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EDITED BY R. T. A. BELL.

THE OFFICIAL ORGAN

—OF—

THE GOLD MINERS' ASSOCIATION OF NOVA SCOTIA,

THE UNITED MINING SOCIETY OF NOVA SCOTIA,

THE ASBESTOS CLUB, QUEBEC,

THE GENERAL MINING ASSOCIATION OF QUEBEC.

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

The Gold Miners' Association of Nova Scotia.

"At the annual meeting of the Gold Miners' Association of Nova Scotia, held at Halifax on 6th March, 1893, THE CANADIAN MINING REVIEW was adopted the official organ of this Association.
(Signed),
E. C. WILSON, President,
G. J. PEARSON, Secretary.

The Mining Society of Nova Scotia.

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

The Asbestos Club, (Quebec.)

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

The General Mining Association of the Province of Quebec.

"At a meeting of Council held at Montreal on Friday 6th May, 1891 it was moved by Captain Adams, seconded by Mr. R. T. A. Bell, and resolved: That THE CANADIAN MINING REVIEW be the official organ of the Association.
(Signed),
GEORGE INYISE, President,
R. T. A. BELL, Secretary."

OFFICES:

Victoria Chambers, 140 Wellington Street,

OTTAWA.

Vol. XII. FEBRUARY, 1893. No. 2.

Canadian Mining Investment.

At present a great deal of attention is being attracted towards British Columbia as a field for investment in gold and silver mining operations, but we are told that nine-tenths of all the work in the new districts is being done by Americans, as the people of Canada are content to call the residents of the United States. It is of primary importance that the country should be developed no matter who does it, and we have no sympathy with those who abuse foreigners for exploiting the treasures which Canadians leave unsought. But we should be glad to see a greater spirit of enterprise awakened among our own capitalists. We know of several cases where enterprises in our own country, offered first to Canadians and declined either through timidity or apathy, have been promptly undertaken by Americans. A correspondent from the far west writes: "It seems a little odd to me that the Canadians sit idly by and let the Americans take all the good things, and then wake up after all is over and howl about the Yankees getting the best of everything. While it is well to be conservative, there is such a thing as being too slow." The same correspondent, however, states a fact that explains some of the caution felt by our capi-

talists. He says: "Some of our people are a little disgusted because some of the Slocan people sold them twelve-eighths in one property, and they are now busy trying to figure out what interest the last four purchasers have. But such is life. The poor prospector must be fed." It is this frequency of fraud as well as the uncertainty of mineral deposits that occasions hesitancy to invest. Some of our capitalists, instead of waiting for the scheming promoter to come along and unload his "wild cats" on them, are sending trusty men into the new regions and getting properties direct from the Government, or at first hand from the discoverers at comparatively moderate prices. In such cases there is a large chance of success, and mining becomes a legitimate and tolerably safe business. We would urge our capitalists, where they can intrust their money to men in whom they have confidence, to take risks in uncovering the vast riches that nature has deposited in our hills, rather than to employ their means in gambling in stocks and betting upon futures in wheat and pork. Apart from the money side of the question, they would gain an added interest to their lives in knowledge of new regions with all the romance of discovery and growing development. A great deal of money is being made in the Kootenay District, and it has attracted such capitalists as Rockefeller. Mineral locations that cost \$500 from the Government, are changing hands at from \$10,000 to \$100,000, and town lots that six months ago sold for \$50, now are eagerly bought for \$500. Men of energy and enterprise have a good chance to "feather their nests."

The National Museum.

"The necessity of enlarged and more secure housing of the magnificent collection of the Geological and Natural History Survey of Canada at Ottawa."

Such is one of the topics which is to occupy the attention of mining men in Montreal next month, on the occasion of the 64th annual meeting of the American Institute of Mining Engineers, and of meetings and conventions of every mining society in Canada. The question is one of vital importance, it is one which has more than once been brought forward before the public in the columns of the CANADIAN MINING REVIEW, and no amount of pressure or solicitation on the part of the press of Canada will cease until "the magnificent collection," to quote the words of the resolution, finds an adequate and fire-proof building in which the natural and attractive resources of our great Dominion can with safety be kept for reference.

Not to speak of the educating influences of such a museum on the masses, which may be judged from the annual visits of some twenty thousand persons who register their names at the door. The natural collection on Sussex Street, Ottawa, affords mining men and practical geologists, agriculturists as well as those interested in natural science as a study, a most excellent means of judging for themselves of the VAST MINERAL WEALTH and the variety of it in

Canada. In this great Dominion of ours we have the rocks which—*par excellence*—carry minerals and mineral veins. The enormous development and distribution of primary rocks as we find them in Canada are such that no country in the world possesses so vast an extent of them, and these are metalliferous.

Our nickel, iron, silver, copper, gold and lead, and other metals are all found in these rocks, and it is now only a question of a proper acquaintance with the nature of these deposits, with the extent and practical usefulness of the ore, that we can begin to develop our mines with due regard to location, market and demand.

The cases of the Geological Museum on Sussex street are filled to overcrowding, and the building contains specimens of ores and minerals from every province, and mining district of the Dominion.

It is essentially a NATIONAL COLLECTION. Members of Parliament and those interested in the growth and welfare of this country, from whatever district they come, may see within the walls of the "old Clarendon House" specimens illustrating the resources of the county or riding they represent or from which they come. Ottawa, as a political centre, is visited annually by hundreds of persons from the old world and by more from the south of the boundary line. In a few moments, after spending—say, only a morning, or better a single day—such individuals as desire to become acquainted with the ore deposits which characterize Canada may do so with entire satisfaction. And, moreover, the information to be received there is reliable. Everything in the Museum tends to the practical. Besides the specimens of ores which are carefully labelled as to locality, exact and definite, as to the nature and quality of the ore, accessibility etc.—there are samples of material applicable to the arts, manufactures, for building purposes, for fertilizing the soil, for lighting and fuel purposes, gems, mineral waters, brines, salt and all such useful resources which it would take more space to catalogue than the present article demands. Suffice it to say that the verdict not only of Canadians who are justly proud of their natural collection at Ottawa, but visitors from other countries have time and again been struck with the REMARKABLE COMPACTNESS, UTILITY and perfect classification of the Museum. But outsiders, visitors from the United States, Great Britain, and from many other countries in Europe, have referred, in scientific and other periodicals, as well as in the public press, to the richness and beautiful order of the collection. AND TO THINK THAT IN ONE NIGHT IT COULD ALL BE DESTROYED BY FIRE. Every now and then we have a narrow escape of losing this grand collection. A fire-scare comes every time the alarm is sounded from the district adjoining, and of all the buildings which the Government owns at present at the capital there is not one so little fire-proof as the Geological Museum. Many visitors from the United States and Europe have called attention to this collection, and the names of

Prof. James Hall, of Albany, N. Y. State Museum; Prof. J. K. Ward, Rochester; C. D. Cope, Philadelphia; C. D. Walcott, and many others in Washington; Dr. F. Schmidt, of St. Petersburg, Russia; and Dr. Woodward, of the British Museum, and scores of others in Germany, France, Sweden, including Baron de Geer, Herr Lundbohm, Barois de Lille, Count Marazzi, and many others who have written on this subject.

It is a matter for our politicians to tackle and at no distant date. THE SOONER THE BETTER. The present accommodations are not only too dangerous, but likewise too small and inadequate to meet the growing requirements of Canada. Hundreds, nay thousands, of specimens are added which help to make the series of Canadian ores and useful natural resources more complete. Explorations in Nova Scotia, New Brunswick, Quebec and Ontario, as well as those in northern Manitoba, in British Columbia and in the remote portions of the Territories, such as the Yukon, Peace, MacKenzie, Reindeer and other river districts, have contributed, and are still contributing, a vast amount of material which give a good practical idea of the nature of the earth's crust at those points.

Canada has still vast regions of unexplored territory. The great North-West on one side of Hudson Bay; the great North-East on the other side of the same great Sea, count hundreds and thousands of square miles of unexplored country, and who can foretell what these regions may produce?

The gold of the Yukon, the tar of the Peace River, the coals of the great North-West, the iron ores of the Labrador peninsula, and in fact all the resources of remote districts are still in their infancy. The timber and agricultural capabilities of Canada are vast. They vary according to the soil and rocks from which these are derived. Canada has the BEST WHEAT GROWING MATERIALS in its soil of any country in the world, and that in enormous quantity.

The Geological Museum contains, besides the rocks and mineral specimens of the Dominion, a very valuable collection of Indian remains which serve to write up and illustrate the history, manners and customs of the tribes in Canada. These are unique in many respects, and additions are constantly made by the staff on the different explorations. Then the collection of plants and woods; these are very valuable indeed. It is the most perfect herbarium of Canada, and represents its flora very strikingly—from the boundary line to places within the Arctic circle. All these together with the Library of the Survey, which is fast becoming a source of valuable information for the study and development of our natural resources, the Chemical Laboratory, also the fossil specimens which illustrate the past life—both animal and vegetable on earth—the fur-bearing and other animals, birds, reptiles, etc.—all from Canada. These all, indeed, form a collection of which our young country can feel proud.

Not too much stress can be laid on the fact that specimens from HUNDREDS OF LOCALITIES

cannot be exhibited for want of space, and all that is exhibited runs the risk of being burned up. "The Museum is on fire," and the "building is destroyed" may any day be the cry whilst the unique collections which it has taken the staff fifty years to gather together will be forever obliterated and could not be replaced. There are type specimens of incalculable value to science. No intrinsic value can be placed on certain specimens. They serve to show the resources and history of our country, and should be placed in a commodious fire-proof building where there would be good light and offices for the staff, in which the officers would not be in danger or dread for their lives by the tumbling or caving in of the floors or walls.

The time has come for the Government of Canada to house these valuable collections properly, place them advantageously and in a fire-proof building in some spot where the general public and citizens can easily reach it. The money could not be better spent, seeing that Canada already possesses these collections, and if they are kept from destruction the annual increase and additions to them will soon make it a complete and most useful storehouse for Canada's products of the forest, land, stream, seas and rocks. A national collection would tend to increase the country's interest and cement the bond of union between the provinces, and at a glance the products of one district could be seen to be specially adapted to the products of the other, and in an harmonious whole all would tend to the upbuilding of a bright and prosperous Dominion, whose territory can safely support some 50,000,000 people. The mineral wealth of Canada is scarcely known as yet. Everything is in its infancy. We earnestly hope that this suggestion, which our mining men assembled are going to discuss, will become a reality.

The Cape Breton Coal Syndicate.

Idleness, or very intermittent work, has prevailed at the Cape Breton mines since the Christmas and New Year's holidays. The "Old Sydney" mines have done a fair amount of shipping to Halifax and Newfoundland, but with this one exception, the mining done has been insignificant. Some of the collieries are now starting, or preparing to start, banking out coal, and in a short time this kind of work will be general. A feeling of uncertainty and speculation pervades all classes dependent on the coal trade just now, and much anxiety is expressed to know what the present situation is going to hatch out. The much talked-of syndicate has taken shape and developed with great rapidity of late, and is now accepted as a *fait accompli* in mining circles. Naturally enough it is the topic of the day, and many and various are the opinions advanced as to the good or evil that is likely to accrue from it to the general and individual interests. We think it may be truthfully stated that the impending change is viewed with complacency, and perhaps with hopeful feelings, by the laboring classes. They expect to see

things "hum" around our collieries and shipping ports, and if modern and labor-saving appliances are used to an extent hitherto unknown, the great increase that is confidently looked for in the amount of work to be done, will more than compensate for this from their point of view, and cause a considerable if not a corresponding increase in the demand for labor. A wail is raised on behalf of the poor "coaster," which, it is feared, will be "wiped out" by the introduction of barges, but the season of 1892 must have demonstrated to the owners of small schooners that coasting, as far as coal is concerned, is now a business flat, stale and unprofitable, and it will be hardly fair to lay the blame for the destruction of this as a money-making business at the doors of the new corporation.

Among the outside public the question seems to have been viewed with tolerable equanimity, and in many cases with feelings of lively satisfaction. The opposition that has been offered locally has taken a political complexion. It would be altogether unfair to say that the Conservatives as a party are opposed to it, but it is nevertheless a fact that the strongest opposition in Nova Scotia has come from two of the leading Conservative organs in the province, while *vice versa*, the syndicate has found its strongest adherent in the Halifax *Chronicle*. The reason for this is not hard to seek. Premier Fielding has got hold of a very good thing, and his friends are jubilant over it. Mr. would-be-Premier Cahan and his friends are a little envious and cross about it. The consolidation of the mines in Cape Breton (which is the only mining district in Nova Scotia affected or likely to be affected by the change) will mean a large increase in the provincial revenue. The new corporation is prepared to pay handsomely for a form of lease of longer duration and more definite in its terms than those that have hitherto been granted. Mr. Fielding, in fact, has struck a "pay streak," which should mean for him a long continuance of the power he has wielded for some years past in Nova Scotia. However this may result, there can be no doubt that this form of raising money will be far more legitimate and by far less demoralizing for all concerned, than the methods recently in vogue. A good deal has been written by the Halifax and North Sydney *Heralds* lately on the subject of this American-Canadian combine, and it appears to us that these papers have indulged to a very large extent in what is known as "begging the question," in their opposition. For instance, they have advanced as an objection, the existence of an understanding between the Boston capitalists, who are the most deeply interested parties in the new concern, and Pennsylvania coal operators. This is all pure guess-work, and is, we are given to understand, utterly untrue. It would look to us as if, so far from being a combination of New England and Pennsylvania to stifle Nova Scotian competition, it is rather a combination of New England and Nova Scotia against Pennsylvania. At least, anyone who studies for a few minutes the position of Boston and New England in regard to the coal question, would favor this conclusion.

