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THE MINING REVIEW

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B. T. A. BELL, Editor and Proprietor.

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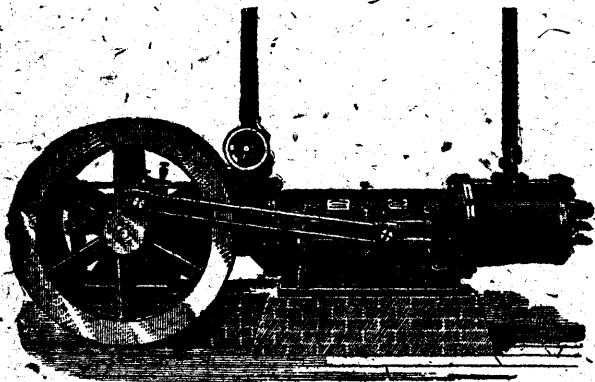
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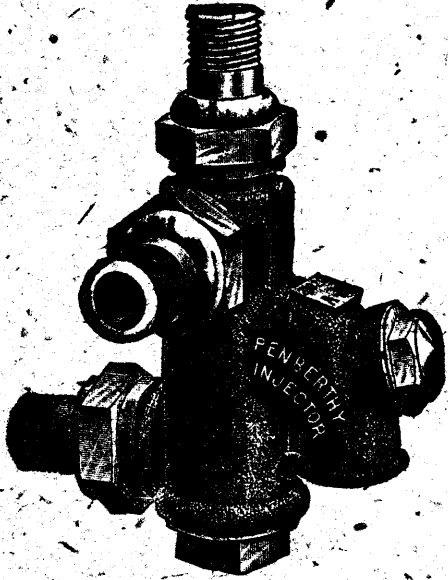
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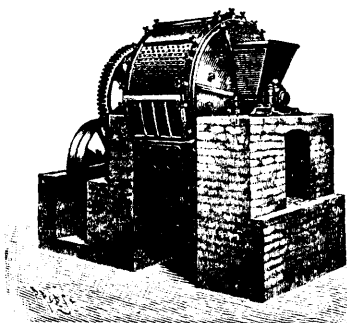
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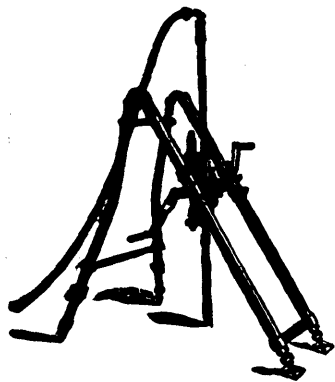
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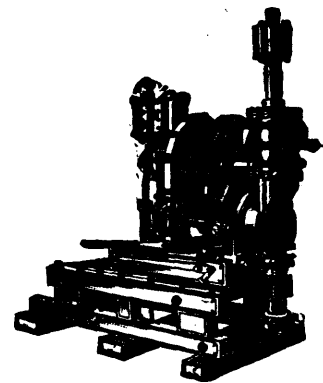
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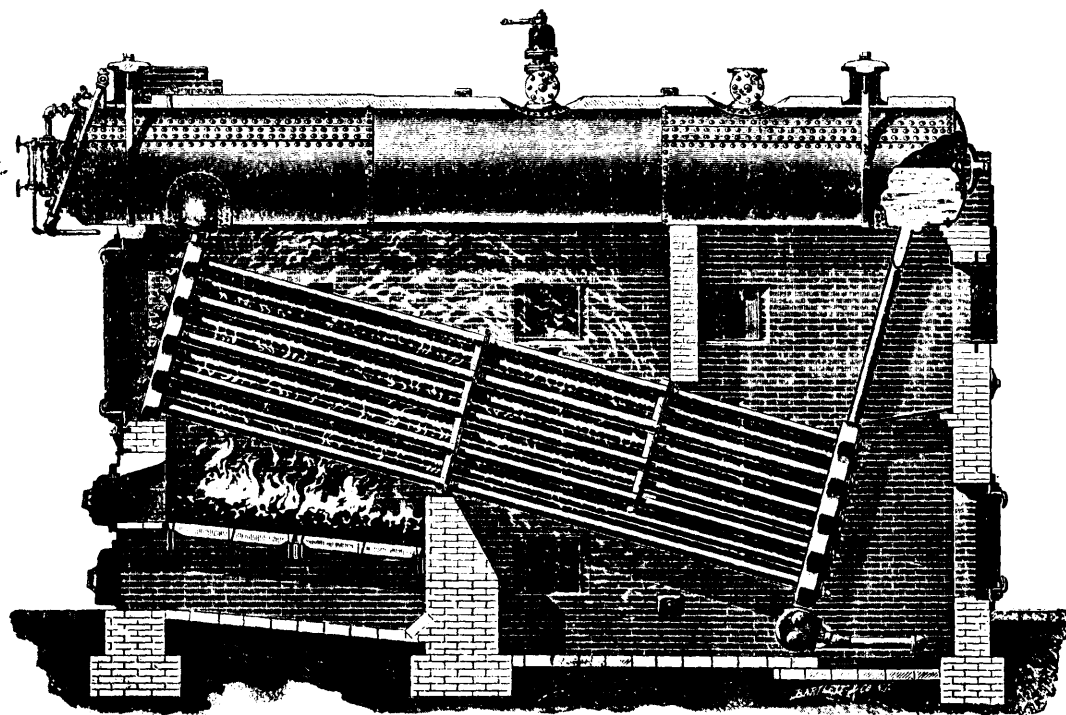
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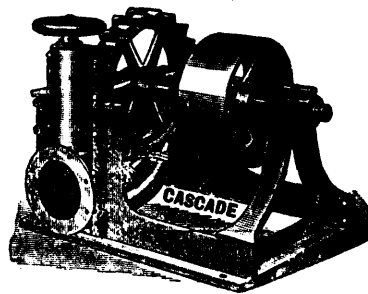
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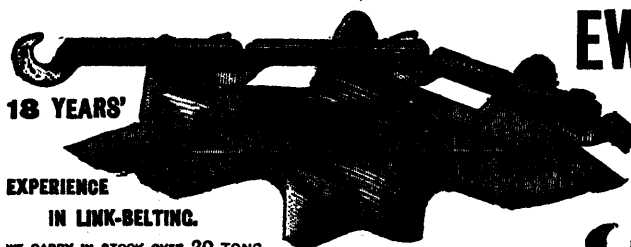
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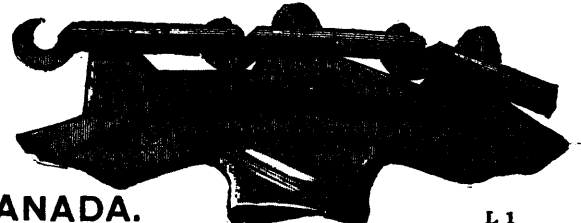
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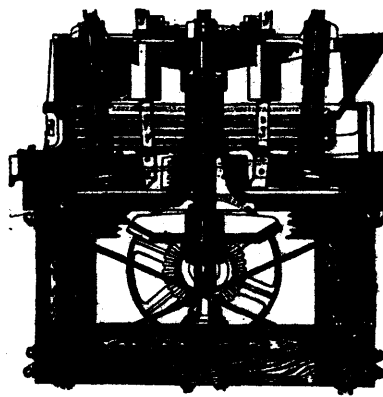
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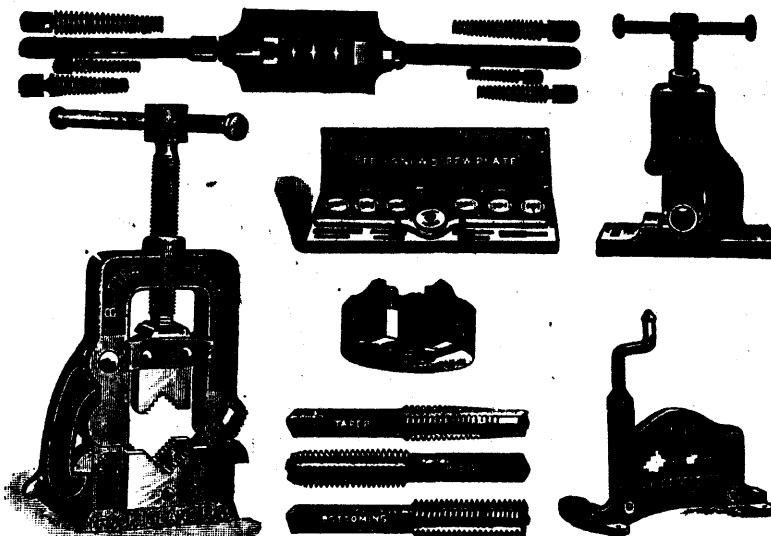
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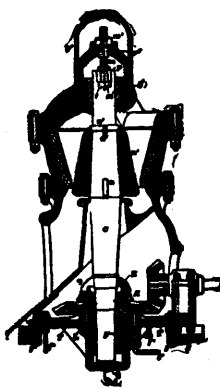
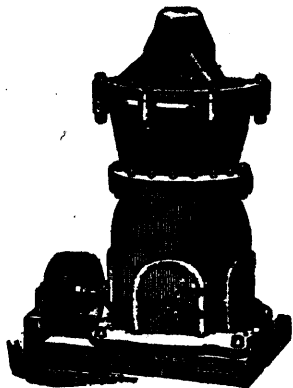
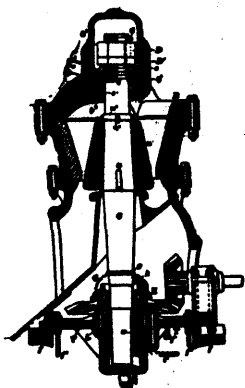
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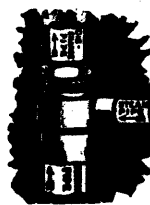
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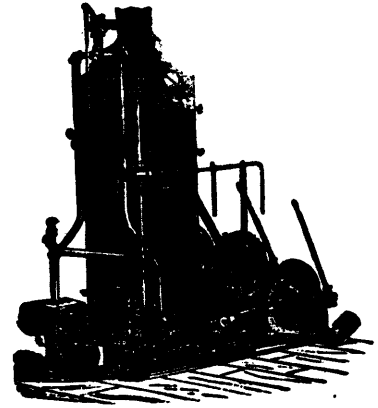
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VOL. XV., No. 1

JANUARY, 1896.

VOL. XV., No. 1

The Annual Pow-Wow.

The sixth annual meeting of the General Mining Association of the Province of Quebec and the first meeting for business of the Canadian Mining Institute, which is a federation of the Mining Associations of Nova Scotia, Quebec and Ontario, call for a few comments.

These meetings emphasized, as all others have done, the value of such organizations. Not only are they important means of securing protective benefits, but as social and educational instruments and promoters of industry and trade their existence is fully justified. The personal acquaintance and conference of men engaged in the same pursuits is valuable in securing an interchange of ideas and helpful suggestions, and also tends to allay the frictions that inevitably occur in the course of competitive business. The bitter feelings that arise against a rival who undersells or gains an advantage are often allayed by the explanation or understanding that may be secured from a friendly encounter. Bargains for products of mines or machine shops are often a practical result of these meetings. Then again, the papers contributed, on technical and mining matters, are brought to notice in a convenient way and an amount of general information is presented that could only be obtained otherwise by a great deal of research. At this meeting a summary was presented of the year's work in the production of asbestos, copper, phosphate, mica, coal, iron, chromic iron and other minerals.

Information was given about gold mining and machinery that was of interest and value. The discussion called forth by the papers was also important and was of educational service to the members, among whom were quite a large number of students. A special feature was the presentation of original papers by mining students in competition for prizes of \$30 and \$20. These papers showed either close observation, accurate perception of facts, or were the embodiment of a great deal of information obtained by study. The stimulation of these faculties of research is certainly a most worthy effort on the part of the Association and will be of service to the country in leading its young engineers into more thorough investigation of its resources.

Among the practical results of the meeting may be mentioned the proposal to secure a common meeting place for mining engineers - a bureau for mining information—in the city of Montreal, where minerals could be seen and information be procured by those desirous of interesting themselves in the productive industry of mining. It is most desirable that such facilities should be provided at the commercial metropolis, where capital is to be sought for active enterprises. It is proverbially difficult to secure money for mining. Capitalists generally, at the first solicitation, refuse to "put money into a hole in the ground," and it needs all the adventitious means of illustration that can be used to assist the persuasive arts of the promoter, whose aim is the development of the mineral resources of the country.

A valuable suggestion was that of inducing the Iron and Steel Institute of Great Britain, and the Federated Institute of Mining Engineers, to visit Canada, thus securing the spread of information about our min-

eral resources and the probable investment of capital. If such prominent organizations of engineers and capitalists could be brought to Montreal and there was a proper centre of information about our mining industries, it might lead to the undertaking of new enterprises and give an impetus to development.

At the meetings of the Canadian Institute much of the business discussion turned upon the vexed question of the duty on mining machinery. At present machinery of a class or kind not made in Canada is on the free list. But it is difficult to determine just what articles are exempt from duty, and in some cases collectors at different ports of entry have given opposite decisions and occasionally duty seems to have been improperly charged. It is of course desirable that uniform instructions should be given to the collectors of customs, and that a liberal interpretation should be applied to the law, which was originally framed with a view to benefit the mining industry. There is, however, some conflict of interest in the Federated Institute. Such an organization naturally attracts to it both miners and manufacturers of mining supplies. All workers crave protection for their products and free trade for their supplies. They wish the exclusion of competition in what they have to sell, and freedom of the open market for what they have to buy. So the miner cries to the Government for bonuses on his product and duties on similar foreign productions, but strenuously objects to the duty on articles consumed in the prosecution of his work. On the other hand the manufacturer of machinery and mining supplies seeks for the free importation of raw material and the exclusion by taxation of competing foreign manufactures. Here are irreconcilable conflicts of interest, and all that can be done is to let each scramble for his share of benefit. The trouble arises from the incongruity of both interests looking to the same organization for help in securing friendly legislation.

It was generally reported that the present law had operated satisfactorily to eastern miners. A rather pungent criticism was made by a bright member, that the only complaints made were about the payment of duties to a small amount upon some articles that admitted of question, and that these complaints came from the coal and iron industries, the two mining industries that were the only ones that receive any protection from the tariff. They were humorously advised not to go to the Government to complain about a small payment of duty, when such large amounts were levied upon the country in their interest, as it might be deemed to be a protest against the national policy of protection of which they had been such ardent advocates.

Another important matter that was considered was the securing of a Dominion grant of money for the publication of the papers and information collected by the Institute, which certainly are of both provincial and national importance, and it was felt that if \$5,000 can be devoted to the publication of the literature of the Royal Society, at least \$1,000 might be given for the circulation of such vital practical information as the mining associations of the various provinces collect.

The Quebec Mining Association came into existence not to secure legislation, but to repeal it. Alas, that it ever should be necessary to

organize to resist the proposed benefits that legislatures are presumed to bestow and which are the only excuse for their existence! The manly attitude of the mining industry should be to say to legislators, "Hands off! We ask for a fair field and no favor." But while the accepted policy is to grant special privileges to certain interests, constant vigilance is needed to prevent encroachment upon the rights of one's own interests through favors shown to others, or to gain offsets for advantages given to them. Under these circumstances it becomes a necessary part of an association's work to attend to legislative action and give some attention to politics, and exercise a certain amount of consideration for the powers that be, who have favors to bestow. But it is the promotion of active effort that is its main object of existence, and the Quebec Mining Association and the Canadian Mining Institute do a good work in this direction in promoting knowledge and enthusiasm for a most important industry, which next to agriculture may become the mainstay of the provinces and of the Dominion.

The Dominion Coal Company.

Although the shipments of the Dominion Coal Company during the past year show a considerable falling off, there has been no diminution in its activity, and the work of completing the equipment of its various mines has been carried on vigorously, so that at the end of the year it finds itself in a position to give a much larger output than at any previous time in its history; in fact, it is an open secret that if the state of trade had required it, it could have shipped about 1,500,000 tons during the year.

With one exception, the bulk of the expenditure has been on construction account, and in the direction of completing the work commenced or projected in the previous year. It may therefore be interesting to note the condition of the principal works at each mine at the present time.

Dominion No. 1, which bids fair to be the largest and most important mine, has, so far as its constructional work is concerned, been completed. The two large Ingersoll air compressors for supplying motive power to the coal cutting machinery and pumps have been in operation for about six months, and are giving good results. An iron bankhead with iron lattice pit frame has been erected, and fully equipped with loading screens and chutes, self-dumping cages, self-weighing tanks, and all the appliances necessary for handling an output of from two to three thousand tons per day. A twelve foot Murphy fan, supplied by the Bullock Manufacturing Co., and worked direct by a 12 x 24 Atlas engine, is in operation, and at the present time is giving one hundred thousand cubic feet of air per minute, with a water gauge of three-tenths of an inch. All the necessary surface buildings have been completed, and railway sidings capable of accommodating the output of this mine, and also for the purpose of marshalling the whole of the coal traffic of the other mines which is to go forward to Sydney for shipment, have been put in by the Company's railway engineer, Mr. H. Donkin, C.E. The underground workings have been developed at a great pace, owing to the use of machinery for all coal cutting purposes, and by the end of the year the mine was equal to a capacity of one thousand tons per day. This is practically the result of one season's development underground. It is intended that the whole of the output of this mine shall be produced by machinery, and no hand-pick men whatever are engaged. So far as Cape Breton is concerned, this is an experiment, and it remains to be seen whether the results will justify the large outlay which has been incurred. So far however, as rapid development is concerned, there can be no question that the means employed have been perfectly successful. A complete system of endless haulage has been laid underground, capable of dealing with the maximum output which this mine is expected to yield.

At the *Reserve* mine the only considerable expenditure has been in the direction of extending the endless haulage system to the main slope. This has been completed, and one engine and two batteries of boilers have been entirely swept away, the latter being replaced by two Babcock boilers, which are supplying the whole of the steam. A new bankhead has been built; new screens fixed, and a slack pocket, capable of holding a thousand tons, with elevator and conveyor, erected. *Reserve* has maintained a large output all through the season, although not nearly so much as could have been done; but the mine is now equipped in such a manner as to be fully prepared to meet any demands that may be made upon it next season: and no doubt for some time to come will continue to be one of the largest coal producing mines in the possession of the Company. It is contemplated to put in a ventilating fan in time for the next shipping season.

The year's work at *Old Bridgeport* marks a distinct advance, and for the first time in the history of this mine an output of more than 100,000 tons has been reached. This doubles last year's work, and must be considered as very satisfactory. The result is largely due to the various appliances having been got into good running order, which was not the case during the early part of 1894. There have been no material additions to the mechanical appliances this year, but the capacity of the mine has been increased by opening up a section of workings to the deep, and may now be considered as equal to one thousand tons per day.

At *International* mine considerable improvements have been made. The endless haulage system has been introduced. Engines have been placed upon the surface, and the ropes led down to the main deep. By these means the operations of the mine have been concentrated in this one district, and the whole of the west district abandoned. The deeps have also been carried down a thousand feet farther, and a new section opened. This has the effect of curtailing the working area, and at the same time increasing the output. The new district of coal opened up is of excellent quality and increased thickness, averaging about six feet. Part of the old battery of boilers has been removed, and one Babcock put in. Two bore holes are being put down from the surface to a point near the face of the deep at a distance of four thousand feet from the shaft, and boilers are being erected upon the surface at this point for the purpose of working the steam pump, and delivering the whole of the mine water to the surface. Steam will be taken down one hole, and the water up the other, the exhaust steam being conveyed in the space between steam pipe and casing, thus forming a steam jacket. As the vertical lift is only about three hundred feet, this will be a great saving as compared with pumping this water back to the shaft, a distance of four thousand feet.

At *Gowrie* comparatively little work has been done this season owing to the slackness of trade. This has been a great disappointment both to the Company and to the workmen, as every provision had been made to give a good supply of coal; in fact, this mine is now well equipped. All the old boilers have been taken out, and three new Lancashires put in, a new Rand compressor erected, and endless haulage fully installed, the engines being placed below ground, and the ropes carried to bottom of the deeps. A bore hole has also been started to deal with the water the same way as at *International*, and it is hoped that this will be completed before next shipping season, when, if trade requires it, this mine should be able to give a good account of itself. There has been a change in the management during 1895, Mr. A. M. Evans having left for British Columbia, and his place having been taken by Mr. John Johnston, formerly of *International* and *Dominion No. 1*.

At *Caledonia* mine the only constructional work of importance has been the instalment of a system for conveying coal from the summit of the deeps to the cages, on the principle of the "creeper." This system was put in at very considerable expense, but has not been a success, and is now being taken out to be replaced by the endless haulage system which is being installed throughout this mine. One of the engines from

Reserve has been set up for the purpose, and three large sets of gearing, with friction clutches, are being erected. When complete, this will be the largest and best equipped hauling plant at the Company's mines, and it is hoped it will solve the question of successfully hauling a large output from this important colliery. Electric light is also being installed here for lighting all the surface works, pit bottom, and principal hauling stations. Caledonia is giving a better account of itself this year than last, but it is hoped that with these additional appliances, next season will show a better result still, and something of the ancient prestige of this colliery be recovered.

The *Sterling* mine, after being fully equipped with endless haulage, having a new Rand compressor added to its plant, and two Babcock boilers set up, together with extension of its permanent surface buildings, and new brick stack, had unfortunately to be laid idle in the middle of the season, owing to the slackness of trade. The mine, however, is in good condition, and a staff of men is being employed to keep it so, in order that advantage may be taken of any improvement in trade to resume operations.

As some compensation for this idle mine, employment has been found for the workmen in opening up and working the *Roost* mine, in the Hub seam, which has been flooded for about twenty-three years, but during the present year the water has been pumped out, the mine reopened, and all the necessary buildings, erections, and machinery for equipping the mine in the most modern and improved manner have been set up; including a pair of Corliss hoisting engines, pair of direct acting man engines, lofty bankhead, with dumping cages, self-weighting tanks, and automatic chutes and screens. An expensive range of colliery sidings have been put in, and an output of from seven to eight hundred tons per day developed. As all this from start to finish having been done in less than a year, we venture to think it is one of the most expeditious and successful feats of engineering we have known, and reflects great credit on all concerned; and we venture to predict a hopeful future for this mine, as we understand that the coal has given great satisfaction in all the markets in which it has been introduced, and there is a fair demand for it for the present winter's consumption.

Victoria mine still continues to work in spite of the many rumours flying about as to its being closed up. No doubt the Company has found it a more expensive mine to work than any of the others, largely owing to circumstances which it cannot control, and to rates which had been in operation prior to its acquiring the property. We are, however, glad to find that the mine still continues to work, and that there are not lacking indications that the directorate have, at any rate for the present, abandoned any idea they may have had entertained of stopping it. During the year work has been concentrated upon the centre slope, and the haulage has been improved, the East and West districts have been abandoned, and owing to this improved arrangement the output per day has been fully maintained, and expenses somewhat reduced. We understand that a large steam pump has been ordered, and will shortly be in position to deal with the whole of the water in this mine, and do away with several smaller ones which were inadequate to its requirements. It is also likely that the endless haulage will be installed this winter, and some improvement made in the steam power. With these improvements, we do not see any reason why there should not be further economy effected in the working of the mine, and a new lease of life secured. On every ground it would be a deplorable thing if a colliery yielding such an excellent quality of coal should have to be closed, and it is certainly as much to the interest of the workmen as the employers to leave no stone unturned to avert such a catastrophe. This mine in common with Gowrie, has had to suffer very considerably during the year for lack of trade, and the output will be some forty to fifty thousand tons less than last year. The whole of the mining operations have been under the control of the Company's mining engineer, Mr. W. Blakemore.

We will conclude this brief summary of the principal operations of the Company during the year by observing that, according to the latest infor-

mation they have practically closed their outlay account, and completed the extensive mechanical and other appliances which had been designed for the improvement and development of the various mines. It now remains to be seen whether these, which have occasioned an enormous outlay, will sufficiently increase the output of the mines, and at the same time reduce the cost, to justify what has been done. Certainly most of the mines have been turned literally inside out, and, while exceptions may be taken to some of the mechanical appliances, on the other hand it must be admitted that much of the work is of the most modern and best approved type, and experience during the past season has shewn that in several instances, the capacity of the mines has been enormously increased. This has already borne fruit in one direction, upon which the Company may be fairly congratulated, namely, that the daily output of the mines is so increased that the Company is able to dispense with banking coal in the winter months. This has always been a drawback, for, whilst it may be argued that it found employment for the men while otherwise would have been idle, we question whether it has not done greater harm than good, in putting upon the market a large quantity of damaged coal, as well as involving the mine owners in heavy loss, and what between finding occupation for the men on constructional work, and possibly increasing their supplies from the stores, we have no doubt that they will be just as well off, and the Company money in pocket.

The work outside the mines has also been brought practically to a close. The railway to Louisburg has been completed, the pier there erected, and worked most successfully for several months past, and the International pier being fully equipped, with the exception of the new tower, which we understand is on order. So we look forward to next season with the hope and expectation that a revival of trade will enable this large and enterprising company to show what can be done in the way of producing cheap coal, and a large tonnage.

The following are the returns for the year:—

Company's Collieries.	Coal Raised.	Coal Shipped. Land Sales.
Gowrie.....	54,138 tons.	41,052 tons.
Reserve.....	199,553 "	192,887 "
Old Bridgeport.....	107,202 "	99,329 "
Glace Bay.....	49,795 "	44,143 "
Victoria.....	96,931 "	83,051 "
Caledonia.....	163,423 "	145,227 "
International.....	96,605 "	80,041 "
Dominion No. 1.....	73,167 "	63,109 "
Hub.....	33,617 "	29,960 "
Total.....	874,431 tons.	784,799 tons.

DISTRIBUTION.

To Nova Scotia.....	148,938 tons.
" Prince Edward Island.....	12,101 "
" Newfoundland.....	38,907 "
Quebec.....	459,124 "
" New Brunswick.....	25,739 "
" St. Pierre.....	4,662 "
" West Indies.....	266 "
" United States.....	56,534 "
" Steamers.....	38,528 "
" Colliery consumption.....	44,469 "
" Company's railways.....	7,146 "
" Colliery employees.....	18,738 "
	855,152 "

RECAPITULATION.

Shipped.....	784,241 tons.
Land sales.....	558 "
Collieries and railway.....	51,615 "
Employees.....	18,738 "
	855,152 "

Mr. E. W. Gilman, of the Ingersoll Rock Drill Co. is at present in Nova Scotia on business connected with the coal trade. Mr. G. L. Burritt, we understand, now represents this pushing concern in that province, with headquarters at Halifax.

Nova Scotia Gold Output.

We are indebted to the courtesy of the Department of Mines, Halifax, for the following returns reported for royalty since the publication of our last issue :-

Name of District.	Name of Mill or Company.	Months in which Crushing Done and Returns Made.	Quartz	Yield of Gold.			Total Yield.		
			Crushed.	Ozs.	dwt.	grs.	Ozs.	dwt.	grs.
Sherbrooke	McNaughton Co.	December.	No. of Tons	200	126	15	0		
"	New Glasgow Co.	December.	304	99	3	0			
"	Crow's Nest	November, December.	31½	4	19	0			
"	Goldenville.	December.	10	1	5	0			
			545½	232	2	0	232	2	0
Moose River and Caribou	Damas Touquoy.	December.	472	35	15	0			
"	Moose River Gold Mining Co.	December.	289	113	10	18			
			761	149	5	18	149	5	18
Uniacke	Golden Lode	November, December.	41½	417	12	0			
"	J. J. Withrow	October, November, December.	77	48	7	6			
"	H. B. Browne	December.	40		17	4			
			160½	466	16	10	466	16	10
Stormont.	James A. McDonald.	October, November.	75	27	3	0			
"	I. D. Copeland.	October, November.	634	234	4	0			
"	Richardson Gold Mining Co.	November	835	135	0	0			
			1,544	396	7	0	396	7	0
Brookfield, Queen's Co.	W. L. Libbey.	December.	465	501	0	0	561	0	0
Fifteen-Mile Stream.	New Egerton Co.	December.	570	277	10	0	277	10	0
Tangier	Essex Mill.	October	40	12	12	0	12	12	0
Gold River.	T. N. Baker.	November, December.	39	78	0	0	78	0	0
		Previously reported.					2,173	13	4
		Total for 1895 so far reported.					16,432	4	5
							18,605	17	9

British Columbia Coal Trade.

The British Columbia coal business of 1895 has been dull, prices have ruled lower than at any previous period, and shipments have been less. Our principal market is San Francisco which absorbs about three-fourths of our entire output. This market is supplied from various sources; Washington and Oregon States, England, Australia and Japan as well as British Columbia.

During the year an Anthracite steam coal has been imported into California from Wales, and being admitted free of duty (whilst Bituminous coals pay a duty of 40 cents per ton) this has already become a formidable competitor.

