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MONTREAL—OTTAWA—HALIFAX.

FEBRUARY, 1896.

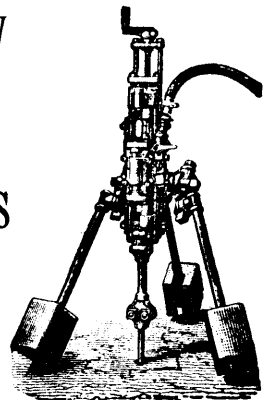
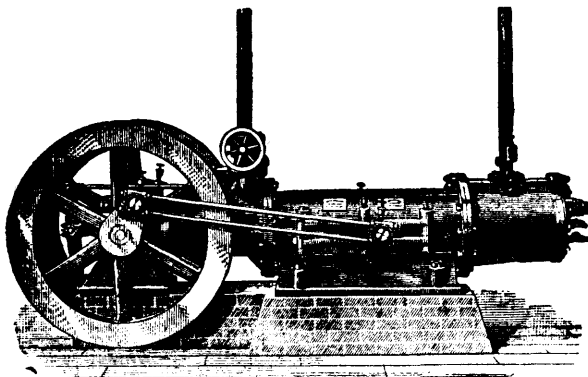
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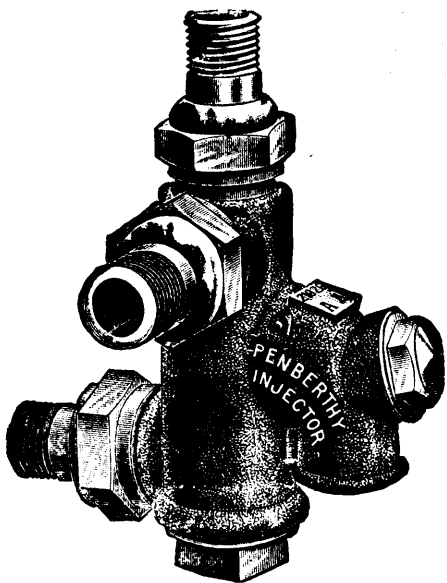
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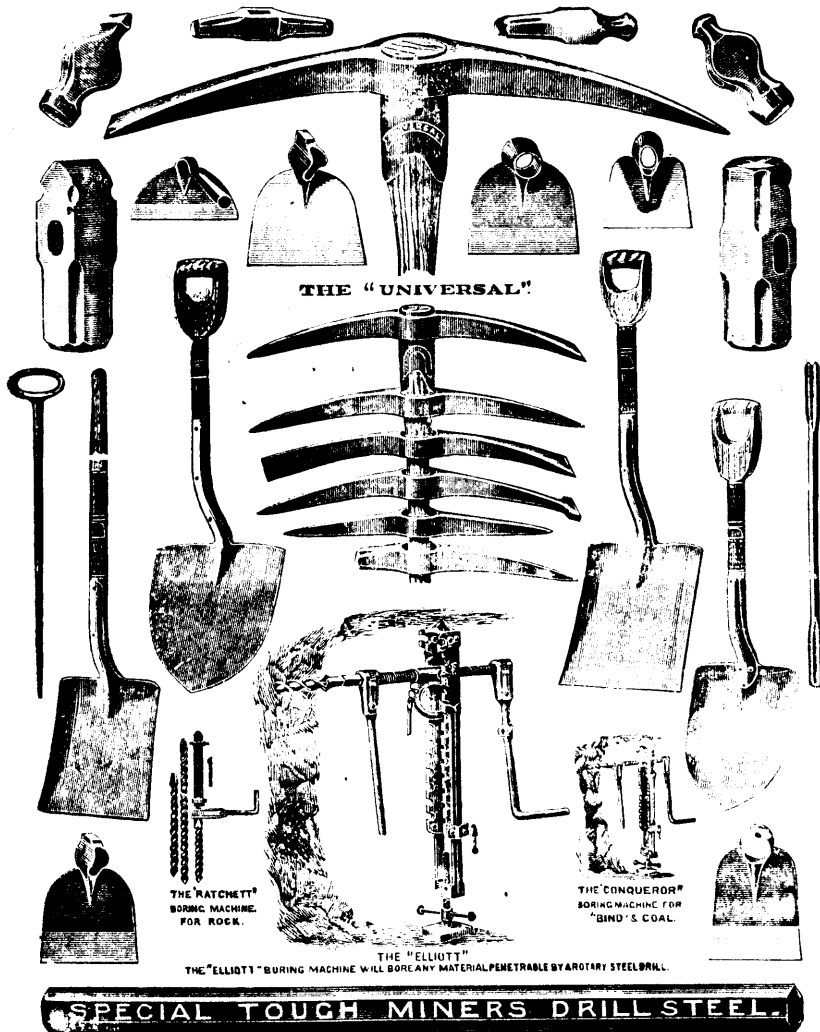
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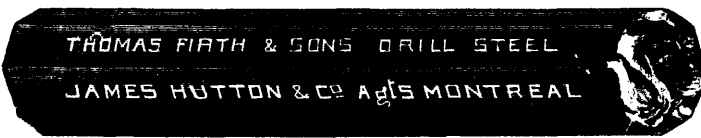
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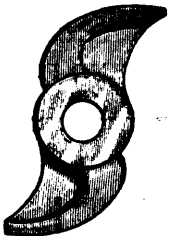


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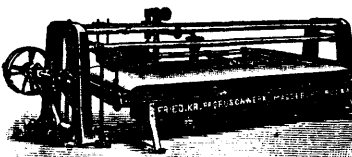
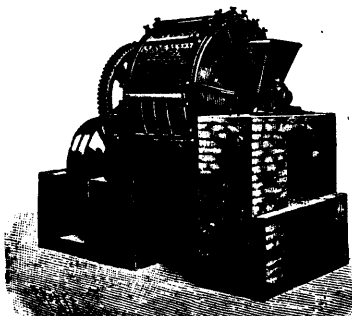


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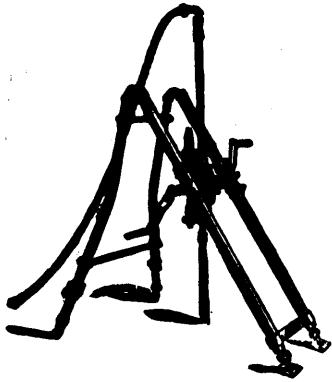
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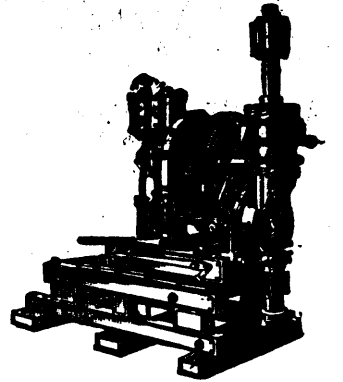
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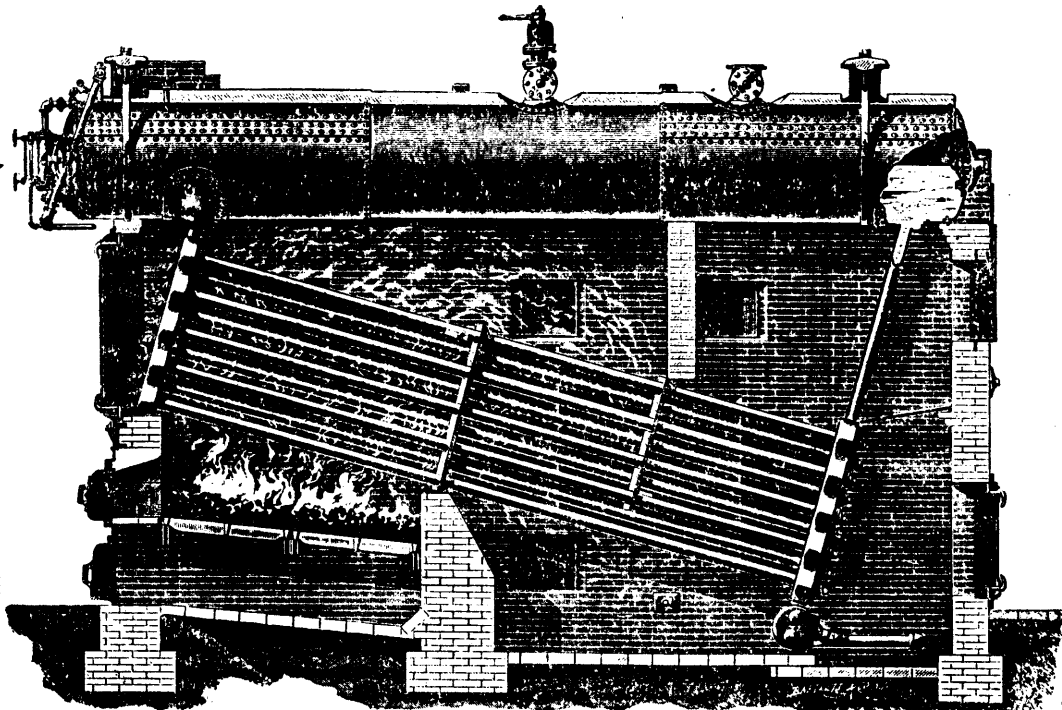
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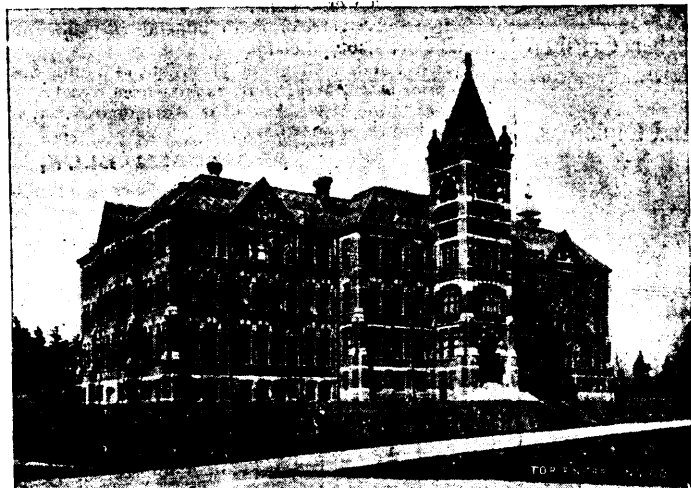
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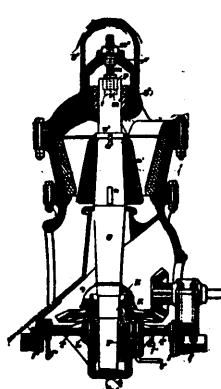
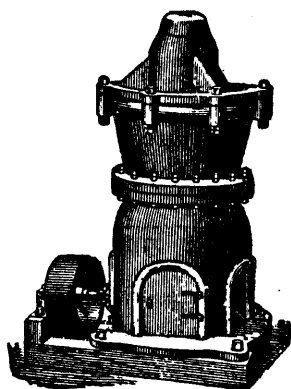
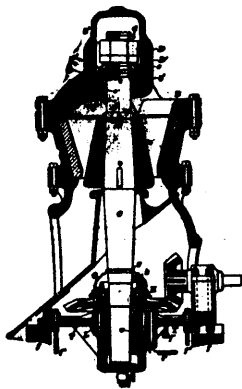
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The Canadian Mining Review, Ottawa, and
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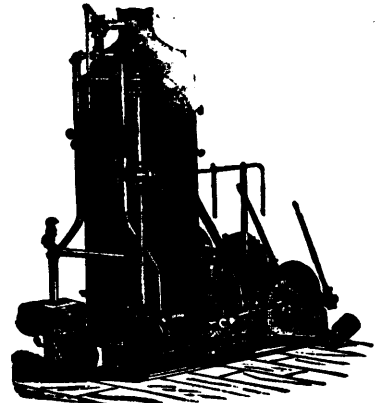
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The Canadian Mining Review

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The Asbestos Club; and the Representative Exponent of the Mineral Industries of Canada.

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Another "Bonus" Scheme.

Under the heading of "Fair and Reasonable," a Rat Portage newspaper reproduces from the *Toronto Globe* an account of an interview with the Government of Ontario by a deputation from the "Dominion Gold Mining and Reduction Company," which had the effrontery to ask for "assistance" in building "reduction works" at Rat Portage.

Accustomed, as Canadians are, to the idea of the parental or paternal functions of a government, one might think this an ordinary enough statement to elicit no remark and provoke no comment, and while it is true that we have bounties on pig iron, subsidies to railways and numerous other grants to various societies and enterprises, nevertheless these are no precedents for granting aid to a company like the one cited above.

In the first place, this company (which is an English concern) has a working capital of £20,000 stg., or \$100,000.00 in round numbers, and has acquired not only the "Black Jack" and "Gold Hill" properties near Rat Portage, with the machinery upon them (see Report Bureau of Mines, 1893, pp. 21-26), which is considerable, but has also purchased the famous, or infamous, aggregation of plant known as the Rat Portage Reduction Works, of which the Director of Mines, in above cited report, says: "Rat Portage has had its scheme of a (custom) reduction mill, which has cost the municipality and a goodly number of its citizens many thousands of dollars, and in the matter of results has been a dead failure," referring to the bonus of \$10,000.00 paid over in the fall of 1891 by the town, on the report of Walpole Roland that the mill was capable of treating 191½ tons in 24 hours, which it never did. In 1892, the mill being a failure, new concentrators and a chlorination plant were put in, to pay for which citizens of Rat Portage bought \$10,000.00 worth of debentures, and in 1893 under foreclosure the whole aggregation was sold out for \$15,000.00.

Now the company which has bought all this property, under the management of one R. H. Ahn (of whom our readers are pretty well informed) and the inspiration of one director, named A. M. Hay, come to the Ontario Government with the very modest request that that Government give them \$10,000.00, and that the Government may not be embarrassed (politically) by giving such a lump sum at once, they suggest \$2,000.00 a year for five years and "a bonus of \$1.00 for every ton of ore treated by the reduction works"!!

Imagine the sublime audacity of the man who, after telling Sir Oliver and his Council that their mill was now equipped with 20 stamps, asks the Government to pay his company more per ton treated than it actually costs (or should cost) to stamp and amalgamate and concentrate one ton of ore!

A first-class chlorination plant, capable of treating five tons of concentrates per day, can be built for from \$5,000 to \$6,000; yet Messrs. Ahn and Hay ask the Government to pay them \$10,000.00 "to make the mill more complete"; i.e., having received a bonus to pay them back more than cost of milling, they then want the Government to reimburse them for building what they already have, according to the

official Mines Report, viz., a chlorination plant—which, if they had it not, would not cost over half the sum they ask from the Government.

We must say that we are surprised that the Department of Mines has not at once vetoed this proposition which seems to us to have no warrant nor foundation for asking help. We think the gold miners of the Dominion, of Nova Scotia and British Columbia, would gasp if they should learn that Ontario bonused a gold stamp mill and proposed to give that mill a chlorination plant free of cost.

The Dominion Gold Mining and Reduction Co. is a company which has doubtless been formed through the representations of its promoter that it would be a money making concern, and that its dividends would come from the very valuable properties purchased, and from the high rates a custom mill could charge, we say doubtless, as we suppose this company has been formed as similar companies have been formed.

Now there has been no hint from any of the sources from which our information has been derived that the Government, if it grants this assistance, may fix the tariff of charges for treatment. Nor do the company say a word upon that very important subject.

That a custom mill in the locality of Rat Portage is a necessity we doubt, that it would be of some slight service is probably true. But it must not be forgotten that the gold ores of that region are largely, if not altogether, free milling, and that the value of such ores is much more readily determined without a mill than are the values of refractory ores. Hence the necessity of chlorination or cyanide works is not apparent at this stage of development, nor would the existence of such works tend to develop the district, for such development must come inevitably from the finding and exploitation of such ore bodies as will give unquestionable profit, as for example the "Sultana."

And we might say just here that the extending of Government aid to a wealthy English company which does not need it would be a distinct injustice to such men as John F. Caldwell, who, for five years, has been fighting his own battles and winning his success by his own efforts, and who is not an alien but a citizen of Canada.

Such mine owners as have pay ores, if they are not able to build their own mills, will of course have to rely upon custom mills, as they do in every other gold field on this continent, and abroad; and the custom mill owners will protect themselves as to their charges, as they do elsewhere—to ask the Government to insure them against bad debts by bonusing is a step we feel sure the Ontario Government will be loth to take.

Such mine owners as have pay ores and are able to build their own mills will very much prefer to do so rather than ship their ores to a custom mill, especially such a mill as the remarkably versatile Mr. Robert Ahn would manage.

We cannot do better than to quote from a paragraph in the report of the Director of Mines for 1894, p. 73: "Until a mine has been so far developed as to disclose bodies of ore sufficient to pay for the mill itself there is serious risk, etc." Let the Dominion Gold Mining and Reduction Company develop its mines until a sufficient body of ore has

been disclosed to pay for making its mill "more complete," and let the Ontario Government spend its money to develop the mining industry in a more intelligent and effective way than bonusing a new company which has as yet not proved itself worthy of any help.

The Trades Journal and the Mining Society of Nova Scotia.

From two very different sources the Mining Society of Nova Scotia has recently been criticized with considerable severity, we wish we could say with equal fairness. The Halifax *Guardian and Critic* falls foul of it for having up to a certain point displayed commendable activity in formulating a series of much needed reforms in our mining law, and then dropping their programme very much like a hot coal, or as our contemporary tersely expresses it, "Marching, like King Charles, up the hill and then down again." No doubt our friends will be able at the annual meeting to offer more or less satisfactory reasons for their course of action, and we shall probably find that like many other well meaning corporations bent on reform they have had to make a temporary sacrifice to the "Moloch" of political exigencies.

We are, however, more concerned to defend our friends from the delicate and altogether embarrassing attention bestowed upon them by a sheet of another color altogether, to wit, the Stellarton *Trades Journal*, which in a recent issue did them the honor to devote some two and a half columns to the "elucidation" of their proposals on the *lucus non lucendo* principle.

It ought not to be a difficult matter, and yet in the present instance it would be extremely interesting to know where a representative labor journal stands upon a question directly affecting the interests of the class supporting it. But we question if any person of average intelligence who has enjoyed the inestimable privilege of following the editor through his periodic lucubrations of last year and more recently through his marvelous peregrinations in the great republic to the south, where his adventures in many States put "Gulliver's" entirely in the shade, and his reception in the private offices of city magnates and the curious information he there received can only be compared to that of Mr. Weller, or the more recent and not less redoubtable M. Blowitz, of Parisian fame; nor can it be stated what the views of this remarkable journal are, either upon mining legislation or any other topic which it has seen fit to discuss for the information, or shall we say, the mystification, of its subsidizers.