Then again the cry is raised that, with the mines all under one control, the price of coal will be instantly raised and a heavy burden thus imposed on Canadian manufacturers and upon consumers generally. This objection again, it appears to us, is more or less of a "bogey." The same competition that regulates prices at present will still operate to prevent anything like extortion, under the new regime. It has been an "open secret" that all the Cape Breton mines have, for some seasons past, been acting in concert in regard to the prices of coal, both f.o.b. and delivered in Montreal and elsewhere. Is it not naturally to be supposed that they have got as much as they could safely ask for their coal during this period? The result of this wise policy on their part has not resulted in any hardship, but, on the contrary, in good to all concerned. Fair dividends have in most cases been paid upon the capital invested, fair wages paid to employees, and we are not aware that any consumer has complained of having been pinched by the combination that has thus practically existed. Can the new combination do much more than the old one did in this direction? It is well known that in Montreal and the St. Lawrence generally—whither the bulk of the coal from Great Britain is sent—prices cannot be forced beyond a certain point without at once letting in Scotch, English and American coals. So far from having the effect of raising prices in this market, the prospect is held out of very considerable reductions being made in the cost of transportation and landing of the coal and also in the price to be charged consumers, while Montreal may become a distributing point for coal for districts now altogether monopolised by our American cousins. These two objections are the most terror-striking of the numerous ones advanced, and, so far as we can judge, there is not much to them.

The further objection, adroitly used to cause a scare among the laboring classes, that it is the avowed intention of the new concern to take advantage of the most improved methods for saving labor and cheapening production, is not worthy of this nineteenth century in which we live, and is hardly worthy of notice. For one thing we strongly doubt its having the effect sought to be indicated, and anyway, the march of science and progress cannot be interrupted. It must and will go on, in spite of any interested clamour to the contrary. We are decidedly of the opinion that the quiet and self-respecting mining classes, now resident in Cape Breton, would welcome all the modern labor-saving machinery with more heartiness than they would the horde of Poles, Hungarians and Italians, with which the North Sydney *Herald* threatens them, presumably as the alternative for the said machinery.

In conclusion, while perhaps it is inevitable that individual interests will suffer here and there in a big deal of this nature, we cannot but think that on the whole, it is calculated to bring prosperity to Cape Breton and to give to the development of its mineral resources—coal being only one of them—an attention and prominence which it has hitherto lacked, and which it has been loudly calling for.

EN PASSANT.

When, at the last of the Session a year ago, clause 156 was unexpectedly added to the Mines and Minerals Act by the Government of Nova Scotia, those who had followed the legislation in connection with mining, at once remarked, "There is a nigger on the fence somewhere." Whereabouts they were in doubt but a short time, for very soon afterwards it began to be whispered options were being given of certain coal mines in Cape Breton, and that a deal to concentrate the mining interests in that country was in contemplation. While the clause in question at the time of its passage seemed to offer sufficient protection to the manipulators of the proposed deal it became evident to their cautious advisors that other safeguards to their title to the minerals in Nova Scotia were desirable, after the CANADIAN MINING REVIEW had so fully and clearly exposed the willingness of the Provincial Legislature to exercise their sovereign power and override prior obligations when impelled by pecuniary necessities. A power that could and did refuse to submit to the decision of a legal tribunal when lessees of mining areas complained that the sanctity of contracts made by them had been assailed by the arbitrary increase of "royalty" to be paid that Government during the currency of their leases. The lessees prayed that the good name of the Province of Nova Scotia should be cleared, by an appeal to the courts, of the charges of repudiation which was made on the passage of the Act increasing the rate of royalty, but this step the Government refused to sanction. Seeing this it became evident to the syndicate to ensure their title and to guard themselves from treatment similar to that which had befallen the capitalists who had been induced by the Legislature of 1866 to sink money in Nova Scotia mines, that they, as lessees, should have in the event of dispute with the Legislature of Nova Scotia as lessors an appeal to arbitration or the courts. For this purpose they applied for special legislation, which the Government was not only willing to grant, but even to call a special session of the Legislature to confer, provided the syndicate was willing to pay for it. The terms asked by the Government were a royalty per ton of twelve and a half cents and a minimum amount based on the output in 1891 of the mines over which they should assume control. These terms were accepted and the Government have confidently appealed to the Legislature to confirm them in the belief that the bargain is a good one for Nova Scotia.

The situation has made the coal mines of Nova Scotia the talking-stock of the continent, and the Opposition, who have of course objected to the Bill, have contended that the ultimate object of the syndicate is to play into the hands of American monopolists, and cut off competition from Cape Breton. A calm and independent consideration of the question leads us to conclude that the immediate effect of the com-

bination of the mines will be to modernize their equipment, and reduce the cost of transportation of coal to chief centres of consumption. That this will be accompanied by a moderate advance in the price of fuel to the local consumers, is most probable. But instead of a reduced output, as foretold by the Opposition, we expect to see an enlarged trade and an extension to points of late beyond the access of the independent but small operators. We have, however, to agree with the Opposition that Nova Scotia is, for present advantages, discounting the future at a high rate, to tie up such a property as the coal field of Cape Breton for so long a term as 119 years, is undoubtedly unwise. The possibilities of that limited field are very great, its position on the sea coast and the cheapness with which its large seams can be worked, give it exceptional advantages which should not be tied up for so long a time.

It is amusing to see how the opinion of our good friend Attorney-General Longley veres to the necessities of the occasion. On January 12th, 1892, he desired to show that all previously existing leases terminated in 1886, and that what the lessees called "renewed leases" were "new" leases, and came within the scope of the Legislature of that date for new leases, and he wrote: "When August 15th, 1886, arrived, as I understand it, the Government of Nova Scotia were at liberty to take exactly the same course in respect to the coal mines of Nova Scotia and in respect to coal royalties, as they were in a position to take prior to the lease of August 15th, 1826. The Act of 1885 also * * * was a notice * that the Province not only had a right to absolute control in the amounts of royalty imposed, but * * held itself at liberty to exercise this right whenever it chose."

On January 25th, 1893, eager to justify the granting of an absolute lease for 99 years, with an extension of 20 years to the Whitney Syndicate, he, on the floor of the House when speaking of the existing leases, said: "By virtue of these leases, which are practically for 80 years, because in each of them there is compulsory right of renewal." Leases that in January, 1892, he says, were absolutely "new" in 1886, he declares in January, 1893, to be for 80 years from 1866.

In connection with the petition of certain lessees for disallowance of the Mining Act of 1892, we would respectfully call the attention of the Department of Justice to this change in the opinion of the Attorney-General of Nova Scotia.

A new principle of electrolytic separation of metals is said to have been shown by Freudenberg. According to Le Blanc, in a solution the amount of the electric charge is identical for one and the same ion, and that, therefore, the point of decomposition of an electrolyte may be exactly determined. As this value differs very considerably for the various metals, the author thought it probable that their separation may be brought about by employing currents of different E.M.F.'s, and the experiments already made

show that such is really the case. Thus, with a single Leclanché cell, having an E.M.F. of 1.35 volt, silver may be separated from copper and bismuth, and mercury from copper, bismuth, and arsenic. The analyses given show a very close agreement with the theoretical numbers.

Our next issue will contain verbatim reports of the proceedings of the International Mining Convention at Montreal.

At a recent meeting of the Manchester Geological Society, Mr. Henry Hall, one of the English inspectors of mines, contributed an interesting paper on the danger attending the recovery of unexploded shots. He said they all knew what a missed shot was, and having had a missed shot, they were bound to deal with it in some way or another, but what they did not know was how to deal with it with comparative safety. He had consequently brought this subject before the association, with the object of getting some information as to the best course to be pursued under such conditions as he had stated. The position seemed to be this, that assuming for a moment a missed shot in a narrow place, the first thing the man would do would be to connect an additional piece of wire to his firing wires and tie it on to the props. He would then proceed to drill another hole, and try to drive out the original shot. When the second shot went off, and he found that, instead of the charge having blown out the missed shot, it had simply blown down his coal and left his shot in the solid coal, the question then arose, what was he to do under the circumstances? Was he to drill another hole, and try to blow out the charge, or was he to try and get the missed shot out of the coal without exploding it? When he found his original shot not blown out he was not likely to go to the trouble of drilling another hole, and consequently he proceeded with his pick to try and recover the

missed shot from the solid, an operation which was attended with the utmost possible danger. That this danger was very serious was shown by the number of accidents which had taken place recently, and this large number of accidents made it very clear that something must be done. The danger seemed to arise, first from the low temperature at which the detonators would explode, and to the impatience of a collier in dealing with a missed shot under the conditions he had referred to. The only conclusion he had been enabled to come to was that they should make it a rule that no person except the shot-lighter or fireman should take any part in the recovery of a missed shot, and that even he should not adopt the plan of picking at the unexploded charge. He was not going to say that such an operation was actually unramming, although it approached very closely to it. He thought it was quite clear that they would be doing right to forbid a collier to take any part in the recovering of a missed shot. So far as he could judge there was no rule in the Mines Regulation Act that was better known to the collier than the rule with reference to his not being allowed to unram, whilst there was no rule the collier thought less of breaking, and the rule was broken every day. So far as the general safety of a mine was concerned the sooner any operation connected with the recovery of a missed shot was taken out of the hands of the collier the better.

In a paper before the Illinois Mining Institute on the subject of coal cleaning, Mr. Thomas Stocket, M. E., claimed that two points are essential for good cleaning. (1.) Evenness and regularity in passing the coal from the hopper to the screen, which insures every separate piece touching the screen proper and passing on to the table or belt in such shape that refuse may be readily detected. (2.) Good light, and an

abundance of it, which can be secured by the construction of large windows on the sides of and skylights directly over the screens and belts.

At the October meeting of the Engineers Society of Western Pennsylvania, Mr. Joseph H. Eastwick read a paper on the "World's Supply of Nickel." He mentioned the nickel deposits at various places in the United States which may be valuable, principally in Oregon, Nevada and North Carolina. A trial of the North Carolina ore by Mr. Mixer, of the Edgar Thomson Steel Works, was rather discouraging. It averaged about 2 per cent of nickel, although samples have been obtained running up to 10 per cent. The Nevada ores are abundant in quantity and comparatively rich, but they are arsenides of nickel and difficult to refine. They are also far from railroad facilities. The Oregon ores are of the silicate class and have not been developed in commercial quantities. During the discussion the question of welding nickel and iron was brought up. Mr. Mixer said that he had examined rolled sheets made in Cleveland, O., of nickel and steel. Looking at the edges of the sheet, it could not be determined where the nickel ends and the steel begins, but of course the outside is mostly nickel and the inside steel. The nickel is welded to both sides of a sheet of steel. It makes a non-oxidizable article having the stiffness of ordinary steel, and convenient for various uses. Mr. Mixer pointed out that the small percentage of nickel used in steel is not likely to increase the demand for nickel so much as is generally thought. The Edgar Thomson people had received from Commodore Folger a bar of nickel steel containing 25 per cent of nickel. It was about 2 inches in diameter and very tough, and a steel chisel was ruined trying to cut through it. It took a beautiful polish. It is obvious that for many purposes a steel with a high percentage of nickel may prove very valuable.

Comparative Statement of Coal Deliveries to St. Lawrence Ports, for the Years 1891 and 1892.

NAME OF COLLIERY.	MONTREAL.		SOREL.		THREE RIVERS.		QUEBEC.		TOTALS.	
	1891.	1892.	1891.	1892.	1891.	1892.	1891.	1892.	1891.	1892.
CAPE BRETON:										
General Mining Association.	40,819	75,547	26,840	1,589	4,173	9,012	24,011	30,472	95,843	116,620
Reserve	84,082	74,326	8,317	4,358	4,300	.....	11,212	9,419	107,911	88,103
International	103,969	77,758	.....	1,233	.....	.....	4,954	7,620	108,923	86,611
Caledonia	69,317	73,225	18,764	.....	.....	.....	940	.....	89,021	73,225
Gowrie	58,200	68,198	1,806	1,845	.....	.....	2,599	3,293	62,605	73,336
Glace Bay	53,324	43,676	.....	.....	.....	.....	412	1,723	53,736	45,399
Gardiner .....	.....	.....	.....	.....	.....	.....	.....	5,521	.....	5,521
PICTOU:										
Intercolonial	40,420	79,155	.....	4,566	.....	.....	276	.....	40,696	83,721
Vale and Acadia	4,193	.....	.....	.....	.....	.....	.....	.....	4,193	.....
FOREIGN:										
Scotch	15,193	23,236	.....	3,103	.....	.....	11,078	12,395	26,271	38,734
English	5,282	6,190	.....	.....	.....	.....	7,844	5,177	13,126	11,367
American Bituminous .....	.....	3,450	.....	.....	.....	.....	.....	.....	.....	3,450
	474,799	524,761	55,727	16,694	8,473	9,012	63,326	75,620	602,325	626,087

RECAPITULATION.