The following figures will show the shipments for 1895 from British Columbia, most of which were consigned to San Francisco, Port Los Angeles, and San Diego. A few cargoes went to Alaska and the Hawaiian Islands.

COAL SHIPMENTS FROM BRITISH COLUMBIA, 1895.

	Tons.
New Vancouver Coal Co.	241,495
Wellington	235,951
Union	207,543
Total tons.	684,989

The annual consumption of coal in San Francisco and neighboring ports, amounts to about 1,500,000 tons, so that this province supplies about one-third, England, Wales, Australia and the Puget Sound mines, the remaining two-thirds.

One or two new coal mines have been started this year, viz: the West Wellington, Alexandria and Esquimalt and Nanaimo Railway Co. extension mine. But with so dull a market there is not much encouragement to develop these new undertakings with vigor.

Mining in Nova Scotia.

The following statement shows the amounts received from the various sources of revenue in connection with the Department of Mines Province of Nova Scotia, during the year ended Sept. 30th, 1895, also for the twelve months ended 30th Sept., 1894, courteously furnished by Mr. W. H. Brown, accountant of the Department :-

Source.	Year ended 30th Sept., 1895.	Year ended 30th Sept., 1894.
Gold—		
Prospecting licenses.....	\$9,336 00	\$7,856 00
Rents—lease applications.....	2,468 00	1,752 00
Rentals.....	3,276 50	2,599 00
Royalty.....	7,724 36	7,517 01
Minerals other than gold and silver—		
Licenses to search.....	4,170 00	5,190 00
Leases.....	2,800 00	2,300 00
Rentals.....	7,020 00	5,340 00
Coal royalties.....	214,647 76	209,330 52
Iron royalties.....		168 60
Fees.....	467 65	604 75
Totals.....	\$251,910 27	\$242,657 88

Increase of 1895 over 1894, \$9,252.39.

MEMO. showing, by Counties the amounts received in connection with gold, by the Department of Mines, for the year ended Sept. 30th, 1895:—

PROSPECTING LICENSES.

Guysborough.....	\$3,474 00
Halifax.....	2,710 00
Lunenburg.....	854 00
Colchester.....	644 00
Hants.....	557 50
Queens.....	545 00
Victoria.....	174 50
Pictou.....	128 50
Yarmouth.....	93 00
Other counties.....	155 50

\$9,336 00

In 1894 there were 15,712 areas held under licenses for prospecting, while for 1895, there were 18,672 areas granted for the same purpose.

RENTS—GOLD LEASE APPLICATIONS.

Guysboro.....	\$1,476
Hants.....	332
Halifax.....	320
Lunenburg.....	168
Yarmouth.....	70
Queens.....	54
Other counties.....	48
	\$2,468

GOLD RENTALS.

Halifax.....	\$834 00
Hants.....	673 00
Guysboro.....	608 50
Queens.....	563 00
Lunenburg.....	318 00
Colchester.....	117 00
Yarmouth.....	101 50
Other counties.....	61 50
	\$3,276 50

GOLD ROYALTIES.

Halifax.....	\$2,982 22
Guysboro.....	2,281 52
Hants.....	1,266 40
Queen's.....	1,121 84
Other counties.....	72 38
	\$7,724 36

MEMO. showing amounts received by the Department of Mines, Nova Scotia, during year ended Sept. 30th, 1895; also, for the twelve months ended Sept. 30th, 1894, from the various sources in connection with minerals other than gold and silver, in undermentioned counties

LICENSES TO SEARCH.

	1894.	1895.
Cape Breton.....	\$1,530	\$1,380
Cumberland.....	1,320	390
Inverness.....	900	330
Pictou.....	330	450
Colchester.....	300	480
Richmond.....	120	330
Hants.....	120	300
Other counties.....	570	510
	\$5,190	\$4,170

Decrease in 1895..... \$1,020

LEASES OF MINERALS OTHER THAN GOLD AND SILVER.

	1894.	1895.
Cape Breton.....	\$1,050	\$1,200
Inverness.....	450	300
Pictou.....	350	50
Cumberland.....	300	1,050
Other counties.....	150	200
	\$2,300	\$2,800

Increase in 1895..... \$500

RENTALS—MINERALS OTHER THAN GOLD AND SILVER.

	1894.	1895.
Cape Breton.....	\$1,950	\$2,910
Cumberland.....	1,560	1,770
Pictou.....	870	1,110
Inverness.....	390	630
Richmond.....	150	240
Colchester.....	150	90
Other counties.....	270	270
	\$5,340	\$7,020

Increase in 1895..... \$1,680

COAL ROYALTIES.

	1894.	1895.
Cape Breton.....	\$114,111 57	\$134,844 03
Cumberland.....	46,938 22	43,416 37
Pictou.....	48,241 00	36,354 90
Other counties.....	39 73	32 46
	\$209,330 52	\$214,647 76

Increase in 1895..... \$5,317 24

Free Imports of Mining and Smelting Machinery, 1895.

From the Trade and Navigation returns just issued by the Dominion Government, we learn that mining and smelting machinery of a class or kind not manufactured in Canada, was admitted duty free as follows:—

Ontario.....	\$50,540
Quebec.....	17,338
Nova Scotia.....	47,519
New Brunswick.....	1,064
Manitoba.....	1,575
British Columbia.....	51,713

or a total value of \$169,749, as compared with imports of a total value of \$87,035, in 1894, and \$87,208, in 1893. These figures, which, of course, are for the fiscal year ended 30th June last, show that the sources of supply were

Great Britain.....	\$ 25,141
United States.....	144,608

There were also brought in duty free, eighteen diamond drills of a declared value of \$15,275, all from the United States.

EN PASSANT.

Mr. B. T. A. Bell, who has edited and published THE REVIEW for the past ten years, has acquired the whole ownership of the paper, its plant and property.

While for the present, our printing house and offices of publication will remain at Ottawa, we will open, next month, a suite of offices at Montreal, from which, in future, the paper will be dated, and which, in a few months, we hope to make our permanent headquarters.

The regular quarterly meeting of the Asbestos Club was held at Black Lake mines on 30th instant.

The annual general meeting of the Ontario Mining Institute will be held in Toronto in March next. Among the contributions so far promised, is one from Dr. A. P. Coleman, on "Ontario as a Mining Country," and one from Mr. Peter McKellar, on the mining developments at Manitou and Thunder Bay. Among the others who have promised, so far, to contribute to the proceedings, are Dr. Goodwin, of the School of Mining, Kingston; Mr. F. Hille, M.E., Port Arthur; and J. H. Chewitt, Ba.Sc., Toronto.

Captain Robert C. Adams, the new president of the General Mining Association of the Province of Quebec, is a familiar figure in mining circles, having been for many years prominently identified with the phosphate and mica industries of Quebec and Ontario, and more recently with gold and silver enterprises in British Columbia. The genial Captain is a capital speaker and an excellent writer. He was one of the original founders of the Association. In his election the members are to be congratulated on having secured an eminently worthy successor to the Hon. George Irvine, Q.C., and Mr. John Blue, C. & M.E., in the presidential chair.

We understand that a strong Canadian syndicate, with ample capital, is being formed to operate the McArthur gold properties in the Chaudiere District, Que. A field of great promise undoubtedly lies open to the enterprise of our people in the exploitation of these old river beds. In this connection, the paper by Dr. Ellis, of the Geological Survey, in this number, will be found to be of great interest.

Our stenographer's notes of the discussions which took place at the recent meetings of the General Mining Association having been received too late for insertion in this number, are held over till next month.

The mica business is abnormally dull, the sales during the month having been much below the average.

Mr. John B. Hobson, M.E., manager of the Cariboo and Horsefly Hydraulic mines at Quesnelle Forks, B.C., was unfortunately unable to reach Montreal in time for the meeting, and his paper on the progress of hydraulic mining in the West, was, therefore, not presented, much to the disappointment of many Montrealers who have invested in British Columbia. Mr. Hobson writes to say that he hopes to reach Montreal early next month. Needless to say a very hearty welcome awaits him.

The question is asked: "What is the most common cause of failure in mining?" Most people would probably reply: "Want of a good mine on which to work." But one whose business has caused him to observe methods of mine management in various regions over long intervals of time, might question whether a better answer would not be: "Want of good mine management." So many instances are remembered where failures can be attributed to this cause alone, that the answer is at least worthy of consideration. Bad management takes such a multitude of shapes that it is almost impossible to describe it, unless it be described in the general term "ignorance of mining." Its most common form is seen in the wasting of ore. A general proof of the facts is found in the hundreds of dumps which have been hand-sorted over and over at a profit. There is an old saying that "a good workman can be known by his chips," and with equal truth it can be said that "a bad mine manager can be known by his dumps." One thing that is indispensable in a mine manager, is an appreciation of the necessity of thoroughly understanding the nature and value of his ore. He may not be able to understand that ore himself, but if he appreciates its importance, he can employ someone who does understand it to take charge of necessary work. The world sees the evidence of waste in the dumps that lie in the daylight, but there is a still greater source of waste that is hidden from the public in the dark stopes of the mine. Every practical man knows how often the ore is knocked down in the stopes, and there partially sorted, and the supposed waste left upon the stulls. If ore sorted by daylight loses much of its value in the waste, what is the loss liable to be in the dark, narrow and cramped stopes? Who, that is competent to hand-sort ore, gives, in the great majority of instances, any attention to this portion of the work? As a rule, the miner is allowed to have his own sweet will in this labor, and his own sweet will too is often to do that which is easiest, instead of that which is best, even if he knows what is best. This is but one kind of waste, and the commonest one, of bad management, where scores might be mentioned. It is not all mines that require the constant services of an assayer, but a good many more than receive them do require them, and would find them the most valuable of all possible investments.

A Dominion Order-in-Council has been passed on the recommendation of the Minister of the Interior, amending the Order-in-Council of September 17th, 1889, with respect to the sale of coal lands in Manitoba and the North-West Territories.

These regulations prescribe that coal lands may be sold at an upset price of \$20 per acre for anthracite, and \$10 for other coal. It has been found that settlers, living at a distance from coal mines, which are being worked by persons who purchased same, either from the Crown or from some other source, are taking coal from Dominion lands for their own supply and for the use of others without permission. These settlers, as a rule, are not in a position to purchase coal lands, in accordance with the provisions of the regulations, and, as they cannot obtain permission to mine coal by paying a royalty, they take it without authority. As it would be a hard-ship to prevent these settlers from using the coal, and, as they are not in a position to purchase the lands, the regulations have been amended, so that the Minister of the Interior is authorized to issue

yearly permits to mine a certain quantity of coal for domestic purposes only, upon payment in advance of a royalty of 20 cents per ton for anthracite coal, 15 cents per ton for bituminous coal, and 10 cents per ton for lignite coal.

The new regulations went into operation on the first of the year.

The wire rope has been steadily making its way into new and varied forms of service since its entering the field as a competitor of its hempen predecessor. In many of these new uses, it has demonstrated its special merits and superiority. The rigidity that in the earlier stages of its manufacture was a serious obstacle to its more general use, has been overcome by the progress made in the making of iron and steel, resulting in a flexibility making it easier to handle and more directly applicable where such a quality is necessary. The substitution of steel for iron has largely helped to bring about the desired results, which with new methods of grouping the wires has secured the necessary association of strength and flexibility. In the rigging equipment of ships and in hawsers used for towing purposes, the wire rope is to be found in the commercial and war-marine of all nations. This in itself has developed an enormous industry that bids fair to keep itself in permanent activity, and to increase rather than diminish. Its use in cable lines and like forms of transport added largely to its use. In elevated service it has a widening field of use, and in ariel tramways it has been indispensable in most of such enterprises. Where there are natural obstacles in the way of transporting freight, as in mountainous districts or over streams not easily bridged, the ariel tramway is an absolute necessity, and is doing service in all parts of the world. Other forms of use as in mines and docks can be readily understood, while its easy and economical service in haulage on large producing plants has secured it considerable favor. In this age of wire it absorbs a large amount of the now enormous product, and is seemingly destined to enlarge its demand as its advantages are more widely known.

In our next issue will be found our usual review of the gold mining industry of Nova Scotia, which an extreme pressure on our space this month has unavoidably crowded out.

For the same reason an extensive description of the new works of the Hamilton Iron and Steel Co. Ltd., profusely illustrated with half-tone engravings and line etchings, of the plant and equipment of the new furnaces, is held over until our February number.

Mr. R. A. Hadfield, of the Hadfield Steel Foundry Co. Ltd. of Sheffield, England, favored us with a call this month. Mr. Hadfield believes there is a good opening in Canada for trade with our collieries, metal miners and manufacturers of mining machinery, for his company's special lines of manganese and other steel castings, which bear a high reputation for durability and economy in stamper-shoes and dies, steel wheels and axles for collieries, axle pulleys and frames, haulage pulleys, steel rolls, screens, wearing parts of crushers, and other duty where hardness and toughness—two qualities which are not combined in the same way in any other material—are required in our mines and quarries. The Hecla works of this company turns out a very large quantity of wheels for colliery tubs, this being one of their biggest productions. The extreme lightness, durability and strength of these castings form a most important feature in modern mining practice.

The fact that the Alaska-Treadwell Company clears \$600,000 annually from ore running \$3.72 to the ton, is a good practical illustration of what economical business methods, even in far-off Alaska, can do with large quantities of low grade ore. It is now being handled at a total cost of \$1.20 per ton.

Our next issue will contain a handsomely illustrated supplement showing prominent hydraulic and quartz mining operations in British Columbia.

CORRESPONDENCE.

The Trail Mining Camp, B.C.

To the Editor of the Review:

SIR—That such wonderful stages in the rapid march of Trail Creek for the front position of the greatest gold-producing camp in America could be made in the short space of one year is almost incredible. January 1895 saw Trail Creek in the cozoic period of its history—two producing mines, and some dozen log cabins, the result of four years patient work and waiting. January 1896 sees the Trail Creek camp the proud possessor of no less than five shipping and paying mines, and with as many more fine properties awaiting the construction of the narrow gauge railway, and the day of cheap transportation. All these properties are within a radius of two miles of Rossland. There is an air of prosperity and confidence about the camp that speaks unmistakably and eloquently of the future of the mines. The building of the narrow gauge railway by the Smelter Co. at Trail, on the Columbia river, and the installation of a first-class electric light plant, and an equally good water works system, by the men who own the best mines of the district, has put a good deal of money into circulation here, which with the addition of the money earned by miners and teamsters, has given Rossland the benefit of a \$25,000 monthly pay roll at least. At the mines everything is in full blast, and strikes of ore both good in size and grade are being daily reported. The greatest strike, both in grade, width and importance yet chronicled in the annals of Trail Creek's history, has just been made in the celebrated Le Roi mine, at a depth of 400 feet. In cross cutting for the foot wall in the west drift on the four hundred foot level, a chute of ore fifty-four feet wide, that averaged on assay \$80 to the ton in gold and copper, has been uncovered, and no wall has yet been found. This strike certainly gives the Le Roi the honor of being the greatest gold mine in Canada. The importance and value of this vast discovery of high grade ore to Trail Creek cannot be overestimated: it proves two things conclusively, that Trail Creek ore bodies increase both in value and size as depth is attained; the workings in the Le Roi being the deepest in Trail Creek. This mine is hoisting 150 tons of ore per diem, which is being hauled by night as well as day to the Trail smelter. One hundred men are on the pay roll. An interesting strike was made on the Josie during the past week. The lower tunnel on this property, which is being steadily pushed, for some time past has been in solid ore. Last week a large cross vein of first-class ore was encountered, but as yet its exact dimensions are not known. Speculation is rife as to what vein this is. Should it be the great Le Roi or War Eagle, the Josie has had an element of wealth to it that will make it a bonanza. The new hoist and compressor, which have been ordered from Montreal, are on the way. But a carload of ore a week is being shipped at present, the company preferring to hold their product until the installation of the machinery and the completion of the railway. The great War Eagle group improves with each day's development work. No. 1 tunnel is looking exceedingly well, both in the face and the stope, while the bottom of the winze which is being sunk on the magnificent ore chute which make this property so famous, is in solid ore. The face of tunnel No. 2 is now in some seven hundred feet, and the ore body has been struck. The showing in this tunnel is all that could possibly be desired the ore chute holding its own in width, while the assays prove it to be the best ore yet uncovered. On the Iron Mask, the second property of this company, a shaft and a tunnel are being driven rapidly ahead. From the shaft which is down some eighty feet, four carloads of ore have already been shipped, at the same time leaving a magnificent pile of ore in the ore house. In the tunnel on this claim, which will be the main working tunnel of both the War Eagle and Iron Mask ground, a fine continuous body of ore, high grade both in gold and copper, is being followed into the hill. Machine drills will be used in this tunnel as soon as the mammoth compressor, which is now lying at the boundary line, owing to the usual customs complications, arrives. This tunnel when it reaches the main ore chute of the War Eagle claim will be over thirteen hundred feet long. Superintendent Clark hopes to have this work completed within eighteen months from the time that air drills are first in operation. In the meantime it is being driven by hand.

A four foot streak of pay ore has been struck, literally at the grass roots, in an adit tunnel on the Virginias, the third holding of the War Eagle Company.

The air compressor purchased from the Ingersoll Rock Drill Co. of Montreal, by the Centre Star Mining Co., is in position, and since Christmas has been working to perfection. The Centre Star is a tunnel mine, and its enormous ore chute can be marketed at a minimum of cost, as the ore cars from the mine can be dumped into cars of Smelter Company at the very mouth of the tunnel. Nothing but "dead" and exploration work is now being prosecuted by the company. A drift and two cross cuts are being worked by night and day. John R. Keovis, the well known mining man, in a recent issue of the Rossland *Miner*, says a conservative estimate of the value of the ore already uncovered in this mine is \$1,000,000, and that by August next the development work now going on will prove the value of ore bodies, known already to exist, that will make the Centre Star a five million dollar proposition. The Centre Star was the first mine located in the Trail Creek district.

In the Nickel Plate, on the 100-ft. level, two shifts are driving each way on the lead, and in addition a cross-cut is being driven to tap a vein which was found on the surface 135 ft. to the north of the present workings. Some very fine ore has been gotten out of the drifts on the 100-ft. level lately, and the ore body is on the increase.

The bond on the Iron Horse was for some occult reason allowed to lapse on the 2nd January, the Humphreys syndicate not making a payment of \$20,000 due on that date. Humphreys himself has been very ill lately, and it was at first thought here that he and his associates did not want the property, but St. Onge, the vendor of the property, informed me that the syndicate offered him \$10,000 on the 2nd and \$10,000 more in 15 days. He refused to arbitrate any one of the original conditions. The mine is in excellent shape and never looked better. Two or three companies are negotiating for it already.

Development work is being prosecuted with vigor on the Homestake, the only property in Trail Creek owned and worked by a Canadian company, and about 150 tons of pay ore have been extracted in sinking two shafts. No. 1 shaft is down 50 ft. in ore, and No. 2 shaft is also in ore at a depth of 25 ft., as also is the 30-ft. level in No. 1 shaft. Twenty-five feet of contract work has been let in both shafts. The Homestake has not yet shipped any ore, as the management are unable to secure teams.

Under the able superintendence of Phil. Hickey, the celebrated Crown Point, remarkable for the size of its ore bodies and their grade, has rapidly passed from a prospect into a mine. The shaft is down 140 ft., and with the exception of one place where the vein faulted, has been continuously in ore. Both drifts on the 100-ft. level are in ore. A pile of ore, which contains about 1,000 tons of ore that will market about \$35 to the ton, blockades the ore dump, and makes further ore extraction impossible for the present.

The fight between the miners and the Nelson and Fort Sheppard Railway Co. for the title to the surface rights to mineral claims on Trail Creek (under locations in years '92, '93, '94) is very bitter, and the claim owners are loud in their denunciation of

Corbin and his associates. However, the Paris Belle suit, which comes off in Victoria on the 15th inst., is a test case, both sides having mutually agreed to stand by the decision therein rendered. The result of this case is awaited with interest in Rossland, as much depends upon it. Both sides seem confident of victory.

Kootenay's mineral production for the last six months of the year 1895 tells an interesting tale, and speaks more eloquently than words of the great possibilities that the district is capable of when adequate transportation facilities are assured. I have gone to a great deal of trouble to ascertain the correctness of the figures herein given, and am sure they are so, as they are taken from the sworn statements of the mine owners at the different customs houses at which the ore is entered:

Division.	Description.	Tons.	Value.
Trail Creek.....	Gold ore.....	17,085	\$829,250
Slocan.....	Silver-lead ore.....	4,864	486,400
Ainsworth.....	".....	1,150	92,000
Nelson.....	Copper.....	241	24,100
Blue Bell Mine (to Pilot Bay Smelter.....		26,511	212,088
	Total.....	49,851	\$1,533,838

In the Indiana Consolidated, on the north slope of Red Mountain, Frank Watson has undoubtedly got one of the coming big mines of the Trail Creek district. In running an open cut in an entry for a tunnel, 20 tons of \$60 ore were taken out. The ore is of a different character than that usually found in the camp, as it carries a large percentage of argentiferous galena, that gives the ore a silver and lead value not found at the other mines. Six men are at work driving a tunnel to tap this immense showing. The tunnel will give a vertical depth of 90 ft.

Col. Wharton, principal owner and manager of the Great Cliff mine, is in Chicago, where he has gone to buy a compressor for the mine. In the meantime some half dozen men are at work sinking shafts and making connections. The mine is in splendid shape. It is gratifying to admirers of the camp that the Cliff will be a constant shipper next summer.

Surveyor Fred. Ritchie has struck 6 ft. of pay ore on the Montreal claim, which partially lies on the south-east end of the town site.

Vancouver capitalists are negotiating for the Commander.

George Plunder has an excellent claim in the Morning Star, situated about two miles north of the town. Though the shaft is down but 12 ft., it is full of iron and chalcopryrite, ore that is barely distinguishable from the richest ore now being taken from the 400-ft. level of the Le Roi.

Three hundred and fifty miners are at work in the camp.

The present daily output of the camp is nearly 250 tons.

The first 50-ton reverberatory furnace of the Trail smelter will be blown in on Monday. The other four will follow as fast as they are completed.

Work on the river end of the tramway is progressing rapidly. Arrangements have not yet been finally completed for the right of way across Corbin's land grant, and the town site.

Rossland is now lighted by electricity. It is the newest town in the district, too. The waterworks system will be completed in ten days.

HAROLD KINGSMILL.

ROSSLAND, 10th Jan., '96.

Notes from Boundary Creek, B.C.

To the Editor:

SIR.—A three-quarter interest in the "Knob-hill" and "Iron-sides" has been bonded recently to a Boston and Spokane syndicate for \$35,000. A thorough prospecting of the ore bodies with a diamond drill will be begun shortly. The ore body is solid magnetite with disseminated copper pyrites, and assays 4 to 6 per cent. copper and \$3 to \$10 gold per ton, the latter gold value being at the greatest depth. The cross-cuts on the surface are in 50 ft. solid ore.

The "Gold Drop" has been bonded by Turner and Innes for a Montreal syndicate for \$15,000. The ore is a large body of copper pyrites with micaceous specularite in calcareous gangue.

Mr. Judson, representing the American Metallic Co. of New York, is in completing a large deal involving the purchase of some 14 claims in this camp, aggregating about \$200,000. The money is in escrow at Vernon. Details will be given when the deal is completed.

Mr. Brophy, representing the Butte and Boston Co., has just secured a bond on the "Skylark" mine. This is a high grade silver-lead property, the pay streak carrying from 100 to 600 ozs. silver, and $\frac{1}{2}$ to $1\frac{1}{2}$ ozs. gold per ton.

Mr. Fagel, of the Parrot Smelting Co., will be in January 15th to visit the "Stemwinder" mine on which development work has been steadily pushed since its purchase in July.

The 10-stamp mill of the Cariboo Mining and Milling Co., Camp McKinney, is running again with two years' supply of ore in sight. A new shaft-house and tramway has been erected. This property has paid its owners handsomely ever since the mill first started.

MIDWAY, B.C., Jan. 13th, '96.

H. G.

NOVA SCOTIA NOTES.

(From our Halifax correspondent)

We very much regret that Mr. Hardman has totally mistaken the meaning of our note respecting the winding up of the Dominion Smelting and Refining Co. which appeared in the November REVIEW. Nothing was further from our intention than to imply mismanagement of the prospecting of the property while Mr. Hardman was in charge, our only regret is that he did not have the superintendence from the start.

Mr. Hardman evidently read our note very hastily, as is shown by his letter in our last issue, and we think he was a little rough in his criticism, for he takes exception to our crediting him with saying, "The work done was not of a sufficiently encouraging nature to warrant further outlay," while his own words were, "I am not

willing to ask you (the directors of the company) to recommend further work to the shareholders, as the result of the work done hitherto is so unfavorable." We take it that the meaning of the two sentences is practically the same.

Mr. Hardman next accuses us of assuming that the body of ore which Dr. Gilpin saw when he made his report on the Smithfield property "is still in existence and in situ." In one of the reports it was estimated that 25,000 tons of galena were in sight; this is equal to about 21,000 tons of metallic lead. There is no record of such a quantity ever being removed from the property, so we think we were justified in our assumption. Finally Mr. Hardman makes some cutting remarks about the term "practical lead miner," which he places in inverted commas, implying that it appeared in our note. This shows what a cursory glance he gave our note before rushing into press with a criticism on it, for the term we used was expert lead miner.

We have only paid a hasty visit to Smithfield, and then our time was mostly occupied in looking at the furnace. Our note was based on previous reports of the property, reports on the strength of which the public were asked to subscribe towards the testing of the property. We may add that we are satisfied that the latter part of prospecting could not have been in better hands, and had the course been adopted at the start, which was adopted when four-fifths of the first call on the shareholders was used, namely, the appointment of an expert mining engineer, either less money would have been spent or better results obtained.

A new find of gold is reported at South Branch, Middle Stewiacke.

Mr. W. L. Libby brought a 561 oz. brick into the city as the result of a month's run. He reports the mine looking better than ever. The North Brookfield is now the best producing mine in the province, and a noticeable feature is that the bricks have been steadily increasing each month. The ore is averaging 1 $\frac{3}{8}$ oz. per ton. We understand that Mr. Thompson has recently made an examination of this mine in the interest of capitalists.

The Londonderry iron mines are showing increased vitality under the management of Mr. C. A. Meissner. The rolling mills, which have been idle for nearly four years, have started up again, and the puddling furnaces are also in full work. Altogether things are looking better than they have done for a very long time.

The Indian Path mines (which by the way, appeared in our last as Indian Post, through typographical error), is in full work now. The mill should have been running by the middle of last month, but the eccentric rod of the engine broke when the mill was started and delayed matters. The ore is reported to be looking well and a good clean up is expected at the end of the month.

The committees of the Mining Society on mining legislation have held several meetings, and it is probable that the original report will be considerably cut down.

The commission on the Ford Pit have made their report. We understand it contains some interesting and unexpected evidence.

An attempt is being made to issue preferred shares in the Cochrane Hill property. Whether to pay the creditors or to work the mine we don't know.

COMPANY NOTES.

Victoria Consolidated Hydraulic Mining Co. Ltd.—During the past season the operations of this company have been directed towards getting ditch in working order, and in opening up the face of the mine. Water for hydraulic mining was available for about two months, and in that time considerable headway was made in prospecting, so as to have everything ready for active work next season. A Mr. Brigham, of San Francisco, an experienced hydraulic miner, has been engaged as superintendent.

Horsefly Gold Mining Co. Ltd.—The annual meeting of shareholders was held at the offices of the company, San Francisco, this month, when the following were elected directors: E. P. Flint, C. Waterhouse, F. H. Beaver, H. N. Morse, C. Roberts, M. E. Babb and M. W. Barlow. Mr. K. T. Ward was appointed general agent for the company. A large hydraulic plant has been shipped from the works of Francis Smith & Co., of San Francisco to the company's property in the Cariboo district.

