations which the Honourable the Attorney-General may see fit to offer with respect to the above points.

As the time within which the Act must be reported upon will expire in a few days, I trust that I may be informed at once whether any observations on these points are to be made.

I have the honour to be, Sir,  
Your obedient servant,  
(Signed), ROBT. SEDGWICK,  
D.M.J.

QUEBEC, 12th December, 1891.

To the Honourable  
The Minister of Justice,  
Ottawa, Ont.

SIR,—I duly received the letter of Mr. Sedgwick, Deputy-Minister of Justice, dated the second December instant, in which he states that, in the matter of Petitioners asking for the disavowal of the Quebec Mining Law of 1890, in considering the arguments of the Petitioners and my arguments it appeared to you that one

contention of the Petitioners deserved further consideration, which said contention Mr. Sedgwick summarises as follows:—

"Whatever may be the law with respect to grants issued by the French Crown before the cession in which the mines were not specifically granted, the substituted article 1425 does not correctly state the law with respect to the patents made by the British Crown subsequent to the cession in which the mines were not expressly reserved. Such grants, it is contended, would, under the English prerogative law which governs them, include the minerals other than gold and silver without their being expressly mentioned. In fact, it is contended that the whole jurisprudence of the country went to establish that where lands were granted without a reserve of minerals, all the baser metals became the property of the grantee.

"Reading the substituted article 1425 in connection with the definition of the words 'private lands' given in the interpretation clause of the Act, it would cover all lands whether granted previous to 1880 or not, in the grant of which no mention is made of mines and minerals. It, therefore, virtually amounts to a confiscation of all mines or mining rights in such lands."

On this point I now beg to offer the following additional remarks:

At page 2 and following of my letter of the 31st July last, I claim to have established that "according to the old French law mines constituted a property distinct from the soil which covered them and these properties belonged to the Crown, and did not become private property except by an express act of the Sovereign," and that the right of ownership in mines which belonged to the King of France passed, at the cession, to the British Crown. (Vide Treaty of Paris, 1763, Section IV., pages 61 and 62 Houston's Constitutional Documents of Canada.)

To avoid the consequences resulting from the application of this law, the doctrine of disavowal now contended that, since the cession, mines in this Province are no longer subject to the old French law, but are governed by the public law of England relating to prerogatives of the Crown, which confers to the subject in whose lands they are discovered, all mines excepting mines of gold and silver, to which by his prerogative the King is entitled, and that the jurisprudence of this Province is unanimous on this point.

This contention of the Petitioners for disavowal, I hold to be erroneous for the following reasons:

The mineral estate (tréfonds) in a land is by nature an immovable property (2. Aubrey vs. R., page 11), and, as such continued, after the cession of this country to England, to be regulated by the laws in force in this Province under the French domination, as modified by our statutes, which laws were preserved to us by the capitulation, treaties and our different constitutional acts.

The Quebec Act, 1774, Sec. VIII., Houston, page 93. The Constitutional Act, 1791, Sec. XXXIII., Houston, page 124.

The Union Act, 1840, Sec. XLVI., Houston, page 168. The Confederation of 1867, Sec. 129, Houston, page 212.

The jurisprudence of this Province is in perfect accord with the doctrine I have just laid down, as can be ascertained by the holding in the case of Regina vs. de Léry et al., already cited in my letter of the 31st July, 1891, 6 Legal News, page 402:—"1st. By the old law of France, which is in force in Canada, the right to minerals did not pass by a grant of lands or grants without special words, but remained in the Sovereign. 2nd. The King of England at the cession succeeded to this right. 3rd. The Sovereign could grant the right to minerals to whomsoever he pleased, and in such case the owners of the soil had no right except to an indemnity for any damages they might suffer by the mining operations."

The fact that the right to mining prerogatives of the Crown does not prevent the old French Civil Law, as modified by our statutes, to apply to mines in our Province. The prerogatives of the Crown are of two kinds: direct prerogatives, and incidental or minor prerogatives. (Bowyer, Constitution Law, page 134.)

The right to mines is one of the minor prerogatives. It is quite true that the direct prerogatives of the Crown are governed by the public law of England, but the same does not apply to the minor prerogatives of the Crown in this Province; they are governed by our Civil Law, which is the old French Civil Law, as modified by our statutes.

Chitty, on prerogatives, page 25, expresses himself as follows:

"But in countries which, though dependent on the British Crown, have different and local laws for their internal government, as for instance the plantations or colonies, the minor prerogatives and interests of the Crown must be regulated and governed by the peculiar and established law of the place." (Idem, pages 29-30-31.)

Our courts have several times applied this principle. Chief Justice Reid, in his judgment on the 30th July, 1828, in a case of the Attorney-General pro Regé, Appellant, and Jane Black, Respondent, expressed himself as follows in the holding of the case:—

"Where the greater rights and prerogatives of the Crown come in question, recourse must be had to the public law of the Empire, as that alone by which they can be determined; but where the minor prerogatives and interests are in question they must be regulated by the established law of the place where the demand is made."

In this case Chief Justice Reid gives the following extract from Chitty:—

"That in the colonies and plantations, the minor prerogatives and interests of the Crown must be regulated

and governed by the particular and established law of the place where the demand is made," and accordingly, where peculiar laws and process exist, as in Guernsey and Jersey, the King himself, in seeking to recover his own debts therein, must resort to such laws for redress." (Stuart's Reports, pages 324, 325, 326.)

Later on, on the 22nd December, 1874, Chief Justice Dorion, on remanding the judgment of the Court of Appeals in the case of Dame Geoganna H. Monk vs. qualité, Appellant, and the Honourable G. Ouimet, Attorney-General pro Regina, Respondent, expressed himself as follows:—

"When this colony passed under the dominion of the Crown of England, the maintenance of the civil laws then in existence was guaranteed by treaty. These laws, as altered by competent authorities, are still in force, and are as binding on the Crown as they are upon any of its subjects, except in cases where the higher prerogatives, which form part of the public law throughout the whole Empire, are affected. The right to be paid in preference to other creditors of a common debtor does not form part of the higher prerogatives of the Crown, which are part of the public law, but belong to what are termed the minor prerogatives, those which are not essential to the supremacy of the Crown, and which are controlled by the private or municipal law of that part of the Empire where they are claimed."

"Vide also Chitty on Prerogatives, 25, 29, 31; Chambers's Colonial Opinions, 88, and Attorney-General and Black's Stuart's Reports, 324, where this rule has been followed."

I respectfully submit that the above authorities establish beyond doubt that in our Province mines are regulated by the old French Civil Law, as modified by our statutes.

The contention of the Petitioners for the disavowal, that our courts have in actual fact held that the ownership of mines on lands granted before 1880, without reserve of mines thereon by the Crown, belong to the surface owners, is absolutely unfounded. The Petitioners do not cite a solitary decision in support of this alleged jurisprudence, for the obvious reason that no such decision exists. The few reported decisions on this question amongst which that of Regina vs. de Léry, already cited, absolutely lay down a doctrine contrary to that claimed by the Petitioners.

Wherefore, I respectfully persist in praying that the Petition of A. Morrison and others, for the disavowal of the Quebec Mining Act, 54 Vict., Chap. 15, be dismissed.

I have the honour to be, Sir,  
Your obedient servant,  
(Sgd.), J. E. ROHDEAUX,  
Attorney-General.

OTTAWA, 16th DECEMBER, 1891.

The Honourable  
J. E. Robitoux,  
Attorney-General.

MY DEAR ATTORNEY-GENERAL,—I am much obliged for your letter of the 12th instant, having reference to the petition for "allowance of the Quebec Mining Law of 1890."

Will you permit me to say that I am still far from being convinced that Crown grants in your Province, since the cession, have the limited effect which you claim they have, and I am likewise somewhat in doubt as to the limited character of Crown grants issued prior to the cession. The Statute under consideration makes the statement that "it is admitted that mines, whether upon private or public lands, belong to the Crown." If the legislation in question were really based upon an admission, it ought to appear that the person making the admission had authority to make it from those who would be affected by it. It seems clear, however, both from the Statute itself and from the correspondence, that our Legislature intended to legislate in respect only to mines which, as a matter of fact, belonged to the Crown. I may be excused for suggesting that all difficulty might be removed by an amendment making it clear that the Act only applied to mines and minerals which belong to the Crown, without making any, specific declaration that this includes all minerals in lands granted by the Crown although not specifically reserved. In that case the legal questions which have been raised, and in respect of which I have the pleasure to say that I am in doubt, will be left for determination by the courts. Such an amendment it appears to me, while in no wise impairing the just rights of the Province, would remove any objection to the Act on the ground of its being a confiscation of existing private rights as claimed by the petitioners. An assurance from you that your Government, at the next session of your Legislature, would promote an amendment to the effect suggested would materially assist me in making my report to His Excellency in Council on the subject of the Quebec legislation of last Session.

Believe me,  
My dear Attorney-General,  
Faithfully yours,  
(Sgd.), J. S. D. THOMPSON.

QUEBEC, 18th December, 1891.

To the Honourable  
Sir J. S. D. Thompson,  
Minister of Justice,  
Ottawa.

SIR,—I have the honour to acknowledge the receipt of your letter of the 16th instant, to the Honourable the

Attorney-General, in the matter of the disavowal of the Quebec Mining Law of 1890.

I have the honour to be, Sir,  
Your obedient servant,  
(Sgd.) L. J. CANNON,  
Assistant Attorney-General.

OTTAWA, 22nd December, 1891.

The Honourable  
T. Chase Casgrain,  
Attorney-General,  
Quebec.

MY DEAR ATTORNEY-GENERAL,—I beg to enclose you copies of certain papers and correspondence having reference to the disallowance of the Quebec Mining Act of last session of your Legislature. You will observe that my last letter to your predecessor was written on or about the day when he ceased to be Attorney-General, and I have not received any reply from him. I send the whole correspondence to you in the hope that I may be able to obtain from you at an early day an assurance that the Act will be amended at the next sitting of your Legislature in the manner I have suggested.

Yours faithfully,  
(Sgd.) J. S. D. THOMPSON.

CABINET DU PROCUREUR GENERAL,  
PROVINCE DE QUEBEC,  
Quebec, December 23rd, 1891.

The Honourable  
Sir J. S. D. Thompson, K.C.M.G.,  
Minister of Justice, Ottawa.

DEAR SIR JOHN,—I beg to acknowledge receipt of your favor of the 22nd instant, enclosing copies of certain papers and correspondence having reference to the disallowance of the Quebec Mining Act of last session. I will attend to the matter immediately.

Yours faithfully,  
(Sgd.) T. CHASE-CASGRAIN.

DEPARTEMENT DU PROCUREUR GENERAL,  
Quebec, 8th January, 1892.

The Honourable  
Sir J. S. D. Thompson,  
Minister of Justice,  
Ottawa.

MY DEAR SIR JOHN,—Referring to your letter of the 16th December last, addressed to the Attorney-General of this Province, and having reference to the petition for the disavowal of the Quebec Mining Law of 1890, after having submitted the same to my colleagues, I am authorized to inform you that we have come to the following conclusion as regards the proposal you made in the above mentioned letter in the following terms:—

"I may be excused for suggesting that all difficulties might be removed by an amendment making it clear that the Act only applied to mines and minerals which belong to the Crown although not specifically reserved. In that case the legal questions which have been raised, and in respect of which there may, I think, be considerable doubt, would be left for determination by the courts."

Without in any way waiving any rights this Province may have to legislate on this matter, and without prejudice to said rights, this Government pledges itself to promote at the next session of the Legislature of this Province an amendment to the said Quebec Mining Law of 1890 to the effect suggested by you as above.

Should you not find this letter a sufficient assurance to enable you to make your report to His Excellency the Governor-General-in-Council on the subject of the Quebec Legislation of the last session, this Government is ready to pass an Order-in-Council to the same effect.

I remain,  
Yours very truly,  
(Sgd.) T. CHASE CASGRAIN,  
Attorney-General.

HON. GEORGE IRVINE—I have only heard the papers read for the first time to-day, and I may say that in my opinion the result is satisfactory. I think we have reason to be satisfied with result of our negotiations.

CAPT. R. C. ADAMS—As far as I can judge, the Report is hardly a satisfactory solution, because it leaves the question open. We simply have the assurance that we may fight the matter in the courts.

HON. GEORGE IRVINE—What we were fighting for was to prevent the Legislature from taking away our titles. If the Quebec Government carries out the promise contained in the correspondence we shall have been successful in our contention.

CAPT. ADAMS—Still the fact remains that there is a question of conflict between the Dominion and Provincial Governments as to whether private owners of land have a good title. It makes public a very serious difficulty.

MR. S. P. FRANCHOT—Do I understand that this retroactive part of the Act is to be annulled?

HON. GEORGE IRVINE—Certainly.

MR. FRANCHOT—Do I understand that each individual will have to defend his title against all comers—the law is not laid down that mines upon private lands belong to the Crown?

HON. GEORGE IRVINE—No.

MR. FRANCHOT—Now if the retroactive clause of the Act be annulled, does it not give standing ground to say that they have no right to put a royalty upon such lands.

HON. GEORGE IRVINE—Royalty is only another name for tax. It is an incorrect expression.

CAPT. ADAMS—With reference to what Mr. Franchot has said, it seems to me that while things are left in *status quo*, the whole statute is an uncertain one.

HON. GEORGE IRVINE—It is made uncertain by the Attorney-General of the Province of Quebec.

MR. FRANCHOT—Do they recognize it as an open question? They may do so; we don't. Suppose we invite capitalists to invest in the Province we must have the point decided beyond a peradventure.

HON. GEORGE IRVINE—The Act would only refer to land granted for agricultural purposes prior to 1880. There is no doubt about land subsequent to 1880, and with regard to phosphate, two years before—I think 1878.

MR. THEO. DOUCET—Still the question is one which is open to doubt.

HON. GEORGE IRVINE—We cannot help that.

MR. THEO. DOUCET—The all-important point is what effect will the present situation of affairs have upon the investing public.

HON. GEORGE IRVINE—The onus is thrown upon the local Government. It will have to prove its position.

MR. DOUCET—Still it will have a deterrent effect upon the introduction of capital.

HON. GEORGE IRVINE—I am afraid that is inevitable.

COL. LUCKE—The titles to the lots held by our company, which I have read over very carefully, reserve nothing to the Crown except pine timber of a certain size.

HON. GEORGE IRVINE—But yours is a mining grant; you will find that it is registered as such.

MR. L. A. KLEIN—In the event of the present Government being defeated at the ensuing elections, will the succeeding administration be bound to carry out this Order-in-Council.

HON. GEORGE IRVINE—I take it that whatever Government is elected will be bound to do so.

#### Election of Officers and Council.

The following were elected officers and council for ensuing year: President, Hon. George Irvine, Q.C., Quebec; Vice-Presidents, Capt. R. C. Adams, Montreal; R. Prefontaine, Q.C., M.P., Montreal; S. P. Franchot, Buckingham; Treasurer, A. W. Stevenson, C.A., Montreal; Secretary, B. T. A. Bell, Ottawa; Council, D. A. Brown, O. M. Harris, J. Lanson Wills, F.C.S., Dickson Anderson, John J. Penhale, Col. Lucke, J. Burley Smith, R. T. Hopper, L. A. Klein.

It was decided that the next meeting of the Association should be held in the Eastern Townships in June, date, place and programme to be arranged by the following sub-committee: L. A. Klein, Col. Lucke, and John J. Penhale.

Messrs. S. P. Franchot, O. M. Harris, J. Lanson Wills and J. Burley Smith were appointed a sub-committee to arrange for the September meeting. This meeting will in all likelihood be held in the vicinity of the phosphate mines on the Lievres River.

This terminated the morning session.

The members re-assembled at two o'clock, the club-room being crowded, a pleasing feature being the presence of a large number of students attending the mining engineering and applied science lectures at McGill University. Capt. R. C. Adams presided in the absence of the president.

#### Technical Education in Relation to Mining.

SIR WILLIAM DAWSON—I propose merely to say a few words respecting our mining course in introducing Prof. Carlyle, who, I hope, will address you at greater length on the subject. The course of Mining Engineering in our Faculty of Applied Science was introduced about twenty years ago, under the able management of Dr. Sterry Hunt and Dr. Harrington, and has been one of the most successful in its results. Our aim has been to furnish all-round men, who, with a little practical experience should be able to make themselves useful in mining, mineral exploration and surveying, assaying or metallurgy. To secure this end, the course of study extends over four years, and includes those portions of the civil and mechanical engineering courses which are useful to mining engineers, as well as a thorough training in chemistry, assaying, mineralogy and geology; besides the special instruction in mining and metallurgy now given by one of our own graduates, Mr. Carlyle. The results have been very satisfactory in so far as the graduates are concerned. They have proved themselves useful, practical men, and have also shown a capacity and inclination to pursue original research in geology. Unfortunately, the demand for such men in the United States and other countries has been so great that but few have remained in Canada. This we specially regret, as we believe our own young men trained here are better suited than others to the work of developing our mineral resources. It is hoped, however, that as the number of our graduates increases, more of them may be induced to remain. On the whole, it may be affirmed that no professional men educated here have been more certain of remunerative employment or more useful than our mining engineers.

PROF. W. C. CARLYLE then proceeded to read his paper, as follows:—

The writer, having but recently returned from that great mining State, Colorado, where the last few years have been spent in work as a mining engineer in one of the most progressive and wealthy mining centres, he finds himself once more in Canada among Canadians, and one of the Faculty in engineering at McGill University. Having taken the course in mining at this college before leaving for the west, and having since then been associated very intimately in extensive mining operations with men of wide experience, this good opportunity has been taken to learn while working with other engineers and practical mining men, the real use or value to a mining man of a technical education.

We all are conscious of the feeling of suspicion and animosity towards young college-trained men, felt by many of those who, through years of constant practical work in mining, have gained large experience and also reputation; felt even by those not so familiar with its details and demands. It must be confessed that many college men have deservedly brought this distrust upon themselves, though unjustly upon their colleagues, by not having worldly wisdom enough to perceive that their book-lore and college training were not all-sufficient to make them thorough mining men, without having, as well, worked in the mill or smelter, or underground, with skilled and knowing millmen or miners having the countless but all-essential details that only such experience can give. Some such have undertaken, with too great self-confidence, operations far beyond their ability and practical knowledge, incurring certain failure and non-fulfilment of that they had glowingly promised. Fortunately, we are glad to say, this prejudice is fast being proved unwarrantable, mostly through the efforts and actions of collegians themselves, who, more wisely, on leaving college halls, have at once quickly sought out mining districts, and working with experienced men, having the all-important practical part, have made themselves, in many instances, men of pronounced success and reputation in the mining world.