	Tons.		Tons.		Tons.		Tons.
1885.....	360,000	1887.....	482,103	1889.....	467,525	1891.....	602,325
1886.....	377,500	1888.....	517,539	1890.....	543,656	1892.....	626,087

CORRESPONDENCE.

Ahn and Dr. Emmens.

TORONTO, Jan. 23rd, 1893.

Editor Canadian Mining Review:

SIR,—In reply to Dr. Emmens' letter in your last issue, allow me to state the following facts:—

During the fall of '91 I met in Toronto Dr. Emmens, and escorted him at my own expense to Sudbury for the purpose of showing him the nickel mines of that district.

During the months of February and April following correspondence was continued, and at Dr. Emmens' request I forwarded him a report on a property in Denison I had for sale. This report was approved and agreements signed and money put up for development work without any examination being made by the Emmens Metal Company. This I considered an unbusinesslike transaction on their part. It, however, proves that Dr. Emmens did not form the poor opinion of my ability he states he did in his letter to the CANADIAN MINING REVIEW, a further proof of which is his letter from Youngwood, April 27th, '92, wherein he writes as follows, referring to the arranging of matters as to the deal for the property in question:—

"I think you have held the scales very fairly and evenly between all parties, and I feel satisfied we are putting the mine in good hands by intrusting its working to yourself. I know you will do your utmost, not only as a matter of professional pride, but also as a fitting reproof to the Canadian Copper Company and other people who treated you so shabbily and tried to prejudice me against you when I was in Canada. I need hardly add that if the mine turns out well we shall be glad to intrust you with its subsequent management when we purchase."

The agreement entered into by the Emmens Metal Company was to the effect that in consideration of their receiving a four months' option, they agreed to expend the sum of sixteen hundred dollars (\$1,600.00) in actual development work on the property. The only money they paid towards this amount was \$700. My receipts show that I paid \$200 more than I received.

After two weeks' work at the mine I found the surface ore playing out and dead rock appearing more plentiful. This was a repetition of what occurred at the Worthington mine, which is really a part of the same deposit, and the formation is identical. Of this change I wrote Dr. Emmens, and suggested stopping work until he could visit the property with me, which he had previously promised to do. He, however, sent his chemist to examine it for him, and on his return to Youngwood, Dr. Emmens wrote me as follows, June 16th, '92:—

The opinion I have formed after considering your letter and my chemist's statements, is as follows:

The mine is a promising prospect but as yet shows no body of ore of commercial magnitude.

Such ore as is found is for the most part nickeliferous, and a portion is exceptionally rich in nickel.

No immediate supply of nickel by the car load will be forthcoming.

The chances are in favour of success being achieved. A good body or bodies of ore may exist. I think they do.

After this Dr. Emmens asked for an extension of the option, which was ultimately granted.

On August 2nd an expert arrived in Sudbury to examine this property on behalf of the Emmens Metal Company. In his report he speaks several times of a vein occurring, and in one instance mentions it as occurring 30 inches wide, and in another part speaks of an occurrence 3 feet wide, and from the various measurements quoted in this report, shows that in the opinion of this expert that a vein does exist which has been already exposed for over 150 feet. In the summary of this expert's report he states, "That a comparison of the geological conditions with those noticed elsewhere, the nickel-bearing minerals found and the local indications are all promising and indicative of improvement in depth as the property is developed. The ore bodies in this district are generally lens-shaped and the nickeliferous minerals are found in greater quantity where lines of fracture or fault occur, as shown in this property."

The development work done is not sufficient to enable any satisfactory estimate of ore in sight, &c.

Further, this expert figures out that 113 feet of the vein, assuming it to be 200 feet deep, will yield \$18,080 worth of nickel and copper. To this must be added some considerable amount for platinum which Dr. Emmens reports occurs in some considerable quantities in the vein matter.

At the time my report was written the surface indications warranted everything that was said of the property, and three shots put in at different points threw out ore that assayed as follows: Sample 1, 7.10%; sample 2, 23%; sample 3, 28%. These samples were selected by some gentlemen from Rochester, and submitted by them to a reliable assayer with the above results.

The contract I signed to deliver ore at the price agreed upon. I signed not that I expected to be able to accomplish it without some small loss to myself, but I hoped by the appearance of the property to be able to make such a showing as would satisfy the intending purchasers. Had I declined to enter into the contract it would have shown that I had no faith in the property. This would not have been correct. I still believe it to be a valuable property and one that will ultimately prove itself equal to the Worthington.

Had Dr. Emmens mentioned in his letter that he had lately reopened negotiations with the owners for a purchase of this property, and upon their declining to take less than the original money for which it was offered, the real reason of his letter might be seen.

Were Dr. Emmens the honest man or gentleman he would have people think or believe him, he would not descend to the gutter to attain his ends, to say nothing of his sacrificing truth, which he has done either in his letter of April 27th or in his letter to the CANADIAN MINING REVIEW. And were he the experienced mining man he would have us believe, he would not expect to develop a mine for \$700.

Yours, etc.,

R. H. AHN.

YOUNGWOOD, PA., Jan. 31st, 1893.

To the Editor Canadian Mining Review:

SIR,—I have read Mr. Ahn's letter of Jan. 23rd to you and I beg leave to comment thereupon as follows:—

1. Mr. Ahn makes no attempt to deny or explain away the specific instances of regrettable actions on his part to which attention is directed in the article published in your December issue. If he wish to have the good opinion of the mining community he must not beat about the bush, and drag red herrings over the scent, and raise secondary issues. He must deal fairly and squarely with Messrs. Rickett's and Banks' report to the effect that they found no verification of his statement that "the hill in question is almost a solid body of Millerite, Pyrrhotite and Chalcopyrite, all of a high grade." This statement was either true or false. No reference to the "contingencies of mining" or "the surface ore playing out" will suffice to justify it, if, in point of fact, the hill was not "almost a solid body, &c."

2. The second advance (\$400) was made to Mr. Ahn on the understanding set forth in my letter of June 23rd, viz.—"We have decided to rely upon your deliberate expression of opinion that, with reference to Gersdorffite and Niccolite, you consider it possible to mine enough to pay the expenses of the development, by which we understand you to mean that we may reasonably expect to receive by August 31st sufficient high grade ore to amount, at \$5 per ton, to the total of our advances. Upon this understanding we forward herewith a cheque for \$400 as an advance on account of ores to be shipped at the rate of \$5 per ton or else to be taken over by us on the mine at \$3 per ton. Please therefore sign and return the enclosed form of receipt. In view of this decision I do not think it necessary to enter upon any technical discussion in reply to your letter. I will merely say that in acting on your advice we entrust our interests to your professional ability and good faith." The previous advance had been \$300. The understanding therefore was that the Emmens' Metal Company was, by August 31st, either to receive 140 tons of "high grade ore" on cars at the Worthington station or 233 tons of "high grade ore" at the mine. Mr. Ahn received and appropriated the money on this understanding, although, at that time, the condition of the mine was such as to preclude any reasonable expectation of the promised ore being produced during the next two months. This action on his part was either honest or dishonest. It certainly has the appearance of having been a dishonest and ungrateful return for the confidence reposed in his "professional ability and good faith."

3. When Mr. Ahn shall have cleared himself from the foregoing clouds that at present obscure the brightness of his reputation as a mining engineer and as an honest man, I will deal, to any extent that he may desire, with all the secondary issues he can raise. For the moment the following brief observations must suffice.

a. When Mr. Ahn volunteered to travel in my company I understood that he was going to Sudbury in connection with his own affairs. I did not discover that his offer imposed upon me any obligation either in law or in courtesy to pay his expenses.

b. Mr. H. P. McIntosh, of the Canadian Copper Co. informed me in Sudbury that I was at liberty to visit the Copper Cliff works, but that Mr. Ahn would not be allowed on their premises. This and other instances of feeling adverse to Mr. Ahn came under my notice, but I would not allow them to bias my mind. I determined to treat Mr. Ahn as I myself would desire to be treated, and I acted towards him on the supposition that he was honest and truthful, simply taking care to word my letters in such a way as to show that I was putting him upon his honour and was giving him an opportunity to prove himself more capable and trustworthy than was opined by his detractors.

c. Mr. Landale, when taking the option on the mine, did not visit the property, because I had laid down the principle of development before decision. And our willingness to expend some money in developing the particular property in question was because we believed Mr. Ahn's report to be substantially true. It contained some proofs of limited technical knowledge, but we made charitable allowance for these, and were influenced by statements which simply raised the issue of truth or falsehood. We felt that although Mr. Ahn might be a poor miner and an ignorant mineralogist, he was surely capable of distinguishing between ore and rock. When, therefore, he stated that "the hill in question is almost a solid body of Millerite, Nickeliferous Pyrrhotite and Chalcopyrite all of a high grade," we believed that some considerable body of ore did, in fact, exist, and that development was warranted.

d. Mr. Ahn's statement as to my having lately reopened negotiations with the owners for a purchase of the mine is

incorrect and misleading—wilfully so, if Mr. Ahn have seen my letters to the owners.

e. I think most experienced mining engineers would be of opinion that a hill (less than two miles from a railroad depot) which was "almost a solid body of Millerite, Nickeliferous, Pyrrhotite and Chalcopyrite, all of a high grade" could be developed and made to pay its way, "from the grass roots downward" with a commencing capital of considerably less than \$700.

f. When Mr. Ahn says I "descend to the gutter" in my article, I do not understand him. I am, however, willing to admit that in spite of my apparently slender acquaintance with mining matters, he may be a profound authority upon all questions of the gutter; and so I will not attempt to meet him in that particular field of discussion.

Yours, etc.,

STEPHEN H. EMMENS.

The Mining, Manufacture, and uses of Asbestos.*

By Mr. J. A. Fisher, Manager United Asbestos Co., Londonderry.

It would be impossible to give, within the limits of a paper of this description, more than a brief outline of the history of the mining and manufacture of asbestos. Moreover, the time at my disposal—since I had the honor of receiving an invitation to read to you a paper on this subject—has not been sufficient to enable me to collect and arrange the materials on which it is based in the order I could have desired; nevertheless, I hope to lay before you some particulars which may be found interesting. Asbestos has been found in all quarters of the globe, and there is, at the offices of the company with which I am connected, a large collection of interesting specimens, which I should be pleased to show to any gentleman who cares to call and see them. They come from Italy, Canada, Newfoundland, the United States, Southern and Central America, China, Japan, Australia, Spain, Portugal, Hungary, Germany, Russia, the Cape, and Central Africa. Scarcely a week passes without some new specimen arriving or an opinion being sought on some new discovery of the mineral substance.

Nearly all the discoveries made up to the present time have proved of little value, although we frequently see in the newspapers announcements of new sources of supply of so-called fine qualities of asbestos fibre, which, on investigation, prove to be worthless to the manufacturer. The important difference between good and bad asbestos will be at once perceived by an examination of the few specimens here, and I may say that the only kinds hitherto found suitable for commercial purposes are the Italian and Canadian varieties. These possess the properties of infusibility, tensile strength, fineness and elasticity which are so essential to manufacturers and the users of asbestos. It will be observed that this specimen of Australian asbestos, about the discovery of which a great deal was made in the papers some time ago, is very brittle and quite worthless for spinning or weaving purposes. I have here, also, a specimen of African asbestos. It is dark blue in colour, and while the length of the fibre is about the same as the Canadian, it is altogether wanting in fire-resisting power. Last year a considerable quantity of asbestos somewhat resembling the Canadian in character and formation was imported into this country from beyond the Ural mountains in East Russia, and we thought it would be worth while to make somewhat extensive experiments with it. As the result was not satisfactory I need not say anything more about it, but confine my further observations to the mining and manufacture of the two kinds of proved value, viz., Italian and Canadian. Specimens of these in the raw state, just as received from the mines, also after being cleaned and carded, are before me. The Italian variety may be distinguished by its longer fibre, saponaceous nature (an important quality when used in contact with moving parts of machinery), and its brown and greyish tint, while the Canadian is shorter, less saponaceous and white in color. Each kind has special merits, and is used for the purposes which experience has proved it to be best adapted.