Stevenson Gold and Platinum Hydraulic Mining Co.—The following is from a recent report to the shareholders:—

"Work was begun on the company's claims on the first day of April under the supervision of Mr. Robert Stevenson, one of the oldest and most experienced gold miners in the province, and has been steadily prosecuted since. We fully expected to be hydraulic mining before the middle of August, but owing to a series of accidents over which we had no possible control, we have been delayed in our work for the period of three months. Being situated about 110 miles from the railroad, and our goods having to be teamed and packed that distance, principally by Indians (who place very little value on time) and some of the machinery being too heavy for packing, we had to build a raft and boat and transport them by lakes and rivers, succeeding extremely well in spite of the difficulties encountered until within a few miles of the claim. The raft unfortunately got snagged in the Tulameen River, capsized, depositing its load in the bottom of the stream. As the river was then rising rapidly we had to wait for it to subside before attempting to recover the articles, which we recovered intact weeks

afterwards none the worse of the submersion. This accident has been the principal cause of the delay that has occurred. One has no idea, unless by visiting the works, of the amount of work necessary to put this valuable property in shape. We have built over seven miles of wagon road, and also several miles of foot trail (these being necessary to get around, the hills being precipitous.) We have built two wagons, one raft, one boat of two tons' capacity, a boarding house, a lodging house, office and stables. A saw mill (water power) has been erected, size 25 x 40 feet, with tanks and ditches leading to the reservoirs on the hills. This mill is 55 horse power and capable of cutting 24,000 feet of lumber per day—the contract only called for a capacity of 2,000 feet. The supply of water is intermittent. We are thus enabled to cut a very large quantity of lumber in a very short time when conditions are favorable. This mill in future will constitute a very valuable asset of the company by doing custom work for other companies on the Tulameen River, and at our own prices. Two hundred thousand feet of logs are cut, hauled and stacked alongside the mill in readiness for use. Trestle work for the flume of a most substantial nature has been laid through the Gladstone claim to the North Fork of Granite Creek, a distance of 7,500 feet. This trestle has mostly been run around the face of high, precipitous bluffs, and has necessitated a vast amount of dangerous work as well as endangering the lives of the workmen, yet I am glad to say that no serious accident has happened to any of the workmen. We have run a tunnel 172 feet on the flume line through a 'hogback' it being cheaper than to run a long distance round it. The piping, over 800 feet, is now all on the ground and placed in position, and a large tank of 10 inch lumber for a penstock has been put up on the Gladstone claim, sites for the monitor and pipes blasted out of solid bed rock. Our flume connection with the North Fork will give us ample water for washing on the Gladstone claim as soon as the weather will permit of it in the spring.

We have secured an option from the proprietors, on very advantageous terms, of the Amberty lease of 80 acres, and the Swan lease of 40 acres. These leases form the central portion of our system of claims, and will be a most desirable addition. They have been well prospected, and are highly auriferous. These purchases would enlarge our acreage from 640 to 760 acres, and give us absolute ownership of all the gold gravel benches on the Creek. The extension of the flume to these properties will be much more simple, and easy of erection than the part just finished, having the saw mill, and the logs already cut, we can extend the work and have two other monitors working on these properties by the first day of June next.

I may also mention that when the flume is extended next spring it will pass immediately over the saw mill, whereby permanent water power for the saw mill can thus be had at no expense whatever.

In conclusion I assure you that the work done is of a very substantial nature, and I am satisfied that by this time next year the results will be eminently satisfactory to the owners."

A Dominion charter is being applied for.

New Vancouver Coal Mining and Land Co. Ltd.—The directors report for the half year ended 30th June last as follows: The net output for this period was 167,933 tons and the sales were 164,887 tons. Owing to the large importations of Australian and Welsh coal the price in the San Francisco market has ruled lower than in the previous half year, and the output has also slightly decreased. The result has been a small loss. No interim dividend was declared. The balance sheet is:—

30th June, 1895.

Dr.		£		s. d.	
To 215,000 shares of £1 each, fully paid.....				215,000	0 0
Debtenture Capital				67,100	0 0
Insurance Fund Account	1,300	0	0		
Land Sales Reserve Fund Account.....	18,487	19	9		
Reserve Fund Account	20,000	0	0		
Sundry Creditors				39,787	19 9
Profit and Loss Account				51,229	1 8
				13,225	17 11
				<u>£386,342</u>	<u>19 4</u>

Cr.

By Estate, Buildings, Collieries, Railways, Plant, Rolling Stock and Wharves.....		£		s. d.	
		312,087	9	0	
Less Estate Fund Account for half year.....		3,498	12	2	
Goods Depot and Reserve Stores				308,588	16 10
Coal in Bin and in transit				6,386	15 2
Sundry Debtors for Land				38,095	13 2
" " Coal and General.....	12,477	15	3		
	16,530	17	10		
Investment in £2,000 Metropolitan £3 10 0 Stock				29,008	13 1
Nanaimo Gas Company's Shares.....				1,945	0 6
Cash in London and Colony				291	13 4
				2,026	7 3
				<u>£386,342</u>	<u>19 4</u>

Profit and Loss Account for the Six Months ended 30th June, 1895.

Dr.		£		s. d.	
To Amount carried to Insurance Fund Account		100	0	0	
" Land Sales Reserve Fund Account		240	2	7	
" Estate Fund Account.....		3,498	12	2	
Directors' Fees.....	450	0	0		
Auditor's Fees.....	15	15	0		
Office Rent	50	0	0		
Salaries	251	5	0		
Printing, Stationery, Postages, Telegrams, Commission and incidental Expenses	174	5	1		
Debtenture Interest.....				941	5 1
Income Tax	420	17	4		
				2,013	0 0
				<u>£7,213</u>	<u>17 2</u>
To Balance, as per Balance Sheet.....				£13,225	17 11



SIXTH ANNUAL MEETING

OF THE

General Mining Association of the Province of Quebec

A HIGHLY SUCCESSFUL MEETING.

The Sixth Annual General Meeting of the General Mining Association was held in the new Club Room, Windsor Hotel, Montreal, on Wednesday, Thursday and Friday, 8th, 9th and 10th January. There was a large attendance at all the sessions, the following among others being present:—

- Mr. John Blue, C. & M.E., (Eustis Mining Co.), Capelton.
- Mr. H. A. Budden, (Intercolonial Coal Co.), Montreal.
- Mr. John Hardman, M.E., S.B., Prof. of Mining Engineering, McGill.
- Mr. John J. Penhale, (United Asbestos Co.), Black Lake.
- Mr. R. T. Hopper, (Anglo-Canadian Asbestos Co.), Montreal.
- Mr. James S. Mitchell, (Beaver Asbestos Co.), Sherbrooke.
- Mr. H. D. Lawrence, (Beaver Asbestos Co.), Sherbrooke.
- Mr. George R. Smith, Bell's Asbestos Co., Thetford Mines.
- Mr. George E. Drummond, (Canada Iron Furnace Co.), Montreal.
- Mr. T. J. Drummond, (Canada Iron Furnace Co.), Montreal.
- Mr. J. T. McCall, (Drummond McCall & Co.), Montreal.
- Mr. W. T. Costigan, (Danville Asbestos and Slate Co.), Montreal.
- Mr. Chas. Fergie, M.E., (Intercolonial Coal Co.), Westville.
- Captain R. C. Adams, (Anglo-Canadian Phosphate Co.), Montreal.
- Mr. J. S. Higginson, Phosphate Miner, Buckingham.
- Dr. A. R. C. Selwyn, C.M.G., late Director Geol. Survey of Canada.
- Dr. Geo. M. Dawson, C.M.G., Director Geol. Survey of Canada.
- Mr. H. P. H. Brummell (N. American Graphite Mining and Mfg. Co.), Ottawa.
- Major R. G. Leckie, M.E., (Torbrook Iron Co.), Torbrooke, N.S.
- Mr. G. H. Baker, B.A.Sc., (Blackburn Mine), Templeton.
- Mr. Edward Wallingford, (Wallingford Mica Co.), Templeton.
- Mr. E. W. Rathbun, (The Rathbun Co.), Deseronto.
- Mr. Wm. Selater, (Selater Asbestos Mfg. Co.), Montreal.
- Mr. Frank Grundy, (Quebec Central Railway), Sherbrooke.
- Mr. J. H. Walsh, (Quebec Central Ry.), Sherbrooke.
- Dr. Frank D. Adams, (McGill University), Montreal.
- Dr. Harrington, (McGill University), Montreal.
- Mr. J. D. Sword, Mining Engineer, Rossland, B.C.
- Mr. F. H. Susmann, Mining Engineer, C.P.R., Montreal.
- Mr. Wm. Snaill, B.A. Sc., Montreal.
- Mr. Ian Cameron, M.E., Sudbury.
- Mr. Thos. Cantley, (Nova Scotia Steel Co.), New Glasgow.
- Mr. A. W. Stevenson, C.A., Montreal.
- Mr. John Jenckes, (Jenckes Machine Co.), Sherbrooke.
- Mr. A. Sangster, Jr., (Canadian Kand Drill Co.), Sherbrooke.
- Mr. J. H. Featherstone, (Caribon Hydraulic Mining Co.), Vancouver.
- Mr. Dan Mann, (North Star Silver Mining Co.), Montreal.
- Mr. F. H. Hopkins, (Dominion Wire Rope Co.), Montreal.
- Mr. J. T. Dwyer, (Carriere Laine & Co.), Levis.
- Mr. L. Chonillon, Montreal.
- Mr. Hanbury A. Budden, Montreal.
- Mr. C. G. Rothwell, Kingston, Ont.
- Mr. W. F. Dean, (Canadian General Electric Co.), Montreal.
- Mr. Walter Adams, B.A. Sc., Montreal.
- Mr. Hersey, Analytical Chemist, Montreal.
- Mr. J. T. Donald, M.A., Montreal.
- Mr. W. T. Bonner (Babcock & Wilcox Co.), Montreal.
- Dwight Brainerd (Hamilton Powder Co.), Montreal.
- Mr. B. T. A. Bell, Editor CANADIAN MINING REVIEW.

And about thirty student members.
The morning session was called to order at eleven o'clock on Wednesday, Capt. C. Adams, in the absence of the president, being called to the chair.

THE SECRETARY read the minutes of previous meetings, and these, on motion were adopted.

AMENDMENTS TO CONSTITUTION.

A motion by Mr. John Blue, Capelton, that two meetings be held in each year, instead of three, as at present, was unanimously adopted.

Mr. George E. Drummond gave notice of motion to amend Sec. VIII, Par. 24, by changing the date of the annual general meeting from the second Wednesday in January until the first Wednesday in February of each year.

THE SECRETARY'S REPORT.

MR. B. T. A. BELL.—It is a source of satisfaction to be able to report the success of our Association during the year. A continuance of such vigorous vitality isarrant for the belief that more than a justification exists for such an organization in the Province of Quebec.

The steady growth of our membership, the prominence and character of those who have joined us, the success which has attended our efforts to originate and promote improvements in our legislation, to protect the interests of mining, to extend knowledge of our resources, are evidences of our growing importance in the community.

During the past year there were five meetings, embracing nine business sessions, one meeting of Council, and three meetings of Committee.

Our annual gathering at Montreal in January extended over three days and was notable for a large attendance, an excellent syllabus of papers and a marked addition to our membership.

The June meeting, in response to the kind invitation of our esteemed past president, the Hon. Mr. Irvine, Mr. James King, M.L.A., Mr. C. H. Carriere, and Mr. Lawrence Lynch, was held in Quebec, and the members are greatly indebted to these gentlemen for an exceedingly profitable and enjoyable outing. Messrs. Carriere, Laine & Co., of Levis, are also entitled to special mention for the admirable excursion carried out under their auspices. It was also a source of gratification to find that members of our sister societies, the Mining Society of Nova Scotia and the Ontario Mining Institute made special efforts to attend this meeting and take part in our proceedings. The cordiality of the reception accorded to the Association and its guests on that occasion is likely to be long remembered by those who were present.

Three important meetings were held at Ottawa in November and December with a view to determining some more satisfactory method of grading Canadian mica, and, if possible, arriving at an agreement among the producers as to a standard schedule of prices for these grades.

It is gratifying to be able to report that a decision was reached which will place the Canadian miner of this product in a much better position towards foreign consumers. As an outcome of these meetings a proposition will be submitted to you to-day providing for a mica section in connection with our Association.

It is also a source of congratulation that the scheme of federation which originated at our annual meeting in 1892, has been carried out to a successful issue and on a basis satisfactory to the sister societies of Nova Scotia and Ontario. The Canadian Mining Institute, on the board of which our Association will have four delegates will henceforward conduct the publication of a combined volume of the proceedings of the societies in the federation, and will be a valuable auxiliary in such matters affecting or relating to the mineral industries of the country as may call for the united action of the mineral operators of the provinces.

The interpretation of the customs tariff respecting the free admission of mining machinery is still far from satisfactory at many of the ports of entry. A deputation from the Association endeavored to obtain an interview with the Controller of Customs early in the year, but political disturbances precluded an appointment at the time, and later on in the year no date could be arranged suitable to a strong presentation of the views of the Association.

This is a matter of vital importance to the welfare of the industry which now properly falls within the scope of the federated board and it is hoped a decided effort will be made by it to have the law carried out not only with greater uniformity, but with a more liberal application of the spirit in which it was created.

The mining law of the province is on the whole a fairly liberal enactment and its interpretation by the present administration has occasioned no complaint during the year. There are, however, certain clauses such as section 1435 respecting royalty, which, while at present held to be inoperative may be put into operation at any time with serious consequences to the successful development of the industry, and it would be well if some effort was made to have them completely wiped out of the statute.

Our membership has been materially increased during the year, the total at date being 132, of which 20 are honorary and 20 student members.

By the death of the late Mr. W. H. Jeffrey, of Richmond, the Association has again to record the loss of one who took a lively interest in its affairs. The deceased gentleman was widely esteemed, and in his death the asbestos industry is deprived of one of its pioneers in this province.

The facilities now provided by McGill University and by the Mining School at Kingston, for the training of students in mining engineering, are matters of satisfaction to those interested in the progress of mining in this country.

At our last annual meeting we created a student membership at a nominal fee and made provision for inducing original contributions to our *Transactions*.

The members of Prof. Carlyle's class at McGill, were also, owing to the courtesy of our president, able to spend a portion of their summer vacation at the Eustis mine, where valuable experience was gained in underground surveying and in making acquaintance with practical work. This is a step in the right direction, which will doubtless be imitated by other members of our Association.

We have to acknowledge with satisfaction the very hearty interest manifested in the work of the Association by the Hon. E. J. Flynn, our esteemed Commissioner of Crown Lands, to whose liberality we are indebted for a substantial grant of \$300.00 towards our publications.

The Legislature of Nova Scotia, during the past year, voted an annual grant to our sister Society in that Province of \$500.00, which has enabled its members to acquire a suitable meeting place and make provision for the proper housing of its library. Surely much would be accomplished for our Province were this Association equipped in a similar manner.

Notwithstanding the extensive and varied mineral resources of Quebec and the rapidly advancing condition of her mineral industries there is absolutely no provision made for a collection of ores or minerals, or a library of the mining literature of the day which could be readily consulted either by the student or the mineral operator, or the inve or seeking information. No record is kept of the history of mining undertakings, beyond the somewhat meagre report of the Department of Crown Lands, and maps and plans of old workings have either been lost or filed in pigeon holes not readily accessible to the public.

Our Association is distinctly an educational institution: its prime object is to cultivate and extend the science and art of mining and to further the development of the resources of the Province. Surely it might reasonably claim a measure of Government assistance sufficient to maintain a permanent mineral collection in the city of Montreal.

Twenty-one papers were contributed during the year, compared with twelve in 1894.

These, with the reports of our proceedings, were published in the second volume of our Journal and issued to members in December.

Copies were also sent in exchange to: The Mining Institute of Scotland, The North of England Institute of Mining and Mechanical Engineers, The South Wales Institute of Engineers, The Cleveland Institution of Engineers, The Iron and Steel Institute of Great Britain, The American Institute of Mining Engineers, The British Society of Mining Students, The Massachusetts Institute of Technology, The Columbia School of Mines, The Geological Survey of Canada, The Geological Survey of the United States, The Mining Society of Nova Scotia, The Manchester Geological Society, The Imperial Institute, The Royal Colonial Institute, The School of Mining, Kingston, McGill University, The School of Practical Science, The Library of Parliament.

That the papers we have issued have been of more than local interest has been shown by the reproduction of some of them in prominent British and Foreign technical journals.

It is worthy of note, too, that Mr. Shutt's eminently practical contribution on the subject of "Phosphoric Acid in Agriculture" has found a prominent place in the Annual Report of the Department of Agriculture for this year, where it will doubtless serve to increase a very desirable interest in the value of fertilizing materials among our farmers.

This example might well be followed up by the Ontario and Quebec Governments with advantage to the farming and phosphate mining communities in these Provinces.

But while the publication of papers is an essential object of our work, and many of them have been distinctly creditable to their authors and to our Association, we have been to some extent deficient in general discussion. We offer prizes for the best paper presented by our students. Would it not be even more desirable to give a prize for the paper which provoked the best discussion?

Comparisons of past with present practices, descriptions of new machinery and appliances, improved processes, difficulties overcome in individual experience—of material, surely, there is an ample supply.

It is thus we learn how much has been accomplished by persistent and intelligent labor, how much remains to be achieved and how by free exchange of ideas and experiences friendly understanding is promoted and personal acquaintance is built up.

CAPT. ADAMS—This is an admirable report, bristling with admirable suggestions. When I was in Quebec I was surprised and astonished to find that the Department of Crown Lands had absolutely no collection worthy of the name, of the ores and minerals of Quebec.

THE SECRETARY—My idea is that there ought to be in this city, the metropolis of the Dominion, a centre where mining men may meet, and where investors could obtain information respecting the minerals and mining operations of the province. We have the nucleus of a library, which is constantly increasing, the collection of suitable specimens would be easy, and if the Government will give the necessary assistance I am quite sure our Association would see that it was equipped and maintained in a proper manner. The Government of Nova Scotia has set an excellent example in this matter, and the Mining Society's rooms at Halifax are the meeting place of all mining men interested in that province.

DR. SELWYN suggested that a mining record office, where plans of old workings, maps and records of mining undertakings, would be filed and preserved, would be an excellent thing.

MR. GEORGE DRUMMOND—I would like to say a word for the business men who are doing business in the Province of Quebec. I think Mr. Bell's idea would help them a great deal. We know from Mr. Bell and from personal observation what attempts have been made to preserve these specimens of the mineral wealth of the province. I would suggest that we appoint a committee to deal with this question direct with the Minister of Crown Lands, and to ask him for a suitable grant to maintain such a bureau. I think that such a bureau established in the business centre of this great city could be made a splendid advertisement of the resources of this province, and a centre for our mining men as well as an educational auxiliary for our students of mining engineering. I would therefore move that the President and Secretary, the Hon. George Irvine, Q.C., Mr. James King, M.S.G., Mr. G. E. Drummond, Mr. Hardman and Mr. Blue, be a committee to interview the Government respecting this matter at an early date.

DR. SELWYN—Of course someone would be required to look after such a bureau.

MR. BELL—I am quite sure our Association would attend to that.

The motion, having been seconded, was put to the meeting and carried unanimously.

DR. SELWYN—With regard to fuller discussion at these meetings I quite agree with Mr. Bell, and I trust that his suggestions will bear fruit at this and future meetings.

The Secretary's report was then adopted.

New Members.

The following were elected members of the Association:—

- H. C. Baker, B.A. Sc. (Blackburn Mine), Templeton, Que.
- Lewis McLaurin (McLaurin Mine), Templeton, Que.
- H. Baumgarten (Mica Miner), Ottawa.
- H. P. H. Brummell (N. Am. Graphite Mfg. Co.), Ottawa.
- J. D. Sword, Mining Engineer, Rossland, B.C.
- Milton L. Hersey, Analytical Chemist, Montreal.
- J. H. Susmann, Mining Engineer, C. P. Ry., Montreal.
- H. W. DeCourtney (Jas. Hutton & Co.), Montreal.
- D. L. Lockerby, Mine Owner, Montreal.
- G. S. Macfarlane, Mine Owner, Ottawa.
- J. H. Featherstone, Vancouver, B.C.
- F. H. Hopkins (Dom. Wire Rope Co.), Montreal.

A National Museum Wanted.

MR. BELL—The urgent necessity of more suitable accommodation for the magnificent collection of the Geological and Natural History Survey of Canada is an old story, but will bear further discussion at this meeting. The present building is in a disgracefully dilapidated and tumble-down condition, and through its connection with adjacent tenements may be destroyed by fire at any moment. The time is opportune for making such representations to the Dominion Government as will ensure the proper housing of this magnificent collection.

DR. SELWYN—This collection is exclusively Canadian, and anyone who wishes to study the resources of the mineral, vegetable and animal kingdoms of Canada, cannot do better than go to that museum. I have had charge of this museum for over twenty-five years, and I do say that it is certainly the best arranged and most complete collection there is in this country. Any new building should be erected on Major's Hill Park at Ottawa, where there would be absolute immunity from fire and from the proximity of traffic. There is absolutely no other site in Ottawa so suitable.

MR. BELL—Any deputation going to Ottawa, and he understood there would be one appointed before the Sessions closed, should be empowered to bring this matter again to the notice of the Government.—Agreed to.

The members then adjourned for luncheon.

The afternoon session was opened at three o'clock, Mr. John Blue, C. & M. E., President, in the chair. The following were elected

Officers and Council, 1896-7.

Past Presidents:

- Hon. Geo. Irvine, Q.C. (Johnson's Co.), Quebec.
- Mr. John Blue, C. & M. E. (Eustis Mining Co.), Capelton.

President:

Capt. Robert Adams (Anglo-Can. Phos. Co.), Montreal.

Vice-Presidents:

Mr. George E. Drummond (Canada Iron Furnace Co.), Montreal.
Mr. H. A. Budden (Intercolonial Coal Co.), Montreal.
Mr. Jas. King, M.L.A. (King Bros.), Quebec.
Mr. Jas. Mitchell (Beaver Asbestos Co.), Sherbrooke, Que.

Treasurer:

Mr. A. W. Stevenson, C.A., Bank of Toronto Building, Montreal.

Secretary:

Mr. B. T. A. Bell, Editor CANADIAN MINING REVIEW, Ottawa.

Council:

Feodor Boas (Danville Asbestos & Slate Co.), St. Hyacinthe, Que.
John J. Penhale (United Asbestos Co.), Black Lake.
J. Burley Smith, M.E. (British Phosphate Co.), Glen Almond.
Geo. R. Smith (Bell's Asbestos Co.), Theford Mines.
S. P. Franchot (Emerald Phosphate Co.), Buckingham.
J. T. McCall (Canada Iron Furnace Co.), Montreal.
C. H. Carriere (Carriere, Lainé & Co.), Levis.
John M. Jenckes (Jenckes Machine Co.), Sherbrooke.
W. T. Bonner (Babcock & Wilcox Co.), Montreal.

Delegates to the Federated Board:

The following delegates were elected to represent this Association on the board of the Canadian Mining Institute:

Capt. Robt. C. Adams (Anglo-Can. Phosphate Co.), Montreal.
Mr. John Blue, C. & M. E. (Eustis Mining Co.), Capelton.
Mr. R. T. Hopper (Anglo-Canadian Asbestos Co.), Montreal.
Mr. John J. Penhale (United Asbestos Co.), Black Lake.

MR. JOHN BLUE—I have very much pleasure in vacating this chair. I have not a word to say. I have worked with you for a couple of years and have enjoyed myself immensely. I have to thank you all, everyone of you, for courtesy and kindness in every way. We have been fairly successful for the last two years. We must give credit where credit is due, and Mr. Bell is entitled to the greater part of it. We have all worked together, and I will ask you to continue doing the same in future and we will get to be one of the strongest associations in the Dominion. My successor, Capt. Adams, is more in the way of making speeches than I am, and will do it a great deal better. I ask him to take the chair.

CAPT. R. C. ADAMS, in taking the chair, said: I thank you very much for the honor you have done me in electing me. I shall feel much more diffidence in following the able and practical mining engineer who has so ably filled the position for the past two years. It is said that the men who occupy the chair are not the real men who manage affairs, and in this case we know who "the power behind the throne" is, and so long as Mr. Bell is at the helm we feel assured everything will go all right.

He then called for the first paper on the programme:

The Canadian Pig Iron Industry.

MR. GEORGE E. DRUMMOND—To review the young and growing Canadian iron industry, without "taking stock" of rival markets, is an impossibility in these days of close competition. The American iron masters especially must be reckoned with, for they have succeeded in displacing the iron and steel producers of Great Britain in the western, or most important portion of the Canadian market, and have now narrowed down the fight for supremacy in that section to a question of the product of American labor as against the product of Canadian labor. The British iron masters frankly admit that they are out of the fight in so far as the trade of Western Canada is concerned. The splendid equipment of the American furnaces, together with their close proximity to the Canadian market, puts the Scotch and English iron masters at a great disadvantage, and it is therefore an acknowledged fact that the competition for the iron trade of Canada must now and for the future be solely and alone between American and Canadian producers. It has been said that our neighbors to the south "want the earth," and if one is to judge by the opinion of so eminent an American authority as Mr. Andrew Carnegie, it would seem that in so far as the Canadian iron market is concerned, they imagine that they have it. Mr. Carnegie, in a glowing article recently contributed to the "40th Anniversary" number of the *Iron Age*, in writing of the iron producers of the United States, of which body he may well be termed "king," says they "have become the largest, best disciplined and most effective army of iron masters in the world. They have wrested their home market from the grasp of the foreigner, they supply the Canadian market upon equal terms with him, and are beginning to conquer territory which never before was theirs."

The foreigner referred to so aggressively by Mr. Carnegie is the British iron master, for no other competitor of consequence, aside from the Canadian, ever fought for the iron trade of these British North American provinces. It is quite true that the British makers have been driven out of the greatest and most desirable portion of this market, and they have been driven out, to a large extent, by American makers. In that Mr. Carnegie is right. Our Canadian ocean steamship owners can bear testimony to this by the consequent loss of tonnage for their steamers plying between British and Canadian ports. The British iron master has passed away, probably never to be reinstated, in so far as the Western Canadian market (the greatest we possess), is concerned, but Mr. Carnegie is mistaken if he imagines that American iron masters are left in sole possession of the field. If he will glance at the statistics of the imports of pig iron into Canada versus the domestic production for the fiscal year ending 1893-4, he will be convinced that Canadian-made pig iron is making a steady and sure headway. Quoting from a late number of the *Canadian Manufacturer*, in which figures taken from official sources are given, the increase of output from Canadian furnaces for the fiscal year ending 30th June, 1894, was 200% over that of the fiscal year ending 30th June, 1891 (three years.)

1893-4 marked an epoch in the history of the Canadian iron industry, because the domestic production for that year, 62,522 tons, meant that Canadian workmen were producing from purely Canadian material 58% of all the pig iron consumed in the country. The official statistical year-book gives the percentage of home-produced iron to the total consumed as 45.4%, but this is incorrect, inasmuch as the imports group together the following material—pig iron, iron kettledge, scrap iron and steel, giving the total as 75,275 tons. The total quantity of pig iron imported for that year was 45,262 tons, the Canadian iron exceeding the importations by 17,240 tons. The statistics down to the close of the last fiscal year, June, 1895, will show (the "ebb and flow" of trade being allowed for), a proportionately steady advance, and this will be still more marked in the coming year, when it is probable that the output of the new coke furnace at Hamilton Ont., will be sufficiently large to replace what is now imported from the United States, and beyond what may seem desirable in mixtures, may be calculated upon to do so.

The *Canadian Manufacturer* places the value of the pig iron production of 1893-4 at \$965,968.77, and when it is considered that almost nine-tenths of this has been paid out for labor to Canadian workmen, the value of the industry will perhaps be better appreciated. A continued encouragement of the industry will mean that Canadian pig iron will yet form a base for many articles of finished iron and steel not now produced in this country. It has been well said that the production of pig iron is one of the best tests of a country's metallurgical greatness. This has been particularly true of Great Britain and the United States. The statistics referred to above evidence the fact that Canada is on the "right track." The Dominion may rank low as yet in the scale of iron producing countries, but she is on record along with such nations as Great Britain, the United States, Germany, France, Sweden, Russia, Austria and Spain, and the Canadian percentage of the world's output, though small, is steadily increasing, and must increase if the industry is encouraged as the circumstances of the case demand.

THE AMERICAN TRADE.

1895 has been a year of surprises. As one authority puts it: "1895 iron trade was like a sandwich, the meat, or best part of it, was in the middle." Opened badly, surprisingly good during the summer and autumn months, and surprisingly bad at the close. On the whole, however, a year fairly prosperous, and with few, if any, failures of importance attending its operations. In this respect an improvement on 1894, and a marked contrast to 1893.

As an evidence of the great fluctuation of prices during the year, Bessemer pig iron was quoted at \$10 at Pittsburgh, equal to \$9.35 at Valley furnace, in the early part of the year. Later on in the season this iron went up to \$17.50 at Pittsburgh, but receded again before the close of the year to \$11.00 per ton. On some lines of finished goods the prices advanced fully 100%, but again receded. While the actual figures of the output of pig iron in the United States to the close of the year have not yet been compiled, it will aggregate almost, if not quite, 9,500,000 tons, and 1896 opens with the enormous output of almost one million tons of pig iron a month, and with but a very light demand for steel and finished material. This would not seem to be an encouraging position of affairs, yet it is safe to say that the actual conditions are quite as favorable as they were along in the summer and autumn of last year, when buyers were "tumbling over" one another in their anxiety to get orders filled. The great railways and other large corporations have not by any means supplied their legitimate wants. Speculators have rushed the market during 1895, and many of them are carrying stocks to-day which were purchased at fairly high prices. The legitimate buyers, at least the larger ones, notably among the railways, have held back, but they must come into the market sooner or later, and there is good ground for believing that even the present immense output will not be, at least for some little time to come, too great for the legitimate demands of the country, when the unsettling war scare, combined with the drawbacks of a presidential year, have permitted trade to settle down into ordinary grooves.