We might now ask, What comprises a technical education in mining, as given at a well equipped college? In the first place, some subjects as given in the general course of education are taught, but chief prominence is given to subjects pertinent to the mining course, as mathematics, physics, chemistry, assaying and drawing. Besides laboratory work, the student takes up surveying in all its branches, surface and underground, and, proceeding, studies, theoretically and practically, mineralogical geology, which, to any mining man, in their real practical use in the daily prosecution of his work, cannot be over-estimated. For, in the first place, he can correctly determine the rocks and minerals of his mining district, and being already versed in the history of similar formations, as carefully worked out by geologists in other parts, he is prepared already as to what to expect in his own mine or locality. Better still, acquainted with the general laws of rock formation; the occurrence and relationship of the different rocks to each other; the habits of slips and faults so often met with in mining; the peculiarities and the probable origin of the veins and ore-bodies, and what marvellous geologic changes have taken place and are possible—the floors of former oceans now lifted up to summits of lofty mountains, or lying all twisted and rent—all this knowledge helps him to arrive at more accurate conclusions, and to avoid following theories and ideas entirely absurd and wrong. Of this last fact the writer has often been impressed, even amazed, while working among old and experienced miners, whose geological education had been gleaned from what they themselves had seen, to hear their very fantastic and impossible explanations of peculiarities in ore-bodies and formations. Geology is not a theoretical or ideal study, with constantly changing argument and classification, but yearly it is becoming more and more a valuable practical science and strong factor in an engineer's training.

In Leadville, about ten years ago, Emmons, the famous geologist of the United States Geological Survey, made as complete and exhaustive examination as then possible of that wonderful silver mining camp, unravelling the intricacies of the systems of faultings, and reaching such definite conclusions as to the relationships between the ore-bodies and the enclosing limestones and porphyries, as were explained in his monograph with its accompanying maps and sections, that these have become the guide to all classes of miners, who have been compelled to acknowledge the usefulness of his researches, by the wonderful manner in which subsequent developments have proved the correctness of his views.

Other subjects of equal importance to a mining engineer are taught, such as applied mechanics, hydraulics, steam, electricity, construction and designing, and so well equipped are our colleges becoming that a man is not confined to book-work and the lecture; he can now work with the mechanics himself, test and compare the strengths of materials of construction, and experiment with different forms of structure. In mining itself he is told of the best methods of work, of the best and cheapest kinds of machinery for hoisting and pumping, of plans for dressing ores, and their transportation.

Through the great liberality of Mr. McDonald and other friends of the University, the engineering department at McGill will soon be able to offer young men entering this profession facilities of instruction unsurpassed in America. With their large buildings, completely equipped with extensive workshops, testing machines and laboratories, and with a corps of experienced men as professors and instructors, the student graduating here as an engineer will have had a course eminently

fitted to help him very materially in his after work. It is hoped and expected that before a very long time the University will be able to erect and fully equip a metallurgical department, to be used in teaching metallurgy, practically, just as it would be seen in the mills, and in testing to determine the best and cheapest process of treatment for any particular ore. Such a laboratory will be supplied with regular machines, such as rock-crushers, rolls, stamps, amalgamating plates and pans, washers, chlorinating and leaching plants, concentrating machinery, and the different furnaces for calcining, roasting and smelting. With such equipments, not only will our students become thoroughly acquainted with the different systems of treating ores, learning practically how to handle the ores and different machines; but mining men throughout the Dominion, desirous of learning the proper method to adopt in building a mill to treat their ore, will thus be able to have their ores systematically treated by the different processes, thus determining the method, the cheapest and best adopted.

A young man having thus taken a technical course in mining, will leave college educated, and familiar with assaying, assaying, analyzing, geology and mineralogy, with more or less practical experience in the various mining properties, and afterwards correctly treating his ores. If a man, capable and intelligent, with such a training, will complement this knowledge by at once entering and studying the strictly practical part of his work, going, if needs be, to the great mining centres of the other side, where mining and metallurgy are reaching such a high state of progress, such a man, though doubly equipped, cannot fail but be a success in his profession, and a benefit to the locality where he labors. That such a training is valuable cannot be better evidenced than by the fact that in the large mining schools of the west the majority of the students are sons of mining men, who, having felt themselves very times hampered by the lack of such an education, and the several advantages and valuable opportunity which was denied to them. Again, throughout the west, by far the most of the best economical and scientific mining is being done by engineers and mining men who have had technical educations. The writer is well warranted in this statement.

In Canada our mining is as yet but just begun, thwarted as it is by defective and incomplete laws. But the time will surely come when mining will be an institution of our Dominion, in economic as well as precious minerals, and men with both technical and practical experience will help in its development, encouraging capital to venture, and then making good its venture. With this great increase in the mining industries, Canada will receive large additions to her income, making her stronger and wealthier, as her great resources promise that she shall be in the not far distant future.

Mr. B. T. A. BELL—For the benefit of Sir William, Prof. Carlyle, and the students who were not with us at our morning session, I would say that the Association will always cordially welcome the students of mining engineering and the professors at McGill, to take part, not only in the activities of this Association, but also in the excursions to mining districts where an opportunity may be had by the students of studying the methods of mining and treating the various mineral products of the province.

The chairman then called upon Mr. J. T. Donald, M.A., Montreal, to read his paper.

#### Canadian Platinum.

It has long been known that platinum had been found in the Province of Quebec. In the Report of the Geological Survey for 1851-52 it is stated that Dr. Hunt had detected native platinum in some of the gold washings of the Chaudière district.

In the Province of Ontario platinum has been discovered in the Sudbury district. It there occurs in combination with arsenic forming the mineral Sperryllite, which is of great interest, as it is "the first mineral yet found containing platinum as an important constituent other than the natural alloys with various metals of the platinum group." So far as can be learned, no effort has yet been made to utilize Sperryllite as a source of platinum; but at present it bears a high price as a mineral curiosity. Canadian platinum ore, as a commercial article, is the tinny product of British Columbia. In association with alluvial gold it has been met with in a number of the streams of that Province. At present the most important platinum-bearing district of British Columbia, as well as of North America, is that of the Tulameen or North Fork of the Fraser River. Placer mining in this district yields both gold and platinum, the latter being found, like the gold, in grains and small nuggets. A notable quantity of platinum has already been obtained from this district. One firm in the United States claims to have purchased within the last year or two fully 2,000 oz. of British Columbia platinum, and it is well known that a portion of the yield of this district has found its way to the London market.

An increased output may be expected as the Tulameen Hydraulic and Improvement Co. have made preparations to begin hydraulic mining on a large scale with the advent of spring. Mr. R. G. Tatlow, a member of this company, informs me that his company has erected a saw mill, having a capacity of 5,000 feet per diem, and has constructed about two miles of flume, 5 feet at base, 30 inches high, on hills placed on solid bed about 7 feet wide, and having a grade of  $\frac{1}{4}$  inch in 12 feet. The water is taken from Eagle Creek, about 14 miles above Granite Creek,

the only creek capable of giving the necessary quantity of water and pressure. In addition to this flume, the company has on the ground, and ready for work, about 400 feet of iron pipe and a monitor, which, where work is to be commenced, will work with a pressure of 900 miners' inches, and a drop of about 160 feet. Mr. Tatlow also states that the largest yield of platinum appears to have been in the vicinity of and below Eagle Creek, where the yield has been about two parts of gold to one of platinum.

The two samples of this Tulameen ore before us contain, 69.28 and 72 per cent. platinum.\* It is really a very complex alloy of platinum, with a number of the comparatively rare metals of this group, such as palladium, iridium, and notably an alloy of Osmium, and iridium, known as osmidium, which in grains of proper size and form is used for pen points. This ore is worth to-day about \$5.50 per oz. troy. The price is very unsteady, being determined by the demand for the metal, and by the state of affairs in Russia, the principal producer of the ore.

The value of platinum depends chiefly upon its ability to resist high temperatures and the action of the majority of chemical reagents. Its value to the chemist is well expressed by Liebig's many cases: "Without platinum it would be impossible in many cases to make the analysis of a mineral; \* without platinum the composition of most minerals would have yet remained unknown." In the forms of foil and wire, and wrought into crucibles, evaporating dishes, etc., it is in constant use in the laboratory; but its use in the chemical laboratory is especially employed on a large scale in manufacturing chemistry, for example, in the concentration of sulphuric acid.

In 1888 platinum in the form of pans, retorts, etc., to the value of \$12,268, was imported into this province, and it is understood that practically the whole was imported for use in the sulphuric acid works in Capetown. Dr. D. D. Day, in his Mineral Resources of the United States, 1857, states that platinum wire is for stems on porcelain teeth. It is estimated that 40,000 oz. of platinum are thus consumed in the United States yearly. In the form of wire it is also used to a large extent in electrical appliances.

An interesting statement in connection with the metallurgy of platinum was made by the president of the chemical section of the British Association, at the meeting of last year. It is to the effect that one firm of refiners in London have such facilities that  $\frac{1}{2}$  cwt. of platinum may be melted in a single charge, and that the same firm, in a single operation, extracted a mass of palladium valued at £30,000 from gold platinum ore actually worth more than a million sterling.

Hon. George Irvine having taken the chair, Capt. Adams proceeded to address the meeting on the subject of

#### Mining Luck.

CAPT. ADAMS said:—

I fear it will seem almost sacrilegious for me to intrude upon this meeting, where we have heard so much of scientific wisdom from eminent men, with considerations of the pecuniary results of mining operations. But perhaps the turning of our thoughts in this direction for a few moments may afford some diversion and may enable us to be better cooled to the serious topics which have been presented to us, and those that we are yet to be presented to.

Under our present complex system in which we earn our living by exploiting the pockets of others, the motive of those who engage in mining is not primarily to supply the world with minerals as a philanthropic effort, but to make money for themselves. The practical question of mining, to those of us who engage in it, is, ultimately, how much of the contents of the mineral pockets and veins can be transferred to our own pockets?

The mining industry is doubtless one of the most beneficial in the world and adds directly to its wealth, but we do not follow it because it is a service to mankind, but to benefit ourselves, and although this may be called the solid view, it is the fact that the pursuit of mining depends upon it, and that we are not yet to be considered legitimate that we should turn our attention this afternoon to the topic of Mining Luck, and by luck is meant the result of circumstances beyond our control.

Statisticians tell us that in commercial enterprises three per cent. of the people are successful, and that ninety-seven per cent. fail. I am not sure how accurate that is, but I have read in Chambers' Encyclopædia that only two per cent. of the mining capital in the United States has been sunk, only eight per cent. realizing, so that any one can see that the mining people were five per cent. ahead of the commercial men. I do not know whether this would apply to Canada.

I was standing before a vein of mineral a few months ago, and predicting a large output from it, when the manager turned to me and said: "I have been engaged in the course of my life in almost every mine in Canada, and I have never known one that has succeeded." I thought that he was talking in a very hopeless way, but I can only say as a result, that the vein I looked at did not succeed, and added one more to his disappointments. Success in mining, I believe, is not always due to the extent of the mineral deposit. I have been engaged in a good deal of the profit that has been made in mining operations has been made by deals in shares. A mining

engineer, who was employed in the Comstock mine, told me some of the fortunes that came from that wonderful lode came, not from the ore that was got out of the mine, but was got by operations in the shares; and he tells me that when a remarkably rich vein was met, in some cases it was secretly gauged; sentinels were put on the mine and work was done designedly in poor ore, the dividends going down, of course the shares went down, and the price of the stock fell. When the original veins were opened up, and great profits were made, and large dividends were declared, and when the stock had gone up to remarkable figures these people unloaded it. I do not know how accurate this account may be, but from all I have heard there seems to be some truth in the statement that many of these great fortunes do not seem to have been successful. One of the gentlemen who has been very successful in the pockets of ore, but out of the pockets of the creditous public. We know, too, that a great many of the operators in mines—the discoverers, the men to whom we really owe the exploitation of this wealth—have not reaped the benefit; for, like inventors, they very often fail to derive the benefit of their work.

It is said that Mr. Washburn, who discovered gold in California, died in the possession of the State. Colonel the discoverer of the *100-lb. lode of Colorado*, settled down upon a little ranch on the Platte River. Comstock, died in poverty in Montana. This has been the history of a large number who have been instrumental in opening up the veins of ore.

We know that the men who have invested in many of these enterprises have been unsuccessful. One gentleman, in order to ask a Boston man to invest in mining near Ottawa, and he said, "Do you think we are going to put our money in the wilds of Canada? We prefer to invest at home, in Colorado or Montana." But one gentleman whom I accosted, quietly went to his safe and handed me a package, saying that it represented in mining certificates of the value of \$100,000. He had invested in the same way, and he said that of all the half million dollars only one company had ever paid a dividend. That was his experience concerning mining investments, but he did have something; he had the most wonderful collection of engravings that I have ever seen; the certificates were covered with rising suns, moons, stars and mining devices, and it was a most beautiful display of artistic work. I remember the mark of the man who had a Boston bank to whom I also spoke in the same way. He said, "I would not invest a dollar in digging if the chance was offered to me by the Angel Gabriel," which shows the impression that had got abroad in reference to mining enterprises. One of these gentlemen, who was a large shipowner, told me that he had charge of one of the largest vessels, and he had a fault in nine cases out of ten. He did not believe much in luck.

This same man sent out his ship loaded with a cargo of ice, in command of this young captain, and three days out from Boston the ice ship caught fire. He discharged the captain, and told him that although it was not his fault, a young man on his first voyage ought to be lucky.

It is said that a man who had a large number of shares in mining, and was very successful in mining, was asked to invest in mining, and he said that he had done for miners, that we may take perhaps a little encouragement from some of their experiences. I remember once seeing Mr. Woodward, in San Francisco, and learning these particulars of his history: He was engaged with a pair of mules in transporting goods to the mines, and one day he was asked to invest in mining. They said they had a claim which they had been working unsuccessfully, and that they had abandoned it. The driver was also disheartened, and said that there was also very little money in his business. These miners offered to give up their claim for his mules, and he decided to take the venture. He changed his mules for the driver's mules, and he was the famous Gould and Curry mine, the shares of which were sold at over two thousand dollars each. The man who went it blind, and changed two mules for a mine, became a millionaire.

You have all heard of the Sarah Sands nugget of Ballarat, Australia—the Welcome Nugget, as it is called, a model of which can be seen in some of our museums, which weighed 233 pounds, one troy, and was worth about \$54,000. It was discovered in Donnelly District, Australia, in 1869, which weighed 2,500 oz. and was valued at £9,600.

A good many stories are told of the Welcome and other large nuggets which may have some foundation, showing that it was an element of luck that in a great measure secured their discovery. It was stated of this great nugget that the person who was working in the vein, and being discouraged they had determined to work one day more and then cease. The evening had come and they were going to leave when one man took up his pick and said "One more stroke for luck." He struck and saw something gleaming; the others saw that he had found something and joined him, and in a little while they brought out this immense nugget. Another version I have heard of this story was, the one of two workmen, a sailor who had run away from his ship and had gone to the mines. He afterwards went back to Melbourne and there was accosted by the captain of the ship who wished to arrest him as a deserter. He told the captain he would pay him off. So he bought the ship from the agents and went home to his family.

There was also a man who had a man prospecting discovered a mine, and thought he was very fortunate in a little while in selling it to four men for twenty-five thousand dollars. The persons to whom he sold it worked it, and all at once found they had an immense deposit of silver. The result was that after clearing several millions they sold the mine for thirteen million dollars.

\* A complete analysis of ore from Granite Creek appears in the Report of the Geological Survey for 1886.



and at the time they sold it it was stated that there was thirty-seven million dollars in sight. That was the famous "Horn" Silver mine.

Last spring, in London, I was told by some of my friends that about three years ago they purchased ten thousand shares of a run-down Colorado mine for sixpence a share. They went to work on it and in two or three months came across large bunches of silver ore. Those shares that they paid sixpence for are now selling for three pounds a share, and dividends of 40, 60 and 80 per cent. have been paid. The mines were at Ouray, Colorado; the New Gustan, the Yankee Girl and the American Belle. It is seemingly to luck that they owe these great awards.

I have been told that the largest show that they ever had in the famous "Emerald Mine" was found when a man, in skylarking, pushed another against a tree stump, which turned up and showed phosphates at the roots. This, being followed, led to the largest show that they ever had there. We have seen the element of luck lately in our phosphate mines, which, owing to the competition of Florida phosphates, have become unprofitable. Many of our mines have been troubled in the past by dark coloured mica, which was worthless and an injury to the quality of the phosphates, and had to be thrown away. But all at once it was discovered that this is a most valuable electrical insulator, and some mines will be able to keep open by the combination of phosphate and mica mining.

It is sometimes stated that mining is gambling with God; the people bet that there is a certain thing in the ground. They are betting against nature; and mining is gambling. But money which is spent on it is not really put in a hole in the ground, for even if not profitable the money goes into the pockets of deserving people—people who are working hard. It promotes a great many contingent interests in the country, and the men who have not made profits themselves, may certainly feel some satisfaction at the benefit resulting from their investments that the money spent in this way developed the country and benefited directly a great number of worthy people.

There is one great encouragement, I think, from this element of luck in mining, which is that ability is not essential to success as it is in some other departments. If one desires to be eminent in geology, as Sir William Dawson; or in chemistry, as Doctor Harrington; or in mechanical arts, like many of our friends; we know that a great amount of intelligence and brains, as we say, is necessary—that it is a matter of learning and skill. But almost any average person may become a successful miner. Learning is not by any means excluded from the field, for no doubt, as Professor Carlyle has told us, those with a technical education succeed best. In mercantile circles we know that a man must be shrewd, but even if he is not so there is a chance for him in mining if he only has the elements of courage and perseverance.

A miner has to be industrious and persistent in intelligent effort, and he must not be discouraged even if people tell him that he is dropping buckets into empty wells and growing old in drawing nothing up, that he is a crank and that he is beating his head against a stone wall. In spite of this a miner must be a man who will never say die while he has a shot in the locker; he must not know when he is beaten, and must not despair when he is down on his luck. He must have tact, perseverance and hope, and he must remember that although there is a good deal of chance in his undertakings, the words are true which have been written by Oliver Wendell Holmes:—

"Be firm! one constant element in luck,  
Is genuine, solid, old Teutonic pluck."

(Loud applause).

Mr. H. S. POOLE, F.G.S., Stellarton, having been called on said: I am in the unfortunate position of one who is employed and does not look to the profits for his pay, but I am afraid from the experience of that section of the country from which I come (Nova Scotia) that it is perhaps a safer position to take. I have experienced great interest in listening to the last paper, because it reminds me of a little experience in the west some time ago: We were going into a small mine which was practically abandoned, and where there was one man working and as I went round I put one or two samples in my pocket, and after returning to my own locality I made several assays, and to my surprise after working it over I found a large proportion of silver, and it turned out that the lumps I had taken out were worth some three or four thousand dollars to the ton. The result was that the mine was sold again to the man who took me round, and who was "dead broke" at the time, and he got eighteen thousand dollars for it. As regards the coal mining generally, I don't think I have anything to say. I have had great pleasure in listening to what has been said, and to enjoy the society of the members, since you have kindly given me the invitation, but not to endeavor to add to the amusement, certainly not to the instruction, for that is beyond my ability.