We think we may be excused for pointing out that a paper which fulminates such decrees and formulates such dogmas as our contemporary should at least be representative of the important class of workmen for which it claims to speak, but the *Trades Journal* does not even enjoy this satisfaction, for premising that it is the official organ of the P. W. A. which owns it and that it nevertheless always claims to speak for the miners of Nova Scotia as a whole, we venture to point out that like many similar organizations its claims are not characterized by modesty. From the official blue book of the Department of Mines bearing the date Sept. 30, 1895, we gather that the total number of persons employed in and about the mines of Nova Scotia is 5,793, while from the *Trades Journal*, Sept. 11, 1895, which contains a report of the 16th yearly meeting of the grand council of the P. W. A., we learn that their membership is 1,416, or less than one-fourth of the class which this journal so loudly claims to represent *in toto*, and we are credibly informed that were it not for the fact that the largest mining company in the Province allows the poll tax to be deducted on their pay rolls, the membership would in all probability dwindle down to less than one-half, as is the case in the home districts of Spring Hill, Pictou and Stellarton, where it is best known. This conduct on the part of the mine owners is certainly unselfish, and it requires no very vivid imagination to picture the astute editor of the *Trades Journal* quietly receiving with one hand from those

generous tax collectors the fruits which replenish the treasury of his Association, and with the other adroitly producing the scourge with which he is to lash and castigate them; but so long as it pleases them it is not likely that the P. W. A. will object. This is the journal which at one time advocates the abolition of all deductions from men's pay as highly improper and immoral; protesting vigorously and indeed eloquently that "spot cash" is the only honorable payment for labor; at another time loudly denouncing company stores as an iniquitous system under the foul designation of "pluck me," and anon (after that little visit to the States) abandoning these views in favor of co-operative stores, a venture in which the company were to find all the money and the men (or the grand secretary) the brains; at one time arguing that all monopolies are a curse, and at another (again after that little visit to the States) blessing the greatest monopoly in Nova Scotia and urging its extension over the Eastern States. Truly the chameleon is outdone and will no longer be quoted for the variableness of its colour; instead it will be the *Trades Journal*. And this is the print of representative character, of remarkable consistency, and shall we say, of refined courtesy, that undertakes to lecture the Mining Society of Nova Scotia and all its members jointly and severally because in pursuance of their functions and in accordance with their constitution they proceed to consider the anomalies which exist in the mining laws of their Province and which undoubtedly tend to restrict the enterprise and limit the operation of the most important of Canadian industries.

The ire of this genial editor seems to be aroused mainly because the Society does not agree with him in supposing that although English law is good enough to form the basis of Canadian law in every other branch, it is inadequate to the requirements of our mining, and so this Solon of latter-day legislation takes credit for having tinkered the British Constitution. He says that the first compilers of the Mines Regulation Act here copied it word for word from the British Act. He does not, however, say that in 1891 he and the party which he represents set to work to introduce a number of amendments altogether at variance with British law, and which, although not found in practice to be necessary for the dangerous mines of the Old Country, many of them giving off enormous quantities of gas, some of them more than three thousand feet below the surface, were yet by him considered necessary for the shallow and safe mines of Cape Breton, which are almost entirely free from gas. This view was accepted by the local legislature and has resulted in the creation of quite a number of certificated classes which are unknown in England and uncalled for here. There the only persons in connection with a mine who are required to hold certificates are the manager and under-manager, and this appears to us a wise provision inasmuch as it places the whole of the legal responsibility upon the principal officers and leaves them free to appoint their own subordinates; and surely this is more conducive to discipline and consequently to good management and the safety of the men, than for the law to step in and say we will license all your officials. The latter system undoubtedly sets *imprimatur* of competency upon a man *pari passu* with that conferred upon him by long experience and the deliberate choice of a superior officer. Its tendency is to weaken the feeling of responsibility on the part of the manager and lead him to rely more upon the fact that a certificate is held by any particular person and therefore *prima facie* he is qualified to occupy a position of trust than would be the case if the manager had to judge of the qualifications and make the appointment entirely on his own responsibility.

It was therefore urged by a leading member of the Mining Society that the amendments of 1891 were superfluous and opposed to the best interests of all concerned, the class of amendment referred to having created certificates for over-men, fire-bosses, engine-men and for coal miners, and since then this policy of meddling has been continued, for at the present moment a bill is under the consideration of the local legislature, promoted by the same parties, creating another certificated class—machine runners. As this is purely a mechanical process and is per-

formed by men who are not in charge of any portion of the mine it can only be regarded as an unnecessary and vexatious addition to the burden of the mine owner, and is calculated to harass and hinder trade. It is not perhaps surprising that the *Trades Journal* should have failed altogether both to understand the proposals and to comprehend the drift of the suggestions made for remedying this state of things, but the argument set forth by the member who proposed the repeal of these clauses is both exhaustive and weighty. Some of his reasons have been here given above and the contention that he was beginning at the "wrong end" by proposing certificates for the chief officers first involves the execution of a mental *volte face* which we should have thought would have been beyond even the capacity of the *Trades Journal*; for this is the first time we have ever heard it argued that the proper way to secure discipline and good management is to license the subordinates and not the superior officers. There is another phase of this question which requires passing comment. Until 1891 a certificate granted by the Secretary of State of the Home Department in England as the result of an examination into the competency of a first-class colliery manager was accepted as of equal value in this country, a course which would seem to us perfectly fair and reasonable, not only because the demands made upon a colliery manager in the Old Country are more exigent than here, but because in all other professions we similarly accept English certificates. This concession, however, to the wisdom of the mining law on the other side of the Atlantic was swept away by the drastic amendments already referred to, and the editor of the *Trades Journal* in the article under consideration has the bad taste not only to exult over this fact, but also flings round a taunt because some who hold English certificates have failed to secure the same credentials from a Nova Scotia board.

We venture to think that the less said about this the better, and as there may be a necessity to refer to it in the future, we will say nothing further now, but the closing remarks of our critic compel us to say that if so much importance is attached to the value of a certificate granted by the N. S. Board, and if the editor of the *Trades Journal* considers, as he states, that this certificate is almost a guarantee for the safety of the men, and if, as he suggests in the first paragraph of his article, he believes that the proposals of the Mining Society would tend to relax the laws and if he further believes, as he states, that such a change would be likely to conduce to an explosion "on a large scale," then it is a pity that a person of such influence that he is able to mutilate the Mining Laws at his sweet will, and of such keen observation that he can scent danger from afar, should not have taken care, in the interest of the class that he is so well paid to protect, that at least *one* question relating to explosions should have been asked in the examination for first class manager's certificates in this province; and that out of some forty questions at least more than one-fourth should have been of a practical character. This state of things, however, has elicited no protest from the champion of miners' safety, and he still affects to regard this examination as a supreme protection.

While we regret that the arduous and protracted labours of the legislative committee of the Mining Society of Nova Scotia, should have failed to produce a satisfactory result the first time of asking, we are glad to be able to compliment them upon the many valuable suggestions for the improvement of our mining legislation embodied in their report.

Meanwhile, we commend to the careful consideration, not of violent partisans or self-constituted leaders, but of all reasonable thinking men, who desire to promote the greatest of Canadian industries whilst safeguarding the lives and interests of both workman and employers, the undue restrictions and unnecessary limitations which are still to be found both in the gold and coal mining sections of our laws, and when these are fully understood and appreciated we are satisfied that an intelligent public will demand, and a fair-minded government will consent to such amendment and consolidation as will meet the requirements of all parties.

Gold Mining in Nova Scotia in 1895.

The returns for both the Government year (ending Sept. 30th) and the calendar year (ending Dec. 31st) show that there has been a substantial increase in the amount of gold won in Nova Scotia during the past year. According to the blue book the yield has been 22,112 oz., 17 dwt., 21 grs., as against 18,402 oz., 16 dwt. and 12 grs. for 1894. From the returns furnished by Mr. W. H. Brown, of the Mines office, and printed in the REVIEW, the year ending December 31st shows a production of over 18,605 ozs. This would indicate that the closing three months of 1894 produced in excess of the closing quarter of 1895, which is borne out by examination of the returns, with the exception of the districts of Sherbrooke and Uniacke (showing slight gains) and Fifteen Mile Stream and Brookfield, the gains of the two last-named districts being enormous, and well keeping up the general average of the Province in spite of the universal falling off in the older districts.

The relative positions are not altered, whether the Government year or the calendar year is taken: Stormont leads as in 1894, followed by Brookfield, Caribou, Fifteen Mile Stream and Uniacke, with Sherbrooke, for the first time in many years, bringing up the list of totals of 2,000 ozs. or over. In the returns to end of September, only Stormont, Caribou, Fifteen Mile Stream and Uniacke exceed the 2,000 oz. mark, although Brookfield and Sherbrooke are less than 100 oz. from it, and in the three months since September Brookfield has added to her output so rapidly as to put her within 4 ozs. of the 3,000 mark for the calendar year.

The most noticeable feature of the returns is the enormous increase in tonnage crushed, being nearly double that of the year 1892, and fully 40 per cent. more than in 1894. In round numbers the tonnage for the Government year was 51,000 tons. This increase is due entirely to the superior character of the mills now in general use. It is less than seven years since the first modification of the old style Nova Scotia mill was first introduced, and less than five years (July, 1891) since the present general type was first introduced for continuous work in the district of Oldham. The steady average of the Richardson Company's mill in Stormont district would have been deemed impossible by the rank and file ten years ago.

The general average yield of the rock has been about the same as for 1894, being about \$7.00 per ton for the whole Province.

The Richardson mill above quoted is perhaps working the lowest grade rock (about \$3.00) that has been continuously worked either in, or outside of, Nova Scotia.

It is most encouraging to observe these signs and indications that at last Nova Scotia is awakening to the possibilities of her low grade ores, of which the Province has, in certain districts, an abundance.

There are many noteworthy items observed in looking through these records for the last few years, some of a very encouraging nature, as witness the revival of the Sherbrooke district, which has remained persistently idle since the collapse of its first boom in the seventies. One misses from the returns any mention of the once famous Dufferin or Salmon river mine, and notices the idleness of the former large producers in Oldham, Lake Catcha and Molega districts.

We predict a steady growth for Nova Scotia gold mines in 1896.

The meetings of the Ontario Mining Institute will be held at Toronto on the evenings of Tuesday and Wednesday, 3rd and 4th March. The papers to be presented are: "The Value of Careful and Complete Analysis of Rocks and Minerals," by Dr. W. S. Goodwin, Kingston; "Ontario as a Mining Country," by Dr. A. P. Coleman, Toronto; "Mining in the Thunder Bay District, Ont.," by Peter McKellar, F.G.S.A., Fort William; and on "The Financial Aspect of Mining," by J. H. Chewitt, B.A. Sc., C.E., Toronto. The election of officers will take place on Wednesday evening.

NOVA SCOTIA COAL TRADE, 1895.

The following returns have been compiled from figures furnished to us by the courtesy of the various colliery managers, and will serve to give an approximately correct idea of the state of the Nova Scotia coal trade in comparison with the previous year. These returns, which are for the calendar year, of course, do not cover some of the smaller operators:—

COMPANY.	Nova Scotia.		New Brunswick		P. E. Island		Quebec		United States		Newfoundland		St. Pierre		West Indies	
	1894	1895	1894	1895	1894	1895	1894	1895	1894	1895	1894	1895	1894	1895	1894	1895
Dominion Coal Co.....	163.911	148.938	28.202	25.739	11.746	12.101	553.781	459.124	53.894	56.534	58.954	38.907	2.620	4.662	7.409	266
Acadia Coal Co.....	126.836	113.674	7.199	6.242	25.950	18.916	5.129	3.152	.....	.....	.....	92	144	.....	.....	.....
Cumberland Ry. and Coal Co.....	123.795	123.848	126057	64.828	.....	.....	98.913	123.443	36.205	.....	.....	.....	.....	16.545	.....	.....
Canada Coals and Ry. Co.....	11.894	9.624	56.558	55.435	401	418	15.800	20.371	7.347	2.457	.....	.....	.....	.....	.....	.....
Intercolonial Coal Co.....	100.508	92.084	7.240	4.198	15.339	16.316	80.687	75.634	3.059	.....	.....	.....	.....	.....	1.052	313
Cape Breton Colliery.....	6.036	4.763	898	368	2.331	624	900	1.303	.....	.....	3.915	.....	.....	365	.....	.....
General Mining Association.....	Not given	Not given	Not given	Not given	Not given	Not given	22.555	31.633	Not given	Not given	Not given	Not given	Not given	Not given	Not given	Not given

	Coal Raised.		Coal Sold.		Colliery Consumption.		Sold to Col'ry Employés		Total Disposals	
	1894	1895	1894	1895	1894	1895	1894	1895	1894	1895
Dominion Coal Co.....	988.170	874.431	931.728	784.799	43.849	51.615	14.490	18.738	990.067	855.152
General Mining Association.....	not given	not given	223.000	208.895	not given	not given	not given	not given	not given	not given
Acadia Coal Co.....	.....	202.971	165.528	173.242	55.400	48.458	5.514	5.243	226.442	203.204
Intercolonial Coal Co.....	not given	not given	208.421	188.545	11.449	11.484	4.873	4.215	224.743	204.244
Cumberland Ry. and Coal Co.....	.....	375.788	384.971	328.666	.....	not given	.....	not given	.....	328.666
Canada Coals and Ry. Co.....	.....	101.688	92.000	88.305	10.029	11.554	.....	1.827	102.031	101.688
Cape Breton Colliery.....	19.086	9.489	14.675	7.491	2.098	1.680	313	318	17.086	9.489

GOLD MINING IN NOVA SCOTIA.

The following returns have been reported for royalty at the Mines Office since our last statement:—

Name of District.	Name of Mill or Company.	Months in which Crushing done and Returns made.	Quartz Crushed. — No. of Tons.	Yield of Gold.	Total Yield.
				Ozs. Dwts. Grs.	Ozs. Dwts. Grs.
Sherbrooke.....	McNaughton Co.....	January.....	200	127 0 0	
do.....	New Glasgow Co.....	January.....	200	58 5 0	
do.....	Stellarton Gold Mining Co.....	January.....	87	37 0 0	
			487	222 5 0	222 5 0
Moose River and Caribou.....	Caribou Gold Mining Co.....	October, November, December.....	260	283 1 0	
do do.....	Gardner Clish.....	October, November..... quartz 929	73	22 0 0	
do do.....	W. A. Sanders.....	November, December..... slate 362	1291	195 14 0	
do do.....	Moose River Gold Mining Co.....	January.....	264	46 7 12	
			1888	547 2 12	547 2 12
Uniacke.....	T. R. Prince.....	October, November, December.....	900	105 5 0	105 5 0
Stormont.....	Griffin Gold Mining Co.....	January.....	308½	47 8 17	
do.....	Richardson Gold Mining Co.....	December.....	850	140 0 0	
			1158½	187 8 17	187 8 17
Brookfield Q. Co.....	W. L. Libby.....	January.....	390	350 0 0	350 0 0
Lake Catcha.....	John H. Anderson.....	January.....	4	14 7 0	14 7 0
Oldham.....	W. C. Sane.....	September, November.....	3½	0 12 0	0 12 0
Tangier.....	Mooseland Gold Mining Co.....	January.....	8	9 10 0	9 10 0
				Total.....	1436 10 5

Gold Mining in Ontario.

Gold mining in Ontario makes slow progress, but there is progress. Hitherto the business has been limited to the operations of the explorer and the prospector. The former has been successful in finding shows of gold in many places, and in a few instances the latter has demonstrated that the precious metal exists in sufficient quantity to make the mining and treating of its ores a profitable business. In the far western corner of the Province discoveries of gold-bearing veins have been made over an extent of 2,000 square miles, throughout a tract 100 miles wide and 200 miles long. It reaches as far north as Lake Seul on the northern boundary of the Province, around Lake of the Woods on the western boundary, and up the Seine river as far as Lac des Milles Lacs. But it is not an unbroken area, for as a rule the gold ores are limited to Laurentian rocks of eruptive granite (or protogine as some prefer to call it), and to Huronian belts of the Keewatin series. These latter are very extensive, especially along the Seine river, from mouth to source; and also northward of Rainy lake along the Vermillion and Wabigoon rivers, as far as the Canadian Pacific Railway. The former exhibits its largest known extent on the north side of Shoal lake, where many promising veins have been discovered; but the Lake Harold mine, near Steep Rock lake, is in the same formation, and so is the Regina mine on Whitefish bay, Lake of the Woods. The vein of the Sultana mine is in green Keewatin schist. A new gold field was exploited last year on the north shore of lake Superior, about a hundred miles east of Fort William. The veins are described as massive and continuous, and many wondrously rich specimens have been taken from one location. This is also a Huronian area. Farther east, in the vicinity of Sudbury, there is another field, but not enough is yet known of it for a safe opinion to be formed of its value. Prospecting operations carried on with a diamond drill in the township of Creighton have proved the existence of large veins which carry gold, and on the eastern and northern side of lake Wabigoon work on a small scale has been carried on during the past year with gratifying prospects as far as small mill tests can show. In the Marmora country there is little of actual work to record; those who have free milling ores are lacking for the capital to work them, and those who have the arsenical ores are lacking both for capital and the knowledge to treat them. But towards the end of the year several thousands of acres were leased by an enterprising Englishman, including among other properties the once famous Deloro mine, and it is reported that work will be commenced there early in the present year. At the price to which arsenic has gone up, one might suppose that the production of that article itself could under proper management make a property like the Deloro mine pay. The most successful mine now in operation is undoubtedly the Sultana, and it merits the name of a developed property. It was worked continuously during the past year, excepting for a few days after a fire which consumed the shaft house, and the ten-stamp mill was kept busy on the ore. Between the second and third levels, at a depth of 150 to 200 ft., the vein has a width of about 25 ft.; and the works are now sufficiently extensive to allow of the ore body being attacked from a number of points, so that it can be raised economically and in quantity to supply the mill when running at its full capacity. At the end of the year the main shaft had reached a depth of 250 ft., and it is reported that not only is the ore found to grow richer as the shaft is sunk, but that the gold is also finer. The Sultana vein is supposed to extend some distance southward under the water of Lake of the Woods and to outcrop on one or more islands, and at the present time an Ottawa syndicate is prospecting it with a diamond drill. The reduction works at Rat Portage and the Gold Hill and Black Jack properties on Big Stone bay were purchased last year by an English syndicate which has since been organized under the title of the Dominion Gold Mining and Reduction Company, Limited, with a capital of £20,000. The reduction works have been thoroughly reconstructed, most of the old machinery

having been torn out and a plant of twenty stamps set up instead. It is said to be part of the scheme of the company to operate these works as a custom mill, where ore from any properties in the district may be treated at a certain rate of charge to prove its value, as is done in some localities of the western States and Territories. The mill at the Gold Hill mine has also been refitted, and some new mining machinery has been set up; but the works have been closed for the winter. Several other properties in the vicinity of Rat Portage are under process of exploration, and favorable reports continue to be made concerning them. The Regina mine is about 45 miles southeast from Rat Portage, and is situated on Whitefish bay, one of the numerous sheets of water connected with Lake of the Woods which radiate in all directions from the main body like the tentacles of an octopus, but beneficent in the sense that they furnish the highways for reaching easily an extensive area of country by the crafts which ply the lake. The Regina mine is owned by an English company, whose president is General Wilkinson, with a capital of £130,000. A neat and well equipped mill with ten stamps was erected on the property last year, and commenced to run in September. Since then it has been working as steadily as the supply of ore would warrant; but as only a little development work had been done it was not possible at first to deliver enough ore to keep the mill going at its full capacity. The latest reports, however, indicate that the supply is steadily increasing, and that gold bars are being produced with greater frequency. A large force of miners is employed sinking shafts and driving tunnels on two of the four veins which extend from the shore line across the granite into the green schists. On Shoal lake, which is an expansion of the Seine river, a number of properties are being explored. The principal of these is the Wiegand location, upon which a Duluth syndicate began last summer to sink two shafts. They have now reached a depth in each shaft of about 150 ft., and accounts received from recent visitors to the property are very favorable as regards the appearance of the veins and the quality of the ore. Upon another property in the same district a five-stamp mill was built last year, and a quantity of ore was treated; but for some cause not very clearly explained by the parties interested (apparently a want of funds), the works were closed down after a very short run. At the Lake Harold mine a five-stamp mill was also erected last summer and was worked for a few weeks; but as sufficient ore could not be supplied to keep it running steadily, the mill was shut down. Meantime development work is going on, and it is expected that the mill will start up again in the spring with five additional stamps. The owners of this mine have also taken up locations on Saw Bill lake, some forty miles northeast of Lake Harold mine, where rich gold ores were discovered last year, and it is probable that mining operations will be undertaken there this year. A number of other properties have been secured by prospectors in the same locality. The Empress Gold Mining Company, composed entirely of local capitalists, has been stocked for \$100,000 to operate the property near Jackfish Bay on the north shore of Lake Superior. A little prospecting work was done late in the season, a camp is in process of construction, and a mill for treating the ore has been ordered. The example of the Empress Company, in so far as local organization is concerned, is worthy of emulation elsewhere. It is not for lack of capital in Canada that our mineral wealth is allowed to lie dormant. The official statement for December showed that there was deposited by the public in the chartered banks of the Dominion at the end of that month the enormous sum of \$187,119,573, more than one-third of which was at call and of course earning no interest, while the balance (\$119,667,176) is earning 2½ or possibly 3 per cent. If there were openings for investment in which people with money had confidence, it is manifest that no such moneys would be allowed to lie in the banks for safe-keeping. Is it not worth enquiring whether openings are not presented in the mineral districts of the Province to win the wealth hidden there? Profits cannot be assured to any one; but the experience of every country in which a mining industry has been established goes to show that mining investments are on the whole as safe as any other.