Natural conditions will all tend more or less to keep prices steady through the coming year. With advanced prices on ore and coke, Bessemer pig cannot be made for \$10.00, or anything like it. Labor is 30 per cent. higher than it was a year ago, and it is now costing more to make iron than it did last season. It is therefore probable that the present low prices are more or less temporary.

The *New York Journal of Commerce* says that the ore shipments of the lakes have been about one-third greater than the previous year, and they have exceeded by more than 10 per cent. the shipments of the banner year, 1892. A significant feature is that ever since 1892 a surplus of about 2½ million tons of ore has been lying on the docks, while now the supplies are down to a point that there are fears of an ore famine, and prices have advanced accordingly. The Mesaba mines commenced shipping in 1892, but the amount that year was nominal. In 1893 there was a considerable shipment, and this was tripled in 1894, but the shipment of 4,000,000 tons in 1895 has a good deal more than doubled the shipments of the previous year. It is notable that at the beginning of last season only ten mines in the Mesaba range contemplated making shipments, but at the close of the year 22 mines were in operation, and a dozen more are making arrangements to ship as soon as spring opens. There is considerable activity in the other ore-bearing districts, and on the Gogebic range it is deemed probable that there will be a repetition of the boom of six years ago.

There will be no lack of ore, yet many of the best authorities agree that prices will be well maintained throughout 1896.

GREAT BRITAIN.

It is too early yet to give full returns of the British output for 1895. The production of pig-iron, however, for the first half of 1895 was 3,721,870 tons which is at the rate of 7,443,740 gross tons, against a production in 1894 of 7,427,342 tons. It will be seen that the output in the United States shows a steady and marked increase over that of the rival market, Great Britain.

In marked contrast with the excited fluctuations of the American iron market during the past year, the course of Scotch pig-iron has been of an extremely placid and uneventful description. Opening at 41/7 with a quiet market, Scotch Warrants closed at the close of 1895 at 45/7, without any special features of interest. The price at which they opened at the beginning of the year was very low, and the market gradually recovered during the spring and early summer, until in the month of September, when the American boom was at its height, they reached the high figure of 48/10, which, however, was maintained for only a short time. Prices then began to settle again, and they continued gradually to recede until the close of the year, when 45/7, as we have stated, was the ruling price. It was expected at one time during the course of the year that the Scotch and English markets would follow the lead of the American, but the collapse of the boom on this side of the Atlantic effectually stopped this.

Another incident happened to further depress the buoyant feeling which was prevalent in Scotland during the month of September, and that was the unfortunate trouble that arose in the ship-building yards on the Clyde, and also at Belfast and in England, in connection with the wages of the ship-building hands. A large quantity of tonnage was placed in the latter part of 1895, and it was expected that the Scotch and English ship-building yards would be fully employed, and the demand for steel would thus be considerably increased. The disputes, however, between the ship-builders and their employees has undoubtedly sent a large quantity of this tonnage to foreign ship-building yards, and consequently the large demand for steel that was expected has not developed. It is understood that these disputes have now been satisfactorily settled, and it is not expected that the prices will decline further than they are at present.

The fluctuations in the Warrants market are of course largely of a speculative character, and are often due more to condition of the money market, and other outside causes, than to any special increase or decline in the demand for pig-iron or consumption. In order, therefore, to judge of the actual condition of the consumptive pig-iron market it is necessary to look at the figures of Scotch shipping brands, such as "Summerlee," "Coltness," "Calder," "Gartsherrie," etc. In looking at the prices of these brands, the extremely placid nature of the market during the past year is especially noticeable. No. 1 "Summerlee" was quoted f.o.b. Glasgow in January,

1895, at 52/6, and the quotation at the close of the year was 51/-. The lowest price quoted during the year was 50/- on several occasions, while the highest was during the months of September and October, when 53/- was asked, and possibly a little higher may have been the ruling price for a short time, but the margin of fluctuation during the whole year was never greater than about 3/6, or under \$1.00 per ton. This is rather different from the course of the American market, for the same grade of pig-iron, such as is made in Northern Ohio, No. 2 American Scotch, was sold as low as \$9.25 at the furnace, while during the boom it went as high as \$14.50, showing a margin of fluctuation of over \$5.00 per ton on this grade.

The figures in connection with the production, consumption and exportation of British iron have not come to hand, but it is safe to say that the British production during 1895 will not fall short of the previous year, and will approximate the figures mentioned below.

With regard to foreign iron imported into Canada, statistics show a great falling off in the imports of pig-iron from Great Britain as compared with the United States. The returns for the fiscal year ending June 30th, 1895, show importations of 33,944 net tons, of which only 6,346 tons came from Great Britain, while 27,550 tons are credited to the United States. 1894 was certainly a most exceptional year, as the iron market in the United States was at the very depths of its depression, and sales of American iron were made at prices very much below the average of previous years, and without doubt below the actual cost of production. Now that matters have been somewhat more equalized it is expected that the British iron-master will be better able to compete for a portion of the Canadian trade, with their American rivals, than during the past year, and particularly in the Montreal and eastern seaboard markets. With the advent of the new Hamilton furnace the Canadian iron industry will make it more and more difficult for British and American producers to secure any portion of the Canadian trade, beyond what little iron may for a time seem desirable or necessary for mixtures. In due course even this moderate market may be lost to the foreign producers.

Cleveland iron import returns, issued at Middlesboro', Eng., show an increase in stocks of 4,000 tons for November. There have been previously uninterrupted decreases since April. The production was 245,000 tons, 120,000 tons being Cleveland iron, and the remainder hematite, etc. The total stock of Cleveland iron is 271,000 tons, 93 furnaces in blast—one increase. The total stocks 12 months since were 200,000 tons. The condition of affairs at the close of the year will probably remain relatively the same, the stocks being greater than they were a year ago.

GERMANY.

The German production for the first ten months of 1895 was 4,788,571 metric tons, as against production for a similar period in 1894 of 4,579,180 tons, an increase in production of 209,391 metric tons.

CANADA.

It is an acknowledged fact that a time of depression in the United States is nearly always followed (generally speaking, a year later), by a period of dull times throughout Canada. 1895 has been no exception to this general rule, but thanks to the moderate dividing wall afforded by our system of protection to native enterprises, we have been preserved from any such panic as the markets of the neighboring Republic experienced in 1894, and the solid financial condition of Canada has been the subject of favorable discussion in the money markets of the world. This has been true of all important Canadian industrial enterprises. In the iron department our operations have been carried on upon a safe basis. Most of the furnace companies have restricted themselves during the year to comparatively short campaigns, being wise enough to suit the output to the times. In the face of this the record for 1895 is creditable, and now starting the new year, 1896, with comparatively light stocks at the various furnaces, and with a knowledge that the new 100-ton per day Hamilton furnace can be depended upon for the coming year, it is safe to predict that 1896 will prove the banner year of the iron industry in Canada, so far as the past is concerned, and the beginning of a new and more vigorous existence in the metallurgical history of our country.

The record of the various Canadian furnaces during 1895 is as follows:—

Nova Scotia Steel Co., New Glasgow and Ferrona, N.S.

	Tons.	Lbs.
Coke pig iron made.....	19,410	1,440
Ore charged.....	38,783	1,520
Fuel.....	28,110	1,560
Flux.....	16,304	1,920
		Men.
Labor employed in steel works.....		450
In ore production.....		100
In furnace work.....		250
		800

This company manufacture all grades of agricultural implement steel, forgings, etc., the basis of which is very largely "Ferrona" iron, made from Canadian ore, so that the utmost possible amount of labor is secured to the country in the special lines now made by this company.

Londonderry Iron Co. Ltd.

	Tons.	Lbs.
Coke pig iron made.....	17,744	320
Ore charged.....	41,557	1,200
Fuel charged—Coke.....	25,264	1,920
Coal.....	3,088	1,920
Cast iron water and gas pipe produced.....	2,110	160

Average number of men employed, 425.
Furnace output of 1895, campaign 8 months.
Pipe foundry campaign, 7 months.

It is a notable fact that the tariff revision of session 1894, by which a duty (on a sliding scale), was imposed on wrought scrap iron, has already resulted in the Londonderry Iron Co. making contracts with Canadian manufacturers of bar iron which is enabling them to start up their rolling mills. The work is just commencing in this department, and will afford steady employment to a large number of Canadians.

Canada Iron Furnace Co. Ltd.

Charcoal iron produced in 1895, in a campaign of nine months.

	Tons.	Lbs.
Ore made.....	6,598	420
Charcoal consumed.....	654,361	bushels.
Ore.....	16,203	
Lime.....	1,500	417

Average number of men employed, 600.

It may be explained that the operations of this company, involving the working of bog and lake iron ores, and the making of wood for charcoal, extend over a considerable territory. The labor is largely drawn from the farming class, and is therefore naturally of a more or less intermittent nature, which accounts somewhat for the large number of men employed.

A portion of the output of the furnace is used for the manufacture of the highest class of railway car wheels, at the company's auxiliary works at Lachine, Que., where a further staff of about 150 men are employed, and in addition it may be said that all the railway companies in Canada are now using the Canada Iron Furnace Co's metal as the basis of mixtures for standard car wheels. It will be gratifying to Canadians to know that the high quality of this special metal, as demonstrated by its great strength and splendid chilling qualities, has so far attracted the attention of foreign engineers that the company has been enabled to open up a foreign trade during the past year, and it is now shipping iron regularly into the Pittsburgh market, where the metal is used for very special qualities of work. In addition to this, important shipments have recently been made from Radnor Forges to the European market. While this trade is not a large one as yet, it proves that the quality of the iron made in Canada is unsurpassed, and is another reason why we should carefully build up our national industry.

Drummondville.

The campaign was short, but the output will be about the same as 1894. The whole of the production of this furnace is used in the manufacture of car wheels at the company's works in Montreal. The campaign is always more or less regulated by the requirements of the car wheel department.

Pictou Charcoal Iron Co., Bridgeville, N.S.

The returns of output have not yet been filed, but a very notable point in connection with the operations of this company is that it is just on the point of installing a steel converting plant, and will use the largest portion of the output in that way, finishing it into the highest quality of agricultural implement steel for the home market. This is a striking illustration of the effect of the Dominion Act of 1894, which provided for the payment of a bounty of \$2 per ton on all steel billets manufactured in Canada from Canadian pig iron.

The Hamilton Iron and Steel Co.

The new furnace with a capacity of 100 tons per day goes into blast immediately. At the start a large proportion of this company's ore will be the product of American mines, but they look to the Act of the Legislature of Ontario, Session 1894, (which provided for the payment of \$1.00 per ton on the pig metal product of iron ore, raised or smelted in the Province of Ontario) to bring about an almost immediate development of the mines of the Province. In the meantime the Hamilton Iron and Steel Co. will naturally have to waive claim to the Dominion bounty of \$2.00 per ton, so that it is entirely in their interest to push forward the exploration and development of Ontario mines, and thus give the real benefit of the industry to Canadian labor. Under present circumstances, Ontario not possessing coal mines, and the question of the economical transportation and handling of Lower Province coal, being as yet unsolved, the Hamilton Iron and Steel Co. will have to use American fuel, which unfortunately means that one-half of the labor benefit of the industry will go to a rival market. Under these circumstances the Dominion Government will probably restrict the Federal bounty to a sum proportionate to the amount of Canadian labor employed in the industry; this as a protection to the coal miners and charcoal burners of the other Provinces.

REMARKS.

The time is perhaps very opportune to draw the attention of the leaders of the contending political parties of this country to the fact that the interests of the industrial enterprises of Canada should be as sacred to the one party as to the other. The workmen employed in the respective enterprises are just as deeply interested in the ultimate success of the operations as the capitalists who have risked, and must continue to risk their money in establishing the work.

The iron industry has perhaps greater claims to the good-will and support of the statesmen and people of Canada than perhaps any other of the great industries of the country, because the raw material used is wholly Canadian, the product of Canadian labor. It is eminently an industry for which nature has fitted the country, and it is therefore well that it should be encouraged and developed, because it will afford a greater amount of employment to labor for the money invested than any other industry that the country is fitted to sustain.

The progress made should also now be sufficient to prove to capitalists and men of affairs generally, that the enterprise of iron making in Canada can be made a very decided success, affording a splendid field for safe investment. It is no longer in an experimental stage, and if many of the investors, who are now putting their money into the silver mines of the west, not only of their own country, but of the adjoining republic, would turn their attention to the production of the most useful of all metals, iron, right here at home, and for the home market, building up every kindred provincial interest, the future of this Province and of Canada would be most promising. What is wanted now is sufficient capital invested in the various enterprises to enable the iron masters to keep abreast of the times in the matter of modern appliances and methods. Nature provides all the material, it remains for men to utilize them by the best and most economical methods.

The industry has naturally suffered from uncertainty with regard to the tariff question. Barred out, as Canadian iron manufacturers are, from the American market, by the customs tariff of that country, and handicapped as all iron industries are in infancy when a very heavy initial expenditure has to be made in construction of plant, prospecting, securing and developing of mines, wood lands, quarries, shipping docks, etc., it is imperative that the Government of the country should give stability to the protective tariff, and thus give confidence to capitalists. Statistics prove that the present protection and bounty granted by the Government of Canada, if well maintained, will result in the development of the Canadian iron industry, but the history of the work done in the United States, as well as the past history of England, proves that the encouragement granted is not by any means too much for the earlier years of the work. This has been well recognized by Sir Oliver Mowat, who, as the head of the Liberal Government in Ontario, recently carried through an Act by which his Government grants a special Provincial bonus of \$1.00 per ton for all pig-iron made in that Province, the product of Ontario ores.

Speaking of the treatment extended to the iron industry by both political parties in this country, neither are quite free from criticism. Special attention is drawn to the fact that the Order-in-Council passed at Ottawa, Nov. 2nd, 1894, entitled, "Re drawbacks on imported goods used in Canadian manufactured articles, and exported," still remains in force, despite the protests and explanations of numerous Canadian manufacturers, who are debarred from doing business with the western Canadian agricultural implement makers on account of this order. The order in question, as is well known, was passed with a view of encouraging the exportation of agricultural implements to foreign markets, and provided for a rebate of duty on the material used in machines so exported. It was so framed, however, that the effect has been to compel the Canadian agricultural implement makers to purchase foreign material before

they can avail themselves of the drawback. The result has been considerable loss of trade to the manufacturers of Canadian pig-iron. To be consistent with their policy of encouraging the native industry, the Federal Government must so frame the order in question as to leave the agricultural implement maker free, if he so chooses, to use Canadian material. So much for the present Government's consistency.

On the other hand, the leaders of the Liberal party evidently do not appreciate the iron trade as they should, and do not understand it in a broad sense. They have shown this by the repeated attacks that the leaders, notably the Hon. Wilfrid Laurier, have made upon the pig-iron industry of Canada. In several of his speeches Mr. Laurier has stated that the Canadian iron furnacemen enjoy a protection, aside from the bounty, (which all admit was granted for the special purpose of defraying the work of development in mines, forests, and at the furnace) equivalent to an ad valorem duty of from 40 to 60 per cent. To prove his argument he takes the selling price of Southern American coke iron (the very lowest and poorest quality made in the United States) at \$6 per ton at the furnace, and to this he adds a freight of \$4.00 per ton, so as to arrive at what he terms the "tax" on the Toronto buyer. This is wholly incorrect inasmuch as the lowest price at which Southern iron can be bought today is say \$10.25 per gross ton, and the freight to Toronto from Tennessee or Alabama is \$4.60, making the cost in bond at Toronto, \$14.85, upon which a specific duty of \$4.00 per net ton would be equivalent to an ad valorem duty of less than 30 per cent.; but Mr. Laurier entirely overlooks the fact that there is iron and iron, and that to arrive at a fair average of the duty he will have to take into account the fact that Canadian founders use not only Southern coke iron, but also higher priced Northern coke iron; as well as Scotch coke and American charcoal pig-iron. If our politicians, before making such statements, would simply refer to the official statistics on record at Ottawa, say for the fiscal year ending 30th June, 1895, they would find that the importations of pig-iron for the last fiscal year were 33,944 net tons, of which the entered invoice value was \$370,574.00. Figured out at the price per standard ton of 2,240 lbs., this means a value at the furnace of \$12.13, to which add an average freight rate of \$4.00 per ton for delivery to any point in Canada, i.e., from the furnace in Scotland or the United States to point of destination, and it brings the average cost per ton to \$16.13. The specific duty on this at \$4.00 per net ton is equivalent to an ad valorem protection of just about 27 1/4 per cent. As a matter of fact the present figures, taking into account the high class charcoal iron used in this country, as well as the lower grades of Southern coke, will aggregate fully \$18.00 per ton, which would mean a protection equivalent to 25 per cent. ad valorem on the average freight, etc., for delivery at any point in the Dominion.

SPECIFIC AS AGAINST AD VALOREM DUTY.

As far as pig-iron is concerned, a specific duty is the only fair and sensible basis. In the first place it is the simplest to apply, and does away with possibility of fraud. It would simply be impossible for an appraiser, expert or not, to determine whether a pig-iron was worth \$12.00 per ton or \$25.00, so that there would, as far as high grade iron is concerned, be a wide opening for entering at fraudulent figures, if an ad valorem duty was applied. Then again, an ad valorem duty would mean a tendency to lower the grade of iron imported, and therefore the class of work produced in this country.

In the case of food, clothes, etc., the argument against specific duties, that the poor man suffers, as he pays an equal tax on his necessity to that paid by the millionaire on his luxury, may hold, but this does not apply to iron, where the quality of pig-iron to be used is determined not by the class of people the finished article is to be sold to, but by the purposes to which it is intended to apply it, and a costlier iron, for example, goes into the poor man's stove than into the rich man's furnace. The highest and most expensive grades of iron are used for the production of articles on which human life depends, such, for example, as railway car wheels, structural work for bridges, buildings, etc. Any one will recognize that it is in the interest of all that the best of metal should be used, and nothing done to operate towards bringing into use poor material.

THE ENCOURAGEMENT OF QUEBEC LEGISLATURE.

It is worthy of special note that the Legislature of the Province of Quebec evidenced, during the last session, a desire to encourage the iron industry in this Province, by passing the Hon. E. J. Flynn's Assembly Bill No. 21, entitled, "An Act respecting colonization of certain parts of this Province, and for promoting the mining industry therein." By this Act the C. I. F. Co. are created a Colonization Society, and 30,000 acres of wood lands are set aside or reserved for the purposes of colonization by the employees of the company. The industry is thus protected against speculators in wood lands, and assured of a constant supply of fuel. The Act is an eminently wise one, and great credit is due to the Hon. Mr. Flynn, Commissioner of Crown Lands, for this fresh evidence of good will towards the mining industry of the Province. It will be well for the Provincial Government to grant similar privileges to any furnace company starting work in the Province of Quebec, for while the Act does not go so far in the matter of encouragement as did the Act of the Ontario Legislature, yet it shows good will on the part of our local legislators. It will be well for the people of Canada generally to give this whole question of the development of the iron industry more careful thought, consideration and sympathy.

We have "wars and rumors of wars" these days. Is it not well to feel that we are self-sustaining in this much abused iron trade? (Applause.)

Copper and Pyrites.

MR. JOHN BLUE—The copper and pyrites ores mined in the Province of Quebec during 1895, amounted to 37,920 tons of 2,240 lbs. Of this quantity there was exported to different points in the

	Tons.
United States.....	23,120
Treated in the Province.....	8,800
And put into stock pile.....	6,000
A total of.....	37,920

About 300 men are engaged daily in the mining of these ores.

All of this ore was mined in the Township of Ascot, Sherbrooke County.

Practically none of the ores of this district can be treated for copper contents alone; to make the mining of them a profitable enterprise it is necessary to utilize all the valuable constituents, sulphur, copper, silver and gold, and for this reason the mining of the ores depends largely on the state of the market for sulphuric acid in the United States, as most of it is exported there to be first treated for acid making purposes.

The acid business in the States has been in a very depressed state during the year and consequently the mining of pyrites shows a falling off in quantity.

The most pleasing feature in the business is the increased consumption of pyrites in Canada for making sulphuric acid, a sure test of the healthy condition of business in the Dominion.

Mr. Drummond, in his valuable paper on iron, states that the increased consumption of pig iron in any country is a sure indication of healthy business' growth and

development in that country. With all deference to Mr. Drummond's statement, I would say that the consumption of sulphuric acid is generally conceded to be a still more reliable and valuable test of manufacturing growth and progress.

I have much pleasure in stating that Dr. Reed, the enterprising proprietor of the Harvey Hill mines in Megantic County is at present engaged in opening up and developing his property, and it is altogether likely that we will be able to report the production of ores in the province in 1896 for their copper contents alone.

CAPT. ADAMS—About what is the average contents of the ore?

MR. BLUE—40 to 42% sulphur, 4% copper, 30 ozs. silver and 30 cents worth of gold.

Phosphate Mining.

MR. J. S. HIGGINSON—Owing to the continued depression in the phosphate trade, in all the producing centres, due to the position of the chief consumers, viz: the farmers, the phosphate shipments of this section have fallen to 5 per cent. of what they were ten years ago.

In 1885, the production of Canadian phosphate was in the neighborhood of 22,000 gross tons, meaning an expenditure of about \$300,000, in labor, etc., in the phosphate districts of this country.

To-day the ore available for the market is no longer mined on its own merit, but is a by-product from the several properties working mica.

The price offered for our Canadian mineral (reported to be the best the earth produces) is still so small, that it would not pay cobbling and transport, much less the mining.

Ten years ago our high grades brought from 1/10 to 1/3 per unit with a rise; to-day we are offered a maximum of 6d. to 6 1/2 d. for 80 per cent. and 85 per cent. f. o. b. Liverpool or London, and in some cases Hamburg, with the usual extra charges, so well known to the shipper, which amount considerably on a commodity, which we are compelled to sell at so much less than it costs to produce, although that price may be its value when placed in competition with the products of Florida and other producing centres.

There is a small home market for our 80 per cent., and some low grade ore, but the amounts so far shipped for this market are not of sufficient account to make it worth a person's while to work for it.

The American market has for the first time bought, during the past year, some of our high grade ore, to use in the fertilizing trade, and we hope it will lead to a larger demand in the near future. This material is ground and shipped in the same way as the lower grades.

The production of phosphate in Canada during the past two years, will amount to about 1,500 tons, chiefly high grade. Last year's shipments amounted to about 700 tons, 525 of which went to England, balance in small shipments to Canada and the United States.

The mined phosphate available in Canada to-day, will amount to about 2,000 tons of all grades, as there was a considerable amount of mineral held over since 1892-3, hoping for better prices, which, unfortunately for the holders, have not materialized.

The future for phosphate, in our opinion, looks rather blue, unless there should be great changes in the condition of the farmer, almost all the world over, as with wheat and root crops, at such low prices in the world's markets, it is difficult for the farmer, in the old sections of the world to compete with the new and fertile lands of certain sections of North and South America, and the cheap labor of eastern countries, as India, etc., with the freight rates so low from the different sea ports to these markets, that even fertilizers in this case, do not avail them very much, although they might be used to advantage by the farmers of Canada to keep good meadows and pastures, to help keep up what has been the best paying industry our people have, viz: the cheese trade.

There is very little help for our phosphate mines in the fertilizer trade, as foreign phosphates can be delivered to our markets cheaper than we can mine them, at a profit, and unless there should be a demand for our high grade mineral, to be used chemically, we fear we are out of it, for the present at any rate, as we are sure phosphate cannot be legitimately mined in Canada to sell at less than 1/10 per unit.

Chromic Iron Mining.

MR. J. OBALSKI, M.E.—Although chromic iron has been known to exist in the serpentines of the Eastern Townships, I do not suppose more than 50 tons were shipped until last year, the different deposits scattered through the country not being considered as of commercial importance.

In the month of April, 1894, quite a large deposit (Nadeau mine) having been discovered, more researches were made and many other important deposits were found, mainly in the township of Coleraine. As by returns kindly furnished by the Q.C.R., the shipments in 1894 amounted to 915 gross tons sent to Baltimore and Philadelphia.

For the year ending 31st December, 1895, the shipments have been as follows:—

To Philadelphia, U.S.	807 gross tons.
" Baltimore, "	725 "
" Pittsburg, "	810 "
" Liverpool, England	400 "
" Glasgow, Scotland	41 "
" Nova Scotia	54 "
	<u>2,837</u> "

I roughly estimate that the value of this year's shipments represents about \$40,000. Besides there are about 1,200 tons of ore delivered at the Q.C.R. track or lying at the mines and ready for shipment.

The summary figures would be then:

Shipped previous to 1894	50 tons.
" in 1894	915 "
" " 1895	2,837 "
On hand ready for shipment (about)	1,200 "

Total production up to date..... 5,002 "

Or, in round numbers, 5,000 gross tons.

The only shipping stations are Black Lake (including Chrome Siding) which is credited with all the 1894 shipments and 2527 tons in 1895; D'Israeli, from which have been sent 310 tons in 1895; and Coleraine, 54 tons.

The ore is mined in the townships of Coleraine and Garthby, the former being the most important, but indications have been found in Wolfestown, South Ham, Bolton, and also at Mount Albert (Gaspesia). The mines, which are merely prospects worked without any machinery and only in a very few instances with horse derricks, number about twenty, of which the most important are Leonard & Morin, Lambly & Co., Lemelin, Hall & Co., Nadeau & Co., Lake Caribou Chrome Mining Co., Dumais, Roberge & Co., &c. Each one is worked with but a few men. I estimate that since the starting of that industry a daily average of 60 men have been employed,

mining and carting being done in winter as well as in the summer. The quality of the ore is variable. The first quality (50 per cent. and over of sesquioxide of chrome) having been sold at \$26.00 per gross ton delivered at Baltimore or Philadelphia. The entrance duty to United States was then 15 per cent. ad valorem, but this has been removed. The railroad freight to Baltimore or Philadelphia is \$4.85 per ton besides \$2.00 per car for entry fees. The water freight to Europe would represent about the same amount.

At first the price was paid without considering the percentsge, but I understand that it is now \$23.00 per ton delivered for 50 per cent. with a rise of 50c. per unit and the same diminution as far as 48 per cent. Below this the ore is considered as what I call second quality, and fetches variable prices as per agreement. The third quality would be the ore of about 40 per cent., which may reach 45 per cent., and for which \$8.00 to \$12.00 may be obtained delivered at the Q.C.R. track. The high grade ore reaches sometimes 55 and 58 per cent. on picked specimens, but some cargoes are mentioned as averaging 52 and 53 per cent., and I was told that one reached 55 per cent.

I would state that the larger part of the ore shipped is of the first quality, the chemical works of Philadelphia and Baltimore requiring only that grade, while the ore used for metallurgy may be of an inferior grade. The most of the ore sent to England was of the third quality.

There is a good demand and the price is fair for the first, while the inferior grades are only occasionally asked for, but those lower grade ores could be easily concentrated and would reach the standard. I believe that a bright future exists for this small industry by concentrating the low grade ores, which are abundant, and in trying to supply the European market, even if the prices remain the same as at present.

I would suggest that for a better understanding of the mineral statistics so happily inaugurated by this Association, that the figures would be for the calendar year, the quantities shipped by rail or water, with a total or average value or grade at the shipping point, not including railway freights, duties, etc., but the carting to said station, with the approximate quantity on hand at the mines or at the shipping stations, and for the labor, the number of days' work or the value of said labor for the whole year. This Association could propose an unique way of collecting mineral statistics which could be submitted to the Geological Survey and to the different Provincial Bureaus of Mines. I consider, then, that with the good will of the members of this Association and mining operators, fair and reliable statistics could be obtained which would give better credit to our country than the very variable statistics which now are presented to the public.

Mica Mining.

THE SECRETARY—Mr. Baker, who was to have presented some notes on this industry, has been unexpectedly called away, but the following statistics of the shipments during the twelve months may be of interest:

Ottawa	284,888 tons.
Quebec	4 "
Montreal	4,888 "
Kingston	2 "
Prescott	3,888 "

Or a total of..... 297,888 "

The Customs valuation of these shipments is about \$47,000, but this is manifestly an undervaluation, and probably \$70,000 would more nearly represent the value of shipments. The principal producer has been the Wallingford mine in Templeton, other operators during the year being the Blackburn and McLaurin mines in the same district, the Vavasour Mining Association in Hull, the Lake Girard Mica System in Templeton and at Perth, and the Canadian Mica Co. in Cantley and Hull.