Dr. Robt. R. W. Ells, of the Geological Survey, then read a paper on

#### The Importance of a Knowledge of Geology and its Kindred Subjects to the Mining Engineer and Prospector.

Few professions probably call for a greater amount of clearheadedness, or for the exercise of that faculty, enjoyed unfortunately by certain persons only, of taking a clear

but comprehensive view of all sides of any problem which may be presented, than that of mining engineering. For not only must the mining engineer become the guardian and trustee of great and important interests, comprising frequently the investment of millions of dollars of capital, and the employment and general oversight of hundreds of men, but he must, by the shrewdness of his judgment, and by the exercise of the skill which he may have acquired either by dint of hard labour and experience in the pursuit of his profession, or by the acquaintance, in the first place, of the accrued knowledge of the school, be prepared, both to direct properly the expenditure of the funds entrusted to him, in the way which shall return the greatest possible amount of profit to the investors, either directly or in such a way as shall lead to large future dividends, and to provide as well for the welfare of the men under his control. To do all this requires the possession of several very important attributes, among which may be mentioned a good stock of plain common sense and the ability to use it, sound judgment, clear and quick powers of perception; and, in order that all these may be most profitably directed, a thorough preliminary training with technical matters pertaining to his profession. Granted that our mining engineer is equipped with the requisites just stated, it is needless to remark that the accomplishment of such desirable results as are anticipated by every board of mine directors must still depend upon several conditions, while primarily it may be said that very much of the success to be hoped for will depend upon the amount of skill enjoyed by the guiding spirit of the work in hand. A still more important factor as regards the success of such operations is the selection of a proper location, which shall contain a sufficient quantity of mineral matter to warrant the outlay of the capital contemplated, without which, indeed, the most surpassing skill of the mining engineer will be of but little avail.

The deposits of the metallic minerals which are stored up within the earth's crust are arranged with regard to the operation of certain well recognized principles. That all these have yet been ascertained is too much to hope for, but it can be safely asserted that very much valuable information of vast practical benefit in regard to the mode of occurrence and distribution of our principal economic minerals has been obtained, and from these a series of carefully drawn conclusions are now available for those who choose to employ the most fitting instruments in the search for the world's mineral wealth.

In the location and development of our mining centres, we should consider, prior to the operations of the mining engineer, the work of the mineral prospector, who may be justly regarded as the pioneer in most mining enterprises; for while it must be stated that the determination of mineral horizons, the conditions of mineral occurrence, and the prospect of successful working or otherwise, are questions which more particularly come under the consideration of the scientific explorer, to the prospector, as a class, it must be confessed that the credit of finding most of our workable mines is due. In the prospector himself we have a wide range, not only as regards the capacities of the individual, but as relates to the method employed in the search for mineral deposits. Thus in the old book of Agricola we find curious illustrations of this class of men, engaged in the attempt to find mineral veins by the aid of the divining rod, called also the *dowsing* or *mineral* rod. Many of you may suppose that this strange instrument of so remote a time should have long since passed into disuse, but such is not the case, for in most countries, even at the present day, the use of the divining rod in the search for mineral veins, buried treasure, and for finding water, is still common. The belief in its efficacy is, moreover, not confined to the uneducated or ignorant by any means, but in several instances which have come under my own personal experience, it has been largely employed by professional men of high standing in the community; and upon its curious antics, many thousands of dollars have been expended in the search for the hidden wealth it was supposed to point out. So complete, moreover, was the faith of these men in this curious instrument, that in spite of the constant failures which attended their efforts, dependent upon the indications of the rod, they still remained firm believers in its value as a test of mineral locations. So important has the using of the divining rod been regarded in some places, that so high an authority on the subject of mining as Dr. R. W. Raymond, has written an exhaustive treatise on the history of the instrument, which appeared some years ago in the Transactions of the American Institute of Mining Engineers.

By others, again, prospecting is attempted through the assistance of the clairvoyant's art, if art such methods can be called; and even in this country, educated men, who apparently enjoy unlimited common sense with ordinary affairs of everyday life, have been known to consult such sources of information as to the location of concealed mineral veins upon whose dictum it was proposed to expend large sums in the attempt to find such deposits by the process of shifting; all of which goes to show that the age of superstition has not yet entirely passed away and that there is probably no branch of industry in which so many men take such pleasure in being humbugged as in the ancient business of mining; and none in which men of sound business ability, otherwise, are so credulous or so readily accept the word of a mere adventurer, who may have chanced to pick up a few scientific and technical terms, of which in nine cases out of ten he knows not even the meaning, and upon the strength of whose advice large sums are rashly invested in the purchase and development of properties which are practically worthless. It is a curious fact that when persons of certain temperaments are infected with the mining craze, they proceed to lose

very much of their aforesaid sound business caution, and there is no doubt that in certain cases this mining fever develops into a form of mild insanity, harmless in general to everyone but the person so infected, but in his case very rarely running its course until every available penny, both of his own property and that of his friends who may be prevailed upon to invest, is most effectually wasted.

While there is apparently no reason why any one should attempt to interfere with the disposition of private funds in the direction of mining investments by anyone who may be predisposed to throw away his personal property in the useless attempt to extract blood from a stone, there are certain conditions from the standpoint of the public and the country's welfare which warrant the presentation of a few facts bearing on the subject. For instance, if the private investor himself were the only one to suffer through the folly, or perchance the knavery, of such representations on the part of an incompetent or dishonest prospector, or so-called mining engineer, the evil would be easily compassed, but unfortunately it has been too often the case that, through the fraud or craft of certain individuals connected with mining matters, or, leaving out the question of fraud itself, through their credulity or ignorance, great harm has resulted, not only compassing the total loss of the private and often limited means of persons who have thereby been reduced to complete poverty, but in some cases has also resulted in great injury to the legitimate mining interests of the country at large.

And first of all, without making any invidious distinctions, it may be remarked that there are prospectors, or so-called mineral experts, who are honest clear through, and who are therefore, in so far as their honesty goes, reliable men and worthy of credence. Whatever mistakes such men may make as to the value of a mining district are, in their case, to be attributed to a lack of knowledge regarding the conditions which govern the occurrence of the mineral sought, in profitable quantity, or to an error in judgment. These are men who very frequently undergo great hardships. They bear, without complaint, the trials and discomfort which attach to exploration in the wild and rugged districts to which their enterprise calls them, and in many of these men the country possesses no braver or more useful citizens. To them, also, it must be conceded that their rewards are, in many cases, but little commensurate with the toil they have to undergo, or with the frequently valuable discoveries which they accomplish. But there are also prospectors of a very different class, as you all know, whose desire, primarily, is to make a good thing for themselves or their employers, regardless of the actual merits of the case. There is a class of men, frequently plausible in the extreme, whose statements as to the value of a mineral location it would always be well for the honest investor to confirm before definitely accepting. While there is no doubt that, taking the class of prospectors as a whole, the dishonest men are in a very decided minority, there are certain features of the craft which to the greater part of prospectors are but little understood.

It has already been remarked that there are certain principles which should guide us in the search for the more important economic minerals. Thus we know, by the study of the earth's crust, that certain series of rock strata, all of which have received their proper place in the geological scale, are more likely to contain certain minerals than other formations. For instance, our apatite deposits, in so far as we know them in workable quantities, all over the world, are found only in the rocks which we call Laurentian, and which are the oldest known in the earth's history. Other deposits of phosphate of lime occur, in composition somewhat similar to apatite, in nearly every rock formation from the Laurentian up to the Post-Tertiary, but they are distinct in character from the apatites of the Archean. Again, we look for coal for the most part in the rocks of the Carboniferous system, and we rarely find it in workable quantity in any other series, though we do find it in certain newer rocks, like the Cretaceous, etc., but we do not look for coal mines in the Silurian, any more than we look for apatite in the Carboniferous, because experience teaches us such search would be unprofitable; and so when we read of the discovery of great seams of coal in the Provinces of Ontario and Quebec we are disposed to smile, because the story is an old one and has been often disproved. Thus we might state the probable position of most of our economic minerals, as, for instance, the copper and nickel in the Huronian, the graphite and mica in the Laurentian, the asbestos, gold and silver in the Cambrian, etc.

While to many of our brethren of the mining profession these facts are familiar, and the mode of occurrence of the greater part of the economic minerals is well known, this knowledge from the scientific standpoint is apparently largely a sealed book to others. It would, therefore, seem to be an item of primary importance in the search for mineral lands, that the prospector or pioneer of the industry should possess some small acquaintance with the principles at least by which their explorations might be most profitably conducted and their zeal and energy turned to the best account.

In the report of the Royal Commission on the Mineral Resources of Ontario, lately published, several passages occur having a direct bearing on this aspect of the question, and are worthy of being quoted. Thus, Mr. Coe, one of the Commissioners, says that during "their travels through Ontario the Commissioners were constantly meeting explorers who did not seem to have any idea in reference to a starting point to their working, but were travelling through the region at random, trusting to chance to make a discovery. Quite a number had spent months unsuccessfully in pursuit of what they would have been

able to determine in a very short period had the necessary knowledge to guide them." And in the remarks on "Technical Instruction" the report also states that "The witnesses examined in the report are almost unanimous in the opinion that there is great need of technical instruction in all operations relating to the mining and metallurgical industries of the Province. Few of the men who prospect for minerals have the practical knowledge which would enable them to explore the country intelligently or successfully. Time and money are often wasted in searching for the precious and common minerals through the districts where they are most abundant and where nature never designed that any should be. Some knowledge of the geology of the country and of rocks and minerals, and their relation to each other, is of obvious advantage to the prospector, and if he is also able to use the blowpipe or make the ordinary tests for metals, his quest cannot fail to be infinitely more satisfactory than it could be without such knowledge, and he may be saved from much disappointment. Some were unable even to make the common and simple test of minerals under the knife, and it is doubtful if one man in ten could make a map or sketch of the district he had examined, so necessary for good prospecting work."

There is another class of men engaged in mineral development, known by the name of "practical miners," who exercise a very considerable amount of influence in mining matters, concerning some of whom the peculiar ideas and methods of work deserve at least a passing notice. The practical miner as a rule surpasses the prospector in the variety and the depth of his knowledge. He very frequently assumes to pronounce with much boldness and confidence upon the merits and demerits of the various and very superficial and inadequate data, and the opinion of a so-called practical miner is apt to be taken by a certain class of investors as worthy of the utmost credence. Trained as most of them are by actual work in some underground mine, either of gold, copper, coal, or some one of the many economic minerals, some of these men, not all, come to consider that the occurrence of all metals is governed by the conditions which exist in the particular locations with which they are familiar. It has been doubtless the experience of many of you to know such men—men who glance over the surface of the tract of land which they propose to develop and who, from some peculiar configuration of the landscape which reminds them of the features of the district with which they are acquainted, are able to pronounce upon the conditions like those conditions of surface or of soil must lead in similar conditions beneath, and that if successful mining has been carried on in this typical district the conditions here should also warrant a like amount of expenditure. Among them are the men who are frequently found preaching the advisability and desirability of deep-shafting and the hypothesis of "undermining" is rather than the adoption of the more modern and scientific method of exploring by boring, when the latter would be equally as valuable at a fiftieth part of the expense. These are the men also who if they find vein matter at the surface straightway consider their fortunes made, in accordance with the general theory that all veins increase in richness and value the deeper they are, and are often misled by no means established, since, while it may be true of certain veins occasionally, experience has taught us very plainly that the principle is far from being one of general application. Very frequently such practical miners assume the lofty and patronizing tone towards the scientifically trained expert, and, if in charge of important development work, they are often very successful in matters of such experts as matters of but little importance, and the conclusions arrived at by them after close study as still less so. These are the men also who, frequently promoted from the pit head or the pick to the position of managing engineer, are sometimes responsible for the occasional accidents which at intervals fill our souls with horror as we read the details of the suffering and death caused by the carelessness or the incompetence which should not have been tolerated for one moment after the indication of danger was made known. Not being aware, however, of the source of such dangers, or ignorant often of the means by which they might be forestalled; or through lack of that training which should ever keep one in a place of special responsibility, and some of our deep miners entail, on the alert, guard against every danger which can be shunned, matters are performed too often allowed to go on in their usual happy-go-lucky style till at last the grand crash comes, and the whole land is plunged in sorrow.

To this class also belong the men who shine conspicuously as designers of fanciful sections of rock strata intersected throughout with rich mineral veins, which exist only in the artist's inner consciousness, and who furnish also the statistics of production (estimated) which make so promising a display in a prospectus intended to draw; often, indeed, before the slightest attempt has been made to ascertain anything whatever concerning the actual condition of things beneath the soil or even at the surface. The marvellous sections of the wonderful wealth about to be uncovered not infrequently succeed in extorting the required amount from the pockets of credulous stockholders, who, in by far the largest number of cases, have to acquire their experience by the payment of good, solid cash, and to whom such experience presents the only form of dividend likely to follow from their investment.

This, however, is not the view of the case. From the celebrated mining schools of London, Freiburg, New York, Montreal and other places, scores of men have been annually graduated for many years in the department of mining engineering, who, in addition to the technical qualifications more directly pertaining to the successful

development of the mining industries of which they have the control, possess very good knowledge of the various geological and mineralogical conditions which first of all are requisite to the correct understanding of the many puzzling questions constantly being presented as the work proceeds. Among such subjects with which the mining engineer should become familiar, is the question of faults, their direction, disposition and extent; the presence and action of intrusive dykes of various kinds; the frequent change in strata encountered, and the study of the new conditions set up by such change; the character and mode of occurrence of the mineral veins or beds, as the case may be, and the arrangement and age of the rock strata in which the work is being carried on; together with many other problems which have an important bearing upon the successful carrying out of the proposed operations. In countries where a careful geological survey has already determined the conditions favorable or otherwise for the finding of profitable deposits of minerals, such knowledge may not at first sight appear so requisite to the mining engineer, but very often the mining engineer must, to a certain extent, precede the geologist. Just how such scientific geological knowledge may be applied may seem an undetermined problem to many, and in illustration we may take some of our mineral deposits in the Province as an example, where we find that asbestos is found in serpentine rocks. To many the kinds and conditions of these rocks are unknown. The serpentine of one locality appears as likely to be profitable as that from another, and consequently thousands of dollars have been and will be spent in the fruitless search after asbestos on the present evidence of two or three small straggle asbestos veins, and, from the experience and expectations that these are rapidly to change their character and become large and profitable deposits. Now, had the mining engineer in charge of these developments fully understood the fact that there is a marked difference in the kind and condition of serpentine rock, depending upon age, origin or other cause, and had he known by careful study of these conditions, what serpentine was likely to yield asbestos, and what was not, the serpentine would yield him no asbestos, let him look ever so diligently, much unnecessary labor and capital might be saved. So also in our copper deposits. Those who have read of the great boom thirty years ago, know that hundreds of areas were prospected, placed on the market and sold for fancy prices. Many of these, upon the attempt being made to develop them, were found to be worthless; the copper occurred under such conditions as to render its extraction profitless. Of the many capitalists who invested in copper properties, or mining engineers who attempted to develop these mines, probably not one in fifty ever set himself to study the conditions under which profitable copper lodes existed, or where the chances were so slight of failure was almost certain. Yet we know that the copper mines of Quebec occur in rocks of different geological horizons, and that the deposits in one part are generally in large amount and of a certain kind of ore, which can frequently be worked at a profit, while, in the rocks of a different formation, where the indications are equally as frequent, the ore is of a different quality, and so-called "poor," and is not sufficient to pay for the expense of extraction. In the latter instance, the ore of the one ore is a chalcopyrite, valuable for sulphur; of another pyrrhotite, which the greater relative proportion of iron is such as to render it unprofitable in the present state of the market for the extraction of copper or sulphur, although the quantity is frequently very considerable, while in yet another case, the ore is exceedingly rich, but so limited in quantity that while there appears to the casual observer to be sufficient amount to warrant development, experience, often bitter, has shown that such expectations have been so rarely realized that the whole may be considered failures. Precisely the same mistakes are made in connection with the coal deposits in the Lower Province. Thus, while there are beds of enormous thickness at Pictou, Springhill and Sidney, which are almost practically inexhaustible, these are confined to a certain portion of the middle carboniferous formation known as the productive coal measures. Other seams, however, occur in a lower part of the formation known as the millstone grit, and even in the lower carboniferous formation, and attempts have been made to work certain of these, generally without success, except very locally, and so instances might be multiplied. Now the rocks of the productive measures and of the millstone grit, while possessing certain features in common, such as the occurrence of shales and sandstones of various colors, are yet, to the trained geologist, distinguishable, and no one who understood the true conditions of such a case would advise the payment of large sums of money in the purchase of so-called "poor" coal on the presence of a thin seam of coal only, when the rock could be recognized as of millstone grit age. Yet how often is this attempted, and how many persons have had to deplore the lack of proper geological knowledge on the part of themselves, or of the mining engineer employed, through whose advice a sum of money vastly disproportionate to the value of the property in question was to put in plainly squandered, and so instances might be multiplied. There are certain conditions, favorable or otherwise, in many supposed mineral localities, which become clear when studied under the light of experience. Yet, strange to say, in very many cases the advice of the geologist when asked in regard to the prospects of a certain location, should it chance to be unfavorable and not in accordance with the, and so instances might be multiplied, with the remark that scientific theories are of no value anyway as regards successful practical workings. I imagine there are not many of you who can

not recall some instance of the foolish and useless expenditure of money in the vain search for mineral wealth in opposition to the correct opinion of the well-trained geologists. Very often the declared opinion of the practical miner, who confidently knows all the conditions, is preferred, though the consequences of following such advice, in many cases, are disastrous in the extreme.