I will refer first to the mining of Italian asbestos. The modern history of Italian asbestos mining may be considered to commence with the present century. We find that about ninety years ago two enterprising citizens of North Italy conceived the idea that what had been done in ancient times might be undertaken for modern requirements, and that a cloth made of this material would answer well for various purposes. They carried out some experiments in Lombardy, which were considered to be, to a certain extent, satisfactory; but the numerous crises which kept this part of Europe in a perpetual state of disquietude prevented the development of the trials, and for a further space of years asbestos seems to have been looked upon as a substance of some interest to the mineralogist and geologist, but of little or no practical and commercial value. It was not until the year 1866 that Signor Albonico, having given some attention to this product of the mountains of his native province, got into communication with a highly cultured and intelligent Florentine cleric, Canon del Corana, and they were subsequently joined by a distinguished Roman nobleman, the Marquis di Baviera. The result of their endeavors was that they produced some asbestos cloth and paper, and were in hopes of obtaining a contract from the Italian government for the supply of the latter for bank notes and other securities, but failed in this, and whatever prospects they may have had of better success in other directions

*Abstract of a paper read before the Institute of Marine Engineers

were spoiled by the outbreak of the Franco-German War of 1870. Signor Albonico had, however, obtained concessions from several communes of the right to work this material on their respective properties.

The valleys and mountains amongst which asbestos is found, although little known to the average tourist, are amongst the most beautiful of those which form the Alpine region, and the scientific man could not desire to explore ground of greater interest. As I am only concerned at present in describing those districts in Italy in which asbestos of commercial value is obtained, my remarks will be confined to those under the control of the company already referred to as that I am connected with, which holds all the mines of any real value, it may therefore be taken that my description will leave none unnoticed.

The first district in which asbestos of commercial value is obtained to which I desire to call your attention is the Susa Valley, which is approached from France through the famous Mont Cenis Tunnel. On emerging from the tunnel on the Italian side, the line follows the southern mountain slope, with a gradual descent, overlooking the town of Susa, which gives its name to the valley, and which is placed at the head of the plain, which at times widens, and at times narrowing, for a distance of about forty miles, finally opens out on the great plain of Piedmont. At a point in the centre of the valley, and on the northern mountain slope, are the places from which the floss asbestos fibre, the appearance of which in gas stoves is familiar to us all, is obtained. In the same locality is also found a fine white powder of asbestos, used in asbestos paint, and for other purposes. The ground from which these materials are got is about ten square miles in extent, and the works are carried on at a height of from 6,000 to 10,000 feet above sea level. The first temperature is, of course, low at such an elevation, but the inhabitants are hardy and robust, and make willing miners. The works are reached by mule-paths for some distance, but the remainder of the way has to be done on foot, and from four to five hours are required for the journey from the plain, on which are the railway and high road. The first work done here in recent times dates from 1876. The mode in which the material is brought down the mountain side is by loading it on a sort of toboggan or sledge, which slides as easily over the rocks as over snow, and so expert are the inhabitants at this work, that two men can bring down 1 cwt. of asbestos in three hours.

The second of the districts to which I will refer is the Aosta valley, commencing at Ivrea, a town of some importance, about forty miles, in a nearly northern direction, from Turin. From Ivrea to Chatillon, a distance of a little under 30 miles, the railway passes through the heart of the asbestos properties which flank it on either side, the direction being north-westerly, and at the latter town (Chatillon), the valley trends sharply to the west, until the city of Aosta, the ancient Augusta, is reached. The history of the asbestos mining industry in this province is as follows: In the year 1849 Signor Antonio Ré, of Rome, finding himself implicated in certain political troubles, took refuge in this valley, where he lived for many years. In 1873 he became aware of the proceedings of the Marquis di Baviera and the Priest Corona, and set to work to investigate the question of asbestos in the Aosta valley. He, like others, was aware of its existence, but until then the mineral found in this district had been thought of inferior quality, and not serviceable for any industrial purpose, so that no trouble was taken about it. In the year named, however, Signor Ré undertook a search for some better qualities, and having assured himself that such could be found in abundance, he put himself in communication with the gentlemen I have mentioned, and they being satisfied with the material, started working on a pretty large scale.

It is impossible to give, with any degree of exactitude, the extent of the ground covering the asbestos mines in the Aosta valley, as it has not yet been all thoroughly surveyed; but as the valley is some seventy-five miles in length, and varies in width from five to forty miles, some idea may be formed of it. Notwithstanding the large quantity of asbestos that has been got, enormous deposits remain untouched, and the yield may almost be considered inexhaustible. The quality of asbestos in the Aosta Valley is not, however, similar to that in the Susa Valley. It is of the kind known as "gray fibre," long, strong, and soapy to the touch, and is similar to that obtained in the third and perhaps most important of the vast areas which is situated in that portion of Lombardy known as the Valtellina. The district is divided into five communes, and the asbestos properties have an area of about 25,000 acres, or nearly forty square miles. The population numbers about 5,000, of whom a large proportion are engaged in asbestos mining. Throughout the whole of this extensive area the mineral is found in abundance and of the finest quality. For a distance of eleven miles of the twenty, which form the length of the Val Malenco, the name given to the valley in which the asbestos most plentifully abounds, there is a good carriage road, but beyond that the ascent to the mines is by following mere goat-tracks, and as the slope of the mountains is steep, the labour of bringing the mineral to the road in the bottom of the valley is very great. The surface of the ground is, for about one-third of its extent, pasture and woodland, the remainder being bare rock, which admits of easy examination and trial. A great portion of these mountains is as yet unexplored, but indications have been observed which lead to the conclusion that the supply of asbestos is practically inexhaustible. The height above

sea-level of the mines hitherto opened out varies from 3,600 to 7,200 feet. The climate, is for such an elevation, comparatively mild, there being some places at a height of 6,000 ft. where work can be carried on during the whole year. The inhabitants work willingly at the asbestos mines, in spite of its not being unattended by danger from landslips and avalanches.

For a long time the opinion was held that at a certain depth, greater or less according to circumstances, the veins of asbestos gradually lost themselves in the serpentine rock, but recent experience has proved the fact that if the direction of the vein be followed it will be again met with. The work is carried on by means of shafts and galleries, dynamite being used for blasting purposes. We also find the fibre at the greatest depths of better quality, being less indurated than that nearer the surface.

I come now to the mining of Canadian asbestos, and in dealing with this part of my subject, although I have visited all the principal asbestos mines in Canada, and studied the subject of asbestos mining in that part of the world as well as in Italy, I shall avail myself in the few remarks I may have to make of the researches of Dr. Ellis, of the Geological Survey of Canada, whom I have the pleasure of knowing. Dr. Ellis and other Canadian authorities state that the mineral asbestos proper—the Italian variety—belongs to the hornblende group of minerals, while that which is produced in Canada at the present day under the head of asbestos is in reality not asbestos proper but a serpentine rock called chrysotile. This occurs in veins in certain portions of the great belt of serpentine rocks of the eastern townships of Quebec, especially in portions of the townships of Thetford, Ireland, Coleraine, and Wolfetown. It is stated in the *Canadian Mining Manual* for 1891 that although asbestos was known at many points in Eastern Quebec more than thirty years ago, and was exhibited at the international exhibition in London in 1862, no attempt was made to work the mineral for some years. The credit of the discovery of the Thetford area is probably due to a French-Canadian named Fecteau, and following up his discovery certain areas were secured from the government by private parties. The value of the mineral was not at first recognised, and in the first year of mining operations, 1878, only fifty tons were taken out, for which a ready sale was not at first obtained.

The publication of the prospectus of the United Asbestos Company in the year 1880, referred to further on, gave a great impetus to asbestos mining enterprises, and new companies obtained tracts of rocky land in the townships of Thetford and Coleraine, and began the work of exploration and mining, the result being that from the year 1884 to the present time, large and increasing quantities of asbestos have been exported from Canada, a large proportion of which, however, would be of the qualities known as second and third grades, and used largely in the United States for covering steam boilers and pipes, roofing, building, and other purposes. Although Asbestos mining and prospecting in Canada has continued for fourteen years, and the areas of serpentine are very extensive, the portions in which asbestos of good quality or in paying quantities is found, are in comparison so small that mining operations are practically confined to two centres only a short distance apart. These places may be reached in a few hours from the city of Quebec by train on the Quebec Central Railway, which runs through the heart of the asbestos mining district at Thetford and Black Lake stations, about midway between Quebec and Sherbrooke, at which point train may be taken to Montreal or the South.

Dr. Ellis points out, and this is confirmed by my own observations, that the rock carrying the marketable asbestos is generally a serpentine of some shade of green on fresh fracture, usually a greyish green, in which are contained numerous small particles of iron, both magnetic and chromic, more usually the former. Serpentine that have a black, hard, chippy aspect do not promise well. In the asbestos-bearing rock proper the veins of asbestos are seen, without any special arrangement, intersecting the mass of the rock generally in every direction. In size they range from mere threads, sometimes close together, as in the specimen here, to a thickness of one to two inches, and, vary occasionally, three to four inches. The asbestos from these larger-sized veins, provided it contains no serious impurities, is classed as grade No. 1, and is used for spinning and weaving; the shorter stuff and such as contains impurities, is classed as No. 2 and No. 3 respectively. These latter grades, as I have already pointed out, are used principally in the United States for millboard, boiler and pipe covering and other purposes. The character of the ground, and the nature of the operation of mining, or more correctly quarrying, asbestos in Canada, may be ascertained from the plan and photographs I have here of our mines at Black Lake. Hand labor, which we are obliged to employ in Italy, owing to the difficult nature of the ground, has been largely superseded in Canada by the use of steam derricks, drills worked by compressed air, and other appliances. When a block of asbestos-bearing rock has been displaced by the usual methods employed in blasting, the pieces are broken up, barren rock removed to dumps or waste heaps, and the remainder passed through the process of cobbing, whereby the remaining rock is removed, and the asbestos exported in the form in which you see it here, and ready for the manufacturer.

The third part of my subject deals with the manufacture and uses of asbestos, and here I suppose we must give the ancient Greeks and Romans the credit of having been the first to make asbestos cloth; but there is nothing on record to prove that it was made or used on what we

should term a commercial scale. There is in the Vatican an interesting specimen of asbestos cloth which is said to have been preserved from ancient times, and Marco Polo mentioned, in the account of his travels in China in the thirteenth century, a fire-resisting cloth, which he at first supposed to be made from the skin of the salamander, but which proved to be asbestos.

I have already referred to the part which the Italian priest, Corona, took in connection with the exploration and opening up of the Italian asbestos mines in 1866. A Mr. Richard Lloyd took out a patent in the United States in the year 1857, for a packing in which he claimed the use of asbestos, but I am not aware that this packing ever came into practical use, so that, so far as our information goes, the priest, Corona, has the credit of being the person who in modern times first explored for the raw Italian asbestos, and then successfully produced from it a millboard which has become such an important article of trade, though its composition and its manufacture have undergone many changes and improvements since Corona's time. I believe that asbestos was used in the United States in the year 1868 or 1869, in connection with the manufacture of roofing felt and cement, but it was reserved for some enterprising Scotchman to first bring asbestos to the notice of engineers in this country. In this connection I should not omit the names of Mr. H. R. Robson, of Glasgow, and the late Mr. Walter McLellan, of the well-known Glasgow engineering firm. These gentlemen (with whom I was afterwards for several years associated in connection with the asbestos industry), having satisfied themselves as to the commercial value of asbestos, formed a company in the year 1871, called the Patent Asbestos Manufacture Company, established a work in Drummond Street, Glasgow, and commenced operations. I have already shown you how about this time the priest Corona, the Marquis di Baviera, Signor Albonico (the present manager of Italian mines), and Messrs. Furse Brothers, of Rome, were actively engaged in securing properties and concessions to work asbestos from the communal authorities in Italy, and when a few years later another company called the Italo-English Pure Asbestos Company, London, came into existence, backed by powerful influence, secured extensive mining rights and established a manufactory in Turin, keen competition for supremacy commenced. The result was that all these companies were amalgamated in the year 1880, by the formation of the United Asbestos Company, under the presidency of Sir James Allport, of the Midland Railway.

Competitors were soon in the field, and obtained a share of the trade opened up by the enterprise of the pioneer company. It was found desirable to concentrate the manufacture hitherto carried on at the old works in Glasgow, Turin, and Tivoli, near Rome, and extensive works were secured for this purpose at Harefield, near London, where asbestos goods, in all the forms in which they are offered to engineers to-day, are manufactured. The machinery and plant for this purpose is of the most complete description and would occupy far more time to describe than is at my disposal. I will briefly state the process of manufacture, and in doing this will refer mainly to the Canadian asbestos. The Italian fibre is more difficult to deal with, and requires special machinery. As we have recently effected further improvements in our mode of treatment, you will understand my reasons for a little reserve on this part of my subject.