There will be losses, and there may be large gains; there is risk in every business. Why should not some small portion of the idle capital of Canadians be risked in an effort to open up our mines, when there is reasonable hope of its being a good investment? If the venture is successful our own moneyed men will earn the profits, idle men as well as idle capital will find employment, and the industry will react healthily upon the whole country.

The total gold production of Ontario mines last year was about \$65,000.

A Great Canadian Convention.

What promises to be the greatest gathering of mining engineers, mine owners and capitalists held in any country is now being promoted by the Canadian Mining Institute (Federated). Invitations have been extended to the Iron and Steel Institute of Great Britain, the Federated Institution of Mining and Mechanical Engineers of Great Britain, and the American Institute of Mining Engineers. It is proposed to have the meetings during the summer or autumn of next year, at Montreal, with excursions to the mining districts of Nova Scotia, British Columbia, Ontario and Quebec. The following replies have so far been received by the Secretary:—

[Copy.]

THE FEDERATED INSTITUTION OF MINING ENGINEERS,
NEWCASTLE-UPON-TYNE, 31st January, 1896.

DEAR SIR,—I am in receipt of your letter of January 28th, which I shall have pleasure in laying before the meeting of the Council to be held shortly.

I need scarcely add that the cordial invitation of the Canadian Mining Institute to hold a meeting in Montreal in the summer or autumn of 1897 will be duly appreciated by the members, and more especially if it should result in combining the two countries and associations more strongly together.

Yours faithfully,

(Signed) WALTON BROWN.

B. T. A. BELL, ESQ.,
Secretary Canadian Mining Institute, Ottawa.

THE IRON AND STEEL INSTITUTE,
28 VICTORIA STREET, LONDON, S.W.,
January 30th, 1896.

MY DEAR SIR,—I am much obliged by your letter of 20th suggesting the possibility of an invitation being extended to hold the autumn meeting of the Iron and Steel Institute in 1897 at Montreal. I shall have much pleasure in submitting your letter to the Council at its meeting on February 25th, and shall not fail to communicate its views on the subject promptly.

Personally I feel sure that if such a meeting could be arranged, the members of the Institute would welcome the idea of holding a meeting in Canada as tending to maintain and strengthen the bond subsisting between Canada and the United Kingdom.

I remain, yours faithfully,

(Signed) BENNET H. BROUGH,
Secretary.

B. T. A. BELL, Esq.,
Secretary Canadian Mining Institute,
Ottawa, Canada.

EN PASSANT.

The announcement elsewhere of the successful organization of a representative association of mining men in British Columbia will be hailed with satisfaction in Eastern Canada, where similar institutions in Ontario, Quebec and Nova Scotia have done much to promote the interests of mining. British Columbia is making such splendid progress in her mineral development that such an association should very rapidly assume a prominent position. It is to be hoped that all who are engaged in mining in British Columbia will at once become members of this association and help it along with their subscription, their influence, their contributions to its proceedings, and by their personal attendance at the meetings. Our heartiest good wishes are with those who are en-

deavoring to build up in the west a live mining organization which will be 'second to none' in the Dominion.

The forty stamp mill of the Richardson Gold Mining Company at Country Harbour, Nova Scotia, was completed this month, and while largely increasing the output of this productive property should reduce the working costs to a minimum. With the old 20 stamps the company's mining and milling was done for about \$2.05 per ton, and the additional battery is expected to bring the figure down to \$1.65. During the past year 1677 ounces, 7 dwts. were won from 10,383 tons crushed, as against 1674 ounces, 10 dwts., 10 grs. from 7016 tons in 1895.

With regard to the report of the Mining Society of Nova Scotia, suggesting certain amendments to the Mines Act of that province, a prominent colliery manager writes:— "Respecting the reference to "Certificates" at the meeting of the Mining Society I am not altogether in accord with what was reported. I consider certificates in themselves are not objectionable, in fact I regard them distinctly of value, and only objectionable when the blundering wording of the mining law makes every pit, however small, to be fitted out with a full set at all hours. It must be remembered they appeal to the spirit "that would strut in buskins," the same that makes all societies that wear regalia in processions so well supported in our mining districts, and the same spirit that leads the majority of the legislative council to style themselves "Honorable," notwithstanding the British North America Act to the contrary. Certificates excite the ambitions, and where obtained through examinations mark stages in the acquisition of theoretical knowledge. In time they will select out the young men of energy and determination. I say encourage the feeling, and urge improved facilities for the acquisition of technical knowledge. The grand mistake that is made is in the holder assuming he necessarily is "the man for Galway."

These remarks do not apply to certificates issued to coal cutters, for they guarantee nothing more than that the holder has been employed below ground for a stated term. Young fellows of 18 and 19 have got them on payment of 50 cents a head to the issuers; and it is well known and cannot be denied that some of these are quite unfitted to be in charge of working places of some of the coal pits. The management has to step in and refuse to accept their certificates as guarantees of fitness. If this supervision has to be exercised, and it is exercised, where-in does the State benefit by requiring coal miners to hold certificates?

The object apparently is otherwise and to make as it were a guild and prevent the employment of strangers at a time when labor below may be required. Evidently it has nothing to do with the grand object of the Mines Regulation Chapter which solely looks to the preservation of life and property. If there was any idea on the part of the legislature of Nova Scotia that further security to life was to result from the system, the same reasoning would require the inclusion also of gold and iron mines. But it does not and the sham is exposed.

What the Mining Society justly complains of is that the regulations are becoming more and more confusing and that the anatomy of the Act is lost sight of. The Department of Mines knows this and does not press for a literal compliance, so that beyond the letter of the Statute the objectionable features are in but a few instances emphasized by oppression."

The coal output of British Columbia officially reported to us by the Hon. Col. Baker, Minister of Mines, for the past year was 939,634 tons, and the shipments 756,333 tons.

Messrs. H. A. Budden, (Intercolonial Coal Co.), John S. McLennan and Mr. Kingman, (Dominion Coal Co.), R. P. Routh, (General Mining Association), and B. T. A. Bell, Secretary Canadian Mining Institute, representing the Lower Province coal trade, waited upon Mr. Robert White, Collector of Customs at the Port of Montreal, on the 6th

instant, and urged a stricter application of the law respecting the importation of foreign bituminous coal at that port. The collector promised to give the matter his attention.

The rapid extension of our mineral industries and their value to the carrying trade of the country has been recognized by the Canadian Pacific Railway, who have now established at Montreal a mining department in charge of a thoroughly capable consulting mining engineer. Mr. J. H. Sussman, M.E., who is in charge of this branch of the company's service, is a graduate of the Massachusetts Institute of Technology, and has had a wide acquaintance with practical work in the metallurgy and mining of the precious metals. Mr. Sussman will examine and report on all mining enterprises in any district through which the Canadian Pacific passes. If his report is favorable the company will do everything within its power to assist by building branch lines, giving low rates of freight, etc.

A new safety cartridge for mines where the flame of the explosive is dangerous is reported in use at the collieries at Polish Ostrau, in Austria. A quicklime and a dynamite cartridge are connected, so that the slacked lime heats a primer sufficiently to fire off the detonator embedded in the dynamite. The compound cartridge is enclosed in a bag of loose cotton, woven like a wick. The experiments were made in a gallery containing 7 per cent. of methane and a great deal of coal dust that was kept in motion, and in no case did the cartridge fire the gases or the dust. The flame is confined to the interior of the cartridge, and is stopped both by the slacked lime and the water in the bore hole at its upper end.

Capt. R. C. Adams, of Montreal, is reported to have made a sale of his Mount Adams group of silver claims in the Slocan district to a Philadelphia syndicate. Dr. R. A. Penrose, Jr., examined these claims last summer and reported favorably upon them. Our congratulations to the genial captain.

The announcement that the construction of the Crow's Nest Pass Railway is to be pushed forward immediately will be received with satisfaction. This line will open up a valuable coal territory and will be of immense service to the important mines and smelters of the Kootenay.

The annual meeting of the Mining Society of Nova Scotia will be held in the rooms of the Society, 107 Hollis Street, Halifax, on 11th March next. A good programme of papers has been prepared and an interesting time is promised. The annual dinner will be held in the evening.

Barney Barnato, the South African millionaire who has made his immense fortune out of diamond speculations, is a keen man of business, but even he can be got at when guileless simplicity pits itself against his business shrewdness. Not long ago a country parson wrote to him in the following terms: Dear Sir,—“My aim has always been investment, not speculation. When your bank came out, I regarded its shares as an investment and purchased four hundred of them at four pounds, sinking my little all in them and a good deal more. They have now fallen to two pounds, and I am undone. I cannot face my parish as a bankrupt, and what am I to do? I throw myself upon your mercy.” Barnato was deeply moved by the appeal, and replied that he would buy back the shares at four pounds. On receipt of this reply, the guileless parson wired to his brokers to “buy four hundred shares Barnato bank stock at two pounds and send them round to Barnato Brothers, who will give you four pounds for them.” Verily the children of this world are in their day and generation smarter than the children of light.

CORRESPONDENCE.

Mr. Pellew-Harvey as a Metallurgist.

To the Editor of the Canadian Mining Review.

SIR:—A friend has recently brought to my notice the Christmas number of the British Columbia *Mining Record*, which in style and get up is a credit to the Province, but which is exceptionally noteworthy from an original article by a Mr. W. Pellew-Harvey, F.C.S., M. N. Eng. Inst., M. and M. E., on *Ore Treatment*, etc.

I have never had the honor of knowing Mr. Harvey personally, although noticing his card as an assayer in your valued paper, and I would not have ventured upon what I am going to say were it not for a paragraph on another page (p. 35) of the same number of the *Mining Record*, which states that this same Mr. Harvey is to lecture in Vancouver during the winter and that his subject is “Metallurgy”; these lectures being a part of the winter instruction proposed by the Department of Mines.

If it is true that one must judge a man by his works, and we attempt to judge Mr. Harvey's knowledge of metallurgy by his contributed article on “Ore Treatment,” it follows inevitably that the Department of Mines have made a huge error in supposing Mr. Harvey capable of teaching the metallurgy of—*silver-lead* ores, to say the least.

No man who has ever smelted lead ores, or has a rudimentary idea of how western smelters try and treat such ores would ever make such gross and ignorant blunders as are contained in this article.

Mr. Harvey prefaces his article with the statement that he has “had a long and varied experience with this subject,” *i.e.*, ore treatment, and hence fairly lays himself open to criticism.

While it is true that smelting rates are based upon the chemical composition of the ores to be treated, and that the rates given by Mr. Harvey may at some time or another have been an actual charge, yet these rates are very much modified by competition, and by the varying wants of the different smelters at different times, according as, *e.g.*, they may need a siliceous or ferruginous ore. To give an example, it is no secret that the ore of the Le Roi mine was smelted at low rates because of the desirability of the ore as an iron flux.

Mr. Harvey defines a standard ore as one whose chemical composition approaches the standard required for economic smelting, and thence proceeds to inform his readers that such a standard requires 5 per cent. of copper in addition to 13 per cent. of lead!

How many smelters in the west will agree with him? While a small percentage of copper is desirable, such an amount as 5 per cent. where the lead is normal is very unusual and entirely unnecessary. I may add also that now-a-days very few smelters make a penalty charge for zinc unless the ore contains more than 8 per cent., and in many cases 10 per cent.; and in the case of high grade lead ores Mr. Harvey's method of figuring rates for treatment will not apply. But these errors are but trifling compared to what follows.

Having bought his ores, Mr. Harvey then proceeds, if they are “not exactly standard,” to make them so by the addition of “fluxes,” and then (shades of Eilers and of Hahn!) “the ore is calcined”!! It is, doubtless, entirely unnecessary to say to your readers that this is *never* done; the roasting plant of even our largest and best smelters is usually taxed to its utmost capacity to calcine the refractory ores bought, without overburdening it still more by attempting to calcine the whole charge of ore and flux.

And not satisfied with having made his ore “standard” (*i.e.* having silica, iron and lime present in the right proportions for a suitable slag, and lead enough present to collect the gold and silver into a base bullion) Mr. Harvey then tells us to add to 700 lbs. of such ore, “600 lbs. of slag, 70 lbs. of lime, 200 lbs. of skimmings from previous operations, and 125 lbs. of scrap iron.” Why just 70 lbs. of limestone? Why any limestone at all if the ore has already been made “standard” by the addition of fluxes? And why “200 lbs. of skimmings from previous operations”? What “previous operations” are there which will furnish enough skimmings for 200 lbs. to the charge? And why add *more* lead when your “standard” ore has already been made up to contain 13 per cent.? Doesn't Mr. Harvey know that the losses by volatilization of lead are enormous when metallic lead is fed on the furnace charge? Apparently he doesn't know anything about it for he proceeds to complete this phenomenal charge by “150 lbs. of bar lead, and 200 lbs. of coke thrown in with the above” ore, slag, iron, &c. This is the climax of absurdity. If the furnaces were in connection with refining works the skimmings would be considerable in amount, but in few cases would they be returned to the blast furnace, being treated by themselves in a special furnace. Moreover, does Mr. Harvey suppose for a moment that a smelter is going to have a lot of lead bars stacked up on the charging floor from which 150 lbs. may be taken for each charge and dumped back again in the furnace?

Equally absurd is the addition of 125 lbs. of scrap iron to the charge. Some iron is of course needed to take up the sulphur in the ore and form matte, but this iron usually is calculated for, and comes from the reduction to metallic iron of some of the iron ore used as flux. A smelting works in the western country which should buy scrap iron to the extent of 18 per cent. of the ore smelted would be forced out of the business into bankruptcy in a very short time.

Again, the addition of 600 lbs. of old slag to 700 lbs. of ore is excessive and absurd; a moderate amount of old slag, usually about 10 per cent. of the total charge, is always added, primarily because this old slag may be “foul” slag, *i.e.* contain too much lead and silver to be thrown away, and also because its addition promotes the smelting of the ore itself, making the charge less dense. But no purpose is served by the addition of so large an amount as 600 lbs. to 700 lbs. of ore, unless indeed it be to consume more fuel than is properly needed.

Lastly, Mr. Harvey has given as *typical*, a charge in which the ore to be smelted amounts to only 35 per cent. of the total material run through the furnace; of the economy and utility of such a charge your readers, may judge for themselves.

I make this exposure of Mr. Harvey's ignorance from the standpoint of one who has both bought and smelted argentiferous lead ores in the Western States, and because Mr. Harvey has posed himself as one having “a long and varied experience,” which is very much to be doubted as regards smelting.

Mr. Harvey has also made some very questionable statements in the rest of his article, as when he talks of leaching low grade copper *sulphides* with water when “sulphuric acid is formed” which, when passed “over pig iron,” precipitates the copper “as metallic copper, or sulphate of copper, whichever the case may be.”

Mr. Harvey must *know* better than this, and one regrets such looseness of language, which is also found in his concluding paragraphs on the chlorination and cyanide processes.

In direct contradiction to Mr. Harvey it should be stated that the chlorination process has *not* been found “too expensive for commercial purposes.” Quite the contrary, as witness the 20 years successful working in the Grass Valley district of California, and the wonderful results obtained by Mr. Adolph Thies in South Carolina, equalled if not excelled by the remarkable degree of perfection to which the process has been brought in the Black Hills by Mr. J. E. Rothwell, and others. If Mr.

Harvey would only inform himself upon the subjects of which he writes he would know that the costs of this process vary from \$3.00 per ton to \$8.00 per ton, and that it is generally known amongst metallurgists that a sulphide ore, or concentrates, which will assay \$10.00 per ton in gold will pay for chlorination.

It is not my purpose to go into the relative merits and costs of chlorination vs. cyanide, believing as I do, that each process has its field and that cyanide has come to stay, but I recommend to Mr. Harvey a similar broadness of view, and a wider acquaintance with what has been done with chlorination.

My only apology, Mr. Editor, for asking so much space in your valued paper, is that mining interests are so subject to the raids of visionaries that exactness and truth are imperatively demanded of those to whom such interests are intrusted, and British Columbia as the coming mining centre of this continent at least, demands that a man who talks to her or about her to the outside world, shall know what he is talking about.

Montreal, Feb. 1st, 1896.

"DURIAM."

To the Editor of the Review:

SIR,—Mr. Pellew Harvey's article in the British Columbia *Record* on the subject of "Ore Treatment" forcibly recalls the fable of the jackdaw in peacock's feathers. I trust the REVIEW will, for the credit of Canadian chemists, let outsiders know that the majority of mining men in the Dominion understand more about metallurgy than this article would give them to understand; for of all the nonsensical productions regarding furnace practice it surely 'takes the cake.'

Yours, etc.,
WM. SMAILL.

Montreal, 21st Feb., 1896.

To the Editor of the Review:

SIR,—I have perused with astonishment the remarkable contribution of Mr. Pellew-Harvey to the columns of the British Columbia *Mining Record* on the subject of "Ore Treatment."