It is a lamentable fact that of the many highly trained graduates in mining engineering who pass out annually from such celebrated schools as Metallurgische Lehranstalt one finds employment in connection with the mineral development of our own country. It is this total lack of appreciation of the value of scientific training on the part of our mining engineers by our mine owners and capitalists could be attributed to the absence of mineral deposits in Canada of value sufficient to be opened or operated property, it might be deplored. On the contrary there is probably no country in the world where the supplies of mineral wealth, in nearly every form, are more abundant than in our own Dominion. Such negligence of our trained mining engineers cannot, moreover, be due to a lack of ability or qualifications on their part; for we find that when they seek their fortunes on the other side of the boundary they very speedily fill exceedingly important and lucrative positions in charge of mining work, and are one of the best of our mining engineers, and the qualifications of those in charge, of even our most important mines, we can be forcibly impressed with the fact that by far the greater number of those in charge are lamentably wanting in even the rudiments of scientific training. Would it be too much to say that, in all probability, the present unsatisfactory condition of our mining industries in Canada is due to the fact that the possibly the majority of the payment of a decent salary to a man qualified to undertake the successful development of a mine, some one, ignorant of what is requisite to success, is placed in charge. Not only is the managing engineer, so-called, often deficient in the technical qualifications requisite to properly open and work the property over which he has control, but very frequently he possesses no mining qualifications at all, and whatever he does know, which of what should be done. While in every other business in life it is thought desirable to place the management in the hands of men who understand best how its affairs should be conducted, with an eye to profitably carrying on the industry, in mining only does the principle seem to apply that no special qualifications are necessary, save that of the good habits of a manly, hard worker, and that a man too much of a student, and who were our mining industries as a whole placed under the control of men who were educated, not only in the technical branches of their profession, but in the other scientific departments as well—as, for instance, the principles of geology and of mineralogy—the status of Canada as a mineral producing country would be increased tenfold, and to add that, with proper management, many industries not apparently desirable would be flourishing. Why, for instance, should our iron beds remain idle? Oh! people will say, there is no fuel. Yet here we have at our door, limitless quantities of splendid peat which, at a cost not exceeding one dollar per ton, according to Mr. D. Aikman, can be manufactured into a compressed fuel equal, for many purposes of use, to any coal that can be obtained, and which, while for the puddling and refining process we have, in the basin of the St. Lawrence, natural gas as yet practically untested, although from the efforts made in this direction sufficient has been ascertained to warrant the expenditure of a certain amount of money in its domestic use, but for various purposes of manufacture, including the iron industry, has long already been used by the General Hunt in various reports to the Geological Survey. But if we have not in Ontario and Quebec the necessary fuel in the shape of raw coal directly to hand, certainly, if it is profitable to the iron smelters of the United States to carry raw ores from western Lake Superior and Canada for their furnaces, it should be equally as profitable on this side, and even more so, in the face of the duties imposed on raw material, to import a certain amount of raw coal or coke for smelting purposes in our own country, while from the enormous forests of hardwood which everywhere cover our Laurentian hills and our other mountain ranges an unlimited supply of the best charcoal can be obtained at a very low rate. Under such conditions and in connection of the perfection afforded the industry by the Federal Government, it does not seem only reasonable that the smelting of our iron ores, which occur in such enormous quantities, should receive far more consideration than has yet been bestowed upon this important element of our national advancement.

That our gold fields are rich beyond those of most countries may not be generally known, but that there is an abundance of gold in certain portions of the eastern counties of Quebec, sufficient, if properly worked and under proper scientific methods, to pay handsome dividends, either by washing the gravel, or by the process of crushing the quartz up, is a fact that cannot, in the face of the evidence before us, be disputed. This industry, however, has never, in so far as can be ascertained, been presented with any regard to an intelligent conception of the conditions existing or the proper methods to be employed.

If the members of the General Mining Association of Quebec should do nothing more than arouse an interest in the proper and scientific development of our mineral resources, it would prove itself worthy of the thanks of the whole Dominion. The land teems with mineral wealth, from the Atlantic to the Pacific, and it is one of the most important minerals we have at present practically complete control, viz.: of our asbestos and nickel.

and yet of the former it must be said, so bad has been the system of development and of extraction that the greater part of the mines are now in a positively unsafe condition as regards working. Had there been the proper amount of scientific and technical training on the part of those in charge at the outset, much unnecessary future delay and expense would have been avoided. A society such as this should be able to exercise a very marked influence in different ways; not only in keeping a watchful eye upon legislation which may prove injurious to the general welfare of the mining centres individually, but to the mining interests as a whole, and in having a watchful care over the interests of the men employed—the conditions of whom, for good or ill, depend, in most cases, upon the intelligence and the amount of scientific knowledge possessed by the persons in charge, among whose first interests should be the keeping of the mines themselves, in which these men have to labor, in such a condition of safety that life and limb may not be needlessly imperilled, and in providing for the sanitary condition of these mining centres as well. Some legislation tending in the direction of a proper system of mine inspection by thoroughly competent men, would be of the greatest value at the present time, and would tend to do away with much of the loose methods of work and of the carelessness, the consequences of which we hear from different portions of the mining centres. The formation of local mining clubs also, where items of interest in connection with the different branches of the industry might be discussed, and in the establishment of night schools for the men, and questions of sanitation, etc., are also important ones. These clubs could formulate their ideas in a series of papers to be presented at the regular meetings of the society, and thus a healthy and beneficial interchange of thought and sentiment among all the departments of mining work could be promoted with much profit to all interested.

**SIR WILLIAM, DAWSON**—Before I leave to fill another engagement, I desire to thank you for the privilege of attending this meeting. If any of the members would like to visit our Peter Redpath Museum, I shall be glad to show them round, and do anything for them in my power.

The **PRESIDENT** expressed his pleasure at the presence of the venerable Principal of McGill at the meeting, and having returned thanks on behalf of the members present for the kind invitation to visit the University, announced that in consequence of the non-arrival of his apparatus from New York, Prof. B. J. Harrington would be unable to read his promised paper on "Assaying by Electrolytic Methods."

**PROF. HARRINGTON**—Messrs. Eimer & Amend, New York, from whom I purchased the apparatus, faithfully promised to have it sent on for this meeting, but as they have not done so, I must ask you to postpone the subject until another meeting.

**MR. E. D. INGALL** then read his paper: "The collection of mining information and statistics by the State."

**MR. C. CIRCKEL** followed with his paper,

#### Occurrence of Asbestos at Templeton, Que.

Of all the minerals which have been discovered and worked in Canada, none of them have assumed so much economic importance in such a short time as asbestos. The growth of this industry since the discovery of this mineral in the years '77 and '78 in the hills of Thetford, and Coleraine, is seen in the fact that in the first year of mining operations in '78 there were taken out only 50 tons, and in the year '90 about 6,000 tons in that district. But not only here; in many other localities, principally in the west of the Province of Quebec, asbestos has been found to occur, and even sometimes worked. Thus asbestos has been discovered in the Papineau, near St. André, in the Ottawa Valley; Gatineau, Township of Wakefield; and in many places of the Township of Templeton. But in these places, since the discovery of the mineral, no growth of the industry is to be stated like in the Eastern Townships—no work on a large scale has been established yet. From the Templeton district, it is reported that in the year '89 some tons of asbestos were taken out in the Range 8, lots 10 and 11, and the opinion prevailed amongst geologists—according to the Mineral Resources of Canada, '85—that the mining of asbestos in this section of the country was destined to become an industry of some importance. Sufficient studies of the occurrence of the asbestos bearing rock, however, had not been made; the deposits were not accessible, and therefore it was difficult to form an opinion about their extent. Since April last year in the said Range 8, lot 11, some development work has been done with a view to studying those peculiar rocks, and it is the purpose of this paper—so far as investigations have showed—to describe the mode of occurrence in this latter place.

The rock in which the asbestos occurs forms a large strata of massive crystalline limestone of about 700 feet in width, striking in a north-east and south-west direction, confined on both sides to red, grey and white orthoclase gneiss in great variety. Quite pure limestone is seldom met with; for the most part it contains impurities of small crystals of mica, iron pyrites, small veins of graphite and sometimes pockets of hematite in small extent; grains of serpentine are disseminated through the whole massive rock, and serpentine deposits as asbestos bearing rock in their peculiar and strange forms are very numerous. The latter form disconnected lumps, patches or pockets of small extent, from 1 foot up to 3 feet in diameter; irregular

masses of limited extent, and round layers with ring or elliptical sections in a diameter of 3 to 50 feet, and with serpentine walls varying from ½ foot up to 3 feet in thickness. The character of this deposit on the surface is for the most part a circle or an ellipse, though in different places straight veins of small extent have been observed. It is remarkable that the round veins are mostly sharp, limited to the inside, while to the outside almost a gradual change in color from serpentine to limestone is to be seen. These deposits are, in relation to the limestone masses, very numerous; nearly all of them contain asbestos more or less; deposits of small extent bear few laces—seldom asbestos veins of considerable length. Concerning the colours, they are very various; light green, yellow green, dark green, greyish-green; and it is difficult to say which color is characteristic for the occurrence of asbestos. Greyish-green colour is seen very often in deposits of considerable extent, mostly containing small laces of asbestos. Small cracks caused by the mechanical action of water are very numerous, and, therefore, the material splits up very easily and is hard to get in large pieces. On account of this fault, it cannot be used for ornamental purposes. Fresh serpentine contains much water and is easily separable from the asbestos. Some light green varieties are soft and have a peculiar unctuous aspect.

The occurrence of asbestos in these deposits is highly irregular. Laces of ¼ of an inch increase to veins of 1 ½ inch in thickness, which continue for a short time and then split up again. Other conspicuous veins of ¾ to ½ inch in thickness split up in many minute laces of ⅛ of an inch, come together and form a large vein. These veins are seen sometimes to be displaced out of their natural position, cut off by cracks running, as observed in two places, perpendicular to the strata line; a displacement, however, larger than two feet has not yet been observed. The general direction of all veins is mostly parallel to the limited flats.

In many cases instead of fibrous veins, asbestiform matter of white colour and of the same structure is met with; it has an unctuous aspect and shows occasionally the gradual change to the fibrous variety. Concerning the asbestos itself, the highly silky fibre is adapted very well for spinning; it has a marked wavy lustre, a light yellow, light green or dark green colour, is very transparent as a sign for the absence of impurities. Several chemical analyses have shown that the Templeton asbestos contains very little iron, much less than any other asbestos in Canada. Black-blue varieties, with very nice silky fibre of 1 ½ to 2 inches, has been observed in only one place in a depth of 60 feet; this occurrence, however, seems to be accidental, supposing that the depth scarcely may have an influence either on the color or on the largeness of the fibre.

Concerning the quantity of these asbestos-serpentine deposits, they are distributed through the whole limestone-strata, and on account of the lack of leading indications it is difficult to say which part of limestone probably can contain a large number of deposits, even when very good surface veins are seen. In one place there were seen on the surface, five round veins 5 to 12 feet diameter, close together, and with very nice asbestos laces of ¼ of an inch up to 1 ¼ inches, and the opinion prevailed that this place in depth might contain a large quantity of asbestos, or a large number of other asbestos-bearing deposits. Quarry work was started, and besides the above-mentioned deposits, six smaller ones of 3 to 5 feet diameter, in a depth of 40 feet, had been found: four of them did not contain any asbestos, and the other two had small veins. The results of this trial work were unfavorable, in so far as the ratio of the cleaned asbestos to the raised rock was very small. Amongst many other deposits which have been found, there are two remarkable. A large vein, with ellipse surface character, of about 50 feet in larger diameter, with serpentine walls of 2 ½ to 3 feet, and splendid fibre of ½ to 1 ½ inches on the surface, showed in a depth of 60 feet the same quality, the same length of fibre and width of the serpentine. In the same depth this vein was followed by drift, and it was stated that it had no larger extent in the horizontal section, the serpentine walls being vertical and regular in occurrence. Close to this vein a great number of serpentine lumps were seen, but the asbestos occurred in the same in few small laces.

Another vein, with ellipse surface character, 40 feet larger diameter, with very nice silky fibre on the surface, had, in a depth of 45 feet, the same width of serpentine and the same length of splendid fibre as observed on the surface.

Most of all the other asbestos-bearing deposits found on the surface or under earth did not show a larger extent than 20 feet. It was often observed that in these deposits asbestos of considerable length occurred on the surface and disappeared by following the vein into the depth. This fact shows evidently that one cannot always rely upon good surface indications in deposits of smaller extent; it shows that it is impossible to make any calculation about the quantity before the vein is opened in different places.

It seems, however, that generally deposits of larger extent, with good fibre on the surface, continue, as observed in two large layers, into the depth, and that these deposits do not show such large irregularities in the occurrence of serpentine and asbestos as such of smaller extent. This observation, and the fact that serpentine layers of considerable extent are found to occur in other limestone stratas of the Township of Templeton, gives us some reason to suppose that extensive profitable mining work can be done, if it is possible to find a certain number of

large deposits, and there is all probability that the latter can be found.

As for the origin of those peculiar serpentine layers, it is this—an unsolved problem yet. But when we take into consideration the discovery of *Eozoon Canadense* by Dawson, the careful observations by Gumbel, Hochstetter and Credner, about pre-existence of organic life in the rudimentary crystalline limestone, we have some reason to suppose that these peculiar forms are built up by organic forms—probably by foraminifera—and that after the death of the animals the cells have been precipitated by silicates of magnesia out of the water of the ocean. Probably the fissures have been caused by shrinking of the serpentine and then filled with asbestiform matter by the activity of water. But this theory must be proved yet by microscopical investigations and it is not the purpose of this paper to enter into discussion about this subject.

**MR. W. H. LYNCH**, Danville, concluded the session by a few well directed remarks on the subject of the development and wonderful promise of the Kootenai mineral district, British Columbia.

#### A Highly Successful Dinner.

"Then drill, ye tarriers, drill!  
Drill, ye tarriers, drill,  
Oh, its work all day without sugar in your tay  
Where ye work beyant on the great railway,  
And drill, ye tarriers, drill!  
Work—and slave—and toil."

Promptly at eight o'clock the members of the Association and their guests filed into the Ladies' Ordinary at the Windsor Hotel, and sat down to an excellent dinner with an appetite all the more keen from a hard day's work. The tables were tastefully decked out with flowers and many colored padella lamps. McQuirk's orchestra supplied the music. Hon. George Irvine presided, having on his right Mayor McShane, and on his left Mr. H. S. Poole, General Manager Acadia Coal Co., Stellarton, N.S. Capt. R. C. Adams occupied the vice-chair, having on his right Prof. B. J. Harrington, and on his left Prof. H. T. Bovey, of the faculties of Applied Science and Civil Engineering of McGill University. Among the other guests present were noticed: Prof. McLeod, Secretary Canadian Society of Civil Engineers, Montreal; Mr. H. S. Budden, Managing Director Intercolonial Coal Co., Montreal; Dr. Robt. Ellis and E. D. Ingall, M.E., Ottawa; W. H. Lynch, Danville, Que.; E. Arnoldi, J. Maclaren, J. T. Donald, M.A., etc. Letters of apology were read from the following: Sir William Dawson, Hon. H. Mercier, Rev. Abbé Laffamme, A. Blue, Director of Mines, Toronto; Dr. Selwyn, Ottawa; Hon. E. Dewdney, Ottawa; E. Gilpin, F.G.S., Halifax; T. R. Gue, Halifax; John E. Hardman, S.B., Oldham, N.S.; Dr. Geo. Dawson, Ottawa, and others.

The **PRESIDENT** having proposed the usual loyal and patriotic toasts, gave "The President of the United States," and made a kindly reference to our American cousins, through whose energy and enterprise the Dominion was indebted for not a few of its successes in mining ventures.

**COL. LUCKE**, Sherbrooke, returned thanks for the toast in a brief but graceful speech.

**DR. R. W. ELLS**, in proposing the "Mining Industries of the Province of Quebec," commented on the remarkable growth of the mining industries of the Province in recent years, and on the systems of working in vogue at the mines.

**HON. GEORGE IRVINE**—I am asked to respond to this toast in a sort of a representative capacity as President of this Association. As you well know I am very deeply interested in mining, and I may for that reason say that it is with great sympathy that I respond to its interest. I could not help thinking to-day when I heard our excellent friend Capt. Adams, explaining mining luck, when he told us that ninety-five per cent. of the money put into mines was lost, that there were a good many people belonging to this Association that belonged to the five per cent. who were successful. Gentlemen, I fully appreciate all that has been said by Dr. Ellis just now, and by the other gentlemen I have heard to-day, about the importance of a good technical education. Now, gentlemen, any person will see the importance and advantage of that. At the same time I must say, on behalf of men who are not technical men, that I have been interested in mines respecting which technical men have not given good advice. For instance: A friend of mine, who was then living in Quebec—a very energetic engineer—came to me one day and he said: "You are a friend of mine and I would like to give you some advice—you are not working that mine of yours right—I will show you how to do it and you will make very much more money." I said "It is very kind of you." Well, there happened to be also in Quebec at that time a man who was acknowledged to be one of the most eminent mining engineers in the Province of Quebec, and I told him what the man had said. He examined the mine very carefully and he came back to Quebec and said, "You have been working that mine for five or six years at a profit." I said "Yes." He replied: "Go on as you have done; you have done very well." (Laughter.) That was on the technical, but we have gone on to the practical advice since and we have had a very fair share of success. I simply mean to say by this that with luck it is quite possible to go on as we have done. Gentlemen, I thank you for the appreciation you have shown to mining interests in which you are all concerned yourselves.

Mr S. P. Franchot and Mr. D. A. Brown also responded.

**MAYOR McSHANE** With your kind permission I beg to propose a toast, and again with your permission I beg to propose a little story. There are no ladies present (Oh!) It is a little story. (Oh!) It is simply this gentlemen. A few years ago I was at a school examination and the class was examined by the different professors and the last question put to the boys was this: "Who was Moses?" All the little boys snapped their fingers, and one little fellow by the name of Jack McLynn said "I know it, I know it," and the professor said, "Well, who was Moses?" Jack McLynn said, "It was Pharoah's eldest daughter's son." The professor said, "Not at all, Moses was found in a basket in the bulrushes." The boy said "Oh, no, that was what she said." (Laughter and cries of "Oh, Jimmy.")

Before I propose the toast, I desire to say, that as Mayor of the City of Montreal, I am proud of the gentlemen who are mixed up in the mining interests of this country; I desire to commend Captain Adams and a gentleman whom I have known for a long time, and I notice that he has taken a great part, and has given himself a great deal of trouble to develop the mining interests of this country. I had the pleasure the other day with a number of aldermen to visit that grand institution, the Workman Engineering building, which is about to be built up by Messrs. Irving, whose energy has done and is doing so much for our city. I visited that great building which is soon to be completed, and which will be an institution that nothing will compare with on this side or the other side of the Atlantic. I ask you to drink to the toast, and I have the honor to name your president—a gentleman who for many years has occupied in this great Dominion of ours the highest position and greatest name can confer upon him—a gentleman whose whole life and associations are with the people: there is not a man living who is more respected by the people than my friend, your president, Mr. Irvine—his talents, his great ability as a lawyer and as a judge have won for him the highest esteem in Admiralty circles, his success as a miner, and his principles of fair play have won the respect of all the mining gentlemen of this great Province of Quebec; therefore, gentlemen, I am proud to stand up, as the Mayor of the people—the citizens—your Mayor (oh), and in the name of the people of Montreal I desire you to drink to the health of your president, my friend, Mr. Irvine. (Loud applause.)

The toast having been drunk with "three times three and a hearty amen," good fellows.