The Quebec Mining Act.

MR. B. T. A. BELL, submitted the following opinion on the Quebec mining law kindly forwarded by Dr. Rossiter W. Raymond, M. E., of New York, secretary of the American Institute of Mining Engineers.

"In reply to your request for my opinion concerning the Quebec mining law, as contained in the Act of 1892, I beg to say, that I have examined the law with much interest, and that it seems to me to be so drawn as to combine the encouragement of mining with a due regard to the rights of private land-owners. It contains some provisions of an administrative character which might possibly be deemed complicated and burdensome; but these are matters concerning which an outsider is not competent to speak. One might as well undertake to say where another man's shoe will pinch. I have no doubt that this law, adjusted with the liberality and discretion for which it explicitly leaves room, can be comfortably worn by those who are used to it.

The most important feature of it, to my mind, is the certainty of the title it gives. The United States law grants with great liberality an undefined estate; and the uncertainty of the grant nullifies to a large degree, its liberality. This uncertainty lies in two features of our federal law: The first is the absence of any requirement of notice to the government of the taking up of mining claims. The locator of such a claim on the public lands records his location, it is true, but not with any official of the United States. The government owning the lands does not know when the locator's title begins, what it covers, or when it is cancelled by abandonment or failure to fulfill the conditions of possessory title. The maps of the United States do not show what portions of the public lands are thus occupied. Not unless, and not until a possessory owner makes application for survey and patent does the United States become officially aware of his location. Then it requires him to advertise his claim; and, if no one presents an adverse claim, it assumes that his *ex parte* statement is correct, and gives him a title practically dated back, perhaps years, to the time when he made the location.

The second element of uncertainty is not removed even by the issuance of letters-patent. It lies in the grant of of the extra-lateral right, which constitutes the essential characteristic of the "law of the apex". This entitles the owner of a mining location to follow in depth, beyond the side lines of his location, and between vertical planes drawn through its end-lines, all veins of which it contains the apex. But the definition of this right under the vague provisions of the law is so difficult as to be well-nigh impossible. After nearly a quarter of a century of practice under it, end-line and side-line and apex questions are still litigated in our courts, involving immense sums of money, and unsettling titles that have been accepted for decades. And the principles upon which these questions should be decided are still differently laid down by our district courts, and have not yet been declared authoritatively by the Supreme Court.

I am glad that the Quebec law carries no such fruitful source of mischief and waste.

Another feature deserving of hearty praise is found in section 1422, which admits aliens, as well as British subjects, to the benefits of the law. The illiberal policy of the United States, in forbidding the ownership of land by aliens, is an annoyance and detriment to the mining industry, and would be still more so, were it not practically evaded by technical devices, such as the holding of lands by trustees. Considering

that the investment of foreign capital in the development of the natural resources of this continent is recognized as desirable, and eagerly invited, the folly of legislative discouragement of such investment should be clear. And in view of the fact that such discouragement never proves effective as a prohibition, but only necessitates extra formalities of evasion, it must be evident that the frank recognition of the rights of aliens, given by the Quebec law, is as wise as it is liberal.

Still another excellent feature of this law is the preferential right conferred by section 1441 upon the proprietor of the soil, to acquire the mining concession thereto. This is in strong contrast with the present outrageous statute of the State of New York, under which, for certain classes of minerals, a simple notice of discovery, filed without sworn or other proof in the office of the Secretary of State at Albany, operates to secure at once to the alleged discoverer the right of entry upon private lands. This and other features of the latest New York statute have not yet been passed upon by our courts; and I have little doubt that they will be declared unconstitutional and void. But the statute, as it stands, is a disgraceful evidence of the disregard of private rights by the legislature of the state.

In my own judgment, the government of any country (at least, of any country under institutions as free as those of Canada and the United States), could safely leave to private interest and enterprise the development of the mineral resources of private lands. Without pretending to discuss the ultimate nature of land tenure, and the extent to which it may be properly modified by legislation in the public interest, I may be permitted to say that, under institutions which otherwise favor individual enterprise, I think history has shown the security of private ownership of land to be the best condition for its proper utilization in the interest of all. I think that, under such circumstances, there is no danger that the agricultural or mineral resources of the land will be neglected to the injury of the community. In the absence of artificial restrictions, such as mortmain, entail, or complicated and oppressive formalities in the transfer and assurance of land titles, there is, in my judgment, no public peril involved in the private ownership, even of large tracts. In the United States, such tracts, if we may judge from experience, will be inevitably divided and sold, under the pressure of economic conditions. At all events, there seems to be no reason for changing the established system which we have inherited under the common law, until real and pressing evils shall present themselves as clearly involved in it.

What is true of the ownership of the soil seems to me to be equally true of the mineral right. Whatever theory be adopted as to the sovereignty of the state over mines, I think that in practice, under free institutions, the development of mineral resources in private lands can be more safely left to the individual interest of the land owners than to any governmental discretion. The possible dangers are two: on the one hand, that valuable mineral resources may be locked up, through the refusal of land owners to exploit them; and, on the other hand, that reckless exploitation may unnecessarily exhaust, or render unavailable, mineral deposits upon which the present and future welfare of the nation largely depends. In view of the latter possibility, I am not disposed to deny that the state might fairly claim to regulate methods of mining, so far as to prevent hopeless injury to its future prosperity; yet experience and observation have led me to believe that such a regulation is likely to be less effective than the simple interest of private owners, and that its exercise would involve more evils than it would cure. But as to the danger that private owners might prevent the development of the mineral resources of their lands, I have no hesitation in saying that no possible governmental control would equal in wisdom and effectiveness the operation of commercial conditions upon individual interests. There is no conceivable way of determining whether a given mineral deposit should be immediately exploited or left for exploitation by posterity, better than the commercial test, whether its present development will be profitable. That secures the answer of the whole world to the question at issue; and the whole world, speaking through prices current, is wiser than any government official could be. And, on the large scale, and in the long run, the opinion of the world would unquestionably prevail with the owner of the soil. In other words, if the development of a mineral deposit would pay, the land owner will either execute or permit that development, in such an overwhelming majority of cases as to take the matter altogether out of the domain of public policy.

So much as to my individual opinion. The Quebec law does not go so far; but by reserving to the owner of the soil a "preferential right" to mine therein, it practically relieves him, at least, from the intrusion of adventurers, and protects the appurtenances of his ownership.

I may add, that this preferential right of the land-owner is, I believe, a feature of the German codes which embody, probably, the most extreme view of the governmental sovereignty over mining. It is to be regretted that some crude American legislation on the subject has copied from these codes their oppressive features only.

In this connection, I am led to consider section 1435 of the Quebec law, which reads as follows:—

"The Lieutenant-Governor-in-Council may, if he thinks proper, and, in accordance with the conditions and formalities which he may deem advisable, claim, at any time, the royalty due to the Crown upon any land already sold, conceded, or otherwise alienated by the Crown, or which may be hereafter sold, but only five years after the date of such alienation.

"Such royalty, unless otherwise determined by letters-patent or other title from the Crown, is fixed by the Lieutenant-Governor in Council, in accordance with the report of the mining inspector, and taking as a basis the value at the mine, of the mineral extracted, after deducting the costs of the extracting; and it must not exceed three per cent. of such value."

An inquiry addressed to the commissioner of Crown Lands, as to the meaning of the first paragraph of this section, elicited the following reply:—

"The words 'but only five years after the date of such alienation,' in section 1435, mean that no royalty can be charged for the first five years after the concession by the Crown. In the Ontario Act (paragraph 4), it is enacted that the royalty shall not be imposed until after seven years from the date of the patent or lease. Our law says five years from the 'alienation,' which means the patent or concession."

I am informed that, under the present administration in the Province of Quebec, no use has yet been made of this discretionary power to exact, after a certain period, a royalty from the mining industry. If this be true, the fact is indicative of a wise liberality on the part of the provincial government. But the law remains, nevertheless, a menace to mine-owners, and, in a certain sense, a cloud upon mining titles. Immunity from special taxation, under the name of "royalty," is not safely secured by the mere "discretion" of a Lieutenant-Governor-in-Council. Investors of capital in mining enterprises must consider, not what a friendly administration actually does, but what it might legally do, if otherwise disposed.

It is of course not denied that miners, like all other citizens, should contribute equitably to the expenses of the government. Nor would a tax of three per cent. upon the profits of the business be necessarily oppressive. The taxes on real estate are usually much more than three per cent. of its annual revenue. But the royalty contemplated by this provision would be an additional tax; and the question is, whether it is wise to suspend over any particular industry the threat of such a special exaction, no matter how moderate.

With regard to this matter, as also to the \$5 exacted as license fee from each gold or silver quartz-mill, it may be said that the small revenue to the state is more

than covered by the expense of administration, and that the chief object of the special taxation is to secure regular reports of the industry. This brings up questions of administrative policy upon which I will not enter. In this country, the payment of small taxes and fees for separate objects is deemed annoying. Our citizens prefer to pay their taxes, as far as possible, in the lump, and be free from petty details. But custom has much to do with the public feeling in such matters; and the traditional systems of Canada may include without discomfort to its citizens features which would be resented, if novel.

Section 1436 provides that mining concessions shall be of three classes, containing: 400, 200, and 100 acres respectively; but the "depth" of the concession is the same for each class, namely, 80 chains and 80 links, or 1.1 mile; while the width only varies, from 52 chains in the first class, down to 13 chains in the third. I do not understand the reason for this arrangement, under which, in many cases, the miner would be obliged to pay for a good deal of unnecessary ground. For instance, I am told that the old river-beds of the Chaudiere and other streams are now attracting fresh attention as sources of gold. Would a single applicant be allowed to take a mile of such a channel, or would he be forced to lay his claim across it, and half a mile into the country on each side? This question is not clearly answered by the law. In surveyed townships, the concessions must follow the established sub-divisions; in townships projected but not surveyed, the side-lines of the concessions must be parallel to the township side-lines, and the concession end-lines must coincide with the projected range-lines. In unsurveyed territory, the concessions, if they border upon lakes or rivers, "shall front on such lakes or rivers," and the direction of their exterior lines "shall be determined by the Commissioner."

I think the law might be improved by permitting concessions of smaller size and different shape; but this is a matter of subordinate importance, compared with the certainty and definiteness of the title granted.

By section 1452, prospecting upon the unoccupied public lands is free to all, without license. Section 1494 provides that "the discoverer of a new mine on public lands" is entitled to a free mining license, valid for twelve months, such as is described in section 1461. Turning to that section, we find that this license covers a maximum of 200 acres, and costs a fee of \$5, and an annual rent of \$1 per acre. Hence \$250 is the maximum value of the bonus extended by section 1494 to the discoverer of a new mine. The reward is certainly not extravagant. The State of New York gives twenty-one years' free license to mine. The United States gives a perpetual free license. It is therefore all the more surprising to find in the Quebec law a restriction well nigh nullifying the economical largesse of section 1494.

Namely, section 1496 declares that "no person is considered to be the discoverer of a new mine, unless the place of the alleged discovery is in a region unknown as a mining region, or at least at a distance of thirty miles from the nearest mine."

The Ontario Act (section 40) declares that "no person shall be considered a discoverer * * * unless the place of the alleged discovery is distant, *if on a known vein or lode*, at least three miles from the nearest known mine or discovery on the same vein or lode." There is some sense in this proposition; I see none in the Quebec burlesque of it. The words I have italicized show the object of the Ontario law to be to prevent the claiming of discoverers' privileges by those who simply locate upon extensions of known lodes. It is analogous to the principle of patent law, under which patents are refused to those who simply carry out the obvious principles of previous patents, without the introduction of any change involving real invention. The locator on the continuation of a vein already worked in the vicinity may fairly be considered to have performed no discovery deserving of special reward. On the contrary, he has been specially benefited already, by the operations of others, which have guided his explorations. But if he finds the vein three miles from the nearest mine upon it, he has made a discovery involving much labor and skill, and of economic importance greater than that of the discovery of a small isolated deposit. The Ontario Act exhibits therefore an intelligent purpose. To take out of it all reference to the vein or lode, and then to substitute thirty miles for three as the minimum distance characterizing novelty of discovery, is to reduce it to nonsense. I make this comparison, because, in answer to an inquiry on the subject, the Quebec Commissioner of Crown Lands writes that section 1496 of the Quebec Act does not appear to him to be an extraordinary provision, and cites the Ontario Act as a precedent.

But the Quebec Act still further hampers the prospector upon the unoccupied public lands. The free mining license for one year, promised to a "discoverer," is conditioned upon the immediate report of his discovery; and section 1495 provides that "any one, who does not immediately report such discovery, shall be deprived, for the space of one year, of the right to mine on public lands." How this provision is to be enforced it is not easy to see. A prospector discovers an outcrop which upon preliminary examination seems to him unpromising. So, not wishing to waste time in a journey through the back-woods, to find the nearest mining inspector, he decides not to report and claim it, but to pursue his explorations further. Or, he thinks a better mine may exist in the neighborhood, and prefers to hunt a while for it. Or, he fancies that his first discovery is less than thirty miles from a known mine, though it is, in fact, more than thirty. In any case, how is his omission to report the first discovery to be proved upon him; and when does the penalty of section 1495 begin to run? Suppose he has not found out until he has actually gone on prospecting for another year; will the penalty date from the time he is found out?

All these provisions concerning the discovery of new mines seem likely to have little effect either way. They can do no great harm, but they can do little good, and that little will diminish to nothing at all at no distant day. For it cannot be long before the "mining regions" of Quebec will be all "known"—if, indeed, this is not the case already. And if mining thrives, it will soon be impracticable to locate a new mine which will not have a neighbor within thirty miles in some direction. Then sections 1494, 1495 and 1496 will be "dead-letter."

I repeat, however, that these frank criticisms of minor features in the Quebec law do not outweigh my hearty appreciation of its general excellence.

Yours truly,

R. W. RAYMOND.

The Gold Deposits of the Eastern Townships.

DR. R. W. ELLS—So much has already been written concerning the gold of Eastern Quebec, that at the first glance it would almost seem unnecessary to add anything further to the literature on the subject. In view, however, of the renewed interest which has arisen in connection with this field, more especially as regards the Beauce district, it is thought that a few additional notes relating to the original source of the alluvial gold deposits, together with some well ascertained facts bearing upon the distribution of the auriferous sands and gravels, may be of sufficient interest to merit a few moments' discussion.

In the early reports of the Geological Survey's operations in the Beauce gold district, the statement is made that "the source of the gold appears to be in the crystalline schists of the Notre Dame range, and the materials derived from their disintegration not only constitute the superficial material among the hills of this range, but are spread over a considerable area to the south of them."* In support of this statement reference

* Geol. Can. 1863, p. 519.

is made to the presence of gold in veins among these schists near Sherbrooke, as well as in Leeds, where "masses of native gold of several pennyweights are found with copper glance and specular iron in a vein of bitter spar." Recent discoveries of native gold have also been made in a small vein of quartz, which cuts the schists in Westbury, south of Dudswell. All these widely separated finds show that the hypothesis put forward so many years ago as to the source of the gold is true, to a certain extent at least, and the metal is clearly visible in certain veins found in connection with the pre-Cambrian rocks of the central anticlinal.

Reports of gold also from the mountain ridge of schists on the west side of Massawippi Lake, in a brook which flows over similar rocks to those found in the ridges farther north, furnish further confirmatory evidence in this direction; while the recurrence of alluvial deposits on the west side of the Belvidere road, which keeps along the west flank of the Sherbrooke and Lake Memphremagog ridge of similar schists would show that probably the gold there found was derived from quartz veins which cut these rocks. So also in the township of Halifax, where crystalline rocks occur, gold has been found in the gravel.

The age of the crystalline schists has now been definitely recognized as Huronian. To the rocks of this system, presumably also belong the gold-bearing rocks of the Lake of the Woods and Sudbury districts, the resemblance in character between the rocks of all these localities being marked. It is also highly possible that the gold-bearing schists of the Marmora and Madoc district are not very different in age from these, though this point has not yet been definitely settled. The evidence therefore that the Huronian crystalline schists and associated rocks carry auriferous quartz veins is very conclusive.

On the other hand it is very well established that the auriferous quartz veins in Nova Scotia occur in slates and other strata which are called Cambrian, and which, geologically speaking, succeed the crystalline schists and other associated rocks of the Huronian just described. This gold-bearing belt in Nova Scotia has been carefully studied by the Geological Survey staff, as well as by others, over many miles, and the peculiarities of its structures, and the conditions under which profitable gold-bearing veins occur, have been carefully noted. This work in Nova Scotia is of interest as bearing upon the question of the Quebec gold deposit; since we have now ascertained, quite conclusively, that much of the slates and quartzites which underlie the most productive alluvions in Quebec are precisely similar in character to the gold-bearing slates of Nova Scotia and are their probable equivalents in age. The fact that the richest pay streaks in Quebec, or those yielding the largest nuggets and the coarsest gold, have been uniformly found overlying or near quartz veins, which traverse these Cambrian rocks, is an important one, and should be kept in mind in future investigations.

In view of this important determination we may consider, first of all, if there are any peculiar conditions existing in the Cambrian slates to warrant the hypothesis that the gold may be derived from quartz veins in this series; secondly, whether any similar conditions occur in the pre-Cambrian slates, and thirdly, what conditions existed which could afford the present alluvial distribution of the gold itself as we now see it.

On the two eastern map sheets of the Townships series published by the Geological Survey of Canada, the distribution of the rocks assigned to the pre-Cambrian, Cambrian and Cambro-Silurian systems has been delineated as well as could be done in a series of highly disturbed strata, for the most part destitute of organic remains by which exact horizons might be defined. The mapping of the crystalline schists of pre-Cambrian age was rendered comparatively easy from their lithological character, as contrasted with the slaty and sandy strata of the overlying formations, while the older aspect of certain slates and quartzites which flank the crystalline rocks at many points, and which are intermediate between these and the overlying series of slates and limestones which contain fossils of Chazy-Trenton age, enables us to define, with a fair degree of accuracy, the outlines of the Cambrian series, the rocks of which are, as already stated, probably the equivalent of the Nova Scotia gold series. Quartz veins are found in the rocks of all the systems, and it is scarcely necessary to say these have been produced in the containing strata at some date subsequent to their deposition, and are presumably due to some disturbing cause, either of folding, cracking or metamorphism which has affected large areas of all these rocks.

If now we examine the structure of the schists we find them not only highly inclined, contorted, and, in places overturned, but intersected also by numerous intrusive masses or dykes of granite, diabase or some other form of igneous rock; and it is near these intrusive masses that the metalliferous lodes, such as the copper and iron are found; similar conditions prevailed in the still older Laurentian rocks in connection with the deposits of mica, apatite, etc., and also in the mining area of Sudbury with the deposits of nickeliferous pyrites. It may therefore be inferred that the presence of intrusive dykes, both in the schists and the overlying slates, has exercised a marked influence for good in the production of the gold there found. These intrusive masses, it may be said, occur at all the places where gold has been noted in the quartz veins, at Leeds, Dudswell, Westbury, the Sherbrooke anticlinal, etc., in all which places, and in many others, dykes of diorite are clearly defined, but in none of these has the quantity of gold yet discovered been sufficient to warrant the expenditure of much capital in its extraction.

In the Chaudiere section, the Cambrian slates and sandstones are well developed along that stream for some miles. They are well exposed along the line of the Quebec Central Railway from Theford north, and the contact with the underlying schists is apparently about midway between Beauce Junction and the Village of St. Joseph. Thence they extend upward along the stream to the Famine river, near the village of St. George, Beauce, and in this part of the section we have the rich alluvions of the Des Plantes, the Gilbert and the Famine on the north, and of the Millstream and the Bras on the south, as well as of the bed of the Chaudiere itself. Many quartz veins occur in this area, some of which are of large size, but in which visible gold has been rarely found. In the Geology of Canada, 1863, however, we find free gold reported from a quartz vein which crosses the Chaudiere at the Devil's Rapid, between St. Francis and the Gilbert, and on Bras, as well, in a garnet rock in which small grains have been found.

The presence of gold in pieces of quartz near the Devil's Rapid vein, recorded in the Geology of Canada, leads to the remark then made, that "it was derived, in part at least, from beds or veins of this mineral which are common among the talcose slates of the region."

An examination of the rock along this portion of the Chaudiere shows the presence of intrusive masses at many points. In the vicinity of St. Francis, and between that village and the Gilbert, these intrusions are specially conspicuous in the form of masses and dykes of dioritic diabase, which cut the Cambrian slates and alter them along the contact. West of St. Francis village, towards the Bras stream, intrusions are also seen in the hillsides and along the roads, as well as on the Bras itself; while on the north side of the Chaudiere about the Rochers station, and in the Des Plantes River, the intrusive rocks are frequent and include both granites and diorites, the latter being altered in places to serpentine and carrying small veins of chrysotile. While there is no evidence to show the precise date of these intrusions, they are certainly newer than the slate which they penetrate; but as very considerable

disturbances of the strata occurred in this area subsequent to the Silurian time, as seen by the altered condition of the Devonian rocks near St. George, it is probable that some of the intrusions at least belong to a comparatively recent period, and are presumably about the time of those found to the south and south-east as at Montreal and the other dioritic mountains of the Eastern Townships.

That the greater increase in the yield of gold from these portions of the slate formations affected by these dyke masses is due to this agency is supported by the evidence from other localities. Thus at Marmora and Madoc in Ontario, the gold-bearing belt is in close proximity to a mass of granitic rock which has penetrated the strata at that locality, while at the Risborough and Marlow silver mines the dioritic dykes are closely associated with the metalliferous lodes.

The same beneficial action upon, or at least intimate association of intrusive rocks with the strata containing our economic minerals, has been pointed out at many other places.

Bearing this in mind we would naturally suppose that the most favorable place for profitable gold mining in the Beauce district would be found where these intrusions are the most marked; and the past history of the industry clearly supports this aspect of the case.

The consideration of the alluvions presents somewhat different features, though as a whole it is closely allied to the question just discussed. The work of the last fifty years along the Chaudiere shows that by far the richest deposits have been found in the streams between St. George and St. Joseph, notably on the Des Plantes, the Millstream and the Gilbert; much of the gold obtained in these streams being coarse; while large nuggets are not infrequent in these localities, as well as the channel of the Chaudiere itself. Further to the south and to the south-east but little attempt has yet been made to find the ancient channels of the many streams which are tributary to the Chaudiere. The gold is found at many places, in fact there is scarcely a stream anywhere throughout this great synclinal valley, between the boundary of Maine and New Hampshire on the east, and the Sherbrooke and St. Francis ridge on the west, in which gold cannot be obtained. Much of this, however, is very fine, and appears to have been carried a long distance; while the coarse gold is invariably found in close proximity to quartz veins in the Cambrian slates, both in the Chaudiere and the Ditton areas.

This coarse gold drift is evidently largely local, and occurs for the most part in old river channels, some of which have been recognized for years, but none have been thoroughly explored. Where work has been carried on in the old channels, as in that of the Gilbert, the returns in gold have been very great even with the most ordinary appliances, since no attempt has ever been made apparently to carry out the work in any scientific manner or by the employment of proper engineering skill. The natural inference therefore should be that the coarse gold is derived from the reefs which traverse this area.

The gold found in these old channels should not, however, be confounded with that obtained from the widespread areas of sand and gravel which now in many places border the present channel of the Chaudiere and are found along some of its branches. There is a wide difference in the age of the two deposits. Thus the old channel gravels are clearly proved to be older than the glacial period, since they are covered frequently by a great thickness of other sands and gravels and surmounted by heavy beds of boulder clay. These glacial deposits have effectually closed up the pre-existing channel and forced the streams into new courses. As for the widespread areas of sand and gravel such as are seen about the junction of the Du Loup and Chaudiere, a part are presumably of about the same age, since they are also overlaid by boulder clay, while other portions may be more recent. These have evidently been carried down in the waters of the two streams and deposited here after the manner of other widespread superficial deposits of much more recent date. As a source of gold, however, many of these deposits are destined to be of great importance, and many hundreds of thousands of dollars' worth of the precious metal are there hidden, waiting for the enterprise and engineering skill which, with a proper amount of capital, will certainly make some one wealthy.

The tests made of these gravel deposits by the Geological Survey in 1852 show that the average amount of gold per cubic yard in the area tested was \$1.40. Anyone familiar with hydraulic methods can easily reckon the profit to be derived from the exploitation of a few hundred acres of such a deposit, since with proper appliances the cost of washing and extraction should not exceed four to five cents per yard. In view of the difficulty of locating the old channels of these streams it would almost appear at the present time preferable to turn our attention to these easily reached deposits, especially in view of the fact that a ditch capable of affording a head of water of over 200 feet is already available or can be made so at but small expense. It may be mentioned also in connection with these gravels, that nuggets of good size were obtained at the trial, one of which was valued at \$124. It may, however, be assumed that, with the comparatively crude appliances then used, all of the gold was not collected, so that presumably the real value per cubic yard of gravel is still greater than the figure stated.

It is to be expected that an old channel of the Chaudiere exists near the juncture with the Du Loup, but this will probably be found difficult to work by ordinary methods owing to heavy water. Could it, however, be successfully located and operated, there should be very profitable returns, as the specimens already obtained from the experiments made, show that much coarse gold is there buried.

These extensive deposits of surface gravels and sands of the Du Loup and Chaudiere area have evidently resulted from the destruction of the slates and contained quartz veins which are found along the upper part of these streams and which has been brought down in periods of high water, the gold being as a whole somewhat finer than that found in the old channel of the Gilbert or in the main stream as along the Devil's Rapid vein. The fine gold which occurs over so wide an area of the Eastern Townships, on the other hand, has probably been distributed first of all, through the influence of local glaciers, and secondly by the overlying currents of water that evidently swept over this entire area, subsequent to the retreat of the ice sheet.

It is encouraging to notice the renewed activity which has arisen in connection with the gold deposits of Canada, not only of the east, but of the extreme west. And especially so in connection with the Beauce district, where the subject is now being investigated by proper scientific methods by one of our most able and active members, under whose management we feel sure the enterprise will be thoroughly tested; and we trust his efforts will meet with the financial reward they deserve. In the meantime I do not think that the pursuit of old channels should be allowed to draw off the attention of capitalists from the exploitation of the rich gravels of the Du Loup, which have already been shown by the efforts of the Geological Survey to be so productive of gold when properly worked. I can only reiterate my belief that if the mistakes of the earlier operators are avoided, the scientific testing of these gravels will be productive of very rich returns; and I believe the day is not far distant when the gold fields of Quebec, although they are near home, will be quite an important factor in the output of the precious metal, as many of those areas in the more remote portions of Canada, from which such glowing accounts have lately reached us, but in some of which at least the promised returns are largely swallowed up by the difficulty of access and the greater cost of working.

* Geol. Can. 1863, p. 254.

Water Tube Boilers.

MR. W. T. BONNER—When our worthy Secretary called upon me for a paper on water tube boilers, I little realized the difficulty attending the work, for the subject has already been so fully and so ably discussed in the technical journals, and even in the ordinary trade catalogues, that I fear my humble contribution to the proceedings of this Society will contain little that is new or interesting. However, hoping that I may at least be fortunate enough to glean from fields which, possibly some of you have passed over, I beg your indulgence and attention to certain facts which we of the water tube persuasion, believe to be proof positive of the correctness of our system.

OLD AND NEW.

Not at all infrequently are the promoters of water tube boilers called upon to furnish evidence of the extent to which such boilers are, and have been used. The prevailing idea in the minds of many steam users appears to be that of mistrust in the principle and effect of water tube boilers. It is not what their fathers used, neither does their local boiler maker approve of them, a negative premise naturally calling for a negative conclusion.

Why are not water tube boilers in more general use? Because, as was explained in a discussion* of the subject by the American Society of Mechanical Engineers, they require a high class of engineering to make them successful. The plain cylinder is an easy thing to make. It requires little skill to rivet sheets into a cylinder, build a fire under it and call it a boiler; and because it is easy and any one can make such a boiler, because it requires no special engineering, they have been made, and are still made to a very large extent. The water tube boiler, on the other hand, requires much more skill in order to make it successful, a fact proven by the great number of failures in that line.