Our works are divided into several departments. First there is the sorting and opening department, where the crude asbestos is dealt with. The blocks of fibre or "rock," as seen here, are crushed and opened up in special machines in such a way as not to destroy the fibre, and are passed thence to "shaking" machines, where the long fibre is separated from the short, and particles of rock removed. The long fibre suitable for spinning into thread is then taken into the carding and condensing department, and the short to the millboard and boiler covering departments. The treatment of the long fibre in the carding and condensing department is very similar to that in a textile factory, but its appearance would be scarcely encouraging to one who had been accustomed to wool or cotton. These latter staples, examined under the microscope, exhibit a notched or serrated appearance, which explains the ready way the material clings together when twisted. The peculiar nature of asbestos presents difficulties which are rendered more evident when its behaviour in the machines is watched, but these difficulties are overcome by special appliances attached to the condensing machines. As the fibre comes from the condensers in the form of silver or condensed thread without any twist, it lightly folds itself in cans placed there to receive it, and is then taken to the spinning and doubling department, where it is twisted into threads of every degree of fineness required. The thread then passes to the weaving and braiding department, where it is made into various forms of yarn packings, also into tapes and cloth. The cloth is then taken to the indiarubber department, where it is proofed and made into what is known as asbestos and indiarubber woven sheeting, tape and rings for steam and other joints, and also into rolled cloth and square block packings for glands.

This brings me to an important matter to which I should like to direct your particular attention. Recognizing that in these days of fast steaming and high pressure it is of supreme importance to marine engineers that they should have jointing and packing materials upon which they might place reliance, we produced six or seven years ago a combination of asbestos and metallic wire, which, with further improvements, recently effected, fully answered our expectations. Attempts had been previously made in this direction, but the results were not considered satisfactory, inasmuch as the asbestos metallic cloth to which

I refer was simply woven either with a wire warp and asbestos weft, or with alternate threads of asbestos and wire. We enclose, by an improved method recently adopted, a fine brass wire in the centre of every thread of asbestos in both warp and weft, thereby adding very largely to the strength of the cloth, while the wires are completely protected by the asbestos. This material is known as the Victor metallic cloth, and, being made into tapes and all sizes and shapes of joints as well as into round and square packages, is now largely used with satisfactory results by marine engineers and others. So dense and close can we now make joints from this material that it is being largely supplied for hydraulic work, and I have here two small rings which have been tested up to pressures of 2,500 and 3,500 lb. to the square inch respectively.

Another form of joint to which I should like to direct attention is the Salamander joint recently patented. These joints have two concentric rings made from the metallic cloth to which I have just referred. The rings are sustained by a suitable metal ring, the vertical wall in the centre of which forms a partition between them, and absolutely prevents the possibility of displacement by either steam or moisture. By this arrangement, in fact, a double self-sustaining joint is made in place of the ordinary one. There is great diversity of opinion as to the utility of Indiarubber cores in gland packings. If the cores are properly made, and are of the right quality of rubber, there may be a good deal to be said in their favor, but my opinion is that the use of inferior rubber is detrimental to the packing. Metallic cores are being tried, but I cannot see the use of a core at all unless it has some degree of elasticity. None of those I have seen contain this quality; some are practically solid, and others collapse completely under pressure. I have been making experiments lately in this direction, and have so far succeeded as to lead me to hope that I may shortly be able to submit an elastic metallic core packing to the practical judgment of marine engineers.

Turning again to the processes of manufacture at Harefield, I said that in the sorting and opening department the long fibre suitable for spinning is separated from the shorter fibre suitable for millboard and boiler covering, and this brings me to the millboard department. The manufacture of asbestos millboard is somewhat similar to that of ordinary cardboard. After some preliminary treatment, the asbestos fibre is run with water into the tanks of beating engines. Each of these tanks is provided with a rotating beater, which maintains a thorough circulation, taking up the fibre, opening and drawing it out, and then sending it forward to be soaked for a time until it comes round again to the beater. The binding ingredients are here added and thoroughly mixed with the fibre, when the pulp is passed into the vat of the millboard or paper machine, where it is kept in a state of agitation until gradually drawn off. The water passes through a fine wire gauze on a revolving cylinder, leaving a thin coating of pulp on the cylinder. This is then transferred by means of an endless band to a second rotating cylinder, where it gradually accumulates until the desired thickness has been reached. It is finally cut across and removed in the form of a square sheet of millboard. As the sheets contain a large percentage of moisture, they are next placed between sheets of zinc and passed under hydraulic pressure, and then hung in drying rooms. They are then again pressed and their edges trimmed, when their manufacture is complete.

In this process the chemical composition of the asbestos undergoes little if any change, and excepting the binding materials which have been added, chemical analysis shows the composition of the best millboards to be practically the same as the fibre from which they are made. It will be observed that nothing would be easier than to adulterate millboard pulp while in the beating engines, and large quantities of china clay and other ingredients are used by some manufacturers in this process. It has the effect not only of increasing the weight, but also reducing the cost, to the detriment, however, of the finished material. I should not like to say how far the practice prevails in this country, but of one thing I am certain, it is not done at the works of the United Asbestos Company. I have here a specimen of our special A1 quality of Italian asbestos millboard.

I now come to the boiler covering department, where the short fibre and powdery asbestos is worked up with other suitable ingredients into a non-conducting composition for covering steam boilers and pipes. Great improvements have been effected in this composition in recent years. The use of asbestos for this purpose has been criticised in some quarters lately, where it was desired to supersede it with other materials, and an attempt was made to show that asbestos was after all a bad non-conductor of heat. Now, after years of study of this subject, I may perhaps be allowed to say that much depends, firstly, upon the kind of asbestos used, and, secondly, upon the composition of the ingredients used with it for lightening it and for binding purposes. I venture to assert that with proper manipulation and application, asbestos composition will compare favorably with any other material as regards its power as a non-conductor of heat, while its indestructible nature is certainly a point worth consideration. The subject of covering steam boilers and pipes has, however, been brought into special prominence by the rule of the Board of Trade that all steam pipes and boilers of marine engines shall be tested by hydraulic pressure to double the working pressure at certain intervals. Before testing the pipes the lagging must be removed, but it is, I believe, in the discretion of the Board of trade surveyor whether or not the lagging of the boilers shall also be removed before testing.

This rule points to the desirability of producing a satisfactory removable boiler and pipe covering. The idea of making quilts or mattresses composed of asbestos cloth filled or stuffed with non-conducting material is not new, for this was done by us years ago for non-conducting purposes. But the way in which these quilts or mattresses were prepared was somewhat defective, as the fibre or other material with which they were filled shifted its position, the result being that some parts of the mattress became choked and other parts empty. This defect has now been removed by a simple arrangement which we have protected, and I have pleasure in showing you samples of this covering, which I hope will satisfactorily meet the requirements. The weight of the covering is only 1½ lb. to the square foot; it is easily applied, and may be removed and replaced without trouble. It has been carefully tested as a non-conductor, and found to give excellent results. We have already supplied several mattresses of this class to shipbuilders in this country. The surface can either be painted like the specimens submitted, or they can be covered with sheets of zinc. The latter has been done in some of the cases to which I have referred.

I may here allude to the asbestos paint, in which a considerable quantity of asbestos powder is used. These paints were patented by us and introduced in November, 1881, and are of two principal kinds: asbestos fireproof paint, suitable for rough woodwork such as joists, rafters, beams, stairs, warehouses, and wooden structures of all kinds, respecting which numerous public experiments have been carried out from time to time, to prove its remarkable fire-resisting qualities, and the asbestos oil paints, which are fire and acid resisting, but not quite fireproof. One special kind, however, will be of interest to marine engineers, viz., asbestos funnel paint. It resists great heat, as well as the action of sea water. When first introduced in an experimental stage, it proved less satisfactory than could have been desired, but the difficulties have now been overcome, and its use is steadily increasing.

Will you bear with me while I refer to one other matter which I think will interest you? I refer to bunker fires. You may remember that Professor Lewes read a paper before the British Association in August last on the "Spontaneous Ignition of Coal." In the course of his remarks he said that bunker fires, which were becoming very frequent on some of the fast liners, were due entirely to rise of temperature from the bunkers bulkheads being too close to the hot-air upcast shafts from the boilers and furnaces, and he said that he thought the necessary safety could be obtained by having a thin water jacket between the smokeshaft and the bunkers. Now, it happens that a day or two before I was invited to prepare this paper, I had written a letter to the editors of several technical papers on this subject venturing to express an opinion that many practical difficulties would arise in connection with the fitting of efficient water jackets, and pointing out that the necessary safety might be economically obtained by a proper application of asbestos to the uptakes, funnels and bunkers. I pointed out that this would not occupy more space than is usually occupied by the air casings or baffle plates which are generally fitted to these parts, and that it could be applied to any existing steamer (as it has in fact been already applied for the purposes of my experiments) without any alterations being made or room being specially provided. With asbestos on the uptakes and funnels to keep the heat in, and on the bunkers to keep it out, and with ordinary ventilation of the space between the two, all risk of fire would be removed. I shall be pleased to go more fully into this matter with any gentleman who takes an interest in the subject.

If I were to refer to the numerous other articles into which asbestos is manufactured, I should only weary you. Twelve years ago only three or four distinct kinds of goods were made; now we turn out over a hundred varieties. Asbestos twenty-five years ago was practically only known in the laboratory of the chemist or mineralogist. It now finds its way in one form or another into almost every workshop where steam is employed. I am being constantly asked to advise as to its suitability for a variety of operations, and it seems likely that its use will continue to extend.

Mining in British Columbia in 1892.

(By C. F. Law, B. C., World's Fair Commissioner.)

In looking back over the year 1892, we are pleased to note a great advance over the preceding year in all that pertains to the development of the mines of this Province. The era of active quartz mining appears to have dawned at last, and as the field of such activity is neither local nor restricted, we may reasonably hope that the coming year will see new sources of revenue added to those which already form the basis of our wealth. We propose to report on the general advance which has taken place throughout the Province in mining industry by noting first what changes have occurred in the oldest of our mining districts, viz., Cariboo, and while we cannot discover any increase in the production of gold from placers or quartz in that country, a state of affairs exists which will within a year or two, at the most, make a notable change. The district has long been an interesting study to those who look for a quartz development to supersede the worked out placers which proved so rich in the earlier history of mining in this Province. In all of the gold bearing countries to the south of us and in Australia, the placers after

being worked out, led to a great quartz era, and we may certainly expect that, although so long delayed, this will take place sooner or later. Cariboo has some drawbacks which other gold countries have not suffered from, but these cannot be said to be insurmountable, although they are of a character to keep capital in more accessible places. We refer chiefly to the lack of railroad communication. The construction of the Canada Western would produce a very remarkable change, because it would open that portion of the district which is at present most inaccessible and would lead to the opening of a country, known as the great bend of the Fraser, which is rich in gold and only waits cheap transportation to attract a large population.

With the new importance given to gold by reason of the single standard being maintained and the consequent decline in silver, we think a great impetus will be given to mining in Cariboo in the near future. Those quartz properties which have been opened already present some good features which make them worthy the attention of capital. The Island Mountain Mine, B. C. Milling & Mining Co's property and the Black Jack properties only require more capital and cheaper labor to be made productive. There are other prospects which have still greater attractions, but as there is a more extended field for investigation, only a very small section of the country has been prospected for quartz, whereas the whole district is worthy of close attention. It is possible that a zone of auriferous quartz may be found, as in California, to be outside of the placer area. If a mother lode exists it has yet to be discovered, but a key to this may be found in looking for similar conditions to those which prevail along the course of the best known gold quartz belts of other countries. In the vicinity of Hixon Creek some rich ore has been found in irregular pockets and stringers, in a dyke of so-called porphyry which lies between slate and granite, having Dioritic rocks intruding the slate.

It is possible that a good pay zone may be found along the contact of the slate and granite in that portion of the slate which has become metamorphosed where it approaches the granite.

This belt should be prospected from Hixon Creek to Cariboo proper, as it is where Diorites intrude that rich ore bodies may be discovered similar to those in California.

A very favorable locality for the discovery of gold quartz is the ridge which lies between the North and South Forks of Quesnelle River. An effort will be made to look this ground over next season.

The Forks of Quesnelle River enjoy the distinction, at present, of attracting more attention than any other portion of Cariboo.

The Victoria Hydraulic Company has completed a ditch 12 miles long, five feet on the bottom, seven feet on top and two feet deep from Spanish Creek to North and South Fork. They have one mile of iron pipe to connect with the ditch. It is expected that work will begin early in the spring and a clean-up made next season. The South Fork Company have eight miles of ditch completed, four feet at bottom and twenty inches deep. They have some difficulties to overcome before getting into the old channel which is known to run through the ground, but when this is opened a very heavy production of gold may be looked for. It is to hydraulic mining in this vicinity and Horsefly River that we must look for the first solid advance in Cariboo mining. Taking a careful review of the whole situation as it now stands in Cariboo, there is no investment which promises so well as the consolidation of these various hydraulic properties, with large capital, in the vicinity of Quesnelle Forks.

Too limited capital has caused the failure or retarded the success of more than one great enterprise, and we think money can be nowhere so well employed as in opening hydraulic properties of known value, on the largest scale. If this is done we have reason to hope that the advantage gained will be maintained by the discovery of gold quartz veins which will pay for their exploration and development after hydraulic mining in the district has proved a great success and encouraged capital to make further ventures.

There is a vast country lying between the North Thompson and great bend of the Fraser, which is practically unknown and invites the attention of those prospectors whose ambition it is to explore where no one has yet travelled. Bowman says in his report, that "the Cariboo range, forming the north-eastern limit of the Cariboo country, is the north-westerly continuation of the Selkirk range. The crystalline schist, or gold belt, seen on Quesnelle Lake, is represented by similar rocks on Shuswap Lake and in Eagle Pass." Here is a key for the prospector to work upon and should be closely followed up.