**Hon. GEORGE IRVINE**—You have received the toast Mayor McShane has proposed with a great deal more enthusiasm than I have deserved. Mr. McShane has spoken flatteringly of me, but you know he is an Irishman, and sometimes given to blarney; (laughter); at any rate Mr. McShane and I have fought in old time, we have fought side by side, sometimes we were against and sometimes we have disagreed—most times we were agreed, though. He and I fought together to try and put down a great evil in this country, which is corruption in high places; no man can say that the people's Jimmy has ever changed, he will continue to do as he has always done. (Cries of question?) Gentlemen, I thank you very much for the way you have received the toast. I have done the best I could do for the Association, and if I have done any good I am pleased to have done it, and I thank you very much for the kind way you have drunk to my health.

**CAPT. ADAMS**—I am glad to propose a toast to our schools of Mining and Technical Education, not that I feel qualified to do justice to the subject, but because I am an enthusiast in mining, and being a Boston man must necessarily be an enthusiast of education. Our worthy Mayor has told you about the birth of Moses, and as we need all the endorsements that we can get for our industry, it may encourage you to know that Moses was the first miner. Mining men are usually religious, and you are doubtless all familiar with the good old hymn: "Could I but stand where Moses stood and view the prospect of 'Ere' showed me, my former pursuit is of great antiquity, and that Moses was successful in his first venture, he not only went prospecting, but actually saw the ore."

Mining in Canada has too often been done by main strength and stupidity, and I prided myself upon being the first person in the phosphate industry to employ a skilled mining engineer. He made a systematic search for minerals and his shafts, but the results never came together where his science demonstrated they were to, and at length his shafts blew out the underpinning of his well constructed crib work. (Laughter.) I found that an educated engineer might be like some mines; he shows well on the surface but there's nothing in his lower levels. Education means to lead forth, and there must be something in a man that is brought out. Another experiment was more fortunate. I decided a young student of a philosophy from Harvard College, who at first being snubbed by my "practical" manager, who said "I have seen enough of such fellows, and I don't want any more of them about me." He however eventually became manager of the mine, and is now assistant geologist of the State of Arkansas. (Applause.)

The origin of the name "Canada" is thus given: The Spaniards visited Canada previous to the French, and finding no gold or silver, which they were in search of, often said among themselves, "Acanaada,"—there is nothing here. The French arrived, and the Indians, who did not want their company, and supposed they were also Spaniards on the same mission, were anxious to inform them in the Spanish sentence "Acanaada." The French, who knew not the Spanish as the Indians, supposed this incessantly recurring sound was the name of

the country, and gave it the name of "Canada." But even if this story is true, its implication is not correct. There is a good deal in Canada, and it will be better utilized when more knowledge is applied to its development. It is said that north of Lake Superior every man owns a mine: poor men have two or three mines, and very poor men have seven or eight mines—the poorest are the more they have. (Laughter.) Men are impoverished by their riches. We need education to enable us to work these properties economically, to surmount natural difficulties, and to throw off legal shackles. The phosphate we need mechanically—chemical processes for the separation of the ure from impurities, in asbestos we need better systems of cleaning the fibre, in gold we want improved processes to amalgamate our arsenical ores of Madoc, of which forty per cent. are said to be wasted, and it is technical education that will lead to these discoveries.

The phosphate men especially should favor these schools, for it is not said by a German philosopher, "Without phosphorus no thought," and I have come across a parody of an old nursery rhyme:—

"Sing a song of phosphates,  
Fibrous in line,  
Four and six makes  
in a vast time,  
When the phosphorene  
Swirls and spins,  
Superstition ends,  
Man began to reign."

The asbestos men may pride themselves on the antiquity of the use of their marvellous product, if it be true, as is stated, that the three worthies who survived the scorings of Nebuchadnezzar's fiery furnace were clothed in asbestos suits. Asbestos miners are largely dependent upon the application of educated intelligence not only in the production of their mineral, but in discoveries of methods of using it.

We are glad to learn that our honored president has "made his pile" in mining, and that our worthy Emerald friend the Duke of Buckingham has a bursting pocket book, but if we are not all rich we all expect to be rich, and there is not a miner present who is not on the eve of a great "strike," and who is not sure of being a millionaire in a few years; for as Pope says, or meant to say, "Hope springs eternal in the miner's breast." (Applause.) I wish therefore to let my remarks lead to a practical conclusion. It is very easy for us to give away what we have not, and I wish to propose that we should to-night agree that a goodly proportion of the large mining profits that we are all going to make shall be presented to McGill College to endow the branches of mining and chemistry and its science courses so that it shall become the very best school of mining upon this continent. Mr. Chairman I have much pleasure in proposing the toast of "Our Schools of Technical Education." (Loud applause.)

Mr. Wm. Selater, at this stage, favored the company with his great original melodramatic warble "What will my good old mother say to me."

Mr. W. C. CARLILE, Professor of Mining Engineering at McGill University, in returning thanks, gave some incidents in his mining career in Colorado to illustrate the utility of having a good technical education when combined with a sound practical experience in the actual mining work. He was loath to think that our mining laws were not as they should be, and he was astonished to find that in the Province of Quebec the miner to-day was in doubt as to the security of his title to lands of which he has had possession for many years. He believed that mining property should be for the people and not for the Crown. Every facility should be given to the prospector, the capitalist, and the miner, to engage in mining ventures.

Prof. Dovey and Prof. Harrington also acknowledged the toast on behalf of their respective faculties.

Mr. E. Arnold sang with splendid effect "Drill, ye Tarriers, Drill," the company joining with the greatest heartiness in the chorus, and insisting upon an encore.

Mr. H. A. Budden proposed, in a few well chosen sentences; "The Mining Industries of Canada."

Messrs. H. S. Poole replied briefly for Nova Scotia, and W. H. Lynch at some length for British Columbia.

Prof. McQuirk having favored the company with a song, Mr. B. T. A. Bell proposed the toast of kindred societies, to which Prof. Macleod replied for the Canadian Society of Civil Engineers, and Mr. E. D. Ingall for the Logan Club.

Mr. L. A. Klein also acknowledged the toast on behalf of the Asbestos Club. He took some of the speakers at the afternoon session of working for the slur that had been cast on the methods of tasking the asbestos mines. He claimed that all the mining engineers of the world, and the staff of the Geological Survey combined, could not have opened their quarries in a more systematic or skillful manner than they had been, and he pointed out in support of his contention that there had never been an accident of any consequence except, said he, in the case of "one man who had been blown up by lightning." (Laughter.)

Capt. Adams proposed a bumper to their secretary, Mr. B. T. A. Bell, who, when Mr. W. A. Allan concluded the toast list by proposing "The Geological Survey of Canada."

The proceedings terminated shortly after midnight with "Auld Lang Syne" and the National Anthem.

#### Mazinaw Lake Silver Locality Re-discovered.

The North Hastings Review is authority for the report of the re-discovery of a failed silver cave where, in past years, an old man by the name of Meyers procured rich specimens of native silver. Only the oldest men in Hastings and Frontenac counties remember Meyers or his associates. The last survivor died near Oshawa not many years ago. When he realized that he was on his death bed he sent for a young man, Mr. W. G. Rutan, and gave him the maps and plans by means of which the fatal mine could be found. In 1889, Mr. Rutan and Mr. Thomas Sault commenced prospecting for the lost mine, which so many had tried to find but without success. A few days ago, a miner employed in the mines being opened on John Perry's farm in the Township of Barrie, found a small opening in the rocks, almost choked up with debris and tangled by bushes. He cleared away the rubbish and entered a narrow passage which led him into a cave of considerable size. On the walls he found the name of C. Q. Meyers. Several mining tools were found, and with these he procured samples of native silver and ore. A company has been formed in Peterboro' to develop the discovery.

A small vein holding meneginite was opened on the Peterborough near Marble Lake during the time of the gold excitement in North Hastings, but native silver has not been reported to have been found in Eastern Ontario, and the Review will be pleased to receive samples of the new discovery of native silver.

#### A Great Electrical Transmission.

The United States Consul-General in Frankfort, in a recent report, describes what he calls the most momentous experiment in technical electricity ever made since electricity has been rendered servicable to mankind. The object was to create a current of 200 or 300 horsepower, by a dynamo driven by water-power at Lauffen, on the Neckar, 108 miles south of Frankfort—"convert a great current of intense pressure, by specially-devised transformers, transmit it to the Frankfort Exhibition, there re-transform it to a current of ordinary pressure, and in that form apply it to motive and lighting purposes." It is said that fully 75 per cent. of the energy created in Lauffen is available in Frankfort. Part of the current thus secured is used to illuminate 1,200 arc lights, while the remainder drives rotary pumps which draw water from the main and forces it to the top of an artificial hill, when it tumbles as a waterfall on the exhibition grounds. Thus the falling waters of Lauffen, 108 miles away, are reproduced at Frankfort by a current over three delicate copper wires. The apparatus is described by the Consul-General as follows: At Lauffen a Girard turbine wheel of 300 horse-power, under a 12-foot head of water, is coupled directly to a dynamo of the multiple-current or rotation-current type. The turbine makes, at ordinary speed, 30 revolutions per minute, and the dynamo five times that number. This produces a three-phase rotation current, whose three components have, in technical phrase, "an electro-motive force of 50 volts and 1,400 amperes each, giving an output available for transmission equal to 200 kilowatts." The three separate circuits lead to a switchboard provided with the ordinary measuring instruments for current and motive force, and thence into a transformer specially constructed for this purpose. Besides the large dynamo, a continuous-current machine, operated by a special turbine, serves as an exciter for the principal generator. In the transformer the current is converted into an intensely high pressure and great strength. To the reason for this is that a component insulator for currents of high intensity, the transformer is immersed in a large, closed tank filled with oil. The converted current, having now a motive force of 1,500 volts at 12 to 13 amperes, is transmitted from Lauffen to Frankfort on three light, naked copper wires, 4 mm. in diameter, strung upon poles 25 feet in height at 190 feet apart, with a span of 100 feet. The insulator, each of which is provided with one or more troughs filled with oil. The copper wire conductors necessary for the experiment are 430 miles in length, and weigh 132,000 lbs.

**A New Miners' Electric Lamp.** A new miners' safety electric lamp has been invented by Mr. C. N. Gauzantes, a French electrician residing in Calif. A primary battery is employed, which consists of a case in it containing two cells, around the sides of which are placed, four in each cell, vertical slips of carbon; in each cell a zinc rod is suspended from the cover into the generating fluid. Binding screws are fitted to the carbon, and iron poles for connecting purposes, and the lid is tightly fastened, being, to all intents and purposes, airtight and sealed. Upon this lid is placed a small incandescent lamp, with its guard and reflector adapted either for diffusing the light horizontally or vertically. In size the lamp is about 4 inches wide, 2 inches broad and nearly 8 inches in height, and easily carried by means of a light handle affixed to the side. The weight of the lamp when fully charged is about 3 lbs. 12 oz., and it gives a sufficient light equal to 3 candles, or 300 candle power in excess of that given by the most powerful safety lamp. The prime cost of construction is only 5s., and the weekly working cost of replenishing the battery is estimated at 5s. 1/4, whilst so little wear and tear do the internal parts undergo that the life of the lamp is reckoned to be five years.

## Mine Ropes.\*

The report on mine ropes in Belgium, England and Germany, made to the French Government by Aquillon, may be thus summarized:

With regard to the material for pit ropes, whether hemp, or iron, or steel wire, and their shape, whether round or flat, the advantages attributed to hemp ropes, of giving warning before they break, is shared equally by wire ropes when properly looked after, and the latter can be employed with as much safety as hemp ropes when proper care is bestowed upon everything affecting their working. In wet pits, particularly where the water is at all corrosive, or where it is wound up in buckets instead of being pumped, aloes ropes are preferable. But in up-cast shafts, however slightly warm be the air-current, wire ropes should be used in spite of the disadvantage of their hemp core. In the absence of any such special reasons the choice of material is more a question of economy and convenience than of safety. Where it is determined that the rope shall be flat instead of round, the power of the winding engine in deep pits can be better balanced with a hemp rope, because a flat wire rope is too thin to alter the leverage quickly enough in coiling or uncoiling on the rope roll, and would involve some kind of counterbalance, which would be a matter of difficulty. This is the practical reason why several deep pits in France have recently changed from flat wire ropes to flat aloes ropes. With wire too, there is much more difficulty in making a good flat rope than a good round one; and round ropes winding on conical or spiral drums afford a convenient means of balancing the engine power. As to the choice between steel and iron for wire ropes, German and English practice goes to show that steel ropes well made and of a suitable quality of steel, are capable of working better in all respects, and appear even to be safer. The exclusive use of steel wire ropes in Germany and England, and of hemp or aloes ropes in Belgium, for all depths of pit, is attributed to the degree of excellence which has been arrived at in the two former steel-producing countries in the manufacture of steel wire of sufficiently homogeneous quality and otherwise suitable for ropes; whereas, in Belgium the manufacture of aloes or hemp ropes has always been a special industry of Flanders, where it has attained a rare degree of perfection. The whole of the winding gear should always be carefully adapted to the particular material of which the ropes are made. In France the mistake has generally been committed of ordering a rope without giving the maker any idea of the conditions under which it is to work, the very make being often specified for him in detail. Elsewhere the more sensible practice is to consult with the maker throughout, furnishing him with complete information as to the whole of the requirements to be fulfilled.

In addition to being tested, all ropes should be guaranteed by the makers. In Belgium the guarantee for aloes ropes is generally that they shall last one and one-half to two and one-half years, or else for a given output; and one-twelfth or one-twenty-fourth of their value is deducted for every month short of their stipulated duration. At the Royal Collieries at Saarbrücken, the ropes, of English crucible cast-steel wire, are guaranteed for six weeks, during which the maker is held liable to replace them if found defective. Testing should apply for hemp and aloes ropes both to the raw material itself and to the spun yarn, as well as to sample lengths of the finished ropes. The twist of the rope and the stitching of a flat rope, should be very uniform, and the rope should not contain more than 20 per cent. of tar.

Iron wire for ropes should be strong, hard, pliable and not galvanized, and should be selected from standard makes. Steel wire should be made from crucible cast-steel of very homogeneous and comparatively hard quality and suitably annealed; it should have a tensile strength of 70 to 76 tons per square inch, and should stretch three-fifths per cent. and be pliable. It should be tested for tensile strength, stretching, bending and torsion; and all the wires in the same rope should be as closely alike as possible. Sample lengths of the rope itself should also be tested. The lay of the wires and strands should be regular; in flat ropes the stretching should be regular and should be done with annealed wire. Torsion is considered an excellent test for homogeneous quality in wire; steel wires of 0.059 inch and 0.118 inch diameter should stand twisting through 40 and 20 revolutions respectively in an unloaded length of 6 inches, and the surface markings produced by the twisting should follow regular lines.

The size of the wires and length of their lay or pitch in the rope should vary in accordance with the diameter of the drums and pulleys around which the rope will have to work, and particularly with the distance between the drum and the pit head pulley, and with the angle which the inclined span winding on the drum makes with the vertical portion hanging down the pit. These are essential points for determining the stiffness requisite to prevent the rope from flapping as it runs.

Experience proves that the very material itself of every rope does certainly undergo deterioration in working, thereby diminishing the rope's strength till it becomes no longer safe. This deterioration of material is something more than mere wear by friction or rusting. In aloes ropes the fibres lose their strength, and in wire ropes, even where testing fails to show any loss of tensile strength per square inch of section, there is a clear diminution of pliability and elasticity; the wires become harsh

and brittle, whereby the rope is weakened. Though the deterioration is generally accompanied by unmistakable external indications, it is yet desirable to trace its progress by actual tests of the individual wires or of the end of the rope itself.

Large diameters for drums and pulleys are of more importance for wire ropes than for hemp, and for steel than for iron. The smallest diameter should be at least 1,300 to 1,400 times that of the iron wire in a rope, and 2,000 times that of the steel wire. Its relation to the size of the rope itself matters less, because the disadvantage of too small a diameter can be obviated by selecting a suitable size of wire and by a suitable make of rope. It is well, however, for the smallest diameter of pulley or drum to be not less than 80 to 100 times the diameter or thickness of the wire rope, and 50 times for a hemp rope.

The rope should wind smooth on the drums or pulleys, without rubbing sideways against them, and so as to run free from jolts and flapping. For wire ropes it is desirable to line the grooves of the pulleys with wood. The larger the diameter of the head-gear pulley the less does it matter how small be the angle which the inclined span winding on the drum makes with the rope hanging down the pit; but with smaller diameters of pulley the angle should be increased in order thereby to diminish the bending of the rope in passing over the pulley. Opinions differ as to the minimum angle to be allowed. Some assign 40° as the limit, while according to others it should never be less than 60°. In plan, the obliquity of a round rope between the overhead pulley and the drum should always be kept within the smallest possible limits.

In doubling back the rope end for attaching it to the cage, the loop should be kept as large as possible by inserting within it an iron eye or a wooden disc: this is particularly advisable with iron wire ropes, and still more so with steel. The attachment should also be made with springs for easing the jerk at starting.

Iron or steel wire ropes of large size should not work at more than one-tenth of their breaking strength: small, round ropes may be worked up to one-sixth; well made aloes ropes may be loaded to one-seventh or one-eighth.

Careful maintenance is indispensable to the preservation of all ropes, especially of wire ropes. Hemp ropes need tallowing regularly, and aloes ropes need to be kept always damped; wire ropes, steel particularly, should be greased regularly, and often enough to prevent their ever beginning to rust. The grease should be soft enough to work into the strands right through the hemp core, but stiff enough to stick on the outside of the rope. A mixture of oil and grease, well stirred and laid on hot with a brush, answers very well: both oil and grease should be neutral.

Iron wire ropes are rapidly being replaced by steel wire, owing to the less weight needed to afford the same strength. But it must be remembered that when the mine water contains much acid the steel will wear much faster than iron.

The softer kinds of steel, which contain less carbon, approach wrought iron in character, having equal toughness, greater strength and the same capacity of welding. The mildest steel contains 0.15 to 0.4 per cent. of carbon; and the hardest 1.4 to 1.6 per cent. The following are the breaking strains per square inch of wire of some of the most usual varieties employed in ropemaking, as given by Frecheville:—

Mild steel.....	from 40 to 50 tons.
Best crucible steel.....	50 to 60 "
Best patent steel.....	70 to 80 "
Best plough steel.....	110 to 120 "

Too great stress cannot be laid upon the necessity of having ropes constructed of the best material. The selection of the material, however, somewhat depends on the conditions of working. Thus, with a perpendicular shaft and large drums and pulleys, a plough steel wire rope will be found the most reliable; but with small drums and pulleys, and a shaft with angles in it, a rope made of best patent steel, or mild steel, will last longer, as the wires are not so apt to snap in bending. In describing a wire rope, the number of strands, the number of wires in each strand, their gauge, their quality of metal and the material of which the centre or core is composed, should be specified.

As to the gauge, since the ultimate strength of wire increases as its diameter decreases, and since small wires are more pliable than large ones, it would seem that the finer the wire used the better; but there is a practical limit to this, as very fine wire offers too much surface for oxidation, and is too easily injured by friction. Experience has shown that it is advisable to employ medium-sized wires, between Nos. 10 and 15 of the Birmingham-wire gauge.