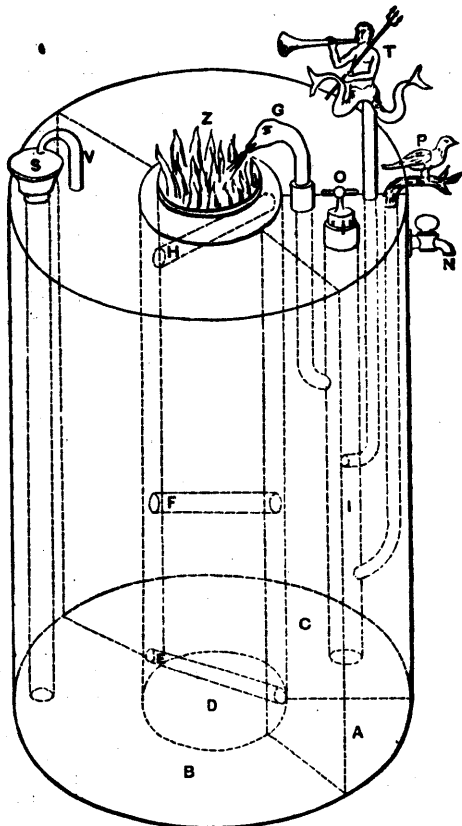


FIG. 216

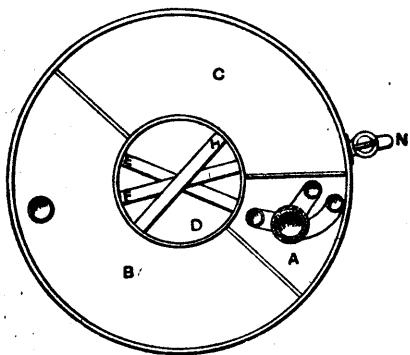


FIG. 217

Water tube boilers are not new. From the earliest days there have been those who recognized their advantages, and in modern practice to refuse them equal consideration with the best known mechanical appliances of other types, is only pardonable on the ground of ignorance or injustice.

I was greatly amused recently to find in a so-called Engineering Journal, the following item of news:—

“At Davenport, Ia., the old battery of four boilers at the Arsenal is being replaced by two new boilers of novel construction in that region. The new boilers are of 200 h.p. each, and instead of the heat passing through tubes surrounded by water, as in the ordinary boiler, the process is reversed and the water in pipes passes through a current of hot air, thus giving a greater heating surface and insuring the greatest safety.”

*Trans. Am. Soc. Mech. Eng., vol. vi., page 566.

Plainly those are nothing more nor less than our ordinary water tube boilers, and it is quite evident that the author of that item gauges the progress of this world by the developments on the little rock island in the Mississippi occupied by the U.S. Arsenal.

Contrast with this another item of news in the *Youths' Companion*, to which my nine-year-old boy called my attention only a few days ago. It read as follows:—

“An interesting discovery has recently been made in the Museum at Naples where the works of art and utensils found in the buried city of Pompeii are preserved. Careful inspection of one of the ancient copper vase-shaped vessels there has shown that it is in reality a tubular boiler. That this form of boiler should have been known to the Romans two thousand years ago is somewhat remarkable. For just what purpose it was used is not known, but the boiler is well constructed and contains five tubes running across a central fire-box, and so arranged as to permit the water surrounding the fire-box to circulate through them in a continuous current. The soldering of the tubes was so skilfully done that it remains intact today, and the cover of the boiler closes hermetically. The entire height of the machine which, as remarked above, is shaped like a vase with two side handles and three feet, is only about 17 inches. It has been suggested that it may have been employed for distilling purposes. However that may be, its preservation under the ashes of Vesuvius proves that tubular boilers are not altogether a product of modern invention.”

No doubt you have all read Lord Lytton's account of the Last Days of Pompeii and recall his description of the wonderful therme or baths which formed so prominent a feature of every Roman city during the first century. Possibly this ancient boiler was designed by one of those bright Roman or Grecian mechanics for heating the water for the sudatorium or warm baths. We find it duplicated almost exactly in the Galloway Water Tubes of the present day, and I have no doubt if we could follow up this investigation of ancient boilers, we would find the knowledge possessed by the ancient Greeks and Romans was not confined alone to poetry, sculpture and art, but that even water tube boilers or heaters were known to them.

The principle of the Galloway tube originated at the time when probably the first steam boiler ever made in this world was constructed. It is not known when the first steam boiler was constructed, but the first steam boiler recorded was made at least 200 years before the year 1 of our era.

In a discussion* of various forms of shell and water tube boilers at the New York meeting of the American Society of Mechanical Engineers in 1885, Mr. W. F. Durfee gives an illustration of this very unique boiler, copied from the first Latin translation† of the Pneumatics of Hero of Alexandria, who lived and wrote about 200 B.C.

Its construction is shown in Figs. 216 and 217. The first figure is copied from the Latin translation referred to and represents a perspective elevation of the boiler and its appendages, showing its internal construction by dotted lines. The second figure (217) was drawn by Mr. Durfee to facilitate explanation; it shows a horizontal section of figure 216 taken just below its top.

The apparatus consists of a vertical cylindrical shell, whose ends are closed by heads, through the centre of which passes a vertical cylindrical flue, D, whose upper end is provided with grates for the support of the fire, Z, the hot gases from which pass downward through the flue. The space between the flue and shell is divided by diaphragms into three unequal compartments, A, B, C, in the first of which steam is generated, the others being simply reservoirs of hot water. The central flue, D, is crossed by three cylindrical tubes, H, F, E, the tubes H, F, connecting the hot water spaces B, C, act in the same way as the Galloway tubes, now in common use, but the bottom tube is closed at the end, E, its opposite end opening into the smallest or steam compartment, A. The compartment, B, is provided with a funnel, S, whose tube extends nearly to the bottom of the boiler; and also with a safety tube, V, whose curved upper end is immediately above the funnel, S. The compartment, C, has a cock, N, from which the hot water is drawn. The compartment, A, has within it a three-way cock, I, the three discharge pipes of which are connected with the goose-neck blow-pipe, G, the Triton, T, and the singing-bird, P, respectively. The three-way cock, I, is operated by a cross handle, O, and the upper end of its plug has graduations which, when brought opposite an index mark on the shell of the cock, determine which of the three discharge pipes shall receive the steam generated in compartment A.

The principal function of this apparatus was to furnish hot water, and it is so contrived that it is impossible to draw any considerable amount of hot water from the cock, N, without putting in an equal amount of cold in the funnel, S. In order to put this apparatus at work, the compartments B and C were filled with water to a level above the upper water tube, H, by means of the funnel, S, the goose-neck, G, was then removed and water poured into the compartment, A, sufficient to fill it nearly to the lower end of the three-way cock, I; the fire was then lighted, and as soon as steam manifested itself, the goose-neck, G, was returned to its socket and placed in such a position that the fire, Z, was blown by the issuing steam. The three-way cock, I, could be turned by its handle, O, so that the steam would cause the Triton, T, to sound his trumpet, or the bird, P, to warble, and thus announce to interested parties that the water was “boiling hot.”

In case any steam generated in the compartments B and C, it found an exit through the safety pipe, V, and any entrained water re-entered the boiler through the funnel, S. In case it was desired to draw hot water in any great quantity from the cock, N, it was necessary to supply an equal amount of cold water through the funnel, S, this requirement insuring a constant volume of water in the boiler.

But I need not weary you with ancient history,—it may satisfy our curiosity and lend some additional color to Solomon's proverb that “There is nothing new under the sun;” yet we cannot expect ancient Greece or Rome to furnish models for our boiler-makers of today. Only by comparison do we really begin to appreciate the vast changes by which the engineering talent of today is taxed to its utmost to produce machinery and appliances which will accomplish the greatest amount of work for the longest period, with the least expenditure of effort.

Steam boilers perhaps have not attained that degree of perfection usually accorded to the steam engine, yet when we note the progress which has really been made and realize how close we have approached to the theoretically perfect boiler, we have great cause to feel encouraged.

Of the two hundred and sixty odd boilers recorded in Mr. Bell's most valuable Directory of Canadian Mining Industries, 30 per cent., or 5,400 h. p., are of the water tube type, and 50 per cent., or 9,000 h. p., are shell boilers, leaving 20 per cent., or 3,600 h. p., unclassified.

Since practically all of the above water tube boilers have been installed within the past ten years, we can safely infer that in the mining trade at least, more horse power of water tube boilers are now sold each year than all the other types combined.

There is no better evidence of the survival of the fittest in modern boiler practice, than a comparison of the various types exhibited at the Centennial Exhibition of 1876 with those shown at the World's Fair, 17 years later. At the Centennial there were exhibited fifteen different types of boilers, of which two were cast-iron sectional, four were shell or tubular boilers, two were shell boilers with water tubes crossing internal fire tubes, while seven were exclusively water tube boilers. Of the whole number exhibited at the Centennial, but one, the Babcock & Wilcox, re-appeared in its original

* Transactions Am. Soc. Mech. Eng., vol. vi., page 566.

† Heronis Alexandrini Spirituum Liber. A Federico Comondino Urbinate, ex Graeco, nuper in Latinum Conversus: cum privilegio Gregorii XIII. Pont. Max. Urbini, 1575.

form at the World's Fair in 1893. Of the fifty-two boilers exhibited in the main boiler room at the World's Fair, all were of the water tube type, while thirty-one of them were distinct copies of the original boiler patented by Stephen Wilcox in 1856, just forty years ago.

THE PERFECT BOILER.

What really constitutes a perfect boiler? Mr. George H. Babcock, in his lifetime, undertook to formulate the twelve fundamental principles upon which it should be built. It was about twenty years ago that his formulas were first published, yet those same principles still live and are looked upon to-day as the acme of scientific boiler construction. I need not repeat them here, they have long occupied a prominent page in the Babcock & Wilcox Co's book "Steam,"* but rarely do we find so much truth in so few words.

Few boilers there are entirely devoid of all good talking points, but do not be satisfied with a boiler simply because it is made of good materials and workmanship, or because it has a mud drum, or because it has large water and steam capacity, or because it has a large disengaging surface, or because it has a good circulation, or because it is built in sections, and is therefore safe in the event of explosion, or because it is able to withstand high pressure and unequal expansion, and has its joints protected from the fire, or because the furnace is provided with chambers for the proper combustion of the gases, or because the heating surface is composed of thin metal so arranged that the heating gases will cross it at right angles and only leave it when the greatest possible heat is extracted from them, or because it will work up to or over its full rated capacity with the highest economy, or because it is fitted with the best quality gauges and fittings. Each of these qualities add greatly to the value of a steam boiler, but that one is best which combines the greatest number of such qualities, and therefore proves the best investment independent of first cost.

Messrs. Galloway, Ltd., of Manchester, Eng., illustrate, on page 94 of their late catalogue, what they are pleased to designate as their "Manchester boiler," but which is in reality a reproduction of the ordinary inclined water tube boiler, built by so many manufacturers of today. In explanation of this marked deviation from the Galloway, Lancashire and Cornish boilers which they have been building for so many years, Messrs. Galloway, Ltd., say:—

"For ordinary pressures the Galloway boiler possesses great advantages, but beyond that, cylindrical boilers are frequently of large diameter, necessitating extremely heavy plates, and although for marine practice this is carried out, yet for situations where the conditions are less rigid, it is advisable to have a boiler more suited to the requirements of the case.

"In addition to this, where transport of large pieces is difficult, the Manchester boiler offers considerable advantages, as the largest piece is the upper vessel, which rarely exceeds 5 feet in diameter, 20 feet in length and four tons in weight, the tube rods and boxes being separate. It will be seen that all the tubes are inserted into one water box or chamber at each end, the front one connected to the upper vessel by a wide neck, and the back chamber by a large circular connection by which means an even circulation is kept up. The boiler is further provided with an internal arrangement in the upper vessel for separating the steam from the water, thus preventing priming and its attendant evils. This arrangement of boiler has been largely adopted on the continent, and we anticipate that, when its merits become known, it will be received with great favor by steam users requiring boilers for high pressure."

That is good: coming from such an eminent authority, we can only interpret their adoption of the water tube principle as a strong endorsement of the work accomplished by their predecessors in that field of engineering. I fully expect, however, in the next issue of their catalogue, Messrs. Galloway will have overcome their prejudices sufficiently to limit the diameter of their drum to 36 or 42 inches, and that they will further arrange to enclose the drum so as to utilize its surface for heating rather than condensing. Then they may add to the merits of their boiler, safety and economy.

I might add that although Messrs. Galloway are pleased to limit the use of their water tube boilers to stationary work, the boilers of that type are just now making tremendous strides in the race for supremacy in marine practice.

In proof of this statement I might refer to the steamers Turret Cape and Turret Crown, which have just closed a very successful season in the coal carrying trade between Sydney and Montreal. From their lessees, the Dominion Coal Co., I learn that the two steamers have a combined record of 27 trips, extending over a period of 44 weeks, during which time they brought 66,981 tons of coal into this port. To this total should be added 11,700 tons for short cargoes, made necessary by the very low water in the river and canal, which difficulty prevailed through all of last season. Had there been a sufficient depth of water both steamers could just as easily have brought in a full cargo each trip.

The actual carrying capacity of each of the Turret boats is 3,000 tons. They are fitted with water tube marine boilers, 2,200 square feet of heating surface being the total for each boat. They have been kept in continual service right through the season, and the captain's log shows a clean record for the boilers.

Many other and larger steamers fitted with water tube boilers have gone into commission during the past few months, and in every case the boilers have given the greatest satisfaction.

CAPACITY.

The term "horse power" is one which admits of a wide interpretation, being little understood by some and often misapplied by others. Originally used as a unit of capacity by James Watt, and supposed to be the average amount of work performed by a good strong English cart horse, its value is 33,000 lbs. raised 1 foot high per minute. It may be expressed in any equivalent of this unit, as 1 lb. raised 33,000 ft. high per minute. At best this is but an arbitrary unit since the actual value of a horse power depends as a Yankee boiler maker has very aptly expressed it, upon the size of the horse. The evolution of the term "horse power" as applied to steam boilers has been gradual, but not the less marked.

Prior to the advent of compound and triple expansion engines, it was always customary to calculate the steam consumption of the ordinary slide valve engines then in most common use, at the rate of 1 cubic foot of water per hour, or say 62½ lbs. For instance, a 10 h. p. engine would require a boiler capable of evaporating 625 lbs. of water per hour. In general practice it was found boilers of different types of construction varied in evaporative capacity according to the efficiency of their total heating surface, the amount required per h. p. averaging about as follows:—For plain cylinder boilers, 10 sq. ft. For large flue boilers, 12 sq. ft. For horizontal and multitubular boilers, 15 sq. ft.

Of late years tremendous strides have been made in the development of the steam engine, so that instead of one cubic foot of water, or 62½ lbs. steam consumption per h. p. per hour, the modern engine builder knows that he must develop a h. p. with less than 30 lbs. of steam for simple non-condensing engines and from that down to 13 lbs. or less for triple expansion condensing engines, depending upon the size of plant and number of cylinder expansions.

Here then arises a serious complication in the determination of h. p. Shall it

be a large or a small horse? The prospective purchaser should consider this matter carefully and demand that all tenders must state specifically the actual evaporative capacity of boilers to be purchased, to be determined if necessary by a practical test. The American Society of Mechanical Engineers has very properly solved this problem by the favorable consideration of its Special Committee's report* at the New York meeting in 1884, whereby the equivalent evaporation of 30 lbs. of water from a temperature of 100° F. into steam at 70 lbs. pressure is fixed as a boiler h. p.

American manufacturers generally have adopted this standard, and while they may differ in the number of square feet of heating surface they allow for developing a h. p., there is no longer any doubt as to the size of the horse.

I cannot leave the subject of h. p. capacity without first making a strong appeal for a more uniform rating of boilers, a rating which has some tangible basis. Not until you are able to compare boilers by the actual number of square feet of effective heating surface they contain, or the actual number of lbs. of water they will evaporate under ordinary working conditions, can you judge whether one boiler is cheaper than another.

I confess I was greatly shocked, only a few days ago, to hear the admission of a fire tube boiler man, that he only figured the upper half of his tubes as effective heating surface. I shall always remember him as an honest man of good sense. There is no question but that fire tubes and shell plates exposed to the direct action of hot gases, form very efficient heating surface when they are clean, but who is there who will claim the possibility of keeping such surface constantly clean while the boiler is in active service?

Effective heating surface is that which receives the direct contact of the hot flames or gases and continues to do so without interruption from soot, or interference by close furnace walls or bluff plates. This is the proper basis upon which to purchase your boiler, other conditions of course being equal.

SAFETY.

I have been asked why a water tube boiler is necessarily a safety boiler. It is not necessarily a safety boiler: in fact, I could name a number of water tube boilers which are safe in name only. Certainly a boiler with very wide, flat stayed surfaces, enclosing chambers receiving the usual circulation of all the tubes, should not be considered a safety boiler. Stay bolts and braces at best are a constant menace to safety, since they are usually located in inaccessible places, difficult to inspect and repair. But the principal objection appears to be the impossibility of providing braces which brace at the proper moment. How is it possible to assemble a number of pieces of metal, all of different sizes and shapes, and subject to greatly varying temperatures, and expect them to expand, contract, and remain uniformly tight at all times? But it is to be regretted that in defending the principle of water tube boilers, there are other weaknesses to apologize for than braces and stays. There are those with tubes closed at one or both ends, the aggregation of pipe and fittings, and the bent tube monstrosities, so aptly described in a recent publication called "Facts," all more or less dangerous because they cannot be cleaned.

Quebec Imports of Coal.

MR. B. T. A. BELL.—Although coal mining is not one of the mining industries of Quebec, the coal trade of the Province is so important that the following statistics will be of interest:—

	1904.	1895.	Increase.	Decrease.
<i>Canadian Coal by Water.</i>				
Dominion Coal Co.	544,953	454,513	.....	90,440
General Mining Ass'n.	109,351	115,435	6,084	
Intercolonial Coal Co.	80,587	75,034	.....	4,953
Cape Breton Colliery.	900	1,291	391	
Canadian by water.	735,791	646,873	.....	88,918
Scotch, English, Welsh and American Bituminous.	73,658	88,405	14,771	
Total Sea-borne.	809,449	735,278		
American Bituminous by canals, estimated.	10,000	12,000		
Total water receipts.	809,449	747,278		
<i>Canadian Coal by Railway.</i>				
Cumberland Railway and Coal Co.	98,913	64,828	.....	34,085
Acadia Coal Co.	5,000	3,205	.....	1,795
Canada Coals and Railway Co.	15,800	20,372	4,572	
Intercolonial Coal Co.	100			
Total receipts by Province of Quebec	929,252	835,683	.....	193,579

DISCUSSION.

MR. BUDDEN—I may say with regard to the excess of imports of foreign coal that there are some peculiar circumstances connected with it. The protective duty on round coal is 60c. per ton, but the duty on slack coal or screenings is only 20 per cent. That enables the foreigner to send in a great deal of slack coal. Here the question of freights comes in. During the past year the British shippers have been eagerly seeking for freight and have been carrying coal at a very low rate or even as ballast. Large quantities of slack coal have been imported during the last three or four years. I know of one concern in Montreal that has contracted for 25,000 tons to be delivered this coming year from the east coast of England and carried by ships trading here at ballast rates.

Another point to be considered is the imports of American bituminous coal. The trouble that lies before us there is that without the duty, American bituminous coal will to a large extent capture the Montreal market. The coal is mined in Pennsylvania cheaper than anywhere else in the world. It is laid down on Lake Ontario at points convenient to Montreal by the railways at absurdly low rates and is carried from there to Montreal and other points also at low rates of freight. Therefore we have very much to fear from Western Pennsylvania. On the other hand, we have to carry coal

* Steam, 28th edition, page 7. Babcock & Wilcox, New York and London.

* Transactions Am. Soc. Mech. Eng., vol. vi., page 256.

by chartered steamers at high rates of freight as the railway rates are prohibitory. The railways take out very little coal, as we pay twice as much as during the season of navigation. Our distances are also in favor of the American mines—the distance from Western Pennsylvania to Montreal being about 500 miles, whereas from the Lower Provinces it is 750 or 800 miles. You can readily see, therefore, that the maintenance of the duty is of immense importance. In previous years, before reciprocity was in force, we relied principally in this market on British coal and the price of this coal was very much regulated by the amount of tonnage offering; sometimes there was a feast and at other times a famine. It must be remembered that the development of our Provincial coal fields has cheapened coal immensely and has kept the price regular, which is of immense importance to the consumer. The price has been gradually declining, particularly on account of the cheaper freights, and also greatly owing to our own competition that was brought about by the development of our Provincial coal fields. I can say very little further except that I hope that the Government will continue the duty of 60c. per ton and enable us to continue the work we have been engaged in.

MR. GEO. SMITH—As our own mines would consume about 10 tons per day, say about 3,000 tons per year, and I know of other mines located at Theford that would use from 2,000 to 3,000 tons per year, which makes 5,000 or 6,000 tons per year, and all that coal has been lost to the coal trade during the last two years on account of the excessive freight rates. We get coal at \$1.90, nut coal, screened, from Joggins and Spring Hill, but we had to pay a freight of \$2.25 over the I. C. R. and Q. C. Railways. This simply prohibits the use of the coal. When we have to pay 5c. per 100 lbs. for having the coal hauled 100 miles, and when we can get cordwood at \$1.25 per cord we are obliged to use the wood. Of course there is a great deal of trouble in handling 5,000 or 6,000 cords of wood, piling it, &c., besides the risk of fire, and the coal, no doubt, is far preferable. If you could get the rates reduced no doubt we could use your coal.

MR. BUDDEN—That adds emphasis to my remarks about water-borne coal as the freights are less than by the railways. I think if you will make enquiries you will find that you can buy coal in Montreal and carry it over the railways at a very low rate of freight. You speak of paying \$2.25 or \$2.50; the rate from Montreal would not be much more than half that.

MR. SUSMANN—How is the price at Levis? Levis is only 80 miles on the Q. C. Railway.

MR. BUDDEN—No cheaper than at Montreal.

A question was asked as to whether the abolition of the duty on the American side would make up for the abolition of the Canadian duty.

MR. BUDDEN—The competition is entirely different since reciprocity days. The development of the West Virginia and the West Pennsylvania coal fields has taken place since then and not only the coal fields but the railways have been multiplied, and these railways carry coal at excessively low rates, and the coal is mined at extraordinary rates. They have no machinery, no pumping, no ventilation, and the coal lies practically at the water level; they run into the hill-side, and the ventilation is of the most meagre type, and the expense very, very trifling. From Newport News and elsewhere the freights to eastern markets is also very low; in fact the coal was carried as low as 50c. per ton from Newport News to Boston. We cannot attempt to carry coal at any such rates. The coasting voyage is an easy one and mere barges may be used, but, on the other hand, from Nova Scotia it is a regular sea voyage and the expenses are entirely out of proportion to those on the American coast. The eastern seaboard is also reached by rail from western Pennsylvania and elsewhere and the coal is carried just as cheap. Pennsylvania coal was sold at \$1.65 f.o.b. Philadelphia and carried to Boston at 60c. You can see what Nova Scotia coal has to contend against. I think myself we have to preserve our own fields by increasing our own consumption. The consumption in Montreal is very important, but it is not the only market we ship to; it only takes one-third of our output. After all, the main point is the development of the iron fields of Nova Scotia (hear, hear). If this is done, the consumption of coal will go on. We have plenty of coal, and very good coal.

The Trail Creek Gold Mining District of British Columbia.

MR. J. D. SWORD—The Trail Creek gold mining district of which there has been a great deal of notice during the past year, particularly in the western mining states of the Union and Canada, and extending to the mining communities of the eastern States and Great Britain, is a section of considerable area and rapidly growing importance, and the large amount of prospecting already done, has certainly put the question of permanency beyond a doubt.

The name "Trail Creek" owes its origin to the fact that the celebrated "Dewdney Trail" built some thirty odd years ago follows the creek for a considerable distance to the Columbia river. The centre of the mining district as at present defined, inasmuch as we are unable at such an early age of the camp to determine properly its limits, is situated at Rosland, which town is seven miles west of the Columbia river and eight miles north of the international boundary. The town of Rosland has a population of about 2,500 people, and has grown from what was, eighteen months ago, a few log cabins, to a well built and busy town, and what would be a typical western mining camp but for the absence of gambling houses, innumerable saloons and such irregularities as an occasional homicide, justifiable or otherwise. Incidentally I may mention that an electric light and water company is at present engaged in installing a plant to meet present requirements and an excess power to furnish light and water in view of the rapid growth of the city.

The means of access to the district are two, viz., from the northward taking Revelstoke on the C.P.R. as a point of departure, by boat down the Columbia river to Trail Landing, a distance of over 150 miles, and thence by waggon road to Rosland. From the south and State of Washington, taking the city of Spokane as the departure, by the Spokane Falls and Northern R.R., northward as far as Northport (a small town on the east bank of the Columbia river), and thence by stage after ferrying the river, seventeen miles on a waggon road of good easy grade. From eastern points, such as New York and Montreal, there is no difference in the time occupied in traversing the different routes, providing connections are made immediately on reaching Revelstoke with the steambot sailing down the Columbia twice a week. In going from the east, via Revelstoke and the C.P.R., one traverses an all Canadian route, and any extra delay in reaching Trail by this route is more than counterbalanced by the delightful trip down the Columbia river in the steamboats of the Columbia and Kootenay Steam Navigation Co., which are well equipped with good berths and have a first-class cuisine.

Another small advantage in coming this way is the shortening of the stage ride about ten miles.

All inward freight, as mining supplies, etc., and outward freight, as ore, is sent by either of the above routes. At present a narrow gauge railway is in course of construction from Trail Landing on the Columbia to Rosland, and branches are being laid to the different mines. This is to be in operation early this spring.

The Canadian Pacific, I understand, are going to build from Robson, or from the Columbia river, and the Spokane Falls and Northern R.R. have their road surveyed

from Northport to Rosland; this road, however, cannot be built until the Colville Indian reservation is thrown open, or the railroad company has permission to build from the U. S. government, which will, no doubt, be given very shortly.

The first location made in this district was the "Lily May," which claim was staked some six years ago, on what is known as the South Belt, but nothing was discovered on Red Mountain or North Belt, where at present the principal mines are situated, or I should say where the most development work has been done, until July 7th, 1890, when Joseph Bourgeois and Joseph Moris, two French Canadian prospectors, located and staked the War Eagle, Centre Star, Virginia, Idaho and Le Roi mining claims. At that time the law would not allow a prospector to stake more than one claim on the same ledge, and as the Le Roi, Centre Star, and Idaho appear to be located on the same lode, they waived their right to the Le Roi and gave the claim to E. S. Topping in consideration of his paying the recording fees.

After carefully sampling the outcrop of the vein and getting assay certificates, ranging from a trace to as high as \$500 per ton, Mr. Topping interested some Spokane gentlemen in the Le Roi, and 1/8ths of the claim was bonded for \$16,000, or at the rate of \$30,000 for the whole. Mr. Oliver Durant, a mining man of considerable experience in the Western States, was one of the parties interested in the deal, and took charge of the property, and he may justly be considered as the pioneer of the camp, as during all its vicissitudes and notwithstanding the unfavorable reports on it, he still continued to put in his money in development work and in acquiring additional property.

The country at this time was a trackless wilderness of rocky hills, covered with timber and undergrowth, in winter time the snow being from four to six feet in depth. The only way to reach the district during the winter being by travelling on snowshoes for many miles. During the winter of 1890 a shaft was sunk to a depth of forty feet on the Le Roi mine, and a car load of ore was packed on horseback to the river and shipped to Butte, where the smelter gave a return of \$86.40 in gold, copper and silver. This gave the company good encouragement to prosecute work, though from that time until 1894, the Le Roi Co. did little else but development work, as the cost of hauling was very high, and transportation expensive.

Up to the present, but little or no geological or mineralogical exploration has been done, and the eruptive rocks which form the country rock of the district have not been identified with any particular epoch, and no sedimentary rocks, altered or otherwise, have been noticed within a considerable distance from the camp. The eruptives which form the country of the camp are, however, very similar to those of some parts of Eastern Canada, notably Sudbury. The prevailing rock is a greenstone in all its various refinements of nomenclature, but mostly diorite, syenite and porphyry diorite of all shades and textures, owing to its constituents, viz: feldspar, pyroxene and hornblende being variously proportioned. At a distance from the veins, the country rock appears to have a lighter color and coarser texture. The whole of the country rocks have a jointage more or less distinct. The lines of jointage or cleavage appear to be more numerous near a vein, and the rocks there have a short, sharp, blocky appearance, which does not obtain so much as at a distance from the ledges. A large portion of the country rock, particularly near the veins, on fracture, shows iron in small flecks in the form of magnetic pyrites, common pyrites, with a few specks of chalcopyrite. Several eruptive dykes, very similar to the adjacent rocks, though lighter in color, owing to excess of feldspar which traverse different sections of the camp. The general contour of the country is by no means abrupt, but the hills appear to have been rounded off by nature and luxuriant timber and undergrowth cover the greater part of it. Winter does not set in until late in the year, and although there is an almost continual downfall of snow, the winter is mild and there is but a very short period of excessive cold such as we experience in Eastern Canada. The general strike of the veins is East and West, and their dip near the surface between 60 and 70 degs., though on sinking on some of them, notably the Le Roi, the veins become almost perpendicular. Regarding the origin and nature of the veins, I may say, a great deal of diverse opinion and speculation has been expressed, and up to date I do not know of any of the many well known mining engineers who have visited this district who have stated confidentially what they deem them to be.