In reviewing the work done in Yale district during the past year, we are compelled to note the preponderance of the economic ores over the precious minerals so far discovered in that section.

We dare affirm, with every prospect of near fulfilment, that Kamloops is destined to become the industrial centre of the Province. Nowhere else has nature been so lavish in her riches in a situation where they can be so easily and profitably utilized as in this section.

The very best quality of iron yet discovered in the Province is found here in close proximity to the track, with a coal field of magnificent proportions to draw from, for its reduction and manufacture into commercial iron and steel.

The Kamloops Coal Company, on the North Thompson, have 1,800 acres of coal lands upon which they have twelve men employed.

The principal vein is 38 inches wide, of clean coal, supplemented by another of four feet which appears to converge towards it. A test made gives 62. fuel carbon with 70 per cent. coking quality.

The Canada Pacific are now making a locomotive test with good results. The Coal Hill Kamloops Mineral and Mining Company, whose property is situated two and a half miles south of the town, near Guerni's ranch, have a similar property in which they have run a drift 110 feet, under the superintendence of Major Vaughan. The coal is a first-class article. In Nicola another company is also opening up veins of coal, which we hope will prove equally good. A very fine quality of cinnabar ore is found on Copper Creek, and should invite the attention of capital at once, as the working out of the New Alameda mines in California, has made the ore of mercury a valuable commodity. Large finds of mica have been made at the head of the Thompson, but these veins are very inaccessible at present; of more importance for the immediate purpose is the discovery and opening up of very good silver-lead properties at Mosquito Flats on the North Thompson River.

Messrs. Wood and Tunstall, of Kamloops, have bonded the Lone Prospector claim to American capital upon most liberal terms, but which have regard to that most important consideration, viz., the development of the property.

On Siwash Creek good ores have been discovered which will be heard from next season.

The Vancouver Hydraulic Co's work on Van Winkle Bar, opposite Lytton, promises to be an important factor in the resources of this district. The bold and aggressive work inaugurated under the superintendence of Jacob Holland and by the advice of so well known a hydraulic expert as Mr. Hobson, is proof of the enterprise of Capt. Tatlow and his associates. A pipe of 3,000 feet in length, varying from 16 to 18 inches, has been laid down to conduct the water under a pressure of 377 feet.

The bar is three miles in length and half a mile wide, with three benches, prospecting from a few cents to one dollar per cubic yard. The facility with which sluicing can be carried on at all seasons and free escape for the tailings make the working of the ground most economical, and we look for great results. Application has been made by Kamloops parties for leases on Tranquille Creek, opposite to the ground which Chinamen have made pay for so many years. A good head of water can be obtained for hydraulic purposes, and next season will witness a change about Tranquille.

In the Westminster district very active prospecting has been done by the Anglo-American Mining Co. at Douglas, Harrison Lake.

Mr. Tallyard reports many good finds of gold and silver ores, but does not wish to advertise the country until developments prove a success. In the Similkameen district some prospecting has been done at the head of Wolfe Creek and discovery made of peacock copper. This whole district has been sadly neglected, but its turn will come when other places have become overdone.

The Hydraulic company operating on the Tullameen River is actively negotiating at the present with English capital, with a view to sale. Increased capital will bring this property into a prominent place. In Okanagan district very little mining is being done, the country being largely devoted to pastoral pursuits.

There exists, however, one property which is most worthy of mention, viz., the Monashee mine, at the headwaters of Cherry Creek. The property has been developed in a most miner-like manner by McDonald McIntyre, one of the owners, and only needs the introduction of capital and mining machinery suited to the reduction of gold ore, which is in part free but where principal value will be found in the concentrates. The ore runs in assay value over \$20 to the ton in gold, one quarter of which is free. The veins have been well exposed by tunnels at various levels, and the situation of the mine is first-class. The district of Osoyoos has come to the front in a very remarkable way during the past year as a gold producer. The principal camp is about Fairview, in the vicinity of Rock Creek, and embraces the well known claims Ratler, Brown Bear, Silver Star and Wym, acquired by Geo. Atwood and E. D. Reynolds for the Stratheyre Mining Co. These properties were paid for in spot cash, and the direct amount of money transferred in payment for same exceeds any deal hitherto made in the interior of the province. Other very valuable claims exist, among them being the Silver Crown, owned by Messrs. Andrews & Fleming, of Seattle, and Stemwinder, Morning Star, Black Diamond, Wild West, claims by various parties.

Camp McKinney, also in the same district, has a good property in the Eureka claim, which is being operated by the Douglas Mining Co., other important claims being Carbonate and Cariboo locations.

Boundary Creek has some remarkably good prospects, which have been opened up by Mr. Atwood and the Spokane & Great Northern Mining Co. Trial shipments of ore have already been made and proved very high grade. Many varieties of both silver and gold ore occur in this district, the Mineral King and Mountain Chief being free milling ores.

Kettle River and Priest Lake have added to the known wealth of the district, and we look for a large development next year. The district of Osoyoos, like West Kootenay, is very easy of approach from the other side of the line and offers great inducements to prospectors, who find their field of operations too circumscribed south of the 49th parallel. The first continuous supply of gold bullion produced from quartz mined in this province promises to

come from Osoyoos, which is no mean distinction. Trail Creek is advancing steadily in the same direction.

The ores from this camp contain as high as 7 per cent. copper, but gold is the principal value. Several very important properties are mentioned as promising to make big mines, viz: the Le Roi, Centre Star & I. X. L., O. K., Standard, Yellow Jacket, Josie, etc.

The Le Roi and Centre Star have been opened by tunnels over 200 feet long, and the development of the entire camp has been of the very best character. The future of Trail Creek is assured, and as wagon road connection is now had with Northport, on the Spokane Northern Railway, it is easy of access, which is no unimportant factor in the opening of a camp.

A very promising gold find was made on Salmon River late last summer, which gives high average returns in free gold. The country, a small amount of placer gold, has attracted the attention of Nelson men as a possible gold quartz field. On Toad mountain and in the district of Nelson no new discoveries have been made, but as it already has such properties as the Silver King, Dandy, Iroquois, Goldendale, Poorman, Whitewater and others, upon which a vast amount of work has been done, it is not necessary that new discoveries should be made in order to insure the success of the district.

So far as yet known the Silver King is without a peer, and when the hope which has been deferred so long is at last realized, this camp will at last take its proper place as a great mining centre. At Pilot Bay we have evidence of the enterprise of a gentleman who has done much for West Kootenay. Dr. Hendryx has made for himself the proud record of furnishing the Kootenay Lake district with the first smelter, which makes it possible to reduce the ores of the district into refined bullion. Mr. Farrell, who is associated with Dr. Hendryx, must be well pleased when he considers the great field which has been opened up by the discovery of Slocan and Lardeau.

The Blue Bell mine ore can now be mixed with the other ores of the district and a continual supply furnished without fear of interruption. The Pilot Bay smelter will cost when completed \$300,000.

The wharves constructed are of a very permanent character, and extend for a distance of 900 feet.

The office building contains nine rooms and is fitted with fire-proof vaults.

An assay office, 25x50 feet, with a wing, 25x25, has been completed. These are brick and iron, and are very substantial.

In addition to above are a warehouse, 35x65; blacksmith shop, 24x40; carpenter shop, 24x50; boiler house, 48x50; smelter building, 60x98; sampling works, 98x128; calcining furnaces in a building 98x170, boarding house, three stories and basement, accommodation for 100 men, refinery building, 120x245, all brick made in three drying houses, 36x50 each.

The Ainsworth camp is making fair progress, and will be heard from when the others get down to solid production.

A number of deals in properties have taken place, but the camp has suffered to some extent by the overshadowing influence of Slocan.

Development work has been proceeded with throughout the season, notably in Centre Star, where Mr. G. B. Wright has had eleven men employed driving a tunnel. The No. 1 and United are quiet. The Neosha has been continuously represented, and the Krao, Sky Line, Little Donald, Spokane, Tiger, Lady of the Lake, Mamie, Sultan, Bunker, Fourth, Eden and Crescent, Glengary, Tam O'Shanter, Kootenay Chief, Tenderfoot, Tariiff, Libby, Highlander and others are still to the fore with excellent prospects for the future. We understand that the Sky Line will be worked this winter on a large scale.

The history of the discovery and subsequent opening of Slocan district is most absorbing to those who watch the march of events in this province. To give an extended report of the wonderful transformation which has taken place since we wrote on this subject a year ago, is to repeat an oft told tale, but one which cannot fail to be of interest to the general public.

Although less than a year has elapsed since the first transfer of mining property in Slocan was placed on record, \$220,934 in cold cash has been paid for mineral claims situate in the district.

There are now 750 locations on record in the office at New Denver. Assessment work has been performed on 120 locations, only twenty-five claims being abandoned. The records show that 300 bills of sale, agreements and contracts have been recorded, and that \$554,500 is still due on sales and bonds.

In most cases large prices have been paid and the following are some of the largest transactions: Two-third interest in the Reco group, \$50,000; Twin Lake group, \$40,000; Stormont group, \$6,000; Jardine group, \$75,000; Ruby Silver, \$25,000; Idaho, \$20,000; half interest in the California, \$8,000; one-third interest in the Best, \$10,000; Last Chance, \$10,000; Slocan Star group, \$25,000; Freddy Lee, \$20,000; Blue Bird, \$25,000; Lucky Jim, \$10,000; Great Western, \$15,000; Washington, five-twelfth interest, \$8,000; Washington, one-fourth interest, \$8,500; Washington, one-fourth interest, \$22,000; Dardanelles, nine-sixteenth interest, \$56,000; Mountain Chief, \$15,000; Montezuma, \$25,000. The lowest of these is \$8,000, and there are also a number of other sales recorded under \$5,000 and downwards. The total amount of the transactions reaches the immense sum of \$700,000, and an idea of the increased confidence in the mines can be seen from the different sales of portions of the Washington, a quarter interest having been sold for \$8,500, while shortly after another quarter interest was sold for no less than \$22,000.

Assays show a range from 100 oz. to 2,000 oz. per ton, averaging nearly 200. A 10-ton shipment from the Dardanelles averaged 500 oz. per ton: Freddy Lee shipments, from 100 to 200 oz. The producing mines being worked this winter are the Young Dominion, Freddy Lee, Washington, Best, Idaho, Blue Bird, Cumberland, Mountain Chief, Mountain Boomer, Dardanelles, Montezuma, Solo, Alpha, Bonanza King and Wellington. In addition to these are the Yosemite, Reco, Monte Christo, Sunset, Scottish Chief, Stranger, The Noble Five, Lucky Jim, Payne, World's Fair, Beaver, Lincoln, White Water, Echo, Ajax, Tam O'Shanter, Revelstoke, Lucky Boy, Porcupine, Greenhorn, Robert E. Lee, Ruby Silver, Great Western, Grizzly Bear, Slocan Star, Honeycomb, and many others included in the Bremen and Jardine camps.

At least 1,500 tons of ore will be delivered at Kaslo this winter, by George Hughes, from the Freddy Lee, Blue Bird and Idaho, besides the ore which is being shipped by McMahon from Four-Mile Creek to Nakusp.

The town of Kaslo has sprung into existence with the opening of Slocan and is, perhaps, the most important representative mining town in the Province. The citizens are public spirited and not afraid to venture a few dollars when funds are required to promote the interests of the town and the country around it. The construction of a wagon road to Bear Lake and sleigh roads to the various mines from that point, is an evidence of the sort of men who have established themselves at Kaslo.

Next year will see this town advance to the rank of a city, with banks, warehouses, Board of Trade and other metropolitan improvements, such as electric light and waterworks system. This place may have a rival later on in New Denver, but any rivalry between Kaslo and Nelson is absurd, as the latter place occupies a position which does not enter into conflict with the other points.

Transportation facilities will, no doubt, have a marked effect upon the future of all towns in West Kootenay, but so far, both Nelson and Kaslo have secured a vantage ground in their relative situations from which it will be hard to dislodge them. The future of New Denver is most hopeful, but it is at the mercy of those companies who build railroads and their connections, though its situation is more favorable for securing all the trade tributary to Slocan Lake.

A novel object to be found in Slocan is a boulder of galena weighing 122 tons, which lies below the Slocan Star and is supposed to have come from that vein. It weighs 122 tons by measurement and assays 186 oz. silver, which makes its assay value over \$20,000.

Another interesting feature of the district is the carbonated mineral springs, discovered by Mr. Kemp and situated about four miles back of Kaslo on the road to Bear Lake.

The temperature is 38° F., and constituents:—

Lime Carbonate	83.50 gr. per gal.
Magnesia	12.85 " "
Soda	5.50 " "
Potash	.40 " "
Carbonate of Iron	0.56 " "
Sodium Chloride	1.20 " "
Silica Allumina and Phosp. Acid	3.20 " "
Lithia	Not determined.