In the first place the American smelters who are taking the bulk of British Columbia ores are not governed by the hard and fast rules given by Mr. Harvey in making their rate for treatment. While it is true that rates are based on the chemical composition of the ore, these are modified by competition and the varying wants of the smelters at different times. When purchasing ores I should have been more than glad to buy the silicious ore Mr. Harvey cites with only \$9.00 treatment. The method for calculating treatment rates does not apply at all to high grade lead ores. As a general thing no penalty is exacted for zinc unless the percentage exceeds eight per cent. Payment is now made for gold when the ore contains $\frac{1}{10}$ ounce or over, and in some cases when it only carries $\frac{1}{16}$ ounce.

With respect to smelting Mr. Harvey adds his fluxes to the ores before he roasts them. This is, of course, never done. Only the refractory ores go through the roasters, for, as it is, the roasting plant in a smelting works is generally taxed to its utmost capacity. A standard charge is defined as one whose chemical composition approaches the standard required for economic smelting. Mr. Harvey requires that the standard charge carry 5 per cent. copper in addition to 13 per cent. lead. Now while a small percentage of copper is regarded as desirable, such a large amount on the lead charge is unusual and unnecessary.

Having his standard ore, i.e. an ore having the proper proportion of iron, lime and silica to make a suitable slag, and lead enough to collect the precious metal in bullion, he adds 70 lbs. of lime, (Why just 70 lbs.?) and 125 lbs. of scrap iron. Now some additional iron is needed to take up the sulphur to form matte. This iron is usually derived from ores rich in iron. A Western smelter buying scrap iron to the extent of 18 per cent. of the ore smelted would soon have to go out of business.

As to the addition of slag, some slag from previous operations is always added to the charge, but an addition of 600 lbs. of slag to 700 lbs. of ore is excessive.

The cited addition of 200 lbs of skimmings to the charge raises the question as to the source of these skimmings. In the smelting works little or no skimmings are made. Where the smelting works are connected with a refinery, the skimmings from the latter are sometimes used to replace lead ores in the blast furnace charge, but as a general thing they are treated in separate furnaces and are not allowed to go into the general ore charge.

But to cap the climax he throws on his heterogenous charge a 150 lb. bar of lead. If the standard ore already contains 13 per cent. of lead, why this further addition? Every experienced smelter now is aware, that the losses by volatilization are enormous when metallic lead is fed on the blast furnace charge; and that this practice is only resorted to in cases where the percentage of lead ores is so small that it is impossible otherwise to get enough lead on the charge to collect the precious metals.

It is futile to talk about the economy of a process where the ore to be smelted amounts to only 33 per cent. of the material run through the furnace.

A common blast furnace charge in the West is composed as follows:

\$50 lbs. miscellaneous ores, 150 lbs. limestone, 160 lbs. coke and charcoal, 400 lbs. slag (or less) from previous operations.

Products—(1) Slag carrying 32 per cent. silica, 38 per cent. iron oxide, (Feo.) 16½ per cent. lime. (2) 100 lbs. lead bullion. (3) 50 lbs. matte.

The practice of leaching sulphide copper ores with water to extract the copper is not very likely to come into general use in British Columbia.

Boston, 3rd Feb., 1896.

LEAD SMELTER.

Treatment of Mine Timber.—In a paper read before the Mining Institute of Scotland Mr. Robert Martin remarked that the treatment of pit wood to render it durable and incombustible, though apparently a small matter, was of great importance for the safe working of mines. He referred to the frequency of underground fires in mines, and fires on the surface, and described a method of treatment known as the Henry Auker method, which is in use at Niddrie Colliery. In this process the idea is to soak the timber in hot or boiling water containing a strong solution of common salt and chloride of magnesium. The timber treated should be free from bark, well seasoned and thoroughly dry. The props that had been found most suitable were those free of bark and natural sap. They were shipped from Sweden and several ports in Norway. The ordinary good class of battens and deals from Sweden can also be treated to great advantage. The author then described the plant at Niddrie Colliery, the cost of which, he stated, was about £50.



The Provincial Government Favorably Entertains the Association's Projected Mining Bureau at Montreal—A Grant of \$2,500 Will be Given.

On Wednesday morning, 19th instant, at the Governmental Offices, St. Gabriel street, Montreal, a deputation from the General Mining Association of the Province of Quebec, waited upon the Provincial Cabinet with respect to establishing in Montreal a Mining Bureau. The Association was represented by Mr. George E. Drummond (Canada Iron Furnace Co.); Mr. John E. Hardman, S.B., M.E., (Beauce Gold Mines); Mr. R. T. Hopper, (Anglo-Canadian Asbestos Co.); Mr. W. T. Costigan (Danville Asbestos and Slate Co.); Mr. J. D. Sword, Mining Engineer; Mr. Wm. Smail, B.A.Sc., M.E.; Mr. J. T. Drummond (Montreal Car Wheel Co.); Mr. H. W. DeCourteney, (Firth Steel Co.), Montreal; Mr. George R. Smith (Bell's Asbestos Co.); Mr. Richard White, Montreal *Gazette*; Mr. A. W. Stevenson, C.A., Treasurer; and Mr. B. T. A. Bell, Secretary; Mr. Theo. Doucet, N.P. (Gaspé Bay Mining Co.); Mr. J. T. McCall, (Canada Iron Furnace Co.), and others.

The following members of the Government were present: Hon. Mr. Taillon, Premier; Hon. E. J. Flynn, Commissioner of Crown Lands; Hon. A. W. Morris, Hon. W. Pelletier, Hon. Mr. Nantel, Hon. Mr. Casgrain, and the Hon. Mr. Hackett.

Mr. B. T. A. BELL, on behalf of the Association, referred to the importance of the work accomplished in the interest of mineral development by the Association. He believed the time was ripe for a campaign of education in mining generally, as Canadians were not fully alive to the possibilities for remunerative investment in their own country, most of the bonanzas so far having fallen to American enterprise and ability. The citizens of Montreal, had, however, shown a disposition during the past year, to invest in the business of mining, and large sums had been placed in British Columbia and in other provinces. Something ought to be done to secure a portion of that investment in the immense area of mineral territory known to exist in the Province of Quebec. With this object the Association sought for some aid to establish in Montreal in a prominent business centre, a Bureau of Mines, where mining men could meet and discuss mining affairs, where exhibits of the ores and minerals of the Province would be available for inspection by capitalists, where mining students could have access to a library of mining literature, and where a series of popular lectures on mineralogy and mining might be given by members of the Association and others interested in promoting the extension of mining. Such an institution could be best maintained and equipped by the mining men of the Province, and the Association was willing to do its part if some assistance to the project was given by the Government. He asked for an annual grant of \$2,500.

Mr. HARDMAN, who followed, made a forceful speech, in which he recommended the total abolition of the royalty clause in the present mining law, and a reduction in the dimension of mining concessions, particularly with respect to gold areas. He claimed that the Act, which in the main was a good one, should be so amended that if a miner desired only to take up a portion of a concession he should be permitted to pay for that portion only, and not be compelled to pay for mining rights on the whole lot or concession.

Mr. George E. Drummond, Mr. R. T. Hopper, and Mr. W. T. Costigan endorsed the remarks of the Secretary and the value of such an institution in Montreal.

The Hon. Mr. FLYNN, Commissioner of Crown Lands, replied that he felt himself much impressed with the first part of the project suggested by the Mining Association, and would be very glad, indeed, to consider the question and bring it before his colleagues, and, he was sure, if they could see their way in the present state of the finances of the Province to meet the wishes of the Association, they would only be too glad to do it. He expressed himself as entirely in sympathy with the views of the Association on the royalty matter, and suggested that the Mining Association should name a small committee of one or two gentlemen, with whom he could confer upon the whole matter, and endeavor, if possible, to get into harmony the views of the Government and the Association.

Mr. G. E. DRUMMOND, Vice-President, having thanked the Premier for his very courteous reception, the deputation withdrew.

In the afternoon the Hon. Mr. Flynn and the Hon. Mr. Hackett, in company with Mr. Drummond and Mr. Bell, visited a number of places suggested as suitable for the bureau, notably the buildings of the Mechanic's Institute on St. James St., and the Board of Trade.

MINING IN QUEBEC.

Capt. Macduff is rapidly pushing forward the development of the Hardman mine at Slate Creek. Bed-rock is expected to be reached about the first of May.

We learn from authentic sources that there is a likelihood of another sulphuric acid plant being put up at Capelton at an early date in connection with the Eustis mine.

The Danville Asbestos and Slate Co., Ltd., continues the vigorous exploitation of its properties at Danville. A large force is employed and the large output of fibre is well maintained.

The North American Graphite Mining and Manufacturing Co. has a good force at work on the Dickson property in the Buckingham district. The stamp mill and machinery are all installed and give satisfaction.

A proposition is on foot to erect a concentrating plant in connection with the chromic iron mines at Black Lake.

The mica business since the beginning of the year has been somewhat dull.

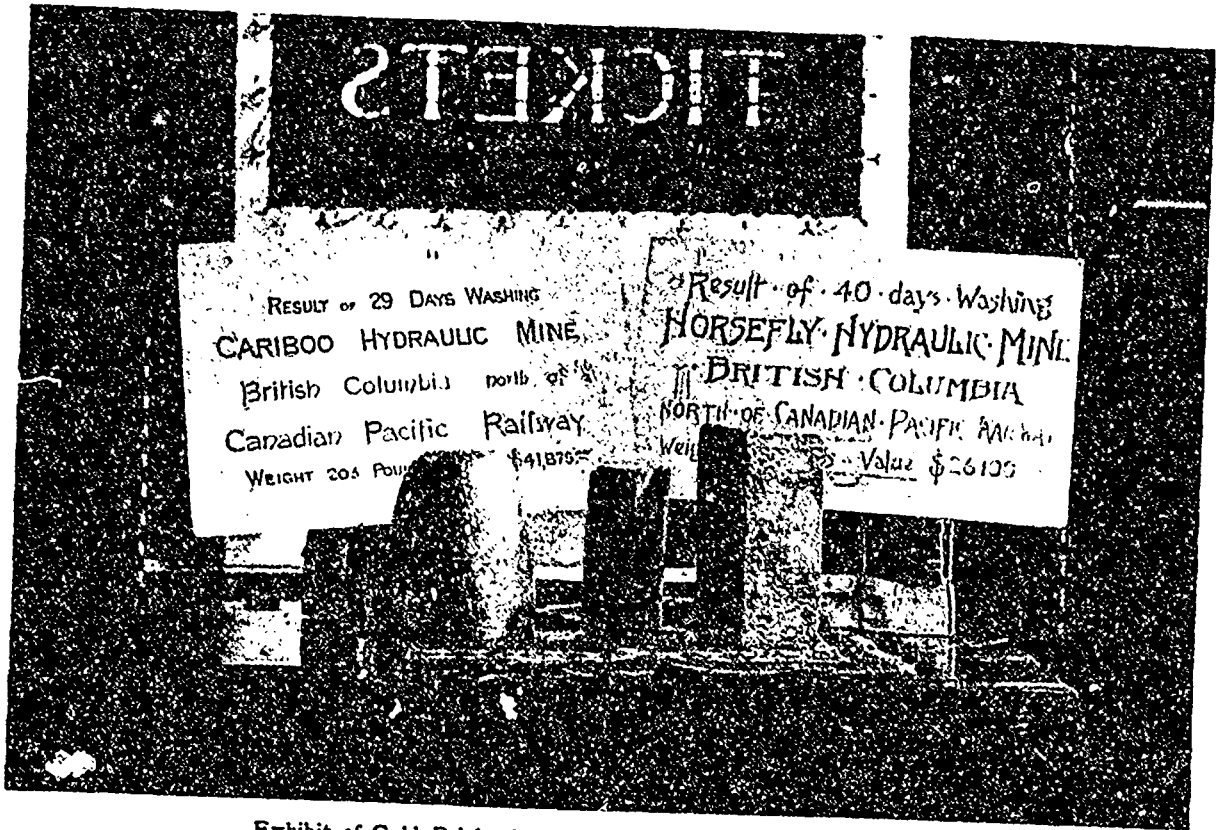
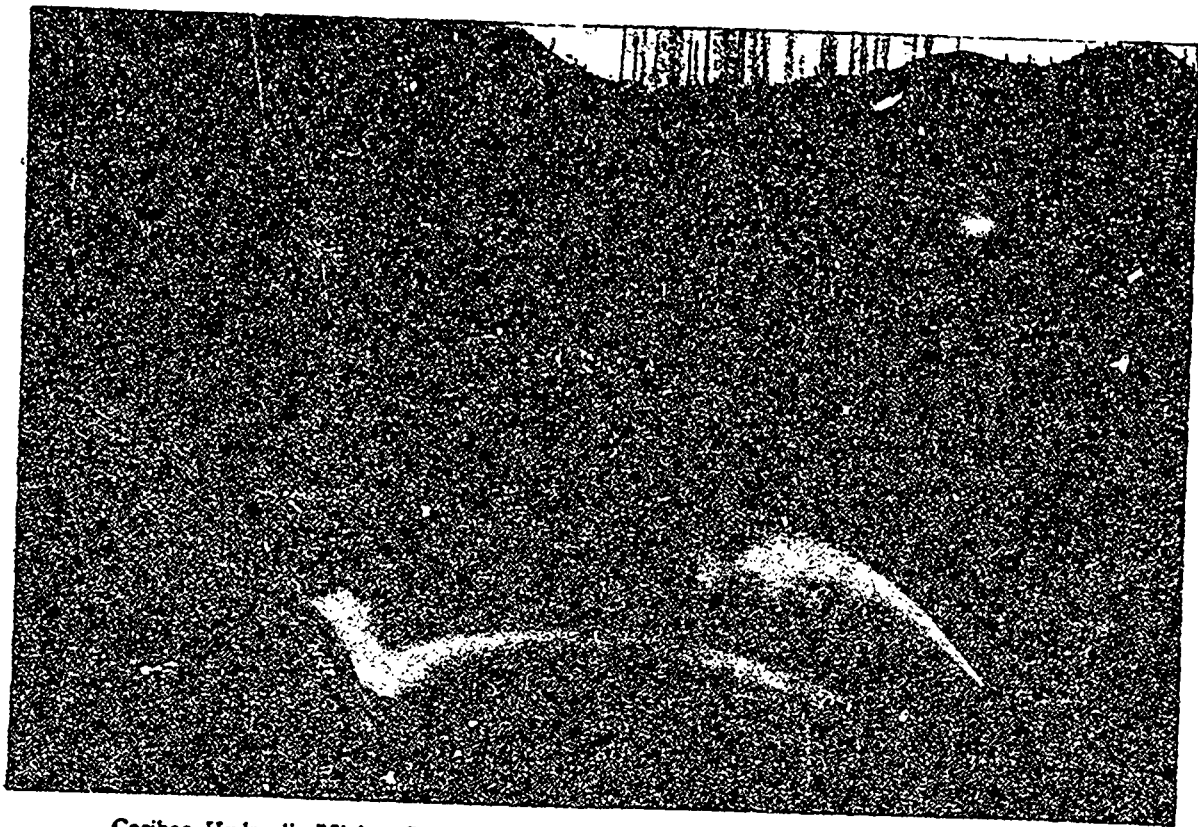


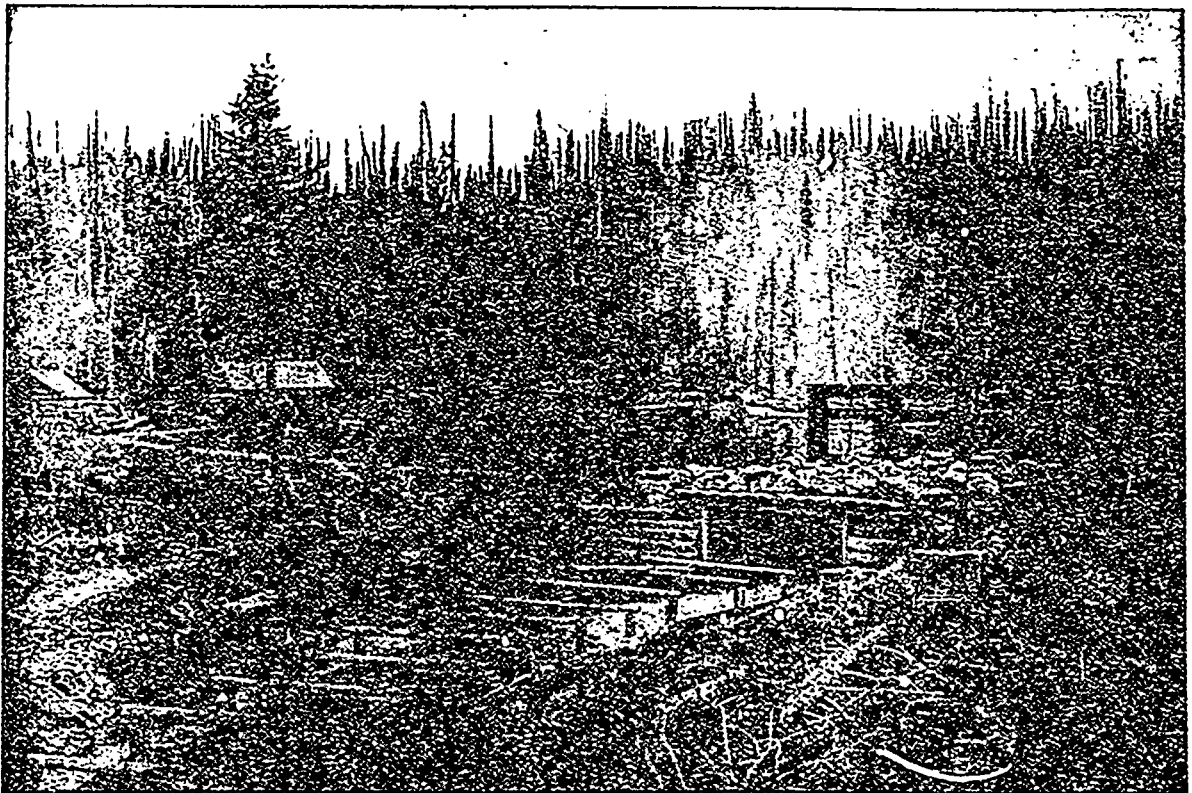
Exhibit of Gold Bricks from Horsefly and Cariboo Mines, B.C.