For ordinary work hemp cores or centres have been proved the best: they stretch with the strand, allow the wires to bed themselves solidly and give ropes greater flexibility than could be obtained with wire centres.

The latter have not given very satisfactory results in practice, although a greater breaking strain is obtained with a relatively smaller rope.

There are many modifications in the methods of laying or twisting the wires.

Common laid rope often has six strands, with seven wires in each, the size of the wires being altered to suit the size of the rope. Compound ropes (that is ropes with more wires in the strands than the usual construction, in addition to other varieties) have six strands with nineteen equal-sized wires in each, or seven strands, with six wires of about fifteen gauge in the middle and twelve around the outside, alternately fifteen gauge and twelve: ropes with six strands of eleven, twelve and thirteen wires each are frequently manufactured. Some makers prefer the

inner wires of each strand smaller, so as to be more flexible than the outer. Six strands in a rope are better than four or five, as they make it more cylindrical, and consequently the friction is better distributed. Six strands of nineteen wires each make very durable ropes: these work better than one of equal size composed of six or seven wires in a strand, as the latter being larger and less pliable are more liable to snap in bending around pulleys and drums. When three or four of these large wires break near together the rope is hardly fit for work, whereas the breakage of that number of small wires would be of much less consequence. More material can be got into the same size rope when compound instead of common laid, as the smaller wires do not leave so much space between.

On account of the many different varieties of steel wire employed in the manufacture of ropes, and the varying size of the hemp centres, and the empty spaces above referred to, it is impossible to state a formula for determining the dimensions of a steel wire rope required to bear a given strain. As the nature of a wire rope, however, is defined by number and size of the wires, it is easy, if we know the section and weight per fathom of the gauge employed, to determine the effective sectional area of the rope and its weight per fathom. Given, then, the quality of the metal, the breaking strain of the rope can be approximately estimated.

The following table by Frecheville, in which the numbers of the Birmingham wire gauge most usually employed in the construction of mine rope are compared with inches, and the weight of a cubic foot of steel is taken at 487 lbs., will be found useful in these calculations:—

No. B. W. G.	Diameter in Inches.	Sectional Area in Sq. Inches.	Weight per Fathom, Lbs.
10	.137	.01474	.2990
11	.125	.01227	.2489
12	.109	.00933	.1893
13	.095	.00708	.1436
14	.083	.00541	.1097
15	.072	.00407	.0825

Thus, in the case of a steel wire rope composed of six strands, seven wires in each, of ten gauge, the effective sectional area will be  $6 \times 7 \times .01474 = .61908$  square inches, and its weight per fathom in metal,  $6 \times 7 \times .2990 = 12.55$  lbs. If best plough steel wire, with a breaking strain of 120 tons per square inch, was employed in its manufacture, then  $.61908$ , the effective sectional area  $\times 120$  tons = 74.28 tons, and deducting one-eighth for lay we obtain 65 tons as about the breaking strain of the rope.

Again, let us suppose a compound rope made of the best patent steel wire, with a breaking strain of 75 tons per square inch, and composed of six strands of nineteen wires each, thirteen gauge. The following calculation— $6 \times 19 \times .00708$ , sectional area of each wire,  $\times 75$  tons, breaking strain per square inch of wire, less one eighth for lay, gives 52.97 tons as the approximate breaking strain of the rope. Such a rope, with hemp core and fairly made, would weigh about 18 lbs. per fathom, and have a circumference of about 4½ inches. The actual breaking strain, however, can only be found out by testing sample lengths of the finished ropes.

As the operations of manufacture introduce so many elements of uncertainty in wire ropes, it is well to allow a wide margin of safety; especially where their breakage would endanger life, and take the working load as one-tenth of the ultimate strength or breaking strain. The weight of the rope hanging over the pulley at the poppet-heads is, of course, included in the working load. In very deep mines this weight, even with steel wire ropes, becomes a matter of such serious consideration that tapering ropes have to be used. In case of a rope working at a very slow speed, such, for instance, as a capstan rope, a larger factor of safety than one-tenth may be adopted. Since any extra strain on a rope leaves it weaker than it was before, on no account should a rope used for raising men be ever worked above its fair working load. In drawing mineral in Cornwall, the custom is to let the skip down on a "gate" put across the shaft. Probably the greatest strain the rope has to bear is when the full skip is lifted. Experiments made at some coal mines prove that when the full cage is lifted from the bottom about double the ordinary strain due to the load is produced. This arises from the inertia of the mass to be moved. In the case of a skip resting on a "gate," the more slack chain there is the greater will be the strain on the rope at starting.

In winding men there should be no resting-place for the cage: the engine should be started gently, driven regularly, and with a speed of about two-thirds of what is otherwise usual. The rope should also be examined every twenty-four hours, and this should be done by winding it slowly through the operator's hands: if he does not happen to see the broken wires in all probability he will feel them. Occasionally the rope should be thoroughly cleaned, and its condition more minutely ascertained. When broken wires are found, the longest may be tucked underneath and the others cut off, to prevent their catching and doing further mischief. A new rope should be tested every several days' winding before men's lives are trusted to it.

It is indispensable for the preservation of steel wire ropes that they should be greased regularly. The grease used should be perfectly free from acid, and soft enough to work into the strands right through to the hemp core. It must not be of such a nature as to harden, for in that

\* From Report of the Secretary for Mines for Victoria during the year 1890.

condition it allows rust to form between it and the wire, so that a rope that appears to be well greased may be corroded to a sensible depth. A mixture of Stockholm or Archangel tar, a vegetable oil, and a little lime boiled together is often recommended. In Cornwall the tar is generally mixed with tallow. These mixtures, however, form too stiff a grease, tend to hide defects, and render the thorough examination of the rope difficult. A mixture containing gas tar is still more objectionable. Of all the lubricants for wire ropes the best is mineral oil. Some of the heavy mineral oils, such, for instance, as the Russian (their specific gravity being higher than the American) possess sufficient viscosity to be used as a lubricant for wire ropes, and will, if tried, owing to their freedom from acid and power of resisting decomposition, be found to give satisfactory results. At the Wearmouth Colliery they have a patented apparatus, consisting of a pair of wire brushes for cleaning the ropes, and a pair of strong hair brushes fed with lubricant from feeders above, for oiling them. Both sets of brushes revolve, being actuated by the travelling rope. It is claimed that this arrangement lubricates very thoroughly, and effects a great saving of oil and labor.

When a rope is used for winding men, the shackle must be cut off regularly every two to three months, the rope thoroughly examined and the shackle reset. This is a point of vital importance for wire ropes. In order to arrive at economical results with wire ropes, accurate accounts should be kept of their working. By this means the kind most suitable may be ascertained, and a considerable saving effected by using an article best adapted for the purpose. However well a rope may seem to be lasting, it should always be suspected as soon as its duration approaches the average that corresponds with the conditions under which it is working. It should, at any rate, cease to be used where human life depends on it. Owing to trade competition there is great danger of inferior metal being used in the manufacture of ropes, so that when a new one is required only the best makers should be applied to, and they should be furnished with full information as to the conditions under which it has to work. There can be no greater false economy than choosing a cheap rope. When a rope is for the purpose of winding men it should be advisable to have a sample piece of it (say a length of ten or twelve feet) tested before use, in order to see that the quality of the metal and the breaking strain are as represented.

#### Coal Handling Apparatus.

The success of most inventions hinges on their simplicity—that is, the most valuable machine is the one that does the work with the least possible expense. The simplest way to empty a bucket of coal is to turn it upside down. There has been building for some time in the shops of the Cleveland Ship Building Company a machine for handling coal that embodies that simple principle—it turns the car upside down. There is plenty of work for coal handling machines on the lakes, as 3,107,816 tons of soft coal was shipped from Ohio ports alone last season. No big claims are made for this machine, illustrated herewith, but it is geared to turn over in two minutes. If it turns in three minutes it will do all that is expected, and even if five minutes were required, that would insure the largest vessels getting cargo in the shortest time, as two days is now considered good time for placing coal cargoes aboard the larger steamers. Following is a brief description of the apparatus.

Upon a trestle of suitable height is mounted a cylindrical crib which is so constructed as to be rotated upon its longitudinal axis. Within the crib is a section of track may be raised and clamped against the side stakes, thus rigidly securing the car within the cylinder. The upper portion of the crib is provided with a number of yokes which forms the ways for a series of sliding shutters and at the same time carry a pair of steel plates, which with the shutters serves as a roof or a cover for the coal, holding it in position until the car is inverted, when by drawing the shutters the entire load drops in a mass to a fixed hopper immediately beneath. The power required for the various operations is obtained from a small engine elevated conveniently on a frame work at one end of the cylinder, and is transmitted to the various shafts by a novel arrangement of gearing.

Under the fixed hopper referred to is arranged a chute

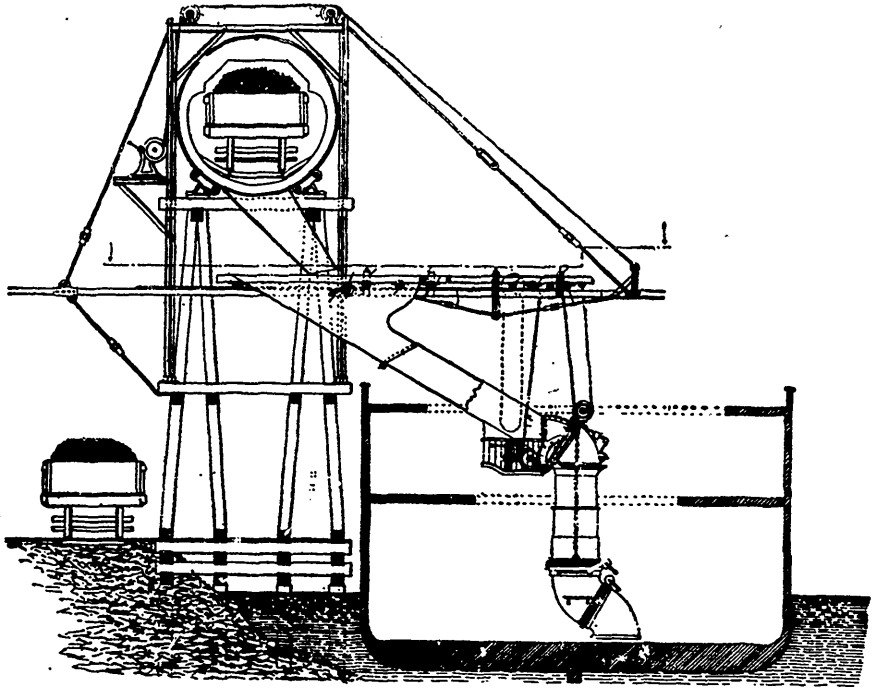
provided with adjustments by means of which the discharge end can be lowered to the bottom of a vessel and be then operated over a wide range for trimming the cargo. By means of a valve of peculiar construction at the lower end of the chute the flow of the coal is kept under perfect control, and the hopper and chute being kept full, the fall and consequent breakage is reduced to a minimum. In the plant now under construction the cars will be raised to the level of the machine by means of an incline and haulage engine, and passing through the machine will run down an incline by gravity at the opposite end of the trestle.

The Lindsley Terminal Equipment Company, owners and operators of the patent, already have the assurance of a large amount of tonnage for the coming season and are pushing their construction as rapidly as possible in anticipation of further requirements in the near future.

**Fires on Coal-Laden Ships.**—The destruction of the Carr Rock by fire and explosions, renews the subject which a Royal Commission was appointed to entertain, and the remedy suggested by that body of experts for preventing spontaneous combustion of coal was supposed to have been found and the perils finally disposed of. The Commission recommended surface ventilation and denounced the insertion of pipes through the cargo, or alloys amidships, or any other device for percolating air under or into the mass. With this object it was proposed to let air down one ventilator and exhaust it by another. By this means it was anticipated that cold air would pass on

gas, and the quicker it is shipped the less must be the chances of its escape. Gas also escapes from coal when it is broken, and consequently there is always a presence of gas in the holds. The longer a ship is at sea the greater must be the danger from firing. The Carr Rock had fore-and-aft shifting boards, and these would add fuel for kindling and sustaining conflagration. — *Colliery Guardian.*

**Experiments with a Compound Winding Engine at the Skalley Colliery, Saarbrücken.**—In a paper contributed to *Zeitschrift für das Berg, Hütten, und Salinen Wesen* it is said: This compound engine was originally a single 4½ inch cylinder winding engine, 61.8 inch stroke, winding two full tubs, of 10 cwt. each, from a depth of 186 fathoms, with a pressure of 44.12 lbs. per square inch. It was compounded to suit an increased steam pressure of 95½ lbs. per square inch, by adding a second cylinder, 31½ inches diameter. The engine now winds four tubs at a time on two decks, there being a counterbalance rope under the cages weighing 8.06 lbs. per yard. The whole winding is done in 40 seconds, at an average speed of 27.89 feet per second, the average piston speed being 4.95 feet per second. In order to show the advantage of the compound system, the author gives, together with the experiments on this engine, tables of results from other winding engines, which show that the gross fuel consumption per hour per useful horse power was 7.3 lbs. for the compound engine, and 11.88 lbs. for a double cylinder ordinary winding engine at the same colliery.



COAL HANDLING APPARATUS.

to the top of the coal, but never penetrate the solid cargo to supply oxygen, and to assist in generating conflagration. Ships laden with coal at ports in the United Kingdom are required to comply with the suggestions of the Royal Commission, and the Carr Rock had the regulation ventilation tubes carried through the upper deck with cool heads, and at the enquiry held at Glasgow into the loss of the ship it is not said that the uprights were washed away. The Carr Rock sailed from Dundee for San Francisco on the 25th of June, with coal hewn from the pits at Barrachulis and Fernegat. The colliery manager stated that the coal showed a great immunity from liability to spontaneous combustion and pyrites were carefully picked out by the hand as the coals passed over a screen. The inspector of mines said that there was very little fire-damp in the mines from which the coals were taken, and the pits were fairly dry, and during his experience he had never known a fire originating from spontaneous combustion in either. If, however, said the inspector, the coal was badly smashed up in loading, there would be a tendency to spontaneous combustion. The ship had been out of port over two months, when she fired and sank. This was quite long enough to warm the coal from the heat of the sun in the hatchways, and to break up some of the blocks by pressure and the rolling of the vessel. Newly-banked coal, as a rule, contain

**A Feat in Engineering** has just been accomplished at the works of the Great Eastern Railway Company at Stratford, London. They have built up a locomotive and tender in ten working hours. Of course, all the parts were prepared, but this time for erecting and riveting is unprecedented. Four years ago at the London and North-Western works, at Crew, 25½ hours was the time taken, and that was considered very good. The engine built at Stratford, too, is of good size. It has three pairs or coupled wheels, each 4 feet 11 inches diameter, while under the tender there are six wheels. The weight of the engine is 37 tons, and of the tender 30 tons. Eighty-five men were engaged erecting the engine, and 52 working at the tender. It is a favorite type of engine, there being in the service of the company 200. The great speed with which the engine was built indicates that every part must have been most exactly made to gauge and measurement.

**Plasticity of Clays.**—According to Seger (*Thomson's Zeitsung*) very refractory clays are not able to stand the chemical action of attacking substances as well as other clays of only medium fire-resisting quality, but of greater plasticity. These latter clays, in consequence of this property, set together quicker into the form of a hard fire-brick than the former. The author gives examples in proof of this statement.

## MINING NOTES.

(FROM OUR OWN CORRESPONDENTS.)

Nova Scotia.  
Cape Breton.

**Sydney and Louisburg Collieries.**—At the Reserve mines the slopes were driven down during the winter for another lift, and levels opened out.

At the Emery Colliery considerable work was done during the summer in driving the leads and opening out the mine for a large output. It was at the Emery Mine that the Seargent coal-cutting machine was tried in July, with such favorable results that three coal companies decided to put in plants.

The Sydney & Louisburg Company headed the list of shipping from Cape Breton, with 154,600 tons.

**Govine Mines.**—Shipping was carried on from these mines every month of the year, which speaks well for Cove Bay as a winter port. In the year new rails were laid from the pit to the wharf, and the railway put in thorough order. An air compressor plant of the Ingersoll Rock Drill Co. of Canada, was put in operation to supply and operate the pumps with compressed air instead of steam. The ordinary level work was done to keep the mine opened out for its full capacity, and the west level driven through the out, and the coal proven on the other side of the upthrow, and found to be of good quality and high. Govine Mines shipped 152,500 tons. The coke ovens were kept running all the year, and the whole of the coke shipped to the copper mines of Newfoundland. The deeps are to be driven down this winter a distance of 900 feet, to open up a new lift for the coming season.

**Calcutta Mines.**—The deeps were driven down for two landings; a new bank head made, and a Jencks underground hoisting engine erected and put in running order, and a greater part of the coal shipped during the summer came out of the new deeps. A contract was made with the Ingersoll Rock Drill Co. of Canada to put in one of their 24 x 30 inch air compressors to operate under ground pumps and eight 40-inch coal cutting machines. Calcutta shipped 145,000 tons.

**International Coal Co.**—At this mine a new ventilating shaft, 90 feet deep, was put down from the surface to the harbour seam, and a 6-foot Murphy ventilating fan erected, which can deliver 10,000 cubic feet of air, or as an exhaust. It has a capacity of 80,000 cubic feet of air per minute, and is driven by a straight-line Jencks engine, 10 x 12 inch cylinder, and runs 2 to 1 with a 10-inch, 5-ply belt. The foundations of both the fan and engine were made of concrete and put up in a very substantial manner. This company also put on their railway, two new Farnley extension engines, built by the Rhode Island Locomotive Works, one 60 tons weight and the other 30, built 25 6-ton cars, and added 40 10-ton coal cars of a new and improved type, which were designed by Mr. McLennan, the managing director. They also added one first-class and one second-class and smoker passenger cars, and a combined flanger and freight car, and put in two miles of new rails, and put their railway in first-class condition.

**Little Glace Bay Mining Co.**—At this mine they are making a great many improvements. A new hoisting engine was received from Messrs. Matheson & Co., New Glasgow, and is now being erected. A new set of 9-inch pumps from the Jencks Machine Co., Sherbrooke, Que., is being put in place, and a new 8-foot Murphy ventilating fan was erected and started to run. They are now preparing to drive the deeps and levels and open up a large section of coal to the dip of their Stirling shaft, which will give them a large quantity of coal at their command, and will enable them to increase their output at any time 50 per cent. They have also added a new block to the entrance of their harbour, which will give them an additional width of 25 feet.

**Gardiner Mines.**—The Messrs. Burchell pumped out this mine, which they took in hand last October; erected the necessary heapstead and screens; cleaned out their levels and put the mine in first-rate working order, and in the face of a great many trials and difficulties had quite a considerable output. They also erected and put in a Jeffery electric coal-cutting plant, from which they are getting very satisfactory results.