Among the mining engineers of high standing that have visited the camp are: Clarence King, Henry and Louis Janin, Covington Johnston, W. DeL. Benedict, W. Gallagher, Susmann, Clemes and others. Their reports, which, with one exception, were for private enterprise and not for publication, are stated by persons well informed to be highly favorable regarding the permanency and magnitude of the camp. The general opinion regarding the veins is that they are true fissures of the regular order, although much altered by the subsequent and unceasing forces of nature. Another opinion expressed and worthy of consideration, is that the veins are replacements of the country rock by vein minerals along a line of weakness or fracture where naturally the mineralized waters would flow and the country rock at such a place, being in a broken and crushed condition, would be most easily attacked and the minerals deposited. This latter theory is probably correct, as regards some of the smaller irregular veins and feeders.

As it is not my intention to go into the matter of speculating or theorizing on the origin or exact nature of the veins in this camp, I shall not discuss the matter further, but leave the unravelling of any doubtful points to time and the efforts of our Geological Survey men.

In no mine in the camp is there noticeable what is called by the miners "gouge," although the veinstone, as a rule, parts easily from the walls. There is considerable faulting in all the veins, though the dislocation is very small. Most of these faults, however, are considered to be merely local hitches, and when a greater depth is attained they will be lost.

The width of the vein filling between walls varies considerably. In the War Eagle and Le Roi the ore bodies in their widest place are from 20 to 30 ft. wide, and narrow down at times to 4 or 5 ft. The ore is essentially a smelting one, consisting of a mixture of pyrrhotite, chalcopyrite, ordinary iron pyrites, and nispickel with quartz and calcspar for a gangue. Some of the ore is all metallic, with little or no gangue, and the amount of copper is extremely variable, as are also the gold assays—they being from a trace to as high as \$500 per ton. No gold can be mortared from the ore when not oxidized, although on the outcrop of some of the veins, the sticky soil on being carefully panned gives exceedingly fine gold in a fine streak. Experiments have been made to ascertain which of the minerals mentioned carried the gold, by carefully separating and assaying them, but it has proved nothing, though gold is generally present with copper, and also the arsenical pyrites. The coarse grained solid pyrrhotite does not carry much gold, and the best ore yet mined from the Le Roi and Josie mines was rather more silicious than the usual run. The ore has been in great demand by smelters where they have an excess of silicious, or dry ores as they are called, and as low a rate as \$4.50 has been charged for treatment, though the regular price I believe is about \$5.00.

The greatest expense in connection with the ore is the cost of transportation, as it has to be hauled either to Trail Landing, a distance of seven miles over a heavy road, and loaded on the Columbia river steamers and taken by them to Northport, or else hauled direct to Northport by waggons over a similar road, a distance of sixteen miles, and then shipped on the train to either of the following places: Great Falls, Helena, Everett, Washington, or Tacoma. This will all be saved when the large smelter, now

building, and of which I shall speak directly, is finished, or the companies operating put in their own reduction plants.

The ore is splendidly adapted for matting, and can be run many times into one, by slagging off the iron; the product being a rich auriferous copper matte.

There are in the camp what are known as two mineral belts, although the line of demarcation between them, if any, is very indistinct. The one on the north is called the North Belt, or Red Mountain, and is on the north side of the town, and the South Belt is on the south of the town and south of Trail Creek. By far a greater portion of the development work has been done on the Red Mountain side of the camp. The mountain being so called, I presume, on account of the appearance of the rock, owing to the amount of iron present. On Red Mountain, and the hills flanking it, there appears to be a system of veins of considerable continuity, one of which can be traced for over 7,000 feet. On this vein are located the Mountain View, St. Elmo, Cliff and Monte Christo mines, two of which are being developed considerably. South of this is another strong vein on which are located the Iron Mask, Virginia, and Iron Horse, and others. Still farther south, a few hundred feet, is the Centre Star vein, on which the Idaho is also located; this is generally supposed to be the Le Roi vein.

South of this again is the Nickle Plate vein, on the same vein the Golden Chariot being located. The extensions of this are not at present discovered that I am aware of. It is smaller than either of the foregoing.

Of the leading mines of this great camp, I will give a short account, commencing with the three principal and producing mines.

The LeRoi mine, which with the Black Bear and Ivanhoe claims is operated by the LeRoi Mining and Smelting Co., a corporation of Spokane gentlemen, is situated on what is called the "LeRoi Hill," a foot-hill of the Red Mountain. It is opened on the lead by an inclined shaft 450 ft. deep at the east end of the claim. A smaller shaft has been sunk and a short tunnel driven on the west end of the claim. Levels have been run on both sides of the 450 ft. shaft at convenient depths apart, and the regular system of back stoping is used to take out the ore. On the surface of the claim, the vein is traceable nearly the whole length, except on the lower end where a heavy wash has covered it up. On the surface the ore shows a width varying from 5 to 10 ft. In many places the vein assumed a lenticular form, and on the 300-ft. level bulged out to a width of 30 ft., all shipping ore. During the sinking of the shaft from 350-ft. level to the 450-ft. level, careful average samples were taken daily, and an assay value of less than \$100.00 per ton was rarely returned. The assays often run as high as \$200.00 and \$300.00, and once or twice \$500.00. The width of the vein from the 350-ft. to the 450-ft. level has not been determined, as the shaft is following one wall and is in ore all the time. I am unable to state the exact amount of gold and copper taken from this mine up to date, but I believe the amount to be at least \$500,000, and this must have been done within the last eighteen months, as nothing more than development work was done previous to that time, and that in a somewhat leisurely manner.

The timbering of the mine is in accordance with the usual western practice for such veins. Stulls are used when convenient, and when the ore body gets too wide regular square sets of round timber are substituted. All the ore is broken by machine drills, and after being broken is hoisted and trammed to an ore house, which has a capacity of 2,000 tons. It is then dumped on a sorting floor above the bins and after having the larger pieces of the waste picked out, is dumped into the bins and is ready for hauling to the river.

The average value of the ore is from \$35.00 to \$45.00 in gold, silver and copper, the value being principally in gold, there being only from 2 to 5 per cent. of copper and one or two dollars' worth of silver in the ore. The amount of ore hoisted daily from the mine runs between 75 and 125 tons, or an average of about 100 tons. The mine is well equipped with a mining plant, consisting of a compressor, eight or nine drills, two hoisting engines and three boilers, and the company have recently added a large electric diamond drill to their plant. The company have also built a fine hotel on the property, including offices.

Judge Turner, the president of the company, estimates there to be at least 100,000 tons of ore in sight. A contract was made last summer to furnish 75,000 tons of ore to the B. C. Smelting Co. at Trail.

The War Eagle Mine.—This mine, in conjunction with the Iron Mask and Virginia claim, is owned and operated by the War Eagle Gold Mining Co., another Spokane corporation, and the due recognition of the greatness of the camp, by the outside mining community, is owing more than anything else to the splendid showing of this mine, as well as to the skillful and energetic manner in which Mr. Patrick Clark, the manager, who is at the same time one of the owners with his brother, Mr. Jas. Clark, handled the property. Up to October last this mine, on which work was actively commenced late in 1894, produced upwards of 7,000 tons of ore averaging 2½ ounces in gold, 3 per cent. in copper, and about 3 ounces in silver. The mine is developed by two tunnels, from which ore is being steadily taken out; another large tunnel is being driven now to tap the already known ore bodies on a lower level—I believe in the neighborhood of 200 ft. lower than the present lowest working. The mode of mining and handling the ore is similar to that pursued in the LeRoi mine.

In making the excavations for the lower tunnel a strong, rich vein was uncovered, but whether this is what is known as the War Eagle vein or still another one is still uncertain; the ore appears, however, to have more copper in it than the War Eagle vein proper. The plant of this company, and which is erected at the mouth of the new tunnel, is a model one in every respect and splendidly installed, and consists of two 100 h. p. boilers, one Duplex Corliss compressor of 20 drill capacity, and a full complement of Ingersoll-Sergeant drills, the air-pipe in use being worthy of remark as it is an 8-in. spiral welded steel pipe.

Substantial boarding houses for the miners, offices and other buildings have been erected by the company on the ground.

Josie Mine.—The Josie mine, operated and owned by the Josie Gold Mining Co., also of Spokane, adjoins the Le Roi and War Eagle claims, and is in nearly every respect similar to them, the difference of course being that there is great deal less development work done, and consequently not such a large amount of ore shipped. The development in this mine has not been pushed as much as it might have been, due in a great measure to the lack of machinery, all work being done by hand. It is opened by a tunnel 350 feet long, in the whole length of which there is a strong continuous chute of ore. A shaft has also been sunk to a depth of about 70 feet at the mouth of the tunnel, and the ore shows up well in this also. A complete mining plant is ordered for the property, and is to be in operation in February, when its production will be increased many times. The ore is equal in value to either the Le Roi or War Eagle. Some very rich ore is, however, occasionally shipped from this mine, one large shipment averaged \$160 per ton. The plant ordered consists of a compressor, boiler, hoisting engines, pump and drills.

Centre Star Mining Co.—This property also adjoins the War Eagle and Le Roi mines, the main and working vein of which is supposed to be the Le Roi vein. It, in conjunction with the Idaho, is owned by the Centre Star Mining Co., and is managed by Mr. Oliver Durant, before mentioned, who is also one of the principal owners. It is opened by a 500 ft. tunnel, driven on the vein, and a 172 ft. shaft sunk from the surface to the tunnel in the vein also. Both the tunnel and shaft are driven into solid ore, the only exception being when the continuity of the ore is broken for a short dis-

tance by a hitch or fault. It is the intention of the management to thoroughly develop the mine before taking out any ore other than that extracted on development, and they are continuing the tunnel 800 ft. farther to their west end line, which abuts on the Le Roi ground. There are three other parallel veins on the claim at present unexploited.

The width of the veins in the different parts of the 500 ft. tunnel varies considerably, and in one place a cross cut was made from one side of the vein 25 ft. without striking the opposite wall, and all in solid ore. The ore, at present, though not as rich as the three before mentioned mines, would pay for shipment; but it is the intention of the company to hold their ore until a railroad is constructed to Trail, or else they put in a reduction plant of their own—the latter is most probable. The mine is well equipped with a seven drill compressor and complement of Ingersoll drills, and work is being pushed as rapidly as possible, and without doubt this will be one of, if not, the greatest mines in the camp.

A considerable number of well developed prospects are under bond, but as in every case the terms of the bond prohibit the shipping of ore unless as a test, several prospects which could be shipping mines are doing nothing more than development.

The Cliff mine, which is located on the long continuous lead I mentioned just now, on which are located the Monte Cristo, St. Elmo, Mountain View, also is under negotiation for a sale at present. In this mine there is an immense quantity of ore in sight, but the general average of the ore is below that of the War Eagle, and at present it is doubtful whether ore could be mined, shipped and treated at a profit. The mine owners realize that it would be discounting the value of their property seriously to ship ore until the rate of smelting and transportation are reduced, or a smelting plant is built on the spot.

Before concluding I may give you a brief description of the smelting plant now in course of erection.

Great credit is due to Mr. Heinze for the energy and enterprise he has manifested in putting in this plant, which is easily the finest smelter in British Columbia, and likely to remain so, as it is Mr. Heinze's intention to enlarge the plant as the increased output from the mines demands. Everything in connection with the smelter has been built with the idea of avoiding the handling of the ore as much as possible. The smelter, which is of 250 tons daily capacity, stands upon a high bench overlooking the Columbia, and consists of three main buildings, and smaller ones as offices, blacksmith and machine shop, saw mill, etc.

The ore after being dumped into bins, above and adjoining the sampling mill from the railway cars is fed into the rock crusher and rolls, and is sampled, crushed and dumped into cars. This is done without any handling at all. From the sampling mill it is trammed a few feet and dumped into the roaster building and dumped into the O'Hara and circular furnaces. After being roasted it is trammed into the main building where the Matting furnaces are located. These are, I believe, usually large and of an up to date design. There is also a water jacket furnace which is used in conjunction with the reverberatory furnaces. A short inclined tramway runs down to the Columbia, where a wharf will be built to ship matte and take coke or other supplies. Mr. Heinze is also building the narrow gauge railroad, which, with branches, is about twelve miles in length from the smelter to the mines. This is to be in operation this spring and the activity shown in building this road is in keeping with the energy displayed in the smelter erection.

I hope this paper, which is merely intended as a general description of the district, may be instrumental in inducing some of our eastern Canadians to look up the district, and while not grudging the Americans and English our mines, it is desirable that our people should have a few themselves. (Applause.)

The Asbestos Industry.

MR. JOHN J. PENHALE—There is very little new to say about the asbestos industry for the year 1895.

As shown by the figures of shipments, the exports have not been up to 1894. Nearly all of the shipments are from the Eastern Townships, a few small shipments of very low grade stock were sent from the Ottawa district.

Work has been carried on during the year by nearly all the companies in the Thetford and Black Lake district, the only properties not being operated are the Beaver Asbestos Co. and the Ward-Ross mines at Thetford, and the Glasgow and Montreal Co. at Black Lake.

Various improvements have been made at the different mines with a view to decreasing the cost of preparing the fibre for market. Chief among these may be noted the very complete mill erected by the Bell's Asbestos Co. at Thetford, by which they can handle a large quantity of crude daily and turn out a very clean grade of fibre. This mill is without question the best equipped of any in operation.

Messrs. King Bros. have also a very well equipped plant, and the product of this mine is noted for its grading.

The Johnson's Company have facilities for turning out a good quantity of milled or short fibre. I understand that this company intend making many improvements in the near future and that orders have been placed for some improved machinery.

At Black Lake work has been conducted on about the same scale as former years and no changes of importance have been noted. Some improvements are now under way at one of the mines, but I cannot give any idea what they are except that it is lessening the cost of preparing a better class of goods for the market.

The only company not operating at Black Lake is the Glasgow and Montreal. Some work has been done in the East Broughton district, but nothing of importance. It is thought that next year will see some activity in that direction.

At Danville a large force are employed and many, and many improvements have been made around the mine, chief of which is the large fibreizing plant which is now being experimented with. The writer can give no idea of the output of this mine, and the figures of shipments do not include any shipped from this district. Up to the present time this mine has not been classed as a large producer. It has recently been acquired by a new company, and they intend if possible to make it rank with the Thetford mines in quantity produced.

Prices have fallen off somewhat as compared with former years, particularly for low grades. The reasons for the decrease are plain to all, and need not be discussed here.

I have been unable to get an accurate report of the total output for the year 1895 owing to the early date of this meeting. The returns at my disposal are incomplete, but by comparing the shipments for 1895 with the previous years a very close estimate of the production of the mines can be made.

The total of all grades shipped over the Quebec Central railway from different points on that line was 5,970 tons, 1,855 pounds. These figures were obtained through the courtesy of Mr. J. H. Wulsh, the general freight and passenger agent of the Quebec Central railway, and their correctness can be vouched for.

These figures show a falling off in shipments as compared with 1894, of about 1348 tons. The reason for this difference in shipment is partly accounted for by the fact that in nearly all the mines new methods for separating the rock from the fibre have been adopted and the cleaning of the lower grades has been carried to such an extent that quantities of what was formerly shipped as "waste," carrying from 25 to 35

per cent. fibre, is now milled at the mines and brought up to 80 or 95 per cent. fibre. The grade known as No. 2 has been correspondingly improved.

While the tonnage may have fallen off as shown by the railway returns, the actual quantity of fibre marketed has been almost if not quite as great as in former years. In addition to the above figures the shipments from the Grand Trunk Railway must be added, will make the total some hundreds of tons more.

Taking the above figures as a basis and allowing for the output of the Danville mine, I should estimate the total production of asbestos for the year 1895 at 8,000.

This is only an estimate, but I do not think it very far wrong.

About 2,900 tons was shipped to points in the United States, and the balance was sent to England and continental ports. Little, if any, crude material has been used in Canada. There is no record of any shipments going to Canadian factories.

Incidentally I might note that there was shipped from points on the Quebec Central Railway:

3,057	short tons	chromic lime.
5,285	"	lime.
1,688	"	brick.
265	"	flagstones.

Mr. BELL—My returns are perhaps a little more complete. They are as follows:

	TONS.
From Black Lake via Quebec Central Railway.....	735½
" Thetford mines, via. Quebec Central Railway.....	5,235½
" Danville, via Grand Trunk Railway.....	2,310
" Tp. of Low, via Gatineau Valley Railway.....	35
	8,315½

I understand that at the mine of the Asbestos Mining and Manufacturing Co. at Low, Ottawa County, the output of asbestos and fibrous serpentine will aggregate several hundred tons.

DR. SELWYN asked if there were any uses for this fibrous serpentine.

MR. BELL—I understand that quantities of the finely ground are being used for filling paper and in the manufacture of cements.

MR. STEVENSON—I know that the Templeton serpentine, in which you cannot detect any fibre whatever, after putting it through a cyclone mill yields about 30 per cent. fibre. They have found uses for the serpentine rock and are, I believe, selling it at \$25 a ton, and there is a very large demand for it for various purposes.

The Manufacture and Uses of Wire Rope.

MR. F. H. HOPKINS—The manufacture and application of wire ropes, composed of metallic filaments, or wires, appears to have originated in Germany about the year 1821, and in the year following this we find records concerning their utilization as supporting ropes for the Geneva suspension bridge. These were, however, of the Salvagee type of construction, that is, composed of a series of parallel wires bound together by an external serving of finer wires.

Shortly afterwards, formed or stranded wire ropes were manufactured on this continent; but the industry was not taken up in Canada until about twenty years ago, when the very latest and most modern machinery was obtained, combined with the very best quality of specially tested wire drawn to specification in England to fill the requirements of this country.

This, as well as a thoroughly experienced superintendence in charge of the works, has placed the Canadian manufacturers on a footing with all competitors, and thus saved a great deal of experimenting usually necessary in these new industries.

The wire rope business in Canada today is pretty much confined to two manufacturers, viz.: The Dominion Wire Rope Company, Ltd., Montreal; the B. Greening Wire Company, Hamilton.

In the earlier days when the Germans inaugurated this new extensive and important industry, charcoal or B. B. iron wires were almost entirely used, but during about the last twenty years, steel wires have almost entirely superseded their employment, excepting where very soft, pliable and tough ropes are specially required for fast running and quick bending, such as electric and hydraulic elevators.

Here it may be desirable to give a few particulars concerning the construction of different kinds of rope, as are sometimes described by conventional names in the trade; for example, a laid rope consists of 6 strands of 7 wires each, twisted from left to right, which are in turn closed around a hempen or a wire heart, in the opposite direction. These laid ropes are also made at times, for special purposes, of what is known as Lang's or Albert lay, in which the wires forming the strands and the strands comprising the rope are laid in the same direction. The advantage of this construction is that a longer continuous surface of the individual wires is exposed to wear, and the crowns of the strands are less pronounced; therefore, whilst more uniform wear is promoted, the cutting tendency of the wires is correspondingly reduced, and the durability of the rope very much increased.

A formed rope comprises 6 strands laid around a heart as just explained, but each strand contains a larger number of component wires, viz.: around the 7 wires laid from left to right before mentioned, a further outside layer of 12 would be laid, thus making a 19-strand rope.

A cable laid rope consists of 6 complete laid ropes closed together to form one cable, as in ordinary hemp roping, and is also sometimes known as tiller laid.

Hawser laid ropes would be made at the Dominion Wire Rope Co.'s works of 6 strands of 12, 18 and 24 wires to the strand, independent of the hempen centres used in the centres of each strand, as well as in the heart of the rope.

The flexibility of wire rope is mainly dependent upon the multiplicity of their component wires and strands, and the manner in which they are laid together, and at the works at issue ropes are constantly being made of all sizes and of their respective types, composed of few as well as of a greater number of wires.

It is comparatively easy to manufacture a rope containing few wires, but considerable skill and experience is required as the number increases, in order to arrange the wires and their respective spiral pitch of lay corresponding to that required of a rope of a given size and for a certain purpose, so that each and every component wire shall bear its due and proportionate amount of working strain, also work with one another and reduce in place of increasing friction.

Every hour of the day wire ropes are rendering some important service, from which the community at large are enjoying most substantial benefits, some of which are in connection with our railways for plough trains and switching purposes, as well as for underground haulage, shaft and slope purposes, in our coal, gold and copper mines, combined with their uses in our asbestos, phosphate and iron mines. This, coupled with the extensive use which wire ropes are being put to for river dredging and general contracting work carried on today, proves to us the number of purposes to which wire rope can be successfully applied.

In order to fully illustrate the greater uses to which wire ropes have been put, I wish particularly to refer to the stupendous and beautiful suspension bridge across the Niagara river, and that from New York to Brooklyn, as well as the prominent part

played in the recent official test made at Tonawanda on October the 26th, before the 3000 spectators of the Lamb electric canal towing cableway.

This canal boat line has recently been thoroughly tested under the supervision of ex-Governor Flower, and in its construction is built with brackets erected upon posts or supports placed 135 feet apart, upon which brackets saddles are placed, having insulated material between them. The saddles are designed to prevent short circuiting of the electric current by rain. A bracket is also provided to support the lower or traction cable, which is not insulated, but at intervals along the line these brackets are grounded. A 1¼ inch steel cable is supported upon the upper side, and a ¾ inch steel traction cable upon the lower.

The bearing cable is placed at an elevation of 16 feet from the ground, and the traction cable 3 feet below.

The motor truck is made with two deep grooved wheels to run on the main cable, having a horizontal axle between them, and below their centre line. Upon the axles is suspended a hanging frame, having attached to it an elliptically grooved sheave, which is revolved by means of a worm or wedge gearing, driven by a 15 Kilowatt electric motor, with vertical shaft, all attached to the swinging frame of the car.

By taking three turns of the ¾ inch steel cable around the elliptical grooved sheave, when the electric motor revolves the gearing, the sheaves wind up and at the same time pay out on the ¾ inch cable—thus pulling the car along. The motor in this way gets its traction independent of the weight of the apparatus.

The current is returned through the steel traction rope, which is grounded at intervals, giving a combined ground, and metallic conductor for the return current. A 500 volt current is used and the motor is run at 1240 revolutions per minute. This current is taken from the main 1¼ inch cable, and thence through the wheels and axle to the axle box of the hanging motor trolley.

It will be seen from what I have stated that the steel wire ropes act to conduct the necessary current for the operation of this towage, in addition to acting in connection with the hauling of the barges, scows, etc., etc.

Justice cannot be given to this important invention, wherein wire rope is so largely used, in so few remarks; but I hope that what I have expressed will give you a fair impression of the installation which has been adopted for the Erie Canal.

Cableway Plants.—As an illustration of this I beg to give you a few particulars regarding two independent plants running at right angles to one another, and built under the direction of the Dominion Wire Rope Company, for Edwin Terrill, at Niagara Falls. At this recent illustration at Niagara Falls an excavating and conveying cableway was installed for handling sand, the digging, lifting, carrying and loading being accomplished by an overhead cableway system, operated by a single engine and boiler and a few assistants, in a simple and direct manner. Both these cableways have the Lidgerwood style of cable carriage, fall block and engine, and employ the Miller patent fall rope carriers, but the whole plant was built in Canada.

A novel feature of this installation lies in the fact that we were able to make use of the Lock-Miller horizontal cableway, with an automatic scoop bucket, with a carrying capacity of 1 cubic yard. The essential feature of this plant consists of a main cable, 2 inches diameter, suspended from two specially constructed triangular pyramid towers, and anchored beyond them to suitable and substantial anchorage sunk 8 ft. in depth. On this cable is suspended a carriage which forms a link in the endless or traversing rope, by which the carriage is hauled in either direction along the main cable, according to the direction in which the traversing drum is driven.

Through fixed sheaves in the trolley, and movable block below it, a hoisting rope is reeved so that, being led to the hoisting drum, it can raise or lower the automatic scraper scoop suspended from the trolley.

This hoisting rope is supported by carrier frames, which are distributed at intervals on a special cable known as the button rope, above the main cable.

The machine is operated entirely by the engine man, who runs out the trolley or carriage until it reaches a position vertically over the toe of the bank, when he slacks off the hoisting rope so as to lower the bucket to the desired place on the ground, and is left there until the carriage has been run further out to a sufficient distance to cause the hoisting rope to the bucket to make an angle of about 45 degrees. A man at the bucket sets certain connecting levers, seizes the handles, and the engineer is then signalled to and winds up on the hoisting rope, so that the scoop bucket is dragged up the slope of the bank, filling itself readily in ordinary sand. The bucket is then hoisted to a convenient height, when both hoisting and traversing ropes are operated so as to take the carriage to any required position. The engineer then, by reversing his drums, returns the bucket to the bank to be again filled. As the bucket is being drawn in toward the engine, it is slowed down just before it reaches a stop, which serves to throw an auxiliary bar on the bucket, thereby unlatching it and permitting it to revolve and dump into the screens, the coarse material running into one car, and the fine into another.

The bucketman has merely to guide the bucket, possibly lifting it so as to direct the teeth on the edge of the bucket into the sand, but the effort is only for a moment, and he has nothing to do until the bucket has returned again, therefore giving him practically only a quarter of a minute's work out of each minute, as one trip is made about every minute.

A visit to the pit showed that there was one bucketman, one extra man with pick breaking down the sand, and one man standing on the bank, who acted as foreman and signaller, and besides these there was the fireman and engineer, and this constituted the labor force for one plant.

The plant was handling, at time seen in full operation, 400 yards per day, making a trip a minute, although the average time was a little longer than that.

The men's wages are about as follows:—Engineer, \$2.50; fireman, \$1.50; bucketman, \$1.75; man for breaking down, \$1.50; foreman, \$2.50. The services of the fireman could probably be dispensed with, as one man could ordinarily run the engine alone.

The cableway therefore pays a handsome profit in carrying out this work for about three cents per cubic yard, not taking into account interest and depreciation, which a cent per cubic yard would probably cover.

The hoisting engine used is 8x12 inch, main cable for big span, 2 inch diameter, main cable for short right angle span, 1½ inch diameter; hoisting ropes, ¾ inch; traversing ropes, ½ inch, and button ropes, ½ inch diameter; all of our special cableway make and quality.

The tramway business being comparatively in its infancy in Canada, I am unable to say much on this subject, excepting that the Bleichert system of tramway is the one we are now advocating for this country, owing to its efficiency as regards the carrying of large loads up to and sometimes over 1,000 pounds to each individual carriage, as well as being free from accidents due to the slipping of the cables from their supports, and also being able to reduce the number of buckets or carriers to accomplish the same output.

This improved ropeway uses separate stationary cables, on which run the carriages supporting the carriers or buckets, the motive power for which being transmitted through a light moving endless cable called the traction rope, to which the cars are attached by patent grips.

A most important advantage which this system possesses is the comparative low cost of maintenance and operation. This is due not only to the substantial manner in which these lines are constructed, and the better distribution of the wear of the ropes, but also to the fact that the greater capacity of these lines does not require any extra labor at the stations, excepting in cases where the rails extend to distant points of loading or discharging.

In regard to the ordering of ropes for mining and all other purposes, I might say that it would be of the greatest assistance to all rope manufacturers if the parties ordering would only rely on the judgment of the manufacturer for the most suitable rope to accomplish a given purpose.

What I wish to convey to this meeting is that when certain work is to be accomplished by wire rope, if the consumer would place the full particulars before the manufacturer, giving what he expects the rope to fulfil, and the manner and travel of the same, as well as the diameters of drums and sheaves, and their respective angles, the manufacturer then being in possession of these facts, will be able to supply a rope which he knows from experience to be the most suitable for the purpose required.

I have found in every case in my experience where I have been placed in possession of facts, as above described, that I have never had a complaint of any rope furnished, and the goods have given entire satisfaction.

STUDENTS' SESSION.

On Thursday evening the session was entirely taken up with a hearing of the papers submitted by mining students in competition for the cash prizes offered by the Association. Captain Adams occupied the chair and there was a large attendance. The following were submitted:

"The Petrolia Oil Industry," by W. Morton Webb, McGill University (Engineering).

"A Rapid Volumetric Method for Estimating Sulphuric Acid and Sulphur," by F. J. Pope, Kingston School of Mining.

"Notes on the Eustis Mine," by Raoul Green, McGill University (Engineering).

"The Chlorination Process for Extracting Gold," by C. Garnet Rothwell, Kingston School of Mining.

"Notes on the Archeon, with reference to certain Metalliferous Deposits immediately North of Lake Huron, Ont.," by R. W. Brock, Kingston School of Mining.

"Notes on Aluminum," by another McGill Student.

These were referred to the following committee of award:—Mr. John Hardman, M.E.; Dr. Frank Adams, Montreal; Mr. Archibald Blue, Toronto; Dr. Goodwin, Kingston, and Captain Adams, President.

SMOKING CONCERT.