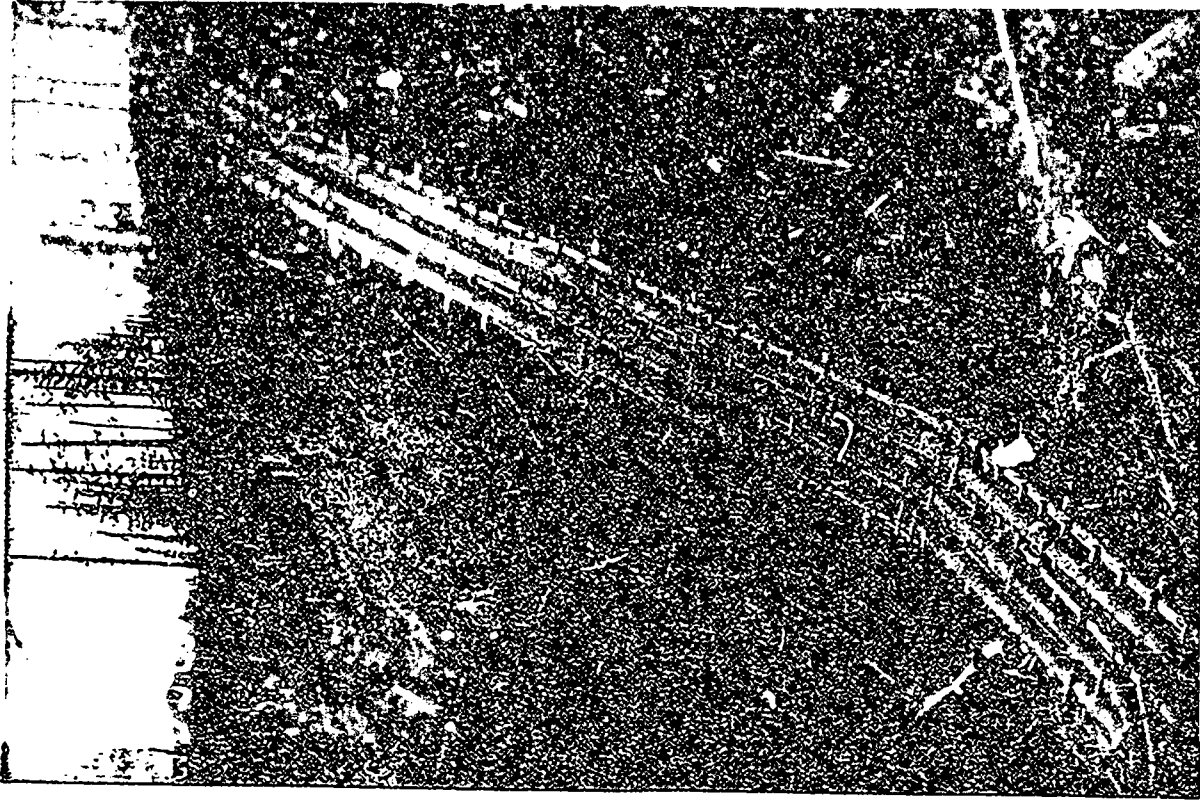
Cariboo Hydraulic Mining Co. Ltd.—General View of Pit No. 1, Cariboo District, B.C.



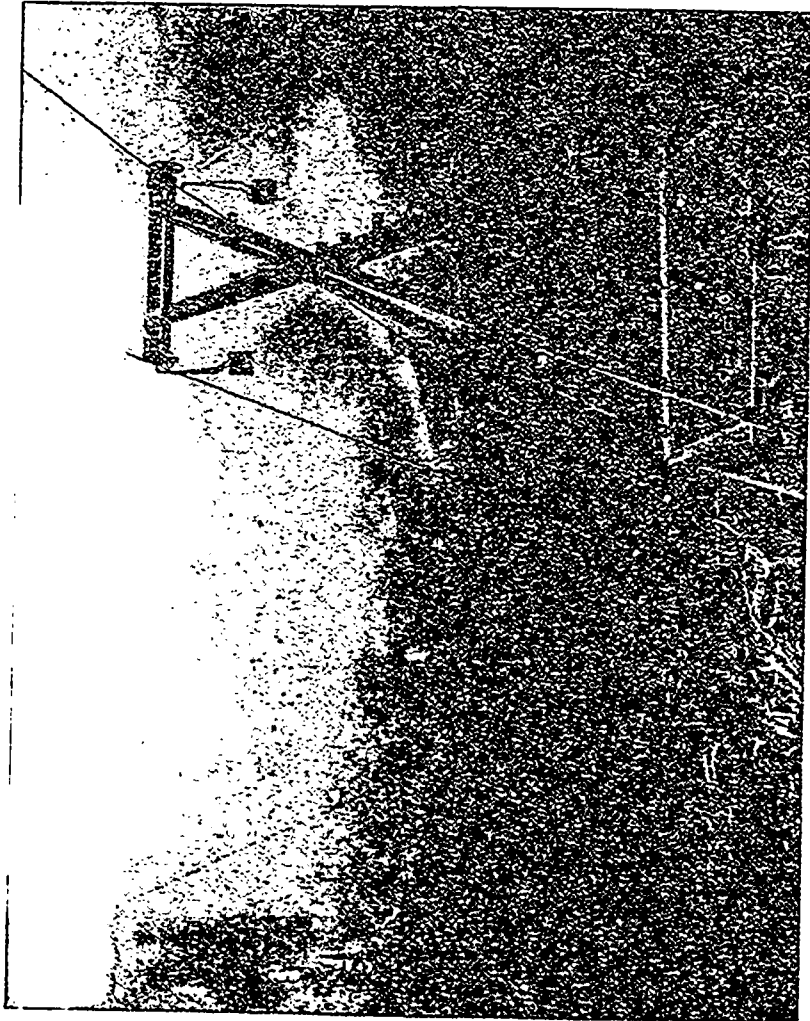
Cariboo Hydraulic Co. Ltd. -Pit No. 1.



Cariboo Hydraulic Co. Ltd. -Pooling Reservoir for Main Ditch—Old South Fork Reservoir Gates and Cabins.



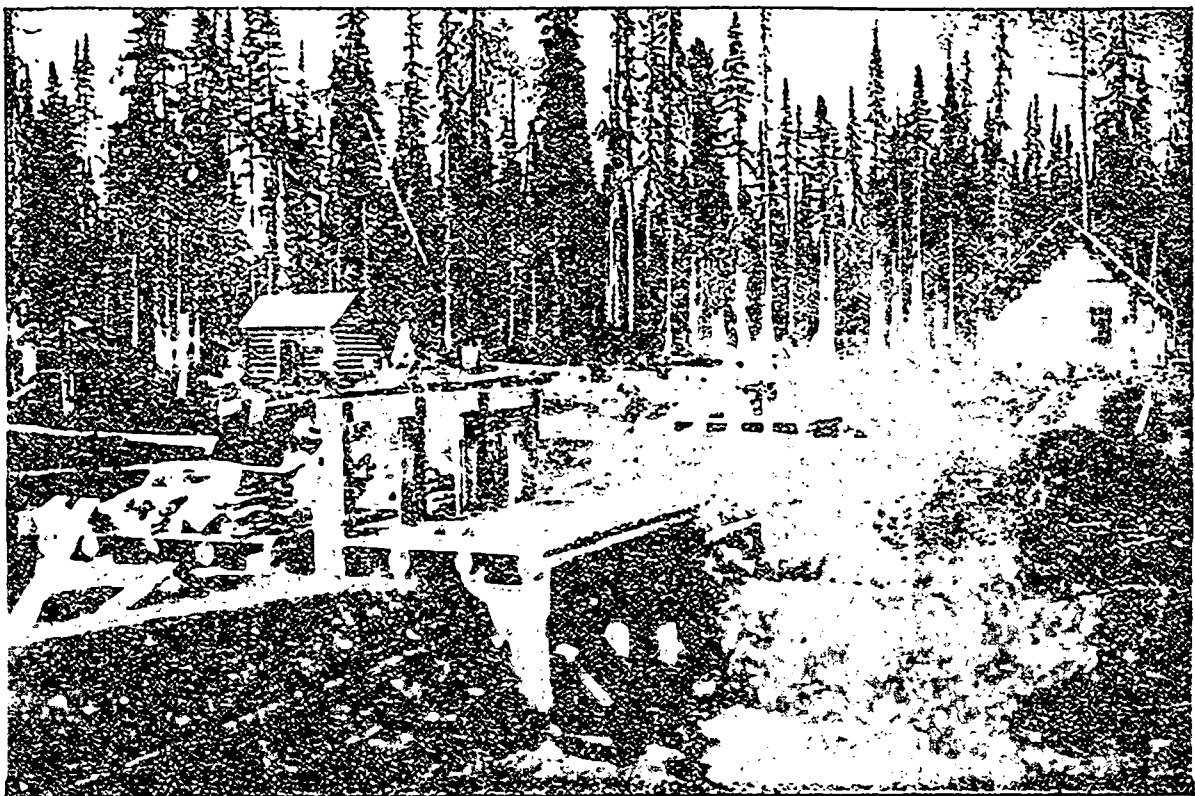
Cariboo Mining Co. Ltd.—Pipes Ad...
Cariboo, B.C.



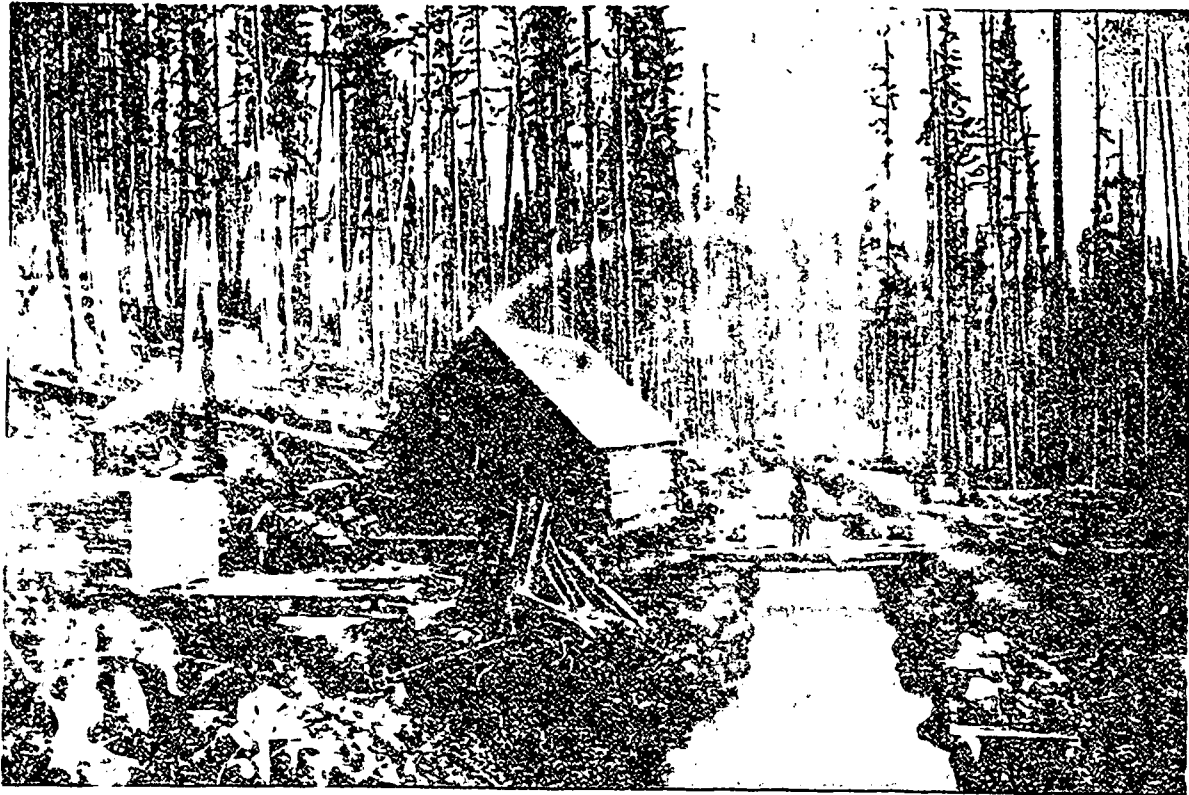
Hall Mines Ltd.—New, Hallidie Tramway at Nelson B.C.



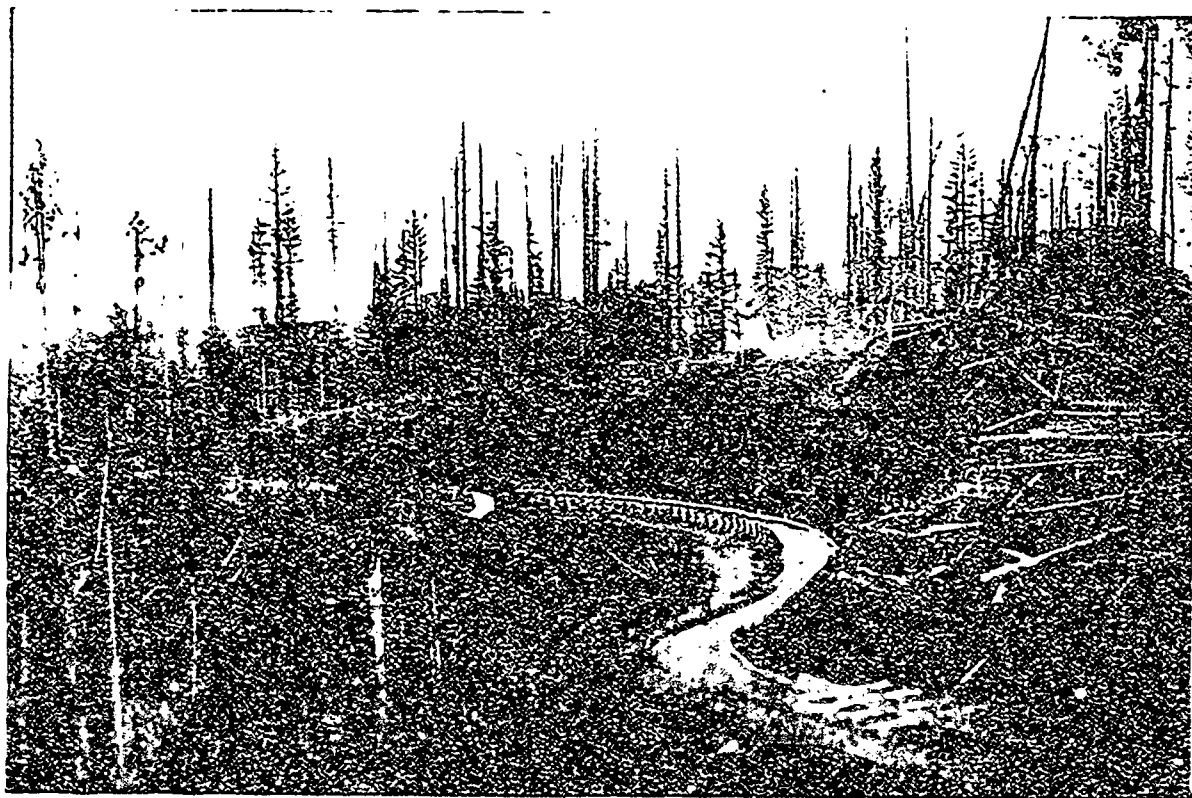
Cariboo Hydraulic Mining Co.—Flume at Stevens Gulch, Built in 1894.



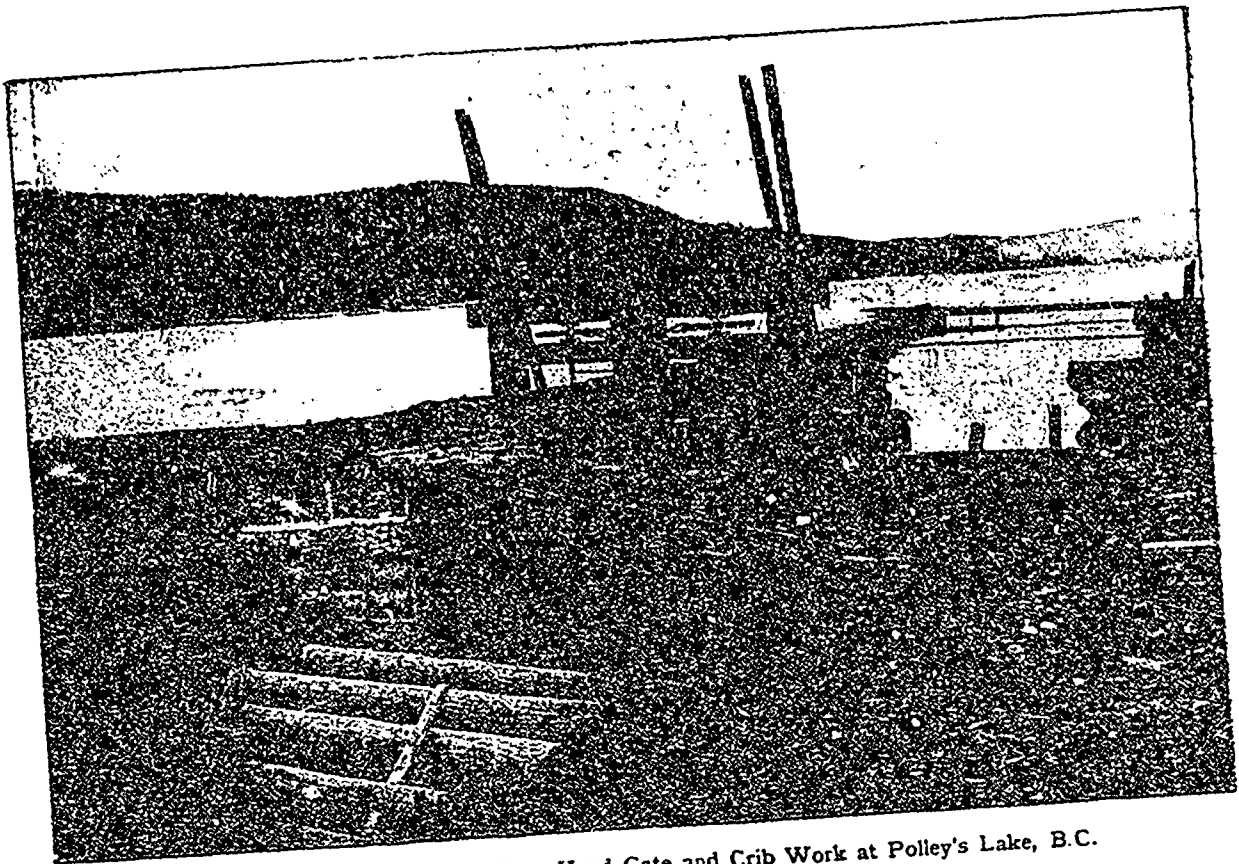
Cariboo Hydraulic Mining Co.—Head of Main Ditch with Division Dam in Six Mile Creek and Head Gate in Main Ditch.



Cariboo Hydraulic Mining Co. Ltd.—Camp No. 4, Hazeltine Creek, Head of Original Park Ditch, beginning of Extension, 1895, 9 miles from head.