**Old Bridgeport.**—This mine sold the whole output of their coal to the International Coal Co., who shipped it at their pier in Sydney Harbour.

## Pictou County.

Latest advices report the 6 foot seam at the Vale working half time; Black Diamond, half time; Acadia, full time; Drummond, four to five days per week.

The English slope, which has been standing idle for the last couple of years, and had reached a depth of 1,500 feet when work was stopped, has lately been re-opened, and operations are now being carried on with a view to connecting it with the Fould pit. A drift of some four or five hundred feet will make the connection and give a good air-way.

## Cumberland County.

Improvements involving an expenditure of \$79,000 have been made at the 550 ft. collieries within the past six months. To keep pace with the immense quantity of coal hoisted daily, it is necessary to be continually extending the underground workings. As the pits get deeper and deeper, ventilation becomes more difficult. At present the current of air that supports life beneath the ground is forced down by three fans. In order to increase the capacity of the fans and give a circulation of air at the working faces, the air-ways or slopes used exclusively for ventilating purposes have all been enlarged. There are three of these, and at two the area has been doubled. This is most expensive work. At No. 2 slope an experiment was tried. Hitherto all the pits have been timbered with wood, but having a quantity of steel rails on hand, the manager had them cut into suitable lengths and used instead of booms. Of course the improved steel booms are supported by props of wood in the usual way. The manager says that the experiment has proved entirely satisfactory. All the slopes have been sunk this season with a view to an increased output at an early date. No. 2 slope has been sunk 1,000 feet, making a total depth of 2,000 feet. But no coal will be hoisted from this depth for about a year. At present 600 tons are hoisted daily from the 1,000-foot level. At this slope a new pit has been erected, being 360 feet long, 30 feet wide, increasing to 42 feet at the screens. It is constructed on a strong trestlework 30 feet high, and the 12-foot post of the building gives a total height of 42 feet. From the pit's mouth the screens are supported by tracks. The loaded boxes will run by gravitation to the screens, and the empty boxes return by means of an endless chain, over two elevated tracks. The screens are 54 feet long and 5 wide, fitted with longitudinal bars 15 feet long. Two of the coal chutes are arranged for loading closed box cars. The facilities provided at the slope for handling a large quantity will enable the company to greatly increase their shipment when they begin to hoist from the deep workings.

## New Brunswick.

The mining outlook in this Province is, at present writing, rather quiet.

Since the coming into operation of the new mining Act, quite a few applications for rights of search, prospecting licenses, etc., have been entered upon the books at the Mines Department in Fredericton. As yet very few of the applicants have made any actual start at development, making matters look as if they were simply holding the areas for speculative purposes. In some parts of the Province, however, work is quietly going on, but with what actual results I am unable to say.

Near Woodstock operations are being prosecuted at the Britton silver mine, and it is said the outlook is encouraging.

Work of prospecting, testing, etc., has been energetically pushed at St. Stephen, on the supposed nickel beds, but whether from lack of capital and good judgment or from the fact that the nickel is not in sufficient quantity in the ore, there seems to be no decided boom. One fault, perhaps, is that these deposits fell into the hands of parties who ask heavy prices for what are practically undeveloped areas, consequently capital is kept at a distance. It seems a pity this field cannot be opened up properly, with necessary capital, as many who have seen locality and ore pronounce it a second Sudbury. It may, however, fall far short of it on actual development, but the chances for a good working mine seem wonderfully good.

In Gloucester County considerable work is being done on silver and gold areas, and it is said some deposits not far from Bathurst are showing wonderfully good results, and may lead to the formation of a first-class company for the working of the mines in this vicinity.

## GOLD MINING SUPPLIES.

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H. H. FULLER & CO.,

Halifax, N.S.

It is understood quietly that an attempt may be made during the ensuing year to re-open the antimony mine in Prince William, York County. If so, and they have capital behind them, and are worked systematically, judiciously and economically, good results will certainly follow as the ore is there in paying quantity, if produced and sent to proper markets.

There are numberless other little booms in the mineral line which are as yet not fully organized.

Some St. John capitalists, on a small scale, have gone into two ventures in gold mines in Guysboro' County, N.S. We trust they may be fully successful.

The writer of these notes has had the pleasure of examining closely deposits of splendid ochres in good colors; amber, equal to the best Turkish imported amber; sienas, raw and burnt, which cannot be surpassed in quality; selenite, or rock gypsum, clear and as transparent as window glass, and in abundant quantity; and finally, a natural deposit of marl and shell, in bed of a lake, which is, in itself, if prepared for the market, one of the best fertilizers and natural plant foods for house and garden flowers in Canada. These all occur in Nova Scotia, and are open for negotiation on any fair or reasonable terms, and facts can be obtained from your correspondent, which are reliable and can be depended on fully, by applying to the Review.

It is rumored—but how correct I cannot say—that many changes will take place in the mining laws of New Brunswick at the next session of the House. Certainly the mining law as it now stands is very rambling, and too technical altogether. Some more suitable and concise laws would have answered the same purpose, and it is thought that the abandonment of all royalties, say for a term of ten years at least, would be more conducive to the chance of capital from outside being employed in our mining industries. It is to be hoped the matter will come up more fully for consideration, and that some amendment may be made which will attract the attention of the capitalists from the United States and Great Britain.

It is to be hoped that the tide of capital which has been flowing into the United States for years past, in mining properties—syndicates of various kinds—may be, or a portion of it, directed into Canadian channels during the next year; and if so, we have no fear but that the Maritime Provinces will receive a fair amount of attention at the hands of such investors; and that New Brunswick, though to all intents and purposes a new comer in the mining field, may be among the provinces to benefit thereby in its sincere wish of yours, etc., CRYSTAL.

## British Columbia.

Mr. J. E. R. Ellis, M.E., writing from Nelson, says: There is two to three feet of snow on Toad mountain, and a few inches on the shore of the lake, so that prospecting has been at an end for some weeks past, and the only news of importance to be chronicled for several months to come will proceed from the mines, where active work is to be carried on. Good progress is being made at Pilot Bay, the site of the new lead smelter. Hot Springs camp should consequently make a good showing in 1892. A. B. Hendryx, one of the owners of the new plant, paid us a his end last week. The contract for the iron work of the smelter has been awarded to the Chicago Iron Works.

**Dandy.**—The main vein on this property has been tapped in the crosscut tunnel, and shows a width of two feet three inches. The ore is similar in character to that found on surface, but for professional reasons I am not at liberty to disclose the grade of the ore. It was the opinion of some that, as death was attained, the galena seen on and near surface would disappear and be replaced by copper-silver bearing minerals, but at the depth now attained the galena is present in as large quantity as ever. The men are now drifting both east and west on the ledge; 15 to 16 feet have been made in either direction. Mr. Esler has been expected in for several weeks, but has not yet arrived.

**Grizzly Bear.**—Work is being done on the same lines as hitherto, the tunnel is now in 200 feet, and the crosscut towards the ledge 21 feet. The ore has not yet been reached.

**Silver King.**—Some ten men are at work, and probably will continue all the winter; but no important results are announced. It is the general opinion that nothing of consequence will be done until the Ramsay interest secures the whole of the property; yet the near future of this camp depends in a great measure upon the results or amount of work done on the Silver King.

**Sundown.**—The owners have started a tunnel on the ledge lower down the hill than the old tunnel, and propose to push it 100 feet during the winter. Some 25 feet have already been made, with very encouraging results; the ledge is 4 to 5 feet wide with well defined veins, and shows 7 to 6 inches of good ore. The ore, consisting of iron pyrites in streaks and patches, in a gangue of hard, milky ribbed quartz, frequently assays high, e.g.: \$25, \$203, \$83, \$92 in gold per ton. The claim is 3 miles southwest from Nelson.

**Evening.**—A couple of men are pushing forward the tunnel on the Equity, but owing to sickness a little progress has been made, and nothing new has been developed.

**Slocan Camp.**—The recent discoveries are still the topic of discussion, and sales of bonds with cash payments have already been made to parties who have never seen the district. Equities, too, are pouring in from the Eastern states from men who propose to pay the Slocan a visit in the early spring. Many prospectors are wintering near the lake, and a general store has been started there by Hunter & Co., of Nelson. Among others, Mr. Shoemaker, of Butte, and Mr. Hutchinson, are here; the latter has paid \$1,000 for the privilege of holding the "Washington" and "G.W.R." claims till summer, while the former—who is said to be working for Marcus Daly—left Nelson for the Slocan a couple of days ago. As a proof of the excitement prevailing, some of the parties who left Ainsworth recently took brooms with them, so that the inspection of the ledges should not be impeded by the snow which now covers everything. The trail from Columbia Railway, near the Ward's Ferry, up the Slocan river, is nearing completion, and the same is true of the route from Kaslo City on the Kootenai lake. The Slocan ore is high grade, and the district is well worthy of attention in the spring, but a heavy discount must be allowed on the statements made as to size of the ledges and the amount of ore actually in sight.

**Lizzie C.**—Three men are at work running a cross-cut tunnel to tap the ledge at a depth of over 100 feet. The ore which will not be reached for some time to come, consists of fine grained galena, with some zinc blende and small quantities of argenticiferous tetrahedrite, in a hard vitreous quartz gangue, more or less charged with chloritic minerals. The claim lies near the contact of the granite and diabase-schist, three miles south-easterly from Nelson.

**Hot Springs Camp.**—But little news has reached us of late from this camp. Men are at work on the "Skyline," "Krao," "Tenderfoot," and other properties; the "Krao" and "No. 1." The machinery which has just been placed on the "Tenderfoot" is the most powerful yet brought into the camp, consisting of a 35-horse power boiler, a 20-horse power engine, and a No. 7 Knowles' pump, with the requisite appliances for sinking 450 feet. The machinery was supplied by the John Doty Company, of Toronto, and, while undoubtedly strong, does not possess that finish and elegance which American mining engineers have become accustomed to. The new shaft on the "Tenderfoot" is now down about 70 feet, but, having recently reported upon the property to the owners, I am not at liberty to discuss its merits.

The year 1892 should be a lively year for the Hot Springs, seeing that the end of the summer will, in all probability, see the new smelter in full blast. Difficulties there are of course, e. g., supply of good and cheap fuel, disposal of the lead, etc.; but the enterprise is in able hands, and will not fall from lack of forethought or from want of capital.

**CANADIAN COMPANIES.**

**Silver Queen Mining Company (Ltd.)**—Application will be made to the British Columbia Legislature for the incorporation of the above company to purchase and carry on mining on the "Silver Queen Mining Claim," located on Toad Mountain, Kootenai District, B. C.; head office, Victoria. Capital stock, \$1,000,000, in one million shares of one dollar each. Applicants, Joseph Edward Bass, Spokane, Wash.; William Dalby and Fred J. Claxton, both of Victoria; J. M. Lefevre, M.D., Vancouver; Hugh Paton, W. Strachan, Andrew F. Gault, George W. Stephens, Edward L. Bond, Robert Lindsay, Frank. Buller, M.D., Alex. Robertson, A. C. Clark, John Popham and Samuel H. Swing, all of Montreal, and Thomas Leeming, New York.

**The Neosho Mining Co. (Foreign)** has been registered under the British Columbia acts to construct smelting and reduction works for gold, silver or other ore, and to engage in mining, &c. Head office, Ainsworth, B. C. Capital stock, \$50,000, in \$5,000 shares of \$10 each.

**The Petit Rocher Silver Mining Co. (Ltd.)**—Application will be made to the New Brunswick Legislature for the incorporation of the above company to work mines in the County of Gloucester, N. B. Head office, Petit Rocher, N. B. Capital stock, \$25,000, in 5,000 shares of \$5 each. The provisional directors are, Jerome Boudreau, teacher; John Morrison, clerk; Joseph F. Comeau, merchant; Frederick Comeau, merchant; Jerome H. Comeau, merchant, and J. A. Langis, surgeon, all of Petit Rocher, Gloucester Co., N. B.

**The Gold Rock Mining and Milling Company of Algoma and Nipissing (Ltd.)**—Application will be made to the Ontario Legislature for the incorporation of the above company to purchase, lease and work mines and mineral lands, to buy, sell, refine, smelt gold, nickel and other ores and minerals, &c. Head office, Toronto,

Ont. Capital stock, \$100,000, in 100,000 shares of \$1 each. The applicants are, James Healy, Q. C., Joseph J. Davis, brewer; Elmer S. Townsend, mineral expert; William McCabe, actuary; W. Thomas Newman, mineral expert, all of the City of Toronto.

**The Commercial Mining Co. (Ltd.)**—Notice is given that the above company will apply for incorporation to the Ontario Legislature with the object of dealing in mining claims in the Province of Ontario, and working and operating mines thereon, and smelting and refining and selling the minerals found thereon. Head office, Toronto. Capital stock, \$100,000, in 20,000 shares of \$5 each. The first directors of the company are: Wm. Lawrence Besterman, quarry work; Frank Edward Shearman, manufacturer, Jamestown, N.Y.; Charles Arthur Murrle, merchant, Toronto; Arthur Harrison Hilyard, salesman, St. John, N.B.; John William Cheesworth, merchant, Toronto; William Henry Cooper, agent, Toronto; John Charles Prickett, Boston, Mass.

**The Nova Scotia Steel and Forge Co. (Ltd.)** of New Glasgow, N.S., give notice that application will be made to the Parliament of Canada to confirm certain powers granted to the Nova Scotia Steel Company (Ltd.) viz: To reduce the original shares, increase the capital stock, extend the powers, and to change the name of the company to the first mentioned title; to authorize the new company to divide their stock into preferred and ordinary shares.

**Canadian Companies.**

The following is a list of the companies incorporated under the various Joint Stock Companies Acts, and also private concerns, for the pursuit of mining and kindred industries in 1891, together with the capital stock and chief places of business:—

NAME OF COMPANY.	CAPITAL STOCK.	HEAD OFFICE.
Atlantic Stone Co. ....	\$ 30,000	Lower Cove.
Canada Coal Co. ....	50,000	Joggins.
Canadian Smelting & Refining Co. ....	100,000	Yarmouth.
Evangeline Mines Co. ....	35,000	Windsor.
International Mining and Transportation Co. ....	\$ 100,000	Sydney.
Lunenburg Iron Co. ....	10,000	Lunenburg.
Mabou Gypsum Co. ....	25,000	Inverness.
Nova Scotia Mining, Mineral and Transportation Co. ....	500,000	Louisburg.
Pictou Charcoal Iron Co. ....	200,000	New Glasgow.
Royal Gold Mining Co. ....	50,000	Whiteburn.
Torbroke Iron Co. ....	100,000	Halifax.
Victoria Gypsum Mining & Manufacturing Co. ....	100,000	Halifax.
Wentworth Gypsum Co. ....	200,000	Windsor.
West Waverley Gold Co. ....	60,000	Waverley.
<i>New Brunswick.</i>		
McNaughton Gold Mining Co. ....	16,000	St. John.
New Brunswick Mineral Developing Co. ....	50,000	"
Provincial Chemical Fertilizer Co. ....	50,000	"
<i>Newfoundland.</i>		
Newfoundland and Canadian Exploration Trust, (Ltd.) ....	£ 150,000	London, Eng.
The Pyrites Co. (Ltd.) ....	£ 300,000	Filley's Island.
<i>Quebec.</i>		
Beauce Asbestos Co. ....	10,000	St. Francis.
Canadian Super-Phosphate Manufacturing Co. ....	250,000	Buckingham.
Central Lake Mining Co. ....	120,000	Montreal.
De Nederlandsche Phosphaat Maatschappij Glasgow & Montreal Asbestos Co. ....	200,000	East Templeton.
La Compagnie des Mines d'or de Mattawa ....	70,000	Black Lake.
Mattawa Mining and Smelting Co. ....	24,000	Joliette.
Moir Granite Co. ....	300,000	New York, N.Y.
MacGregor Lake Phosphate Mining Co. ....	100,000	Stanstead.
Phosphate Milling & Shipping Co. ....	60,000	Montreal.
Taylor Decarbonized Iron and Manufacturing Co. ....	10,000	London, Eng.
Templeton Asbestos Mining Co. ....	150,000	Montreal.
Templeton Asbestos Mining Co. ....	£ 25,390	East Templeton.
<i>Ontario.</i>		
Badger Silver Mining Co. of Gillies, Ont. ....	\$ 250,000	Port Arthur.
Belmont Bessemer Ore Co. ....	600,000	Toronto.
Belleville Natural Gas and Ore Co. ....	25,000	Belleville.
Bonanza Nickel Mining Co. of Sudbury ....	150,000	Toronto.

NAME OF COMPANY.	CAPITAL STOCK.	HEAD OFFICE.
Canada Chemical Manufacturing Co. ....	£5,000	London.
Canadian Natural Gas Co. ....	100,000	Sherkston.
Chicago-Algonia Nickel Co. ....	1,000,000	Sudbury.
Crescent Gold Mining Co. of Marmora. ....	100,000	Malone.
Dunnville Natural Gas Co. ....	20,000	Dunnville.
Electric Mining Co. ....	125,000	Ottawa.
Empire Mining Co. of Ontario. ....	75,000	Toronto.
Essex Moulding Sand Co. ....	25,000	London.
Farmers' Natural Gas and Oil Co. of Gosfield. ....	100,000	Windsor.
Grimsby Quarry and Transport Co. ....	20,000	Grimsby.
Guelch Silicea Barytic Stone Co. ....	100,000	Ingersoll.
Lyndhurst Lead Mining Co. of Ontario. ....	100,000	Lyndhurst.
Mattawin Iron Mining Co. ....	100,000	Kingston.
Mutual Natural Gas Co. of Ontario. ....	20,000	Welland.
Mycena Marble Co. of Canada. ....	100,000	Toronto.
North Shore Nickel Mining Co. ....	500,000	"
Nickel Bay Co. of Ontario. ....	1,000,000	"
Ogema Mining and Smelting Co. of District of Thunder Bay. ....	150,000	Port Arthur.
Ontario Mining Stock Exchange. ....	50,000	Toronto.
Ontario Nickel and Manitoba Mining Co. ....	50,000	"
Peterborough and Frontenac Mining Co. ....	10,000,000	Peterborough.
Sault Ste. Marie Nickel Mining and Contract Co. ....	45,000	Sault Ste. Marie.
Straight Lake Mining Co. ....	300,000	Toronto.
Sudbury Nickel Co. ....	50,000	"
Superior Natural Gas Co. of Ontario. ....	100,000	Sherkston.
Toronto Granite Co. ....	45,000	Toronto.
Toronto Mining Association. ....	3,000	"
Wahnapitze Nickel Co. ....	150,000	"
<i>Manitoba and North-West Territories.</i>		
H. W. McNeill & Co. ....	50,000	Anthracite.
<i>British Columbia.</i>		
Alberta and British Columbia Exploration Co. ....	20,000	Victoria.
Carbonate Mountain Mining Co. ....	100,000	Vancouver.
Deadwood Mining Co. ....	25,000	Victoria.
Glen Iron Mining Co. ....	50,000	Kamloops.
Gordon Hydraulic Mining Co. ....	50,000	Leach River.
Hixon Creek Hydraulic Co. ....	100,000	Quesnellmouth.
International Mining and Milling Co. of British Columbia. ....	500,000	Kettle River.
Jeanette Mining Co. ....	500,000	Ainsworth.
Langak Consolidated Mining and Smelting Co. ....	200,000	Illecillewaet.
Le Roi Mining and Smelting Co. ....	2,500,000	Trail.
Liverpool Land and Improvement Co. ....	500,000	New Westminster.
Malaspina Red Granite Quarry Co. ....	10,000	Nanaimo.
Montreal and Kootenay Mining Co. ....	20,000	Montreal.
Nelson Smelting and Mining Co. ....	500,000	Vancouver.
North Vancouver Land & Improvement Co. ....	500,000	Nelson.
Port Haney Brick, Tile and Terra Cotta Co. ....	50,000	New Westminster.
Prevost Island Co. ....	15,000	Victoria.
Spokane and Great Northern Mining Co. ....	2,000,000	Spokane, Wash.
Stadscona Silver-Copper Mining Co. ....	100,000	Victoria.
Stevenson Natural Gas & Development Co. ....	50,000	Vancouver.
Tulameen Improvement & Hydraulic Co. ....	60,000	New Westminster.
Vancouver Stone-Quarrying, Mining and Transportation Co. ....	25,000	Vancouver.
Western Canadian Ranching Co. ....	100,000	Victoria.
Western Consolidated Mining Co. ....	\$ 1,000,000	Spokane, Wash.
Westminster Slate Co. ....	100,000	New Westminster.
West Kootenay Mining Co. ....	1,000,000	Ainsworth.