Immediately on the conclusion of the Student's session the annual smoking concert was held, Mr. B. T. A. Bell presiding. A capital programme of music, instrumental and vocal, stump speeches and recitations was contributed. Notable mention should be made of Dr. Drummond's artistic recitation of several of his remarkably fine French Canadian compositions, in which ample justice was done to the *patois* of the *habitant*. Mr. George Smith was also in great form in his stump speech, given in character, by the way, on "Ray-may-dial Legislation." Dr. Nicholls gave some capital selections on the guitar and created much amusement by his inimitable imitations of the phonograph and other modern appliances. Mr. J. D. Sword bore the brunt of the vocal programme, and his comic songs, "The man with the elephant on his hands," "He did," etc., were very heartily encored. A splendid evening's enjoyment was brought to a close shortly after midnight.

CANADIAN MINING INSTITUTE.

Successful Meeting of the Federated Board.

The first meeting of the Federated Board representing the Mining Society of Nova Scotia, the General Mining Association of Quebec, and the Ontario Mining Institute, was held in the Club Room, Windsor Hotel, Montreal, on Friday, 10th January. The following delegates were present:—

NOVA SCOTIA—Mr. John Hardman, S.M., M.E., Oldham Gold Co.
Major R. G. Leckie, M.E., Torbrook Iron Co.
Chas. Fergie, M.E., Intercolonial Coal Co.

QUEBEC—Mr. John Blue, C. & M.E., Eustis Mining Co.
Capt. R. C. Adams, Anglo-Canadian Phosphate Co.
Mr. John J. Penhale, United Asbestos Co.
Mr. R. T. Hopper, Anglo-Canadian Asbestos Co.

ONTARIO—Mr. B. T. A. Bell, Secretary Ontario Mining Institute.

Major R. G. Leckie, on motion, was unanimously elected chairman of the Board, and Mr. B. T. A. Bell secretary-treasurer.

The Secretary then read the constitution as adopted by the Societies in the Federation.

It was then moved by Mr. John E. Hardman, seconded by Mr. John Blue, that the Institute call for a contribution from each Society in the Federation of \$1.00 per capita, and that the Secretary communicate with each Society to that effect.—Carried.

It was moved by Mr. Hardman, seconded by Mr. T. Hopper, that the matter of securing a suitable grant from the Dominion Government towards the publications of the Institute be left in the hands of the Chairman and Secretary to act at such time and as in their judgment may deem most advisable.—Carried.

It was moved by Mr. R. T. Hopper, seconded by Capt. Adams, that the Chairman and Secretary be empowered to interview the Dominion Government with respect to the variation in interpretation at ports of entry of the law relating to the free admission of mining machinery not manufactured in the Dominion.—Carried.

Moved by Captain Adams, seconded by Mr. R. T. Hopper, that the Secretary be authorized to communicate with the Iron and Steel Institute of Great Britain and the Federated Institute of Mining Engineers of Great Britain with a view to ascertaining the possibility of either or both of these organizations holding a meeting under the auspices of the Institute at Montreal in the summer or autumn of 1897.—Carried. This being all the business the meeting adjourned.

INTERCOLONIAL COAL CO.

Our correspondent describes Improvements at the Drummond Colliery.

We recently paid a visit to the Drummond Colliery and found things in a distinct state of "go-aheadness" considering it is the slack season. The mine has had a good year, the gross output being 204,123 tons. Among the additions and improvements to the colliery during the last year are, a completely new bank head further removed from the mouth of the pit, which, when complete, will minimise the risk of a surface fire (should such ever occur) connecting with the mine. The new bankhead is fitted with screening and picking belts, to which is attached a very neat arrangement for lowering the coal gently into the trucks and thereby preventing breakage of the heavier pieces. What particularly took our fancy was an arrangement for manipulating the coal boxes as they come from the mine; they are hauled up an incline by an endless chain, at the top of which they are freed from the chain and they run down a slope by gravity with sufficient force to take them up another incline, here by an arrangement of the rails they are switched automatically onto another line down which they gravitate gently until they reach a revolving tippler where they are turned completely round and while upside down, the coal is discharged into a shaker screen for sizing the coal, the empty coal box goes out of the other side of the tippler and is ready to go down in the pit once more. The whole thing is automatic, the boxes follow each other in rapid succession and are not touched from the time they reach the endless chain on the one line until they reach the tippler on the other set. The deck hands have appropriately named the arrangement the switch back, of which it forcibly reminded us.

A new Walker indestructible fan of the Guibal type 18 ft. diam. by 6 ft. wide has been erected, this is driven by a compound engine with 17 inch and 23 inch cylinder and 36 inch stroke. Expansive cut off. The power is communicated to the fan by 6 cotton ropes. The engine makes 60 revolutions per minute, while by gearing of the pulleys (2 to 1) the fan makes double that number. At this speed the capacity of the fan is 200,000 cubic feet of air per minute.

A new Rand air compressor with duplex cylinders 14 x 22 to drive the pumps and underground engines, was being erected while we were there. The air compressor, fan, and engine, are covered by a substantial and handsome brick building.

Two new reservoirs with a storage capacity of 7,000,000, gallons of water have been added to this property.

Last but by no means least among the additions is a new Robinson coal washer with a capacity of 100 tons per day of 10 hours. By means of this Mr. Fergie has been able to reduce the ash in his coke over 40% while he considers he has not yet reached perfection. This result has been achieved by that dogged perseverance which is characteristic of the Manager of the Drummond colliery. Mr. Fergie has gone step having frequent analyses made as he went until he has now arrived at an almost theoretical ash, the sulphur is also considerably reduced and we think we are safe in saying that from an iron smelters point of view there is not a coke made in Nova Scotia to-day equal to that made at the Drummond colliery. The moisture and volatile matter rarely amount to one-half per cent, while the sulphur ranges between five and eight-tenths of a per cent.

The twenty Bee-hive coke ovens each of five tons capacity yielding three tons of coke are going full blast, the time of coking being from 60 to 70 hours.

One very noticeable feature in connection with the Drummond colliery is that the manager can at a few minutes notice give the analysis of the coal in any part of his mine. He thus knows the exact value of the coal for the various purposes for which it is required and the natural consequence is that all classes of customers are pleased; and the value of the analysis does not end here, for Mr. Fergie assured us that he is able to tell by the analysis when trouble is at hand and is therefore the better prepared to meet it.

Improved fire extinguishers have been placed in all the buildings and workshops.

COMPANY NOTES.

(Continued from page 8)

	Cr.	£	s.	d.
By Nanaimo profit, including £480 5 2 realized from Land Sales, after making provision for repairs and maintenance.....		5,515	2	5
Dividends on Metropolitan £3 10 0 Stock.....		33	16	8
Registration Fees.....		1	2	6
Loss for half year (carried down).....		1,663	15	7
		£7,213	17	2
By Balance brought forward from last Account.....	£19,189	13	6	
Less Dividend paid in May last.....	£4,300	0	9	
Less loss this half year brought down.....	1,663	15	7	
	5,963	15	7	
	£13,225	17	11	

The Hall Mines, Ltd., Nelson.—The annual report and balance sheet of the Hall Mines Co., Ltd., Nelson, as laid before the ordinary meeting of shareholders held in London last month, has been received.

The report describes the development work carried out during the past year, stating that a winze has been sunk in the main ore body to a depth of 135 ft. from No. 4 tunnel and that it is still in ore. In the first ore body a shaft has been sunk for 65 ft., also in ore. A tunnel, No. 5, has been driven from a point 210 ft. below the entrance to No. 4 tunnel on the main vein which shows at the surface. This tunnel is in 85 ft. on the main ledge and shows more or less ore on the whole of its length. Good ore has been proved beyond this point by the diamond drill, which leads to the supposition that the ore body is continuous. Prospecting work with the diamond drill has been carried on to the south of No. 4 tunnel on the Silver King and the existence of two separate ore bodies has been proved. The first was struck 280 feet from the surface and continued to 340 ft. The second was struck at 416 ft. and continued to 440 ft. The ore shows heavy yellow and gray copper, with traces of peacock. Another hole was sunk to endeavor to prove the depth of the vein and ore was tapped at 820 ft., showing gray copper. This was the extent of the boring rods, and work was suspended until next summer. On the Kootenay Bonanza boring operations also proved satisfactory. The tramway has now been completed, and although some hitches occurred at the start, is now in operation and bringing down ore to the bins at the rate of 10 tons to the hour. The smelting works are also nearing completion.

The works on the gold lead discovered on the Daylight have been suspended owing to a large influx of water which necessitates pumping machinery. The directors think well of this lead and have acquired several adjoining claims, but are not prepared at present to go to the expense of pumping machinery.

The income and expenditure account shows the following items:

<i>Expenditure at Mine.</i>			
	£	s.	d.
Mining	7,481	13	0
Salaries and management expenses.....	1,692	3	7
Transport	784	12	6
Office and general expenses.....	487	13	5
Tool stores and fuel purchases.....	2,147	12	3
Assay charges.....	56	6	4
Forest fires.....	594	14	1
	£13,244	14	2

<i>Expenditure in London.</i>			
	£	s.	d.
General expenses, including salaries, law charges, cablegrams, travelling expenses, auditors' fees and office expenses	893	19	6
Directors' fees.....	918	7	7
Interest.....	155	16	5
Difference in exchange.....	11	13	2
	£1,979	16	8

Total expenditure.....	£15,224	10	10
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<i>By</i>			
	£	s.	d.
Ore sales.....	7,955	16	11
Transfer fees.....	4	2	6
Balance, being excess of expenditure over income for year, against which there is a further stock of ore on dump at the mines awaiting treatment...	7,264	11	5
	£15,224	10	10

The balance sheet, which is dated Sept. 30, 1895, shows that of the 50,000 cumulative preference shares of £1 each 25,000 have been taken up, and of the 250,000 ordinary shares 243,270 have been sold.

<i>Paid Up Capital.</i>			
	£	s.	d.
25,500 cumulative shares of 17s. 6d. each.....	21,875	0	0
168,270 ordinary shares, fully paid.....	168,270	0	0
75,000 ordinary shares, on which 17s. 6d. has been paid.....	65,625	0	0
	£255,770	0	0
Less calls in arrears.....	809	5	0
	£254,960	15	0

<i>The Credit Side Shows:</i>			
	£	s.	d.
Mines cost account.....	207,376	17	1
New claims taken up.....	592	1	4
Prospecting during year.....	296	11	11
	£210,931	10	4
Buildings, plant and machinery.....	5,203	3	8
Tramway from mine.....	10,853	12	9
Smelter expenditures to date.....	2,636	4	6
Land purchased.....	411	10	5
Stores and tools on hand.....	1,432	18	0
Ore in stock (value of ore on dump when property was taken over still unrealized).....	7,345	16	0
Cash.....	9,205	8	2
Suspense bank account.....	1,538	0	0
Sundry debtors.....	519	12	7
Office furniture in London.....	82	7	3

<i>Income and Expenditure Account.</i>			
	£	s.	d.
Balance as at 30th September, 1894.....	11,402	0	9
Added during year.....	7,264	11	5
	£18,666	12	2
Grand total.....	£268,816	15	10

Golden Group Mining Co. Ltd.—The property acquired by this company, notice of the organization of which was given in a recent issue, comprises the Rose, consisting of 18 areas, the Annand, 25 areas, the Lawson, 18 areas, and the Montreal, 32 areas, at Montagu, seven miles from Halifax. On the Annand property there is a complete plant, consisting of a ten-stamp mill, hoisting and pumping plant, air compressor, rock drills, tools, tramways, cars and so forth; also a laboratory, with assay outfit and storehouse, the latter containing a large amount of supplies. The purchase consideration was \$8,500 cash and \$50,000 fully paid up shares. The stock has, we understand, been fully subscribed.

The Dominion Gold Mining and Reduction Co. Ltd.—The first ordinary general meeting was held at the offices of the company, in Londn, Eng., on Thursday, December 10th.

The secretary (Mr. F. W. Croucher) having read the notice convening the meeting, Mr. Alexander M. Hay was called to the chair. The meeting being a formal one to comply with the provisions of Section 39 of the Companies Act, there was no business to transact.

The chairman, who had recently returned from visiting the company's properties in Canada, briefly stated the position and prospects of the company, and congratulated

the shareholders on the valuable properties which the company owned. During the four months of the company's existence substantial progress has been made in developing the various mining locations owned by the company, which are for the most part situated near the shores of the Lake of the Woods, within a radius of thirty miles of Rat Portage (on the Canadian Pacific Railroad), which is rapidly becoming an important mining centre. Since the company acquired its properties, prospectors and surveyors have been kept systematically at work with very gratifying results, and a number of valuable veins have been discovered. Some prospect work has been done on several outlying properties, but the principal work of development, so far undertaken, has been on the Gold Hill Group, which consist of a solid block of properties covering about 1,200 acres, on which twenty-eight auriferous veins of more or less magnitude have already been discovered and to some extent tested. Work has been commenced in earnest on the Pebble Vein, on which two shafts and a winze have been sunk to a depth of about 90 feet, 30 feet and 40 feet respectively. Rich ore has been passed through while sinking in all the shafts, and a portion of the same has been passed through the mill with good results. One run of twenty-five tons yielded 26 ounces of gold, and the second run of forty-three tons yielded 46 ounces. The vein appears to be a true fissure, and the vein matter is increasing in width and richness with depth. Some development work has been done on other veins near the Pebble, but the latter is the only one on which systematic mining has been commenced. A small stamp mill on the property has been equipped, and is now in full working order for testing purposes, but it is contemplated to erect a larger mill on the lake shore of sufficient capacity to develop and work all the workable veins at as early a date as possible. The reduction works owned by the company were completed about the middle of November, and consist of twenty stamps of four separate batteries of five stamps each, for the purpose of dealing with ores from different properties simultaneously. These works are considered to be the best equipped in Canada, and the prospects are that they will pay handsomely as a customs mill, apart from their value to the Company, for treating ores mined in development of their own properties and properties under option of purchase. Their situation renders transportation by water from a large area exceedingly cheap; while their close proximity to the Canadian Pacific Railroad, from which a spur line has been built into the works, will enable ores to be brought in by rail from long distances. The opening of these works, and the facilities they offer to the owners of mining claims to develop their properties and obtain returns to enable them to continue such development, has started a number of camps in the districts, and already shipments of custom ore have been received for treatment. A number of rich discoveries have recently been made in the district, which augur well for the future of this company, which has been formed to acquire mineral properties; and if the present policy is pursued of acquiring them under working option, owing to its exceptional position the future prospects of the company are exceedingly bright."

Homestake Gold Mining Co., Ltd.—The officers of this company are:—W. G. Johnson, Vancouver, *President*; E. E. Evans, Vancouver, *Vice-President*; Osborne Plunkett, Vancouver, *Secretary*, and C. B. Hopkins, Spokane, Wash.; John M. Burke, Rosland; J. M. Campion and D. M. Simard, of Vancouver, *Directors*. The Homestake mine is located between the two main forks of Trail Creek on the ridge running west of the summit to Deer Park mountain and is about a mile south of Rosland. Near the east end, adjoining the Gopher, is a shaft sunk by the old owners to a depth of 16 ft.; showing 2 ft. of good ore in the bottom. Near the centre of the claim is the main shaft, down 54 ft., from the bottom of which a drift has been run northwest on the vein about 50 ft. The shaft, and especially the drift, show good bodies of ore.

It is in the No. 2 shaft, however, that the best ore body is exposed. This shaft is sunk 25 ft. on the surface showing first exposed by the original owners. This chute has been stripped on the surface for a distance of 30 by 8 ft. and is all ore. The shaft is in ore all the way down, and at no place is the pay streak less than 6 ft. wide. West of the No. 2 shaft some 200 ft. a tunnel has been run into the hill to the west about 100 ft. Over 40 ft. of this tunnel runs on top of an ore chute, which is supposed to be a continuation of the chute exposed in the shaft. At the west end of the claim an open surface cut 40 ft. long has been made showing 4 ft. of good ore. Thus ore has been found from one end of the claim to the other, and with the necessary buildings for the men this constitutes the work done on the Homestake to date.

The ore of the Homestake differs considerably from that on Red Mountain. It is an iron pyrites carrying galena and with depth some copper. The ore carries gold, silver, lead and copper, and averages throughout a total value of \$30 per ton, though much of it runs from \$50 to \$100, especially in the deeper workings and the No. 2 shaft.

The new company have already built a bunk house for 30 men, boarding house, three shaft houses, blacksmith shop and wagon road connecting with the Trail wagon road. The Trail Creek Tramway runs across the Homestake ground and just below the present ore dump.

A small force is now employed and machinery will be put in as soon as it can be used to advantage.

Regina Limited.—Mr. Chadwick's visit to the Regina mine to assess the damage caused by the late fire must have proved a most interesting one. As a result of the fire he found that the shaft house had been completely destroyed, burned to the foundation, which was, however, very little damaged. The covered passage-way, connecting the shaft house with the mill buildings, was partially destroyed, the main building being uninjured; the machinery very little the worse. The total damage will reach \$1,200. Everything will be in full operation by today, Saturday. During his visit, Mr. Chadwick examined the mine and buildings and was evidently much impressed with what he saw. An air shaft has just been completed and the drifting and sinking work already done fully exposes 1,560 tons of ore, all ready for stoping, which will average at least \$15 per ton. This is a rare showing, seeing that the property has only been under development a few months. The ore already in sight in this way and ready for mining is sufficient to keep the mill running four months night and day. Everything looks fine; men comfortably housed, well fed, warm, with all rooms lighted by electricity, as well as the roadway leading to and from the mine. He expressed great satisfaction with the manner in which the men and appliances must have worked to extinguish the fire in the prompt and efficient manner they did. He thought the fire may have been caused by a spark from the chimney falling in some brush which had been used to exclude the snow from the open drift which leads to the face of the tunnel. There are 35 men now working on the property.—*The Record, Rat Portage.*

Josie Gold Mining Co. Ltd. is being incorporated at Spokane, Wash., with an authorised capital of \$700,000 to operate in British Columbia.

Elk Gold Mining Co. Ltd.—Authorised capital \$10,000. Head office, Vancouver. Directors: Ota Marstrand, Wm. H. Hayward and George H. Cowan. Formed to carry on mining in British Columbia.

Invicta Gold Mines Ltd.—Registered under the foreign companies act, B. C. to operate in British Columbia. Authorised capital £ 100,000, in shares of £ 1.

Queen Charlotte Oil Company Ltd.—Authorised capital, \$14,000 in shares of \$20. Directors: Jas. A. Aikens, Sibree Clarke and Marshall P. Gordon. Head office: Victoria, B. C. Being organised to carry on the work of an oilery and the business of storekeeping and trading at Clue, Queen Charlotte Islands, and other portions of the Province of British Columbia.

Pele Gas and Oil Company of Ontario, Limited.—Being organized to acquire and sink wells for natural gas, oil and other minerals, &c. Authorized Capital, \$30,000, in shares of \$100. Directors: George Jasperson, Leger L. McKay, Herman Dey, W. A. Smith, Henry Mosher, W. H. Nelson, Bon Jasperson, and Alfred Wigle, oil of the City of Windsor, Ont.

Old Ironsides Mining Co., Ltd.—Application filed by S. A. Rigg, C. W. Ritchie, Jay P. Greaves, H. P. Palmerston, of Spokane, and Robert E. Strathern, of Boston. Objects, general mining. Capitalization, 1,000,000 \$1 shares. Place of operation, Boundary Creek. Office, Spokane, Wash.

Great Western Mining Co., Ltd.—Filed under Part IV. Companies' Act, Dec. 20, by John M. Burke, Chas. E. Barr, D. M. Drumheller, Chas. S. Warren, H. M. Stephens, James B. Jones and Louis L. Bertonneau, of Spokane. Office: Spokane, Wash. Place of operation, Rossland. Agent, Jno. M. Burke. Capitalization, 1,000,000 \$1 shares. Objects, general mining.

Sunshine Mining Co., Ltd.—Incorporation sought under B.C. laws. Authorized Capital, \$50,000, in shares of \$10.00. Directors: N. D. Moore, Three Forks, B.C.; W. H. Yawkey, Rossland, B.C.; W. C. Yawkey, Detroit. Head office: Three Forks, where business is to be carried on.

Cumberland Mining Co., Ltd.—Being incorporated under B. C. laws. Authorized Capital, \$500,000 in shares of \$10.00. Directors: N. D. Moore, Three Forks, B.C.; W. H. Yawkey, Rossland; and W. C. Yawkey, Detroit. Head office: Three Forks, B.C., where business is to be carried on.

Peter's Creek Gold Mining Co. of Cariboo, Ltd.—Authorized Capital, \$25,000. Directors: Charles Stanford Douglas, W. H. Boorne, Charles J. Loewen, and R. G. Tatlow, all of Vancouver. Head office: Vancouver. Being formed to acquire and work mines on Peter's Creek in the Cariboo district, and elsewhere in the Province of British Columbia.

Gabriola Coal Co., Ltd.—This B. C. coal company, whose organization was noted in our columns last month, has bonded about 2,000 acres of coal lands on the north end of Gabriola Island, and arrangements have been made to put down a series of bore-holes with a view to determining the value of the coal seams.

North Saanich Coal Co., Ltd., has been organized to prospect for coal on the northern extremity of the Saanich peninsula. About 2,000 acres are held under bond by the company. Beaumont Boggs, 28 Broad Street, Victoria, is secretary to the company.

GOLD MINING AT RAT PORTAGE.

The Esther mine, hitherto known as location H. B. 476, in the Manitou district, is turning out well under development. Two test shafts are being sunk to a depth of 50 ft., one of which is now down about 25 ft. and the other 15 ft. The deeper shaft shows a vein increasing in size from a surface width of 2 ft. to a width of 8 ft. so far as operations have been carried. The assays from this property are most encouraging.

Mr. Motley, of the Regina mine, has been in town during the week arranging for extra labor to carry on more extensive development work on this property. The value of the Regina mine is now pretty well established. The ore in the stopes easily averages \$15 per ton; and instructions have been received from England, where the property is owned, to push its development on a much more extensive scale than has up to the present been done. In the spring the capacity of the mill and other machinery will be greatly increased, and mining operations will be carried on in a manner well calculated to advertise the value of our Lake of the Woods ores. Up to the present the Regina mill has only been running half time, and when in town Mr. Motley informed me that in a run of five days and fourteen hours, nine pounds of gold were obtained.

The usual gold brick comes in weekly from the Sultana mine, and Mr. Caldwell must at length be reaping the reward of his enterprise and determination.

Mr. Burley Smith, of Ottawa, who is operating with a diamond drill on the Queen Bee property, is here.

Mr. Ahn of the Dominion Gold Mining and Reduction Company has received a letter from the Mines Contract Company of London, England, in reference to work they contemplate doing on the Howard-Thompson property in the spring.

Mr. Hay, of the Dominion Gold Mining Co., left for the east on Thursday last.

The Rat Portage Board of Trade is about sending delegates down to Toronto in order to seek Government aid in the development of the Lake of the Woods mineral resources.

A property lately opened up by Mr. Oliver Donnais, is said to be turning out rich.

The owners of the "Yakima" group and Cumberland mine, in the Slocan district B.C., have organized two companies to work these properties. The one to work the "Yakima" group is called the Sunshine Mining Company, and the one to work the "Cumberland" is called the Cumberland Mining Company. Each company's capital is \$500,000, and both have the same officers, namely: W. H. Yawkey, President; N. D. Moore, Vice-President and Manager; and W. C. Yawkey, Secretary and Treasurer. The head office of both companies is at Three Forks.

The Nelson Tribune says: "It must be admitted that the Hall mines smelter at Nelson is an industrial enterprise that will be of great benefit to British Columbia. To be of the greatest benefit its owners, must of necessity keep the expense of treating ore at the lowest possible figure. One of the items of expense in operating smelters is the cost of fuel. Fuel, such as coke, must from necessity be brought from distant points. Every time it is handled adds to its cost. Coke for the Hall mines smelter is purchased in the United States, and shipped in by way of the Nelson & Fort Sheppard railway a road that can not deliver the coke at the smelter because of its not having track connection with the road that has a side track or spur right alongside the smelter. The road that has the side track or spur is the Canadian Pacific, and its managers absolutely refuse to allow the Nelson & Fort Sheppard the privilege of making a connection unless the latter allows it running privileges over five miles of road. More, its managers threaten to enjoin the Nelson & Fort Sheppard if even an attempt is made to extend its track into the town of Nelson. Because of this action the managers of the Hall mines smelter are forced to build a waggon road from the smelter to a railway siding a mile and a half distant, over which all coke used at the smelter will be hauled by teams."

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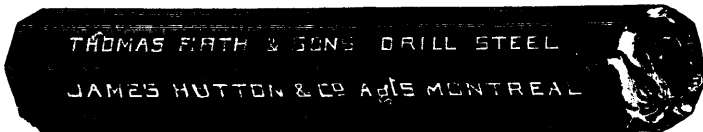
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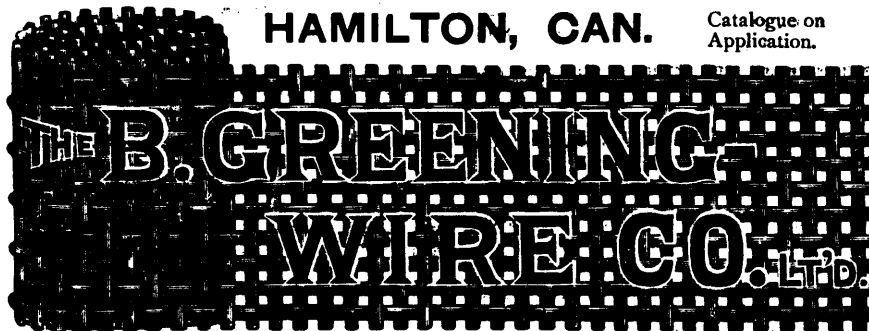
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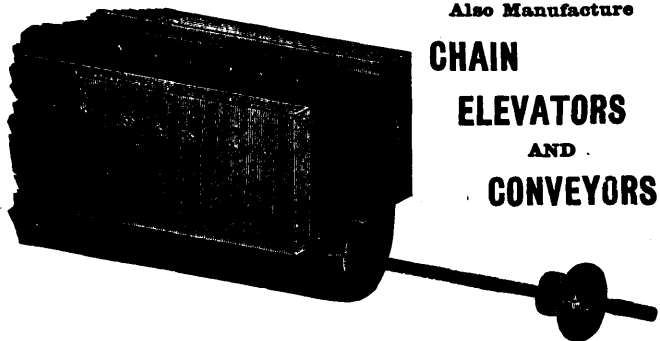
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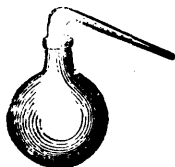
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For further information see the calendar of Queen's University for 1894-95, p. 117.

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Licenses are issued to owners of quartz crushing mills who are required to pay

Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at \$19 an ounce, and on smelted gold valued at \$18 an ounce.

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

MINES OTHER THAN GOLD AND SILVER.

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

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

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

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

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones; five per cent.; Coal, 10 cents on every ton sold.

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

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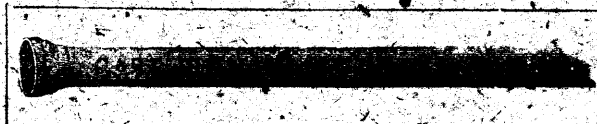
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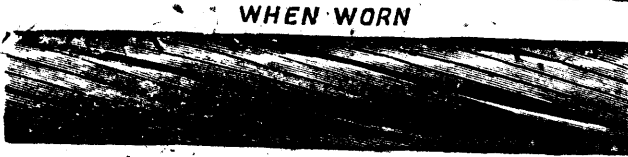
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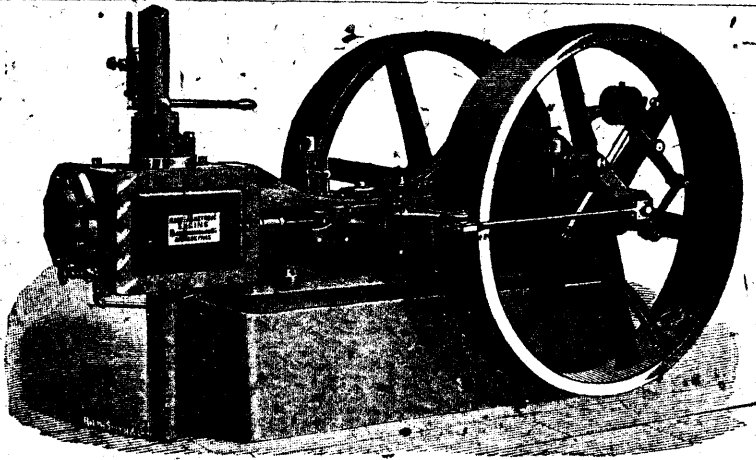
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