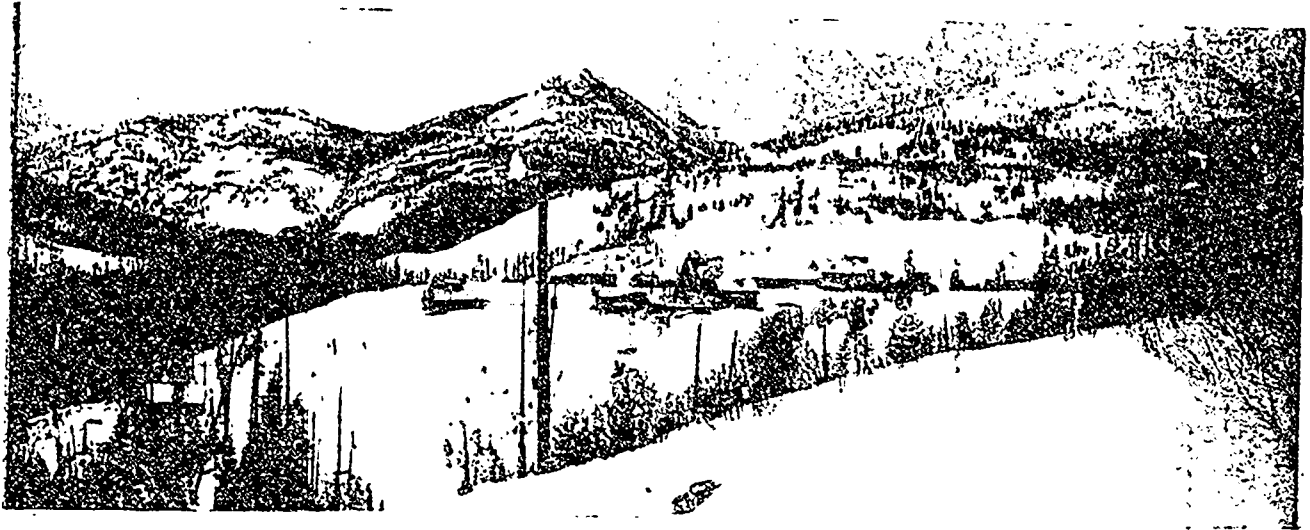
Cariboo Hydraulic Mining Co. Ltd.—Flume at Belloe Gulch, Built in 1895.



Cariboo Hydraulic Mining Co.—Head Gate and Crib Work at Polley's Lake, B.C.



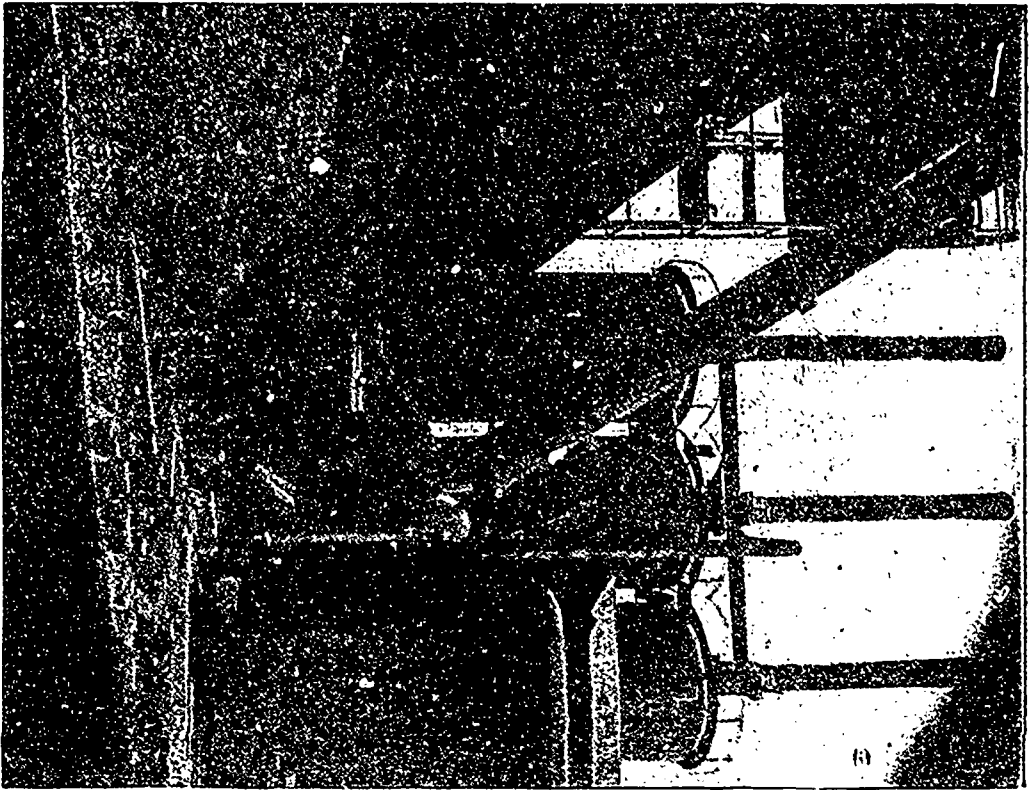
Cariboo Hydraulic Mining Co.—Flume below Hazeltine Creek, built 1895.



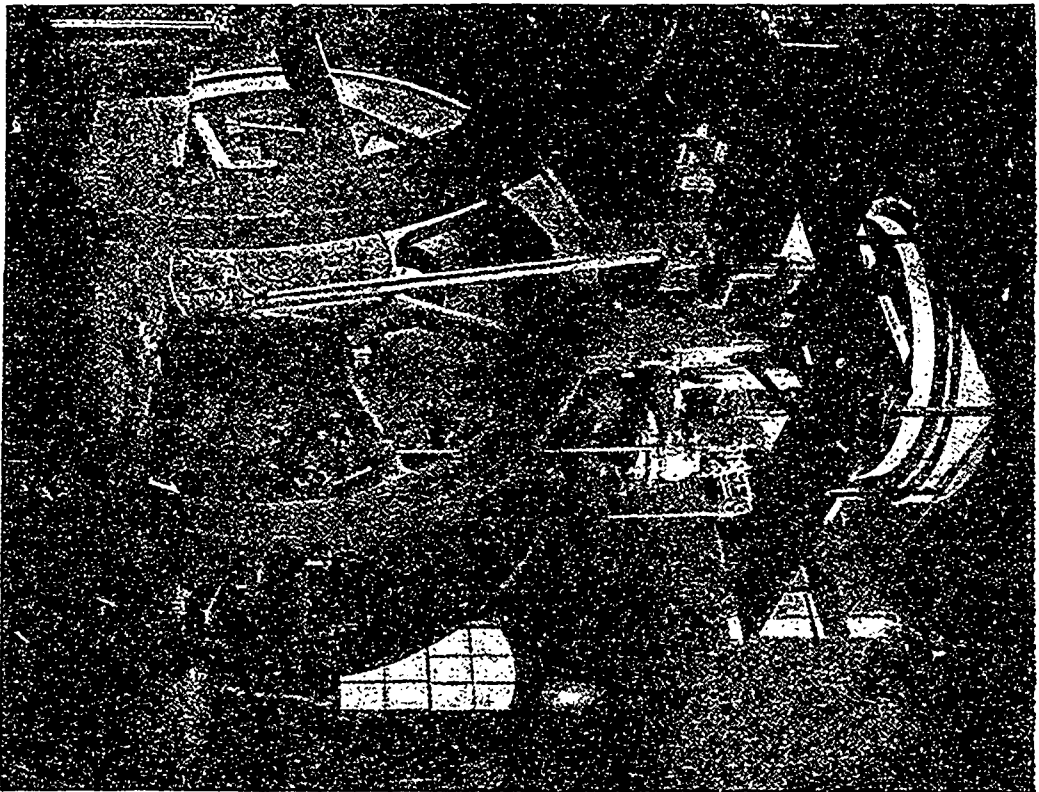
View of the Rossland Mining Camp, B.C., from a Photo taken in 1894.



Prospectors en route for Toad Mountain, B.C.

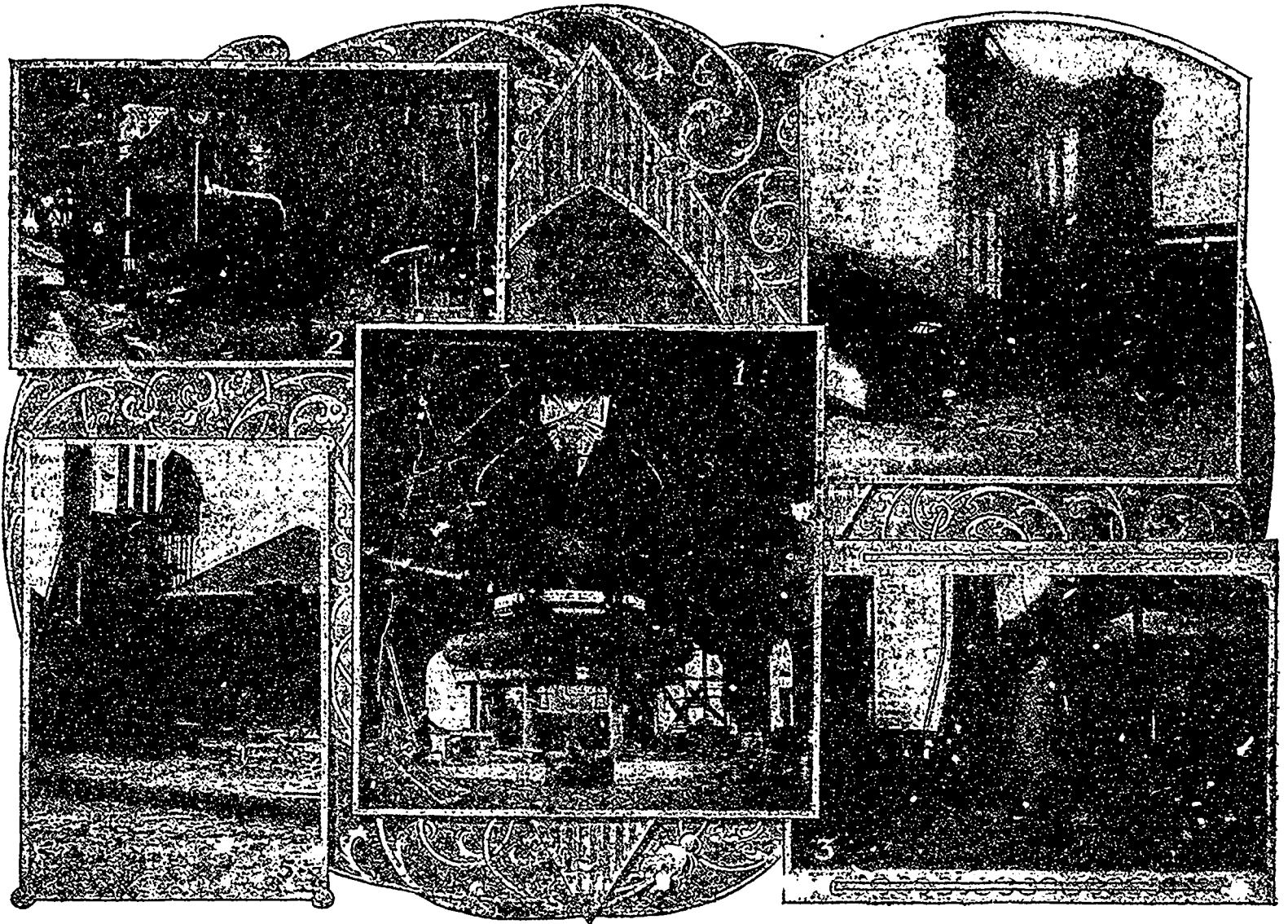


Hamilton Iron and Steel Co. Ltd., Hamilton, Ont.—View showing portion of
Cast House, Down-take, Dust-Catcher, General View of Stores,
Gas Main to Boilers and Cold Blast Main.



Hamilton Iron and Steel Co. Ltd., Hamilton, Ont.—One of the
Blowing Engines.

NEW WORKS OF THE HAMILTON IRON AND STEEL CO. Ltd.



2—Showing Gas Connections to bottom of Stoves and Hot Blast Main.

5—Rear end of Stack House and Stoves; shows Cold Blast connections on top of Stoves.

1—Interior of Cast House and Front of Furnace.

4—Cast House, Furnace, Stoves, Hoist Tower, Hoist Engine House, and portion of Stack House.

3—Base of Draft Stack with Sixty inch Waste Gas Mains from Boilers.



General Mining Association of the Province of Quebec.

PROCEEDINGS CONTINUED.

The following report of the discussions at the meetings of this Association last month was unavoidably held over until this issue:—

Gold Mining in Quebec.

(Discussion on Dr. Ells' paper.)

MR. J. E. HARDMAN—Dr. Ells' paper suggests many points for discussion, so very many in fact that I can only touch upon one or two points with which I am compelled to differ.

Dr. Ells makes some statements which I do not think would be made by a man who had specially studied the economic minerals of the County of Beauce.

In the first place Dr. Ells makes a comparison (which has been made elsewhere and somewhat frequently) between the gold-bearing rocks of Nova Scotia and those of Quebec, and states that the slates and quartzites underlying the alluvions in Quebec have been ascertained, "quite conclusively," to be "precisely similar" to the gold-bearing series in Nova Scotia.

Now, during a protracted residence in Beauce last summer, I was quite unable to see for myself, or to get authentic information from others, regarding these rocks underlying the *original* gold alluvions of Beauce County, and for the very good reason that no one was working original alluvions, but only the re-arranged *post-glacial* gravels derived from the old or *pre-glacial* river beds. However, as Dr. Ells is professionally a geologist and I am not, it is wisdom to give his assertions the benefit of the doubt, remarking only that speculation as to the origin of these gravels and their native *habitat* must remain speculation until the miner has wrought for several years in the original alluvions and has gathered a mass of *facts*, upon which some hypothesis may consistently be formed.

It is not sufficient to say that the Cambrian slates of Beauce carry quartz veins and the Cambrian of Nova Scotia carries *auriferous* quartz veins, and that therefore the quartz of Beauce must be auriferous. Whatever their age, similar or dissimilar, the Cambrian quartzites and slates of Nova Scotia have been subjected to such a metamorphism, such stress of heat and pressure as to make the widest divergence in genetic conditions very possible, if not probable. My experience in Beauce is limited to a comparatively small area, but in that experience I am compelled to say that I have seen no quartz veins which would be considered in Nova Scotia as probable producers of gold in economic quantity.

Of quartz veins, and frequently large ones, there is no lack in the 12 miles from St. François to above the forks of the Du Loup and even to above the High Falls of the Chaudière, but they are barren of gold so far as economic quantities are concerned and lack that vital constituent of all permanent productive gold veins, viz. metallic sulphurets.

I have seen in Quebec no gold quartz that would tempt a gold quartz miner to consider the vein worth opening, and I think the experiments and tests which have been made there during the last year or two by our worthy past president will bear me out. Very little gold that can be seen without a glass is found. I remember a French gentleman, to whom I had expressed similar views, coming in to see me one day and saying, "Mr. Hardman, I have at last found free gold in Quebec quartz." He gave me the specimen, but I failed to see the gold, when he said, giving me his magnifying glass, "You can see it easily with this glass." I replied, "If you've got to use a glass to see the gold I don't care for it." This specimen came from the recent find at Westbury, near Dudswell, to which Dr. Ells refers.

It is an absolute fact that as yet no one has discovered gold in quartz in anything like economic quantities in Quebec. I think the reason for this is largely owing to what Dr. Ells states that the whole of the country is covered with 100 to 250 ft. of glacial drift. The only exposures are on the south or southeasterly side of the streams where the present river-bed has been forced to that side and has washed the rocks clear. It was this enormous ice sheet that came down from the Northwest and filled up the hollows with 200 ft. or more of glacial drift by which the river was forced over to the south side. Take the Chaudière river for example. There are several bridges which cross it, and you will find uniformly that the abutments on the southeast side are on bed rock, but for the second pier you have to sink 15 ft. or more to get bed-rock, and the third pier is never on bed-rock but on clay, and the abutment on the north side is never on bed rock but always on clay. At St. George on the north side a well was sunk 77½ ft., or 59 ft. below the present river, and still was in glacial clay. From this it is evident that the country cannot be prospected easily or rapidly.

Dr. Ells makes mention of a vein at the Devil's rapids, known locally as the O'Farrell vein. I had heard of this vein years before I went to Beauce and it was one of the first things I went to see. We would not look at it in Nova Scotia. We would hardly think it was worth taking samples from. That there are productive gold veins in Quebec is very likely, else where did the gold come from? But if such veins are found at all they will be found in the deep excavations which may be made in mining for old river gravels, and if found may be rich enough to pay to work as quartz mines.

There is another fallacy, at least in my opinion. It is a fallacy that has found its way into all the books on Quebec gold mining, viz., that the gold has been derived from the quartz veins which cross the present streams, and that in these are found the largest nuggets.

Where a workable alluvial deposit has been found it has always been where the old river bed has been cut diagonally across by the present stream. The quartz veins cropping in the present streams have nothing whatever to do with the origin of the gold found in the gravels, and if more gold or richer gravels are found just below these veins, it is because the quartz, being harder, has withstood erosion better, and has therefore acted as a riddle to concentrate the gold as it was washed down the stream. These modern alluvions are merely rearrangements of the old pre-glacial beds at points where the present streams have touched the old deposits or cut through them.

That the ultimate source of the gold was in quartz veins and slate belts, I don't wish for a moment to controvert, only to dispel the idea that the source is immediately at hand in the veins shown above the river washings.

I have yet to find the miner or habitant who has authentic data regarding the finding of gold in the quartz veins *in situ*, uncovered by the washings which have so far been undertaken from the Des Plantes in the north to the Du Loup in the south.

Another thing that Dr. Ells says,—the bulk of the gold has been taken from down the river, between St. George and St. Joseph. The records show that about as much gold has been taken from the Gilbert river alone as from all the rest of the Chaudière country; and eliminating the Gilbert the richest and best deposits have been found above St. George on the Du Loup. Records show that a superficial acre contained \$17,000 in the Du Loup. The washings which have been made have shown that the upper gravels (*i. e.* above the Gilbert) are as good, if not better, than those farther down. As to the ultimate source of the gold as yet no one knows anything whatever, and Dr. Ells may say that it is derived from the veins in the Cambrian schist without contradiction, but also without satisfaction to those mining there. The Geological Survey, under the able direction of Dr. Dawson, who is taking up the economic side of geological investigations, sent up last summer Mr. Chalmers to make an economic survey and to determine, if possible, the origin and source of these gravels. It was impossible, however, for any man to form a generalization, in view of the extremely limited number of facts available. Mr. Chalmers was entirely of the same opinion that before any theories can be advanced as to their origin, these old river gravels must be carefully and scientifically worked, and a body of data accumulated.

The ordinary miner in past years, with wing dams and crevicing, has been only fossicking and digging gopher holes and has added nothing to our store of facts and has done no good to the country. It is hard to say this of such a promising country, but every one of you who visits the district must say the same,—that there has been nothing but "fossicking."

THE CHAIRMAN—This is a most interesting question. We hear so much of the great wealth of some of these mines. I would like to call the attention of the students that this rich gold is to be found at the junction of the Du Loup and Chaudière rivers.

MR. HARDMAN—In looking up this matter it will be found that from the best records available the production of the whole of Quebec has been about two millions of dollars, washed out of the Beauce country since the finding of the first nugget in 1844. About one half of that, nearly one million dollars, was taken from the old river bed of the Gilbert.

(See also Mr. Fitzpatrick's remarks on Quebec Mining Law.)

The Quebec Mining Law.

(Discussion on Dr. Raymond's Paper.)

THE CHAIRMAN—It is a great privilege to have our laws commented on by so great an authority as Dr. Raymond. We would like to have some remarks on the subject.