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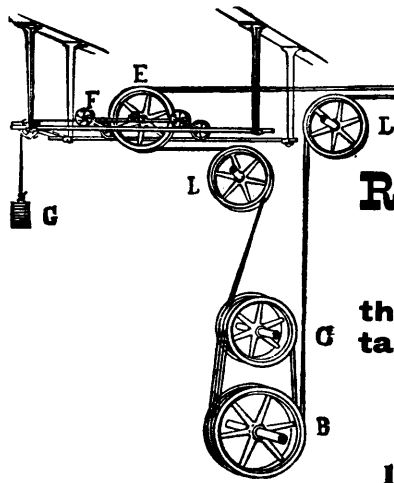
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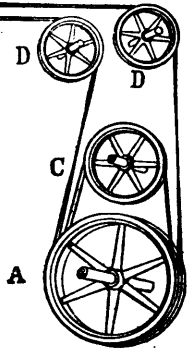


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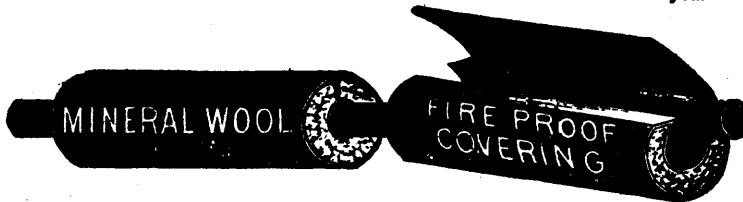
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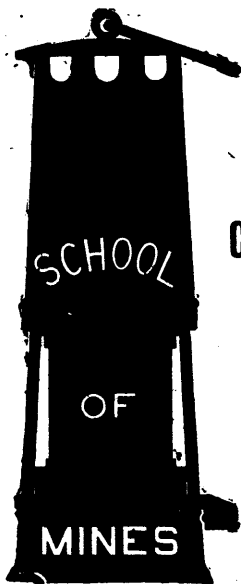
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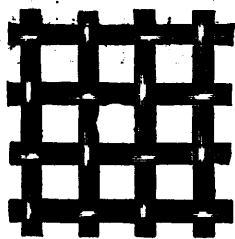
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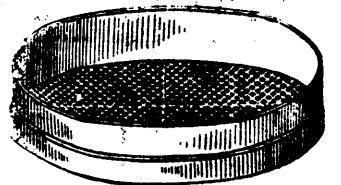
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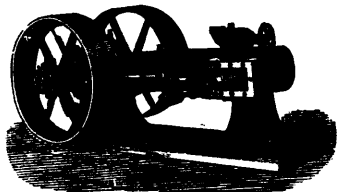
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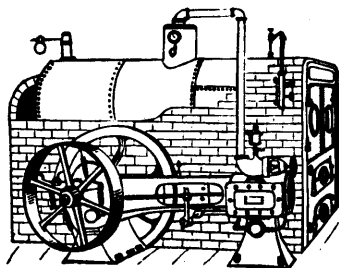
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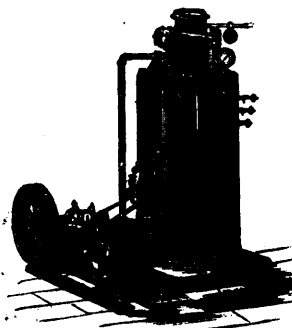
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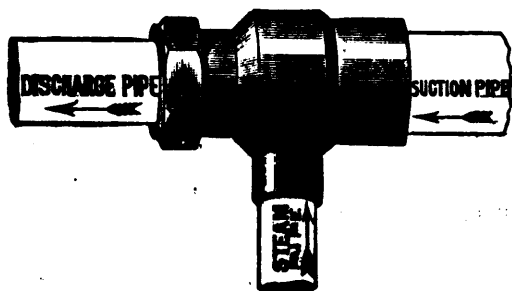
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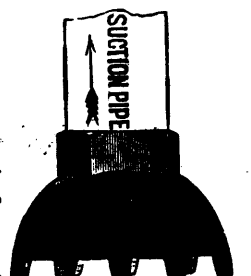
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SECOND YEAR OF PUBLICATION.

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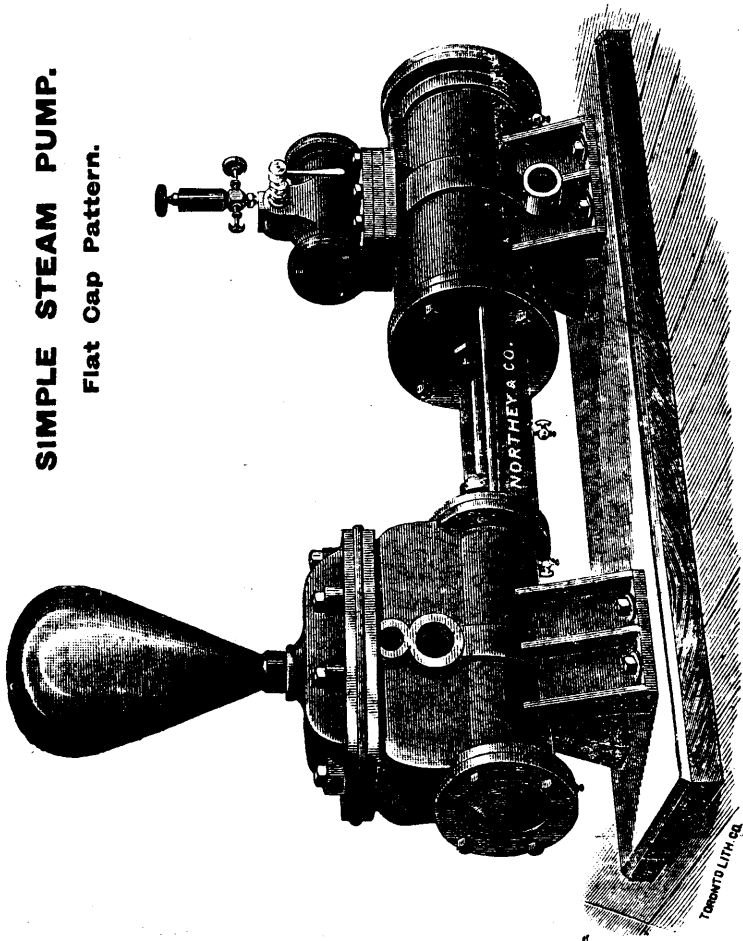
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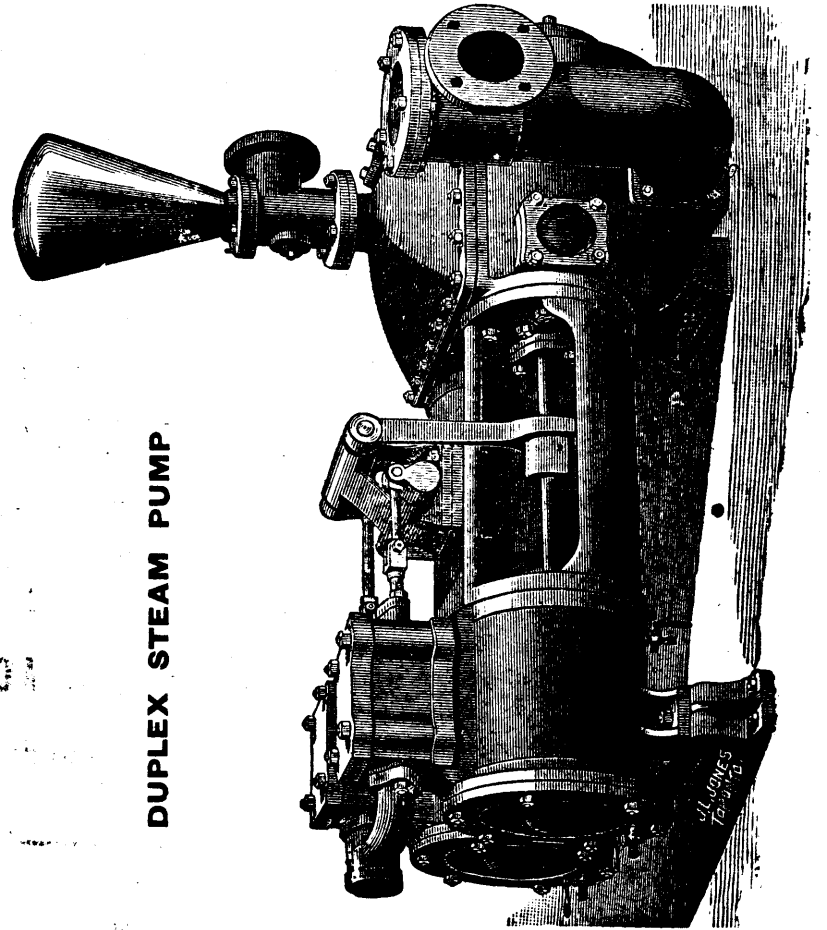
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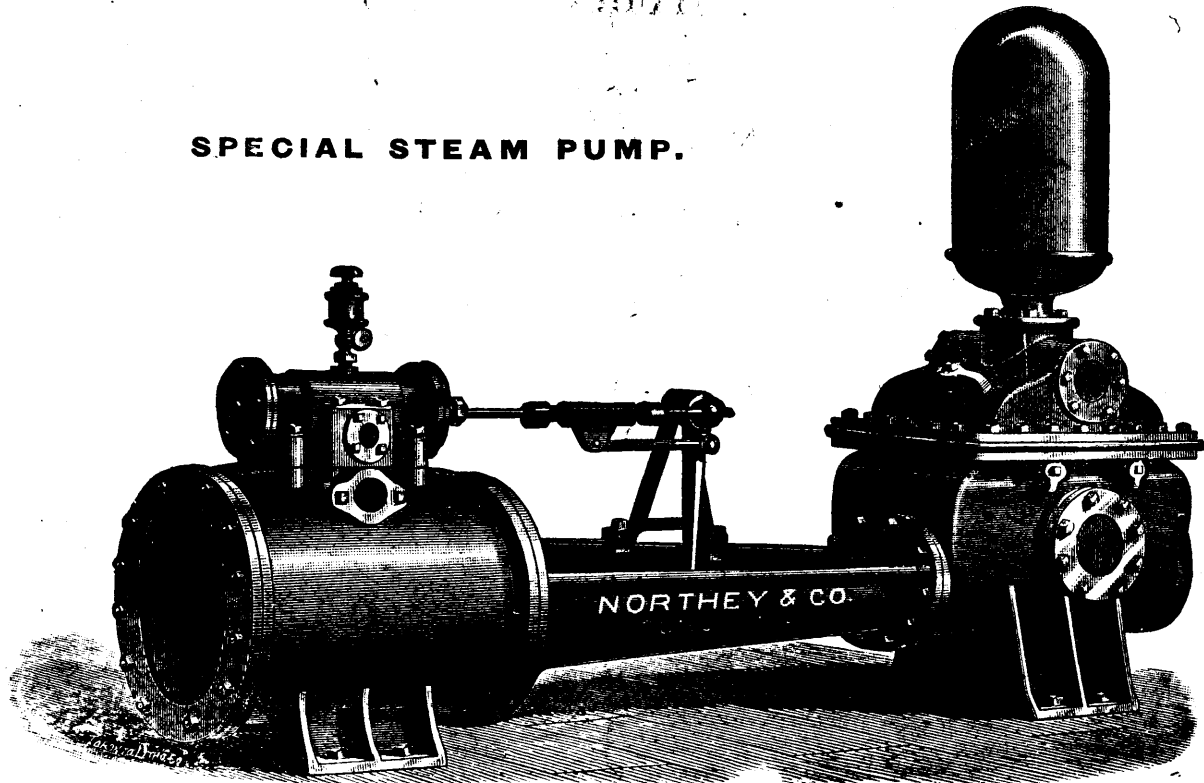
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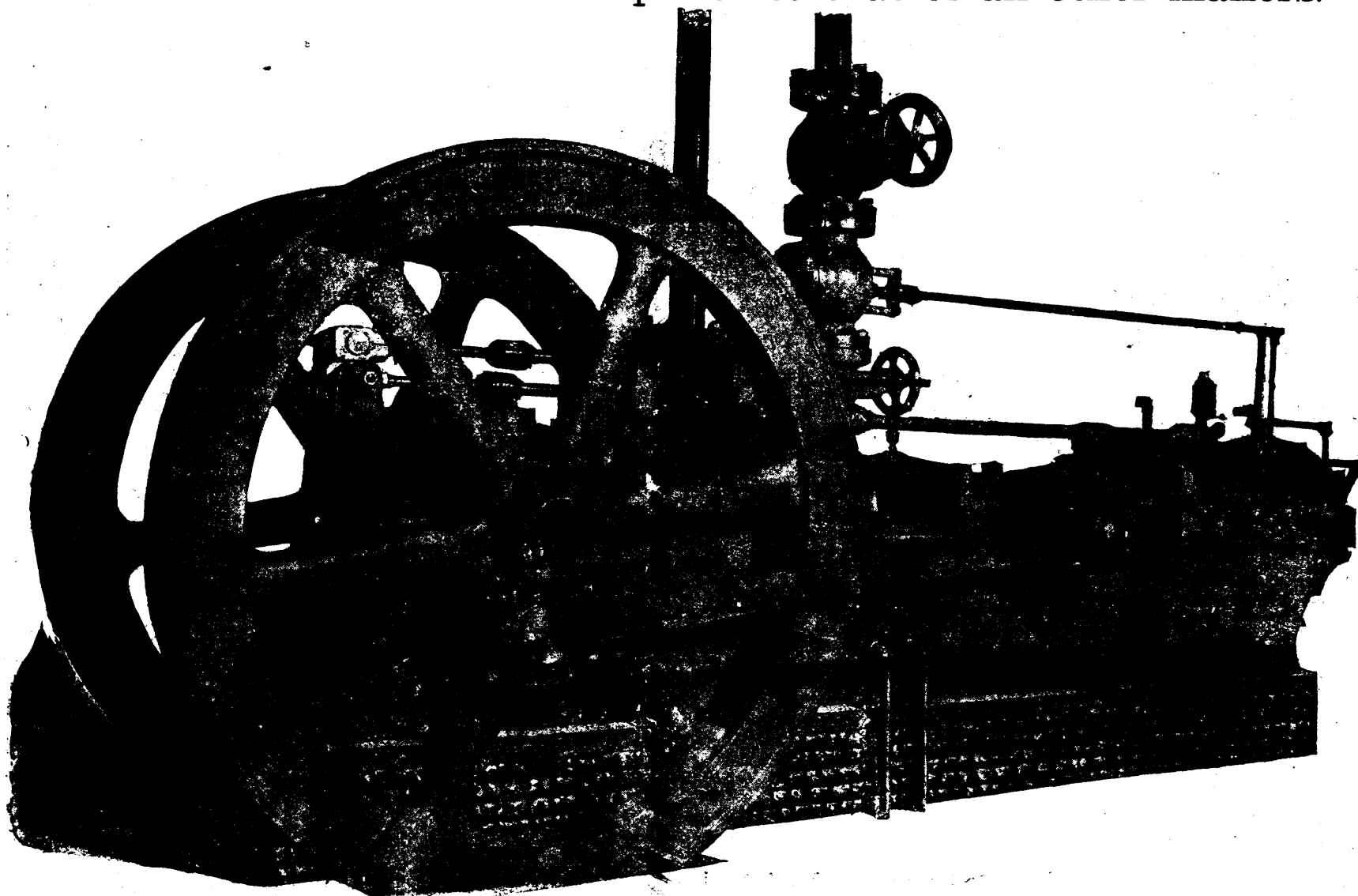
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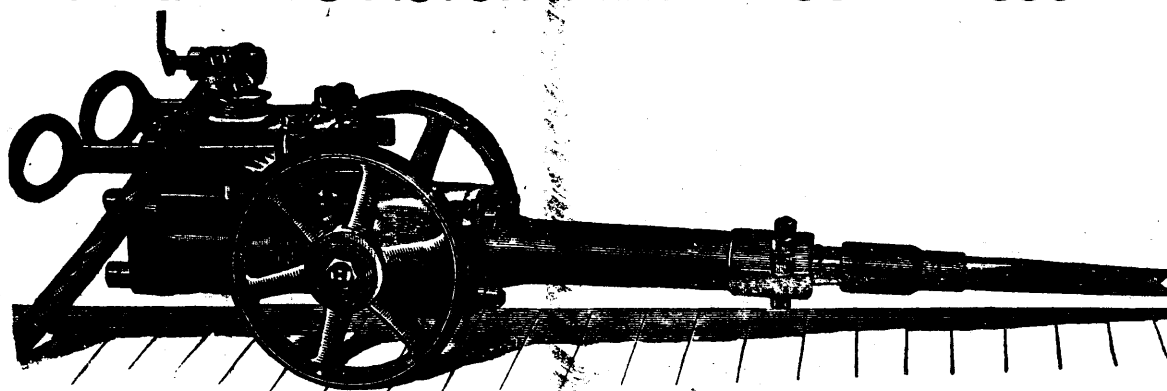
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