It may be interesting to know that the ore chute on the Bonanza, one of the group of Noble Five, is 10 feet 7 inches wide—4½ feet chlorides, 3 feet of galena, and biggest showing in the district, but there are other properties which also have enormous ore bodies. The quality of ore is more remarkable than the quantity, and it may be said, to the lasting credit of this camp, that it is the richest in general average ever discovered in any country Slocan owes its phenomenal development.

The old adage says, "When it rains it pours," and certainly West Kootenay has been deluged this season with mining discoveries.

No sooner had Slocan become a standard topic, when a new district was heard from, viz., The Lardeau. The country has been known for a long time past in a general way, because of its accessibility and usefulness as a rail-road route from the north arm of Arrow Lake to the head of Kootenay Lake. Some places have also been worked at various periods, which made the district known to unknown.

The Lardeau country stands relatively in the same position as Slocan, one year ago. The discoveries were made too late for large developments to take place this season, but the size of the lodes and extent of their ore bodies make it possible to state that its future is already assured, and next season will no doubt add richly to the discoveries already made.

The centre of the district is Trout Lake, and having personally visited the spot, we know it to be a paradise for fishermen and hunters. At both ends of the lake are the mines are approached from these points, and as predict that towns will spring up there next year. The True Fissure, discovered by Messrs. Downs, Walker, Holton and Stobard—this is a bonanza; C. F. Black-burn's group, six claims; Thos. Homes' group, four claims; Poole & Crockett, two claims; Wm. Raimie's group, with extensions owned by others. These are all situated on the north fork of the Lardeau and directly accessible from Arrow Lake or Trout Lake.

On the ridge between the South Fork and Trout Lake are situated the Abrahamson Bros.' group of three parallel

lodes, the Silver Cup claim, owned by Great Northern locators and others. These claims can be approached either from Trout Lake or the South Fork. At the head of the latter stream are claims known as the Gainer group. This is on the same contact as the Haskins, Wagner and Sevoy groups, only the latter are more easily approached from Haley Creek, at the south end of Trout Lake.

The Haskins group is a very remarkable exhibit and only confirms the general character of the ore bodies in Lardeau. The most interesting feature of the ores is the amount of gold which accompanies the silver. In some instances it amounts to as much as the silver product, and this of course adds greatly to the importance of the district. The average value will be from 50 to 100 per cent. in gold and silver. This is distinctly high grade and when taken in conjunction with the fact that the ore bodies are very large, we have a presentation which gives assurance of a great future for the district, without taking into account the discoveries which may be made next season.

Another district of great promise, but as yet scarcely touched, is what is known as the Duncan River country. We may have to repeat, next year, about this district, what we have already said about the Slocan and Lardeau belts, but in addition thereto, we look forward to the discovery of a rich gold belt on the east slope of the Valley, as it is hereabouts that gold quartz lodes of great promise have already been found.

Along the line of the C. P. R. at Illecillewaet, and Fish Creek a large amount of development work has been done, and it is noteworthy of remark that many prospects are passing into the hands of good men, who have an abiding faith in the future of claims in the railway belt. The Lanark and Maple Leaf properties are still the most important, and it is a matter of regret that so much ore should remain in the mines when it can be sent to market. The Elizabeth claim, on Fish Creek, ranks first in importance among many good prospects, and the Dunvegan is expected to become a producer next year, after lying idle for too long a time. The country to the north, between Illecillewaet and Big Bend, is yet to be prospected, and will no doubt prove up good.

In Big Bend district we expect that good gold quartz will be found, as some very good ores were brought into Revelstoke this fall. The Consolation mine and other gravel diggings have done very well, and we hope will continue to do so, as much work has been done by those interested.

Some day the town of Revelstoke will wake up to find itself the centre of a great mining district, and then we hope to see its smelter in operation. In East Kootenay the mining situation remains much the same, except a most important discovery was made in Fort Steele district by Joseph Bourgeon, which will lift that portion of the country into great prominence. It is known as the North Star; is between 20 and 30 feet in width and assays 40 oz. silver. We are quite sure that the people who have taken over this property will be turning out bullion by next season.

The Thunder Hill, under Mr. Brady's management, is the most important enterprise in the district, and has passed the stage of exploration for the more solid one of production. The concentrating plant will be at work 1st March next. Mr. Fred. Wells marketed a carload of ore at Tacoma, which places Vermont Creek mine still at the front, and we understand that Messrs. Wells & Pollock intend to make continuous shipments of ore to Tacoma next year for treatment. If the average obtained will reach same as the last two cars, they will realize a handsome sum for the year's work.

The St. Mary's district gives greatest promise of any portion of East Kootenay, as so far the largest ore body yet discovered has been found there, and important gold finds have been made in the same vicinity late this season.

On Vancouver Island, a little placer mining has been carried on by Chinese on several streams heading into Barclay Sound. Some development work has been done on an extensive deposit of quicksilver, on Sechart Inlet. A number of ledges of gold-bearing quartz have been treated, samples of which have assayed very satisfactorily. Little has as yet been done towards their development, though there seems every reason to believe that gold-bearing quartz exists in considerable quantities in the hills adjacent to the West Coast. Iron of the finest quality has been located in immense bodies in several places along the west coast of Vancouver Island, and convenient to the water, in one or two cases on the water's edge.

The Behavior of Coal during Combustion.—Mr. B. Holgate, M.A.,* describes the variations of the behavior of coal during combustion. Cannel coal contains a considerable quantity of fish remains, and was deposited under water. When coked the lumps retain their original shape. Most other coals are somewhat similar in composition to one another, so that analysis alone will not determine their burning qualities. The appearance of coal is a much better guide. Some coals require a high temperature and a strong draft to burn properly, such as the better bed coal of Yorkshire. As a general rule, coal which breaks naturally into small will not deliver its gas so freely and will not burn so readily, but it makes the best coking coal when it is soft and breaks up easily. When the coal breaks into large lumps the gas can get away more readily.

*Lecture delivered before the Yorkshire College Engineering Society.

Coal Exports From Canada.

Coal exports from Canada during the fiscal year ended 30th June, 1892.

Country.	Tons.	Value.
From Great Britain	22,920	\$53,101
“ British Guiana	2,515	7,545
“ British West Indies	7,081	18,511
“ British Poss., Pacific Ocean ..	1,404	5,616
“ Australia	1,102	4,408
“ Hong Kong	9,915	37,170
“ Newfoundland	99,972	202,607
“ Belgium	400	800
“ China	1,149	3,834
“ Germany	150	450
“ Holland	700	1,445
“ Japan	1,226	4,571
“ Russia	1,181	4,724
“ St. Pierre	14,035	30,413
“ Sandwich Islands	4,222	16,388
“ United States	772,441	2,790,693
“ South West Indies	4,712	12,691
Total	945,125	\$3,195,467

The Cape Breton Coal Syndicate.

AN ENGLISH VIEW OF THE SITUATION.

During the past week, says a correspondent to the *Colliery Guardian*, several announcements have been made to the effect that American capitalists have acquired control of the collieries of Nova Scotia—lately described in these columns. As a matter of fact, this has been pending for some time. The semi-alarmist character attached to some of these announcements is misleading, and excites some mistrust of the insight into surrounding circumstances which Press correspondents are supposed to possess, especially as no mention is made of the fact that in purchasing the Canadian collieries the New England consumers have a length procured a source of supply for their 16,000 factories, independent of the capricious exactions of Pennsylvanian, Virginian, and Maryland producers and carriers. The rapid growth of the coal and iron industries of the south, and the more general distribution of centres of production over the states of the American Union have rendered some such independent source of supply absolutely indispensable to the north, if she is to hold her ground at all. Formerly coal, iron ore and all the allied raw materials were carried into New England as a matter of common usage, and manufactured into various articles for distribution all over America. In the natural order of things, however, this could not continue; manufacturing industries are now conducted, where neighboring and cheap supplies of raw material are obtainable, and from being the foremost manufacturing state, Massachusetts has now declined to third among the states of the Union. Notwithstanding this severe blow, many of the industries of the state have still survived, but of late, the ever-growing pressure of keen competition, allied to the severe transit and material monopolies of the south, have operated most heavily against the obstinate success of the north. The expression “obstinate success” is used advisedly, for sheer obstinacy has alone enabled the Northern States, far from all supply and surrounded by every possible impediment, to retain sufficient prestige to make Massachusetts a household word among 60,000,000 people, as a manufacturer of cotton, woollen, and other useful articles. This state, containing 238 inhabitants per mile, annually consumes £80,000,000 worth of raw material, nearly all of which is imported from her sister states, and in all this possesses no available deposits of native raw material nearer than that of her jealous and sometimes unscrupulous rivals. The principal parts in the rival states from which her supplies are drawn are distant from Boston as follows: New York, 292 miles; Philadelphia, 480; Norfolk and Newport, 620; Baltimore, 880; or an average distance of 550 miles; but to this must be added the distance from the mines to the above ports, such as 250 and 335 miles from Clearfield to Philadelphia and New York respectively, and 290 and 196 miles from the Cumberland mines of Maryland to Philadelphia and Baltimore respectively; so that Massachusetts has to purchase all her raw material, plus this land and sea transport, both of which are subject to the enormous extortions of monopolists. As on coal alone the consequent loss to the New England States is estimated at £1,000,000 sterling per annum, it is not at all surprising that the northern manufacturers and coal or iron consumers should have long meditated a *coup de main* in Nova Scotia, which is the only country so situated geographically as to be able to come into competition with the south. In Nova Scotia, unlike the latter districts, no very pronounced or vexatious monopolies or combines, either in mines or transit arrangements, hamper the cheap getting of raw material. The mines, especially in Cape Breton Island, notably at Cow Bay, Glace Bay, or Mira Bay, are actually on the coast, close to fine harbors, and are operated with exceptional ease and economy, being also capable of development to a sufficient degree to meet the annual consumption of the New England States, which is now set at 1,000,000 tons. As long as the Harrison Government remained in power, however, Pennsylvania and the south succeeded in upholding the duty on Canadian coal and held the New England Democrats in

check, quashing every petition to Congress, notably that of the autumn of 1891, which called for free coal, iron ore and coke, backed as it was by 237 of the leading directors and managers of New England iron-making establishments. Consequently all attempts to place Nova Scotian coal properties on the Boston market during the Harrison tenure have proved fruitless until the present time. Now that the vested interests of the south have suffered a reverse in the defeat of General Harrison, a modification of the coal duties looms sufficiently near to tempt the northern consumers into a consummation of their long-cherished plans, and the collieries have been bought. That these purely commercial arrangements imply anything like a gigantic monopoly of North American coal from Labrador to the Gulf of Mexico is, of course, as impossible as untrue. It is most unlikely that the lion of Pennsylvania will lie down with the lamb of Massachusetts, and as far as the latter is concerned it is equally impossible that Boston or New York, by the mere acquisition of the Nova Scotian collieries, could control the Canadian coalfields, for irrespective of wealthy and unexploited coal areas of New Brunswick and Western Cape Breton, vast areas of the undeveloped Nova Scotian coalfields proper will be outside the new syndicate's control.

Breakage of Winding Ropes in Saxon Mines.

C. Menzel states that since 1884 the law has been enforced in Saxony that all breakages of winding ropes and chains shall be notified to the mine inspectors. The returns obtained in this way show that during the seven years ending in 1891 there were in all 133 breakages of ropes and chains in the Saxon mines. Of this total, 32 occurred in metalliferous mines, 97 in collieries, and 4 in lignite mines. The breakages during the various years were as follows:—

Year.	Metal Mines.	Collieries.	Lignite Mines.	Total.
1884	4	23	1	28
1885	2	20	1	23
1886	1	24	1	25
1887	3	12	1	16
1888	6	6	1	13
1889	9	8	1	17
1890	7	4	1	11

From these figures it is seen that, in the case of the collieries, although the output increased 5½ per cent. from 1884 to 1888, and then decreased, the number of breakages is considerably less, whilst the depth of the shafts has continuously increased. The majority of breakages, as would naturally be expected, occurred as the cage was being raised; in only 18 cases the breakage occurred as the cage was being lowered. The causes of the accidents cannot be ascertained with accuracy. Some 43 of the cases were, however, undoubtedly due to bad or worn material; 5 to 7 were due to imperfect welding, 20 to friction on the pulleys, and 20 to the jamming of the cage or kibble in the shaft.

The question whether it is desirable to have safety-catches or merely to trust to the rope being of good quality is not yet definitely decided by the mine managers. In the 79 cases in the collieries in which safety-catches were provided, they came into satisfactory action in 60 cases, or, in other words, 76 times in 100. These results certainly appear to be in favor of the adoption of safety-catches.

A Great Coal Shaft In the States.