MR. J. E. HARDMAN—I heartily agree with Dr. Raymond in commendation of the general features of the Act and in almost all he has said with this exception, that I fail to see the benefit of the preferential right. I think it is rather a hardship to the miner than otherwise. Not one of the men who have the ground surface, that is the farmers, want to take up the land at the Government price of \$10 per acre, but knowing its value they keep holding up their preferential right as a kind of bait before the miner or investor, and, naturally, when they have got three or four men pitted against one another in competition, they usually get more than it is worth. The farmer has no intention of working it himself, but he looks to get three or four speculators after it, and I think it is rather a hardship than otherwise upon the man who first discovered the property to be of value. In practice the working of the Act is like this:—If I desire to make application for a concession I am obliged to go to the farmer who owns the surface right in order to buy the preferential right to the mineral. I wish to know how much he wants for it. He says "What have you found?" Supposing the farmer and myself strike a bargain; I have then to bring evidence to the Commissioner of Crown Lands that I have *bona fide* paid for the preferential rights. Even then I do not get them. I have got to bring the grantee (or the grant if I cannot bring the grantee), with a certificate duly sworn that I have paid for every preferential right. Then the Government does not give me the mining right, but upon the back of this first grant they endorse a certificate to the effect that the within named grantee has this day bought the mining rights, &c., &c. Then I have to go to a notary and have the mining right transferred to me, as if it were a piece of real estate. This is one of the conditions that is justly open to criticism. There are a good many of these points that come up in practice, and it was some of my difficulties, of which I spoke to the secretary of this association, which evoked Dr. Raymond's paper.

With regard to the royalties I heartily endorse every word Dr. Raymond has said. The safety of the mining industries in the Province of Quebec depends upon the feeling of the Commissioner towards these industries. It is fortunate that we have at present such a man as the Hon. E. J. Flynn as Commissioner, a man who has the mining interests of Quebec at heart, and who appears to want to do everything in his power to further those interests; but Mr. Flynn is a creature of circumstances, political circumstances, and the man who succeeds him may not have any of his statesmanlike qualities and may not appreciate the importance of these mining industries. He may look for means to replenish the provincial treasury and decide to enforce this royalty clause. What then are you going to do? Repeat the experiences of 1892 and 1893? If this law is not going to be enforced and is not meant to be enforced, let it be repealed. If this is the sense of the legislators of Quebec why should it remain on the statute book? Political gentlemen are only creatures of circumstances; Ottawa shows that today. In regard to the dimensions of the concession there are three classes, 52, 26 and 13 chains, containing 400, 200 and 100 acres respectively, and the price to be paid (within 12 miles of a railway station) is \$10.00 per acre. Now take the case of an old river bed—so far as the paying portion of these old river beds is concerned, they certainly do not exceed in width 300 ft. Supposing therefore I want a strip through a farmer's location of 300 ft.; we will say he has got the widest width, 52 chains, 3,200 ft., under the law; I am obliged to pay \$4,000 for 400 acres, when only 24 acres are of any value to me. If all the veins which occur in Quebec should run parallel with the side lines, the clause would not matter, but in reality, according to the map I have, the side lines run in all directions. In any extended beds of precious metal of any sort, alluvial strata, old river beds, or quartz veins, how are you going to get what you want and absolutely require unless you buy probably ten times as much of what you do not want? If any suggestion is in order, I think that the law should be so amended that if a man desires to take up only a portion of a concession he should be permitted to pay for that portion only and not be compelled to pay for mining rights on the whole lot or concession.

MR. PAINT—Is Mr. Hardman acquainted with the Nova Scotia laws?

MR. HARDMAN—The Nova Scotia laws are very different in regard to location.

In the first place there is no preferential right; the owner of the surface has no right whatever to what lies below that surface. The locations are 150 and 250 ft. and are called areas, but if my location is beneath private lands I am obliged to enter into a bond with the Provincial Government not to trespass upon that private land until I have come to terms for damages with the owner.

In reply to a question as to the cost:—

MR. HARDMAN—\$2.00 for each area, with an annual rental of 50 cts.; not more than 100 areas in any one name. The royalty is 2 per cent. on gold. It is perfectly absurd to levy a royalty on *net values*; how are you going to assess and collect it? For instance, I have a mine on one side of a river and my friend has a mine on the other side; he may be honest and say his cost is only four dollars per ton; I am dishonest and say my cost is twelve dollars per ton; how are you going to prove I am wrong? It is a matter of bookkeeping only. The royalty on *net values* is simply a question whether a man is a liar or an honest man. A small committee might be empowered to think over this matter and bring it to the notice of the Government and I think this Association might fairly co-operate with the Government. The Government would be all the better informed, and such a committee could make some recommendations in regard to these infrequent but none the less important matters.

MR. DRUMMOND—Why not empower the same committee to see to this, adding Mr. Hardman's name?

MR. BELL moved that the committee be empowered to act on the lines of this discussion.—Carried.

HON. MR. FITZPATRICK—(Applause)—I am afraid this is largely a case of false pretences. A minute or two before the dinner hour I was asked to come here to hear something about the Beauce country, about which I have lost some of my illusions. I may say, referring to the question of the mining law, that I know very little about it so far as contained in the statute of 1892. I suppose, at that time, I was a member of the legislature, but there are some things even legislators do not know all about. I think I may say that a modification or amendment seems to me extremely reasonable. I may not have the ear of the Commissioner of Crown Lands, as I do not sit on the same side of the House, but I am sure he is a person who is glad to hear suggestions so far as his department is concerned. If you would suggest any amendment I am quite certain it would be cheerfully received by him and promptly acted upon. I think you will find the legislature always open to receive advice from practical men, and we have in the house the member for Megantic who can give us practical information on matters of this nature. I must confess to you that this discussion has been a complete revelation to me and shows me how important it is to have men talk about things who understand them. There was a paper read upon the Mining Law which was admirable and showed how matters of this nature, in the hands of competent men, may become interesting, and I am sure that if that paper were submitted to the Commissioner he would make practical amendments, and would be able to amend the law so as to meet the difficulties you have pointed out. The real point is the permanency of title. If there is one thing we pride ourselves upon in this Province it is that if any man gets anything from our Government he gets a permanency. Having said this much, I can assure you that as far as I may speak for the Opposition, we will co-operate with the Government in the direction of bringing in amendments. In the profession I belong to we thrive on the miners and we fatten on them. I may say that if we do not develop the mines, there is none of the metals we require so much in our profession as gold; in fact it is a metal we all require. Beauce is a tender subject with me. I have got a client who has put in \$150,000 to \$160,000 in that country. I am sorry I did not know you were in Beauce [to Mr. Hardman], I certainly should not have been very far away from you. I would like a little explanation of some things. On a portion of the Gilbert river, lot 13, within an area of not more than a quarter of an acre, it is proved beyond all doubt that St. Onge Bros. took out at an average depth of 80 ft. something like \$40,000. I would like to know where that gold came from? At the Devil's rapids also considerable gold was taken. The Chaudière river was very low at that time. I was looking after some property and I myself saw a miner pick up a piece of gold which I brought home and got \$43 for. I have seen in the records of the Court of Quebec, in a trial going on, the evidence of a man named Poulin, who swore he took \$18,000 out of the Devil's rapids quartz vein. If there is nothing in the country where did all that gold come from? Perhaps it is unfair, however, to get a professional opinion from Mr. Hardman without the usual fee. I will conclude my remarks. I am very much obliged to you, and if I can do anything on my part in any degree, as the owner of a seat in the house, I shall be delighted to do on behalf of your Association. (Loud applause.)

MR. HARDMAN—I think I can answer one portion of Mr. Fitzpatrick's remarks, non-professionally of course. I deprecate the idea that anyone should think I have said, for I did not mean to say, that there was "no gold in Beauce," for I hope to take a good deal out of Beauce myself. With regard to the Devil's Rapids, you say that \$18,000 had been taken out of that vein. I have nothing to say about the affidavit, but I never heard of a sufficient quantity of quartz being taken out of that vein to yield any such sum. I have seen the excavation made, and if \$18,000 was taken out of that vein it must have been the richest I have ever seen, and I have seen 80 oz. quartz. Is it not possible that that \$18,000 came out of crevices just below the quartz vein and was really alluvial gold? Devil's Rapids is in Rigaud Vaudreuil, which is the only place where the mining rights belong to the seigneur and the Crown has nothing to do with them. As to the matter of picking up a \$54 gold nugget, I saw a nugget which I was credibly informed was worth \$200, which is still larger. These are the nuggets which I believe are to be found in the old river beds, because these old pre-glacial crevices having been cut, have acted like riffles in sluices and have caught the gold which has been released from its primal deposit, viz. the quartz.

MR. LOCKWOOD—Take for instance the Gilbert districts, the gold is distinctly different in kind. In many cases it has been found below the veins, crossing the old river beds. It has been found in natural quartz in various sizes and of identically the same character as the vein itself. Some of these specimens are in the Geological Museum in Ottawa. I have myself been in Beauce for many years and worked on the Gilbert. I believe that a large portion of the gold comes from the veins crossing the district. On the north branch the gold is different in character from that on the south branch. It is also different from the Gilbert river old bed.

MR. HARDMAN—I visited the old McArthur claim at the Gilbert, and was willing to pay a very high price for a piece of quartz from one of these veins crossing the Gilbert river, which should carry gold. I was told by a Mr. Brown, who had been there 10 or 12 years, that he had never seen any. As to the different values of gold, it is a very important question and should be investigated. In the early days of the Black Hills it was supposed that the gold found in the river beds was simply owing to the disintegration of the veins in the slates.

MR. DEVEREUX in a paper communicated to the Am. Inst. M. E.* ascertained that the gold in the cement and in the vein was of different degrees of fineness. The theory of Mr. Devereux was that the gold in the veins had been dissolved and re-precipitated in the cement and was therefore not the same gold. As to the gold in the old river bed being of different value to that in the vein, I will admit that it is a very important factor to be determined in assuming that there is gold in the present quartz

veins, but until this is established I should like to be permitted to hold to my own opinion.

THE CHAIRMAN—It seems a good time to remedy matters when things are quiet and before there is any excitement or discussion that would arouse opposition. I presume the legislature will not meet until next fall, which will give time to look into the matter.

The Trail Creek Mining District B. C.

(Discussion on Mr. J. D. Sword's paper.)

THE CHAIRMAN—We are very much indebted to Mr. Sword for his interesting and valuable account of the Trail Creek district, which is going to do so much for Canada in its reputation abroad, and will show the English, as well as other nations, that money is made at Trail Creek, and it will help the Province of Quebec in a way as giving a reputation to Canada. This district has often been condemned by experts, for though there were large bodies of ore there they were considered so refractory that nobody could be induced to look at investment. You will not meet an old timer who has not had the chance of owning these now productive mines. Capt. Stubbs told me he refused to take a half interest in the War Eagle for \$500. The War Eagle was bonded formerly to people who spent \$60,000. They shipped out the ore and did a great deal of work but the returns were so low that they decided to abandon it. Mr. Clarke then bonded it and found the ore body some distance away, showing how purely accidental a good many of these things are. I went through the district with a mining expert from the States and was only there a few hours. He told me he thought there would be a good deal of disappointment to many people who expected the whole country to be a mass of pay ore. No doubt there were pay streaks of immense value there but the veins were irregular, pockety and bunched; it was a mistake to suppose the whole country was solid gold.

MR. SUSSMAN—After Mr. Sword's most entertaining and very exhaustive description of this district, I do not feel that I can add very much.

Some interesting facts might perhaps be mentioned in connection with the distribution of the gold in the ores.

Among the very large number of veins and bodies of pyrrhotite ore in this district, so far only a few have been found carrying gold in paying quantities. Even in these the gold is not found uniformly distributed through the ore, but is found concentrated in the so called pay chutes. These pay chutes are not characterized by any change in the appearance or mineral composition of the ore. Their existence and bounds can only be determined by making numerous assays.

Pay chutes have been found by sinking or drifting in bodies of ore which were quite barren at the point of discovery. While these bodies of pay ore may vary in form, they generally take the shape of chimneys of ore of limited extent when measured along the strike of the vein, but continuing downward to a considerable and so far unknown depth.

These chimneys often make quite an angle with the lines of greatest dip so that shafts sunk on the dip of the vein often pass through the pay ore into barren sulphide before the miners are aware of the fact. The chute is generally found again by drifting in the vein. The geological conditions which determine the concentration of the gold in these portions of the veins, are not at all understood. The distribution of the gold in the pay or shipping ore, is quite as peculiar and is very similar to its distribution in a free milling quartz.

In a pile of smelting ore there is no marked difference in appearance between pieces of ore that carry only a trace and those that are quite rich in gold. It is, therefore, impossible to increase the grade of an ore by any system of sorting. Notwithstanding the great irregularity in specimen assays, there is a remarkable uniformity in the values per ton of the various shipments from the same pay chute.

This uniformity is more marked in the War Eagle than in the Le Roi mine.

It is reported that the pyritic process for smelting will be revived in this district. I say revived, because I know of no place where true pyritic smelting, that is smelting with a hot blast and without admixture of solid carbonaceous fuel with the ore, is at present carried on. True pyritic smelting has been attempted in different places in the United States with varying success, but has either been entirely abandoned or has been replaced by some modified form of the process.

There is no question about the value of this process as an emergency method where the grade of the ore is low and cost of coke and transportation excessive.

The uncertainty about the amount of the losses of the precious metal due to a greater volatilization has prevented its general adoption where conditions are more favorable. I have no doubt, judging from my own observation, that where higher grade ores and mattes have been smelted by this process, the losses in gold and silver have been excessive.

The question has been asked whether this ore, carrying as it does a much smaller percentage of sulphur than pyrite, is adapted to this process. It has been found in practice that the volatile atom of sulphur yields very little effective heat in the blast furnace; much of the sulphur is distilled before it has a chance to oxidize and clog the charge. I have assisted at the smelting of raw—that is, unroasted—mattes, where a low charge and cold blast were used. It was found possible to reduce the coke on the charge to below 5 per cent. and at the same time make a good concentration.

These pyrrhotites would act much like matte in the furnace. In the smelting referred to, the mattes were fairly rich in silver and gold, and the losses were not inconsiderable.

The modified pyritic process may perhaps be used to advantage in smelting the low grade ores of this district, as it obviates the necessity of a large investment in roasting machinery.

While it is too early to make any predictions concerning the probable future extent of the Trail camp, I have no doubt as to its permanency.

Another interesting fact in connection with this district is its resemblance in many ways to the Sudbury mining district in Ontario.

The two districts have something in common even in their topographical features. Trail, it is true, is laid out on a more massive scale. The hills are higher, but they have the same rounded summits and comparatively gentle slopes. The ore is carried in both districts in a diorite more or less mineralized throughout and with the mineral concentrated both in isolated masses and in so-called veins. These veins in Sudbury consist of a succession of lenticular bodies along a fault contact, while at Trail they are more regular and continuous and bear a great resemblance to true fissure veins though no marked banded structure can be observed. The ores are similar in appearance and with some exceptions are made up of the same associated minerals. I have specimens of pyrrhotite from both districts in which angular fragments of hornblende and crystals of calcite are enclosed by the sulphides, and which cannot be told apart. The observing layman would conclude that the formations in the two districts belonged to the same geological age, and that the ore bodies in each had a similar origin, though the preliminary work of the Geological Survey casts considerable doubt on these assumptions.

*Trans. Am. Inst. Min. Eng., Vol. X, p. 247.

Water Tube Boilers.

(Discussion on Mr. W. T. Bonner's Paper.)

THE CHAIRMAN—We have all listened with much pleasure to Mr. Bonner's paper, as anything that has to do with the raising of steam, has, of course, to do with mining men and machinery men. The paper has suggested a good many points for discussion, and I trust that we may hear from quite a number of the gentlemen present.

MR. FERGIE—Mr. Bonner's paper has interested me very much. I had a conversation with him last night on the subject of the comparative merits of the Babcock & Wilcox, and the Stirling boilers. We are using a battery of Stirling boilers at our mines, while our neighbors have Babcock boilers, so we have a great opportunity of comparing them. The only objection I have to the water-tube boiler is the small steam capacity, and I claim the Lancashire boiler has an advantage in that respect. Two weeks ago something went wrong with the feed valves on the Stirling boilers. If they had been Lancashire boilers we could have run for three hours afterwards. As it was, we immediately shut off the water supply, compelling us also to close down the mines and withdraw the men. Another objection I find is that water tube boilers are more liable to prime. Mr. Bonner informs me that they should not. We cannot get as dry steam with the water-tube boilers as with the Lancashire boiler. Otherwise, I am satisfied that it is a cheaper boiler in every respect, and with regard to the consumption of fuel, more economical.

MR. LECKIE—The raising of steam is a most important matter; still a good many of us find "raising the wind" to start with, of equal importance. I may say in a general way that a boiler that would suit for one purpose, under certain conditions, might not in another. For instance water-tube boilers are being placed on the new fast torpedo boats as being best adapted for that purpose. They are of the Yarrow and Belleville types, very similar to your (Babcock & Wilcox) marine boilers. I suppose, with some modifications. Marine boilers are under the care of experienced engineers and firemen, whereas miners have to look to possibilities that render necessary a plant of less refinement, one that will work under different conditions, such as Mr. Fergie mentions, where we have very dirty water, and where we want boilers that are not liable to get out of repair. Sometimes it may be we are 50 miles from a repair shop, and a boiler less liable to get out of repair, even though it wastes a little more fuel, would be preferable. It is the same with steam engines. I have found Buckeye engines in places where there is a great deal of dust, and especially in smelting works, or where they use bituminous coal, soon get out of repair, and their efficiency ceases. After all, the most efficient boiler for a miner, is one that will work with dirty water when necessary, and require very little repair. I have had at Londonderry three Lancashire boilers made by Galloway, in Manchester, which have been running over 18 years, and yet have not cost a dollar for repairs. We can work up to 80 lbs. pressure with them, but for very high pressure they would be unsuitable. Where you would run up to 250 or 280 lbs., as they do in the new torpedo catchers, they would be altogether unsuitable.

MR. HARDMAN—I can only say from the standpoint of the working miner that what he wants is a machine that is strong and capable of being used by the ordinary stoker and fireman.

In many localities fuel is a very important consideration. I have found not only with the Babcock & Wilcox, but with the Stirling and other styles of water-tube boilers, that the heating surfaces were difficult to keep clean if you did not use hard coal. I say this not from personal experience, but from observation of the experience of other people.

I have frequently found that fully one-half the efficiency of the heating surface was destroyed by having a coating of soot averaging from $\frac{1}{8}$ to $\frac{1}{4}$ inch thick, and this soot is a non-conductor of heat rather than a conductor.

MR. GARDNER—I favor and always have favored the water-tube boiler on the point of efficiency. Where boilers are required in isolated places, or where it is hard to get a man to make repairs, it may make a difference. There is a great deal in that.

MR. BONNER—I can readily concede the force of Mr. Leckie's argument that water-tube boilers may not be best for all purposes, but the exception must be some place where neither efficiency, safety, durability or economy have any consideration. Do not understand me, however, to claim that we have the only good boiler. There are many other good boilers besides the Babcock & Wilcox, but when you want the best, examine our record,—you will find the evidence all on our side.

I cannot concede that a shell boiler, whether it be an old-fashioned "Egg Ender," a horizontal tubular, or a Lancashire boiler, is any better in the hands of the working miner than a water-tube boiler, either in point of safety or maintenance of efficiency.