The sinking of the largest coal shaft in the world by the Lehigh & Wilkesbarre Coal Company at Ashley, three miles from Wilkesbarre, Pa., has now progressed as far as the bed rock, which has been encountered at a distance of fifty feet from the surface. The shaft is 70 by 30 feet over all and will be 1,000 feet deep, penetrating to the red ash vein of coal. The size of the opening will be reduced to 55 by 14 feet by the banking of a five-foot wall and a hemlock cribbing. This wall will rest upon the solid rock fifty feet below the surface. The shaft will not only be the largest in dimensions of any in the world, but will have four compartments for hoisting coal, whereas the largest collieries have but two; and with the new breaker to be erected here, it is expected that the daily output and capacity will considerably exceed those of any anthracite coal plant in the world. The excavation of the soil has been rapid, and the refuse has been taken away by means of an overhead railway system. It has taken just one month to get through the quicksand bed, a foot thick, which was near the rock. For this work caissons had to be constructed.

These new workings, with the development of the South Wilkesbarre shaft of the same company, will furnish employment to 1,500 extra men, a fact which is contemplated with pleasure by many hundreds of miners hereabouts, who are in constant fear of partial or total suspension of work at some of the other collieries. The South Wilkesbarre shaft has never yet been worked. It had just been prepared for mining operations when there came the terrible gas explosion two years ago, by which eighteen men were killed, the mine set on fire, and a large part of the cribbing and brattice work destroyed. Since that time the mine has been twice flooded, the first proving insufficient, and the destroyed timbering has just been replaced.

GENERAL PHOSPHATE CORPORATION.

Boodler Sando and Sir George Baden-Powell Retire from the Board—An Excerpt from the Directors' Report to be Presented at the Meeting of Shareholders.

The adjourned annual meeting of the General Phosphate Corporation, Limited, was held in London on 26th inst, and our next issue will contain an account of what took place. In anticipation of the meeting the directors issued a lengthy report, but owing to the accounts from Canada not having been received in time, only an approximate statement can be laid before the meeting. The accounts are to be audited immediately afterwards, the directors having thought it better to take this course rather than propose a further adjournment. "The directors much regret the absence of profits from which to declare a dividend." This result is attributed mainly to two causes—the present low selling price of phosphate, and the difficulties with which the directors have had to contend as regards the development and management of the Canadian properties. When the Company was formed the price of 80 per cent. phosphate delivered in this country was £5 3s. 4d. per ton, while now it has fallen to about £3. In regard to the second of the two causes mentioned, the administration of the Company's affairs in Canada was towards the end of last year placed in different hands. Mr. Alexander Benson was appointed manager and engineer at a salary of £300 a year, thus effecting a saving, while Mr. R. W. Shepherd, Jun., has been appointed general agent. The directors express their satisfaction at the fact that a charter has been obtained from the Canadian Parliament for the construction of a railway from a point near the Company's mines to Buckingham, where it will effect a junction with the main line of the Canadian Pacific. No progress has been made with the mining of mica on the Company's property. With regard to the actions that have been commenced by some of the shareholders for the removal of their names from the register, it is thought that a decision will be given by the courts within the next few weeks. "As regards the future policy of the Corporation the directors are in the hands of the shareholders. The directors think it would be much to be regretted if the work of developing and turning to account the Corporation's undoubtedly valuable properties were not continued, thereby losing the benefit of the money which has already been spent. This is one of the matters which they would be glad of the opportunity of discussing with a representative committee of shareholders. During the year the directors have lost the services of Sir Jacob Wilson and Sir George Baden-Powell, the first owing to his having received a Government appointment, and the latter owing to his engagement on the Behring Sea Commission. Professor Crookes and Mr. Sando have also resigned."

Stopping Back Water by Brick Dams.—An account is given by Mr. J. Niven* of the brick dams constructed at the Mirfield Moor pit for stopping back a heavy feeder of water. During the sinking of a pit a large amount of water came from the river through an open-jointed rock, and had to be tubbed out. Coal was met at a depth of 457 feet, or 110 feet below the ordnance datum; and on driving towards the river two up-throw faults raised the coal 70 feet. These were cut through by a stone drift rising 6 inches to the yard, and the workings continued to a distance of 300 yards from the pit bottom. It was then found that a very large amount of water was coming through a stratum of 2 inches of soft dirt below the coal, and flowing down to the pit, where it had to be pumped from a depth of 200 yards. Brick dams were accordingly put both in the intake and return drifts. The dam in the intake was 10½ feet wide by 7½ feet high, and six courses of bricks in thickness, with 1 inch of cement between each course. The dam in the return was somewhat smaller. The floor, roof and sides were cut back 18 inches, and a 6-foot length of arching was placed on the outside of the intake dam, as the roof was weak. In ten days the pressure rose to 108 pounds per square inch, but the dams have remained tight. The cost of the two dams was £70.

Kelly's Sectional Boiler.—The sectional boiler built by Messrs. P. J. Powers & Co., Ottawa, for the Kootenay & Columbia Prospecting & Mining Co., reached Kaslo 10th January and was packed into the Wellington Mine, and commenced work 5 days thereafter. The boiler in every way is a complete success, so much so that Driller Kelly, the inventor, has decided to have it patented in Canada and the United States. A second boiler with improvements in tubes, grate and firebox is now being built, and will be shipped to the Kootenay in March or April. Cuts of this boiler will appear in the March number of the REVIEW.

* Transactions of the Federated Institution of Mining Engineers, Vol. 111, pp. 132-138, one plate.

MINING NOTES.

[FROM OUR OWN CORRESPONDENTS.]

Ontario.

Algoma Nickel Mines.—The three mines of the Canadian Copper Company are still closed down pending the decision of the courts in Ohio as to certain matters in dispute between the company and Mr. S. J. Ritchie, their former managing director here.

Mr. S. S. Ryckman, M. P., of Hamilton, Ont., has lately secured options on many valuable nickel properties on the range, presumably for a syndicate of English and American capitalists who wish to get an interest in the nickel mines here.

On lot 6, con. 3, Graham, some very high grade cobalt ore was discovered last summer, and the work of further exploiting the property will be started as soon as the snow leaves in the spring. Mr. J. C. Ryan, of East Saginaw, is also organizing a company to work an adjoining claim in the same township.

Mr. Arthur Kitson, of Philadelphia, has purchased a nickel property in Denison, and operations are expected to be commenced soon. Quite a number of other locations are to be opened up this year, and with the growing demand for nickel we look for unprecedented activity and interest in mining here before the present season is over.

The Worthington mine, in the township of Drury, is being worked this winter on a fair scale. About fifty men are employed in it now. A chute of exceedingly rich ore has been disclosed in one of the shafts of this mine, not far from the surface, and carrying over 40% of nickel. This is the richest nickel ore ever found in the district, except at the Vermillion mine.

Some of the finest nickel properties in the District are in the townships of Denison and Graham, where the range "gets her back up," rising in many cases into tremendous hills and ridges of ore above the surface. But their development is retarded by the want of a customs smelter at which ores could be sold. All the companies having smelters here now work their own mines and there is no local market for ores. It is estimated that \$50,000 would build a custom smelter with a capacity of 100 tons a day, and such a needed enterprise, if properly managed, ought to pay well.

British Columbia.

Kaslo.

The stage line from Bonner's Ferry to Nelson, 65 miles, has been running since close of navigation. The fare is fixed at the moderate figure of \$10 per passenger.

Blacksmiths' coal at Kaslo can be purchased for \$80.00 per ton. (Ottawa Cartage Co. will please paste this in their hats.)

Two men were buried in a snow-slide at the Freddie Lee on January 3rd. The gang were working in the drift over which the slide passed. The mouth of the drift was blocked up for fifteen feet or so, and the miners had to dig their way out. Two whipsawyers making boards over a small pit had a miraculous escape, the slide being split by a rocky knoll sixty feet or so above them.

The Kootenay & Columbia Prospecting and Mining Company, and a Spokane syndicate each owning a half interest on the "Stanley," fifteen miles from Kaslo, intend commencing development work early in March.

Real estate has advanced from 300 to 500 per cent. in Kaslo since last spring. Corner lots in the business part of the town are stiff at \$3,500. Stores with plate glass fronts, and first-class hotels adorn the town. "Seven-up Teas" and "Progressive Poker Parties" are all the rage this winter.

Twenty tons of silver lead ores are being hauled into Kaslo daily, awaiting opening of navigation. It is estimated that at least \$500,000.00 worth of ore will be ready for spring shipment.

Miners' wages still continue at \$2.50 to \$3.00 per day and board. Provisions and horse feed are extremely high. Potatoes, \$7 per bag; pork, \$60; flour, \$20; fresh beef, 20 cents. Dealers are paying \$20 per ton at Nelson for ice.

Driving Levels in Hard Dolomite.—A level has been driven by hand in very hard dolomite in the Raibl mining district of Carinthia. V. Wallt gives details regarding the running of this drift. During eleven months 777½ eight-hour shifts were worked off, 2,411 bore-holes were drilled, 2,701 drills were used; 344 lbs. of No. 1 dynamite, 107 coils of fuse, and 2,442 detonators were exploded, and 174 lbs. of linseed oil was also used. The holes were drilled, as a rule, to a depth of 17-7 inches. The drift itself was 7 feet 2 inches high, and 4 feet 7 inches broad. During the period above referred to it was driven 155 feet at a total cost of £90.

CANADIAN COMPANIES.

The West Isles Mining Company gives notice of application for charter of incorporation under the statutes of New Brunswick. Authorized capital, \$1,000,000, divided into 100,000 shares of \$10. Directors: Henry B. Witter, Boston; James M. Lord, West Isles, County Charlotte, N. B.; Fred P. Greenwood, Boston. Head office: St. Stephen's, N.B.. Object: The mining and developing of mining properties, etc.

Anglo-Canadian Asbestos Co., Ltd.—At a meeting of the board of directors of this company held this month, a dividend of 20 per cent. on the year's operations was declared. A similar amount was paid in 1890 and in 1891.

MICA NOTES.

The Lake Gerard Mica System have closed down their Horse Shoe mine near Wilson's corners. The machinery and men are now at work on the "Nellie and Blanche," which is now employing about 50 men.

The Lake Gerard mine has now exposed the biggest show of crystals on record, estimated at 200 tons. Capt. Symons, late of the Bristol iron mines, is superintendent, vice E. B. Roche resigned. 49 hands are employed.

About 15 men are still working on the Thebret lot for the Lake Gerard System.

Mr. S. P. Franchot has nine men under Capt. Henwood mining spar and mica at the Villeneuve mine. The output of spotted and white mica averages about 1,600 pounds weekly and about three tons spar daily.

Mr. Chas. Pearson has five men mining spar on the Dwine lot, near Square Hill. Output about five tons daily. Over 400 tons of selected spar is now on the dump ready for hauling to Buckingham.

There are now three mica cutting establishments in Ottawa. One on Duke street, Chaudiere, one on Sussex street, and the third on Stewart street. The three factories employ about 90 hands.

Messrs. G. B. Hall, John C. Eno and Daniel McGie, of Quebec, are working a fine white mica property on the Saguenay, about 70 miles from Quebec. Mr. Hall was in Ottawa a few days ago and had 60 lbs. of samples of beautiful white muscovite cut to sizes from 3x4 to 9x5. William Campbell, late of Buckingham, is superintending the mine. Two cutters went from Ottawa last week. The output is in the vicinity of 18,000 lbs.

Mr. W. A. Allan is working five men on the Little Rapids for amber mica. About 60 tons is the output up to the end of January.

Messrs. Nellis & Gemmill have 120 tons mica stored in their sheds at Gow mine, Cantley. Seven men, under Wm. Stuart, Sr., are employed. The output averages from three to four tons weekly. Their show is the best looking one at present in the district.

Messrs. Lee Bros. have re-opened their Carey lot on Macgregor Lake. The mica pinched out and a phosphate deposit 60 feet by 12 has been uncovered, and about 225 tons, 85% lumps, are now on the dump. An offer for the lot of \$12 per ton, f.o.b. Templeton, has been refused.

The same firm recently purchased lot 4, in 9th Range of Templeton, from the Templeton & N. O. Co. for \$750. They took out 30 tons mica of fair average quality at a cost of less than \$200, and re-sold the property for \$4,000 to Ferguson Bros., of Montreal.

Messrs. Wilson & Chubbuck have recently purchased 300 acres in the 2nd Range of Wakefield, two properties are being developed with 12 men and show promising veins of high grade mica.

Compressed Peat Charcoal.—H. Ekelund, of Jonkoping, utilizes the heat from the cooling peat charcoal and the waste furnace heat to dry the peat preparatory to coking it, and in this way he is able to treat with advantage material too high in moisture to be otherwise employed. He gives a statement of the cost of production of such charcoal. Experiments with the Ekelund process of making coke from peat have been carried out at Omberg, near Motala, in Sweden. The furnace or oven is built of fire brick, and is divided into four chambers, 32 feet high and 20 feet square. The peat is conveyed on rails into the top chamber, where it is dried for two hours. It is then transferred through doors into the second, and then into the third chamber, in each of which it remains for two hours, and the coking is thus performed in two stages. After this the coke peat is transferred to the fourth or cooling chamber. The gas from the second chamber is passed through condensers to the third chamber, after which it is used for generating steam. The furnace will treat 10,032 cubic feet of peat with the production of 48 tons of coke in the twenty-four hours. The coke is either compressed or is used as produced.