"Raising the wind," as Mr. Leckie expresses it, is indeed an important consideration in the purchase of a boiler, and I am satisfied that is why the cheap shell boilers continue in favor. The first cost of a good water tube boiler is considerably more than a shell boiler of equal rated capacity, and for that reason the prospecting miner, or the beginner of any small or uncertain manufacturing plant with a limited capital, very wisely crawls before he leaps. For permanent works, however, employing steam in any considerable quantity, whether they be operated by skilled or unskilled labor, there is no longer a single argument to be advanced in favor of shell boilers, which cannot be met by half a dozen in favor of water tube boilers. The three Lancashire boilers mentioned by Mr. Leckie have certainly given very satisfactory service, but he also admits they are unsuitable for pressure above 80 lbs. The history of the Babcock & Wilcox boilers, crude as they were in their infancy, will compare very favorably with the Lancashire boilers in point of durability, and when we consider the many instances of criminal carelessness on the part of attendants who do not hesitate to pump cold water into red hot boilers, the wonder is that the repair account can still be expressed in fractions.

In my conversation with Mr. Fergie last evening I took the ground that with a water tube boiler properly proportioned for the work it is intended to perform and with a proper arrangement of the steam piping, there need not be any trouble on account of priming. I speak now of the Babcock and Wilcox boiler only, for in it the circulation is absolutely free and unrestricted, and the disengaging surface and steam space are both amply large, so that there is nothing to hinder a complete separation of the steam from the water.

It may be an advantage sometimes to have boilers with sufficient storage capacity to run for a long time after the water supply has been shut off, but while such accidents seldom occur, the loss of efficiency, due to carrying such a large volume of water, is a constant factor. Large bodies move slowly, and large volumes of water steam slowly. The Babcock & Wilcox boilers will run for an hour and a half at their full rated capacity without exhausting the water in the upper drums—time enough, certainly, to make any ordinary repairs in a well regulated plant.

Mr. Hardman has very innocently ventured on the battle ground of vertical vs. horizontal water tubes. Since he has pronounced us both guilty, I would say—and here again I speak for the Babcock & Wilcox boilers only—they are more accessible for cleaning than any form of shell boiler. With side cleaning doors opening into every part of the boiler, it is possible to remove every particle of soot from the exterior heating surfaces while the boiler is in full operation. It is also possible to examine

every joint and surface about the boiler as minutely as would be possible were the boiler taken entirely apart in the shop, and all without disturbing a single permanent joint.

If the soot from bituminous coal so seriously affects the water tube boilers, why should it not be more detrimental to the fire tube and shell boilers?

In the water tube boiler, the principal heating surfaces are of very thin metal, so that instead of 5-16-in. to 9-16-in. plate to start with, you have only 1-8-in., therefore the total thickness of metal and soot must also be less. It requires a pretty large book to tell all the good features of the water tube boiler, but I am pleased to say such a book has been published, and will be sent to anyone free upon application.

MR. SWORD—What I consider the main point, has been somewhat overlooked in this discussion. It is not a question which boiler is the best, as if one boiler could be better than another under all circumstances. It is really a question of what kind of boiler is most suitable for particular requirements. I think all the boilers mentioned have their proper place. In Mr. Bonner's clever and instructive paper he does not touch on this, neither does Mr. Fergie state the advantage of a Lancashire over a water tube boiler. I think that where the water is bad, requiring frequent cleaning of the interior surfaces, also where fuel is cheap, and the cost of boiler a considerable factor, that a shell boiler is hard to beat.

Regarding water tube boilers, I do not think Mr. Bonner has laid sufficient stress on the almost absolute safety of this type of boiler, as the greatest damage that could result in the event of a rupture of the boiler would be to injure the attendants by scalding, whereas in the case of explosion of a shell boiler the usual result is the complete destruction of the building and great loss of life. The only part of the Babcock boiler liable to deterioration is the tubes, and in the event of their giving away from over-pressure, they act like a safety valve or a fusible plug, and the damage can be easily and cheaply repaired. I never heard of a drum wearing out or bursting. As the tubes form the principal part of the heating surface of a water tube boiler, the drums can be built of extra thick plate without lowering the heating capacity as would be true in the case of a cylindrical boiler in which the shell forms a large part of the heating surface. I think therefore, where fuel is expensive, where pressure can be used and absolute safety from explosion is of great importance, that a Babcock & Wilcox boiler is preferable to any other.

MR. LECKIE—I was not arguing against the Babcock & Wilcox boiler. These are points to be kept in view. The water tube may be better than even the Lancashire with good fuel and water, but there is a good deal in the nature of the fuel that is used. For instance you take a boiler of the Babcock & Wilcox type where your heat has to be localised more, anthracite coal is best, but where you use bituminous coal, or wood giving a long flame and diffusive heat, the Lancashire is the most economical. The conditions of use have to be considered. As for safety, the water tube boiler certainly ranks highest. Not many months ago at Fairfield, where they were examining boilers intended for the new torpedo catchers, there was a very serious explosion in which there were four men killed. The boilers were not in the vessel. They were merely making an experiment upon them. I think they were Babcock & Wilcox boilers if I remember right.

MR. BONNER—I happened to see a report of that explosion as it was given out by the Board of Trade, and I must say that the English Government have a very complete system for investigating and reporting every accident of that kind. It seems they were making a preliminary shop test of the boilers before installing them aboard the ship. In order to save time I presume the tubes were not all put in, which required certain tube holes to be plugged up temporarily. This was done by expanding into the tube holes some short nipples with the outer end plugged, naturally a very imprudent method. As there was nothing at the outer end to counteract the pressure on the inside of the tubes, the result was, several of the nipples blew out, resulting, as Mr. Leckie says, in the death of four men. I haven't the details before me, but I remember the official inspectors appointed to investigate the accident reported that no blame should rest with the manufacturers of the boilers, as the accident was due solely to carelessness on the part of the men in charge of the test.

I am glad that Mr. Sword has spoken out regarding the matter of safety, although I purposely avoided extended reference to the subject in my paper, assuming that you already understood our claims in that particular.

I presume everyone present will recall the horrible disaster at Detroit last November, caused by the explosion of a horizontal tubular boiler where 37 people were killed, 7 or 8 wounded, and over \$100,000 worth of property destroyed. You will also recall the terrible explosion at King & Sons' saw mill, opposite St. John, N.B., last spring, where several people were killed, and upwards of \$40,000 worth of property destroyed. Then another very disastrous explosion in Toronto three or four months ago, where a handsome new four story brick and stone building was completely demolished. And what caused it? The explosion of a little to h. p. vertical boiler. Fortunately the employees had all gone home, so that no lives were lost, but it is recorded that miraculous escapes were very numerous. These are only a very few of the disasters that are constantly occurring right in our midst, and if we could but know the true condition of these volcanoes of energy which surround us on every hand, accident insurance and safety boilers would soon be in great demand. But consider, if you will, the record of the water tube boiler and of all the more successful makes, having thousands of boilers in use, not a single disastrous explosion has occurred. This is perhaps more noticeable in the case of the Babcock & Wilcox boilers for the reason that their record extends over a period of nearly 30 years, during which time they have installed considerably more than 1,500,000 h. p. This vast array of boilers is distributed all over the world, and they are being used for every conceivable purpose by men whose knowledge of mechanics is certainly not lacking in variety.

The Babcock & Wilcox water tube boiler has all the elements of safety in connection with its other characteristics of economy, durability, accessibility, etc. Being composed of wrought iron tubes, and a drum of comparatively small diameter, it has a great excess of strength over any pressure which it is desirable to use. As the rapid circulation of the water insures equal temperature in all parts, the strains due to unequal expansion cannot occur to deteriorate its strength. The construction of the boiler, moreover, is such that, should unequal expansion occur under extraordinary circumstances, no objectionable strain can be caused thereby, ample elasticity being provided for that purpose in the method of construction.

In this boiler so powerful is the circulation that as long as there is sufficient water to about half fill the tubes, a rapid current flows through the whole boiler, but if the tubes should finally get almost empty, the circulation then ceases and the boiler might burn and give out; by that time, however, it is so nearly empty as to be incapable of harm if ruptured.

GOLD MINING IN ONTARIO.

(From a Correspondent.)

The Lake Harold Mine.

This property, consisting of mining location 219 N, with an area of 80 acres, is situated on the shore of Lake Harold, an arm of the Seine River, some thirty miles above Sturgeon Falls, in the Rainy River district, Province of Ontario.

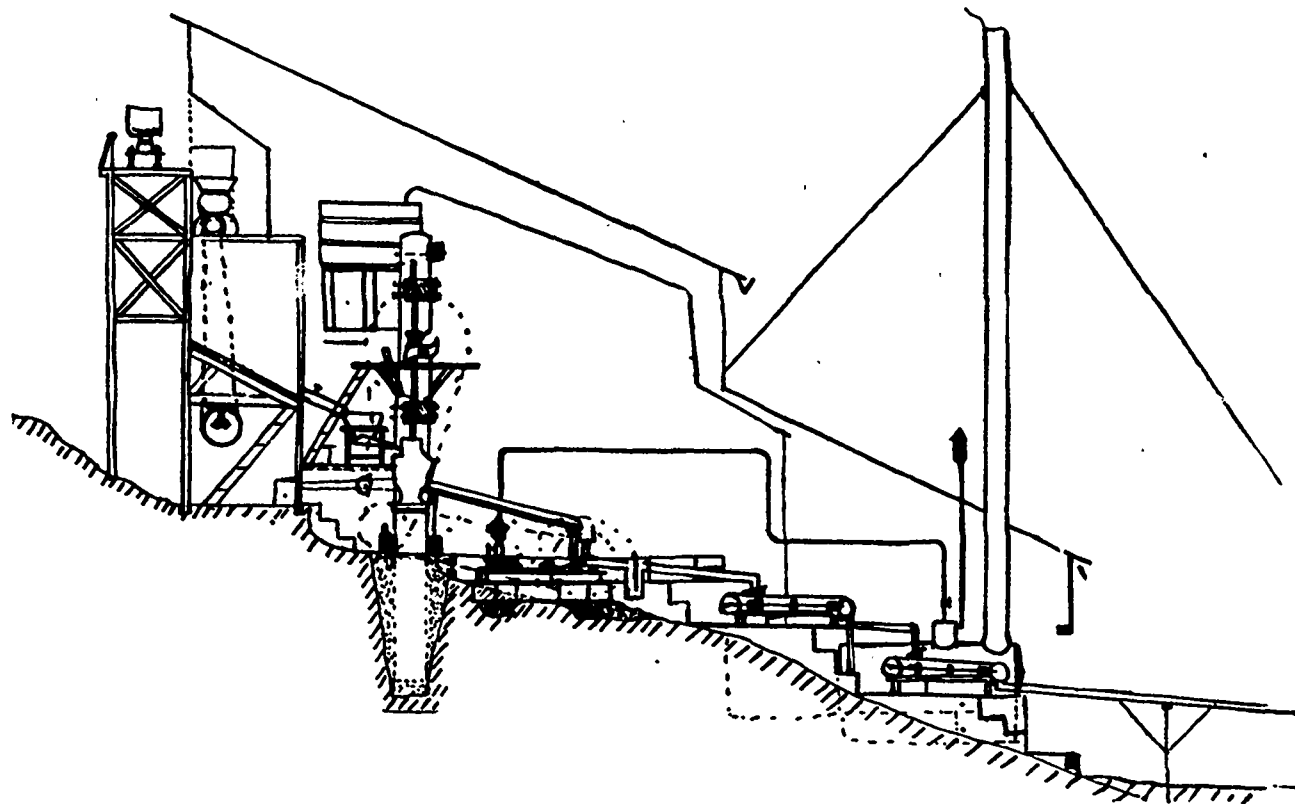
The lake upon which the mine is situated forms a very pretty and picturesque spot, being circular in shape, nearly a mile across and 50 ft. deep, with its shores rising abruptly to a height of 50 or 60 ft. and heavily timbered with large pine, tamarac and birch. Its water is as clear as that of Lake Superior and full of fish, in contradistinction to the numerous surrounding lakes whose waters are of a blackish color, resembling swamp water.

The mine was discovered by an Indian while prospecting for iron in the Atikokan Iron Range in 1890, some little time before the present excitement in gold mining existed. In the original specimens brought in free gold was sticking out all through the quartz, and in the panning tests made the gold tailed completely around the pan; assays also gave correspondingly high results, and on the strength of these, surveyors were sent out and several locations were taken up. From the time of discovery until actual operations were commenced in the spring of 1895, considerable preliminary development work had been done at odd times, in the way of prospecting, stripping and sinking small test pits on the veins discovered.

The present route to the property is from Port Arthur, at the head of Lake

All the veins so far discovered, with one exception, are in this protogine formation and are in nearly every case strong, continuous veins, with clear, well-defined walls, and heavily mineralized with galena, pyrite, and chalcopryite. A selvage of from two to six inches of soft, decomposed protogine, exists both on the foot and hanging wall to a depth of 30 ft., when it again becomes hard like the country rock. This selvage carries sufficient free gold in it to pay to mill.

Vein No. 1, or the "Shore Vein," is the exception above referred to, forming a contact vein lying between the protogine as a foot wall and a chloritic schist for a hanging. It has a northwesterly and southeasterly strike running close to the border of the lake, and is nearly perpendicular. Thirty tons from this vein, which is 16 to 24 inches wide, had fallen down from the face of the protogine bluff into the lake. This was reclaimed by lowering the lake some 5 ft., an operation which was done in two days, by three men, at its lower outlet. This little vein is uncovered for a distance of 200 ft., when it disappears into a swamp. It is the richest vein on the location, and probably one of the richest that has yet been discovered in the gold country. A shaft was commenced during the summer, but had to be abandoned at a depth of 25 ft., the water making too fast to be handled until proper pumping machinery could be brought in. The mineralization is galena, pyrite and chalcopryite. Almost every piece of the quartz picked out of the lake was literally full of free gold, as was also the ore which came out of the shaft. Assays from this vein range from 1½ ounces to 50 ounces in gold per ton. The last assay made and taken from the bottom of the shaft yielded \$779.10 to the ton. The galena taken separately and assayed for silver showed 14½ ounces a ton. Other samples of galena taken from different veins contained almost the same amount of silver. A mill test was made of the 30 tons of float quartz, with the result that slightly under \$20 a ton was obtained as free milling from the plates; the concentrates, panned down from half-hourly samples taken from the tailings, showed a value of \$328.63 a ton.



Superior, to Bonheur, a station on the Canadian Pacific Railway, and thence by water stretches 48 miles due south. This makes a most interesting and exciting trip by canoe during the summer months, after the flies and mosquitoes have disappeared. There are some twenty portages, several lakes, rivers and swift rapids to run, and any one but an experienced canoeist would soon come to grief. The country through which this route runs abounds with moose, caribou, partridge and fish, and in the fall of the year splendid shooting can be had on almost any of the portages. A winter road was cut out last winter, over which all the supplies and machinery were taken in. Another canoe route is by way of Savanne, over the old Dawson route. The mine can also be reached from Rat Portage or Duluth to Rainy Lake and thence to Sturgeon Falls, the head of navigation; from here to Lake Harold it is about thirty miles up the Seine River.

The Ontario Government have granted a bonus to aid in the building of the Ontario and Rainy River Railway, which is to run from Port Arthur to Winnipeg, directly through the gold region. Already a portion of this road is built and fully equipped, and it is expected that the rest of it as far as Rainy river will soon be completed. Besides this, the Dominion Government have granted a charter and promised aid to the Atikokan Iron Range Railway, this road passing close to the mine. The Rainy River Railway will open up a great many valuable gold properties, besides benefiting the immense bodies of iron ore through which it passes. There is, however, no great difficulty in getting in or out of the country, as is evidenced by the fact that over a hundred tons of heavy mining machinery were taken in last winter in less than three weeks' time.

The formation of the country in which the mine is situated consists of talcose chloritic and micaceous schists of the Huronian age, together with a talco-granitic rock, identical with the rock called protogine, a variety of granite in which the mica or hornblende has been changed to a talcose or chloritic mineral. These granites or protogines form the country rock, of the richest and most continuous veins which have yet been discovered in the country. In it the Shoal Lake group of veins exist, the protogine there, however, being somewhat different in appearance. In 1893, Mr. W. H. Smith, of the Dominion Geological Survey, spent some time in the vicinity of Lake Harold in studying the relations of these granites, or quartz-porphyrines, to the surrounding greenstones and greenstone schists, and expressed the opinion that these relations were very similar to those occurring between the somewhat porphyritic granites, in which the now famous Sultana vein, near Rat Portage, is located, to the surrounding rocks there.

Vein No. 2, or the "McComber" vein, is the one from which the mill has been supplied so far. It lies parallel to and 30 yards to the southeast of vein No. 1, and is wholly in the protogine, its mineralization being the same. It runs through a hill 40 ft. high, the ore being taken out by open cut work. The peculiarity in this vein was the native copper which was struck 30 ft. below the surface; the native copper being in close proximity to its sulphide of chalcopryite, and distributed through the quartz. Surface assays ranged from 2 to 8 ounces. An average of the vein, taken out by Mr. Hille, M. E., of Port Arthur, went \$87.00; another gentleman made the veins average \$80.00. The average seems to keep about the same throughout, the last average taken at a depth of 30 ft. making it \$82.01. The amount of free gold, however, varies slightly from \$8.50 to \$10.00 a ton. The value of the concentrates also varied from \$98.20 as a minimum to \$519.76 as a maximum; this fluctuation being due to the varying proportion of the decomposed protogine, which had to be put through the mill, this stuff carrying in some cases, a large percentage of barren pyrite.

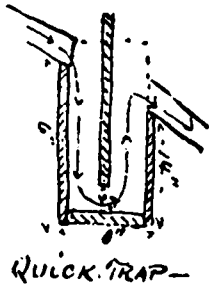
Veins 3 and 4 are the most recently discovered being near the north-west corner of the location. They are seen on the side of two hills opposite to each other and fifty feet high, and are probably a continuation of each other; they are also seen on the opposite faces of the hills, thus showing that they are persistent through the hills. On vein No. 3 a tunnel is now in 65 feet, shewing a vein two feet in width. On vein 4 a tunnel is in 125 feet, the vein narrowing and widening alternately from 2 to 5½ feet. A shaft is down 30 feet below the level of the tunnel or 70 feet below the surface; the vein showing the same tendency of widening and narrowing. The walls of both of these veins are well defined and shew signs of slickensiding, assays range from \$12.63 to \$1006.16 to the ton. No ore has yet been milled from these veins, a tramway half a mile in length being necessary, which is now constructed, or nearly so.

Besides these there are numerous other veins on the property upon which little or no work has been done, attention being centred only on the veins carrying the higher grade ores with which to supply such a small mill. The following are some of the surface assays made before any machinery was taken in.

Mr. Hille, M. E., of Port Arthur, made assays from five veins yielding \$100, \$11.22, \$150, \$42.45 and \$1006.16. E. Burlingame, of Denver, made assays from two veins giving \$57.74 and \$79.14 a ton. Charles Brent, of West Superior, made two assays, one yielding \$998.83, and the other \$335. John Walter & Son, of New York, made one assay giving \$256.16. Rickets & Banks, of New York, made one assay and as the test was a high one and no gold perceptible in the ore, they repeated it, the result showing \$314.00 a ton.

SECTION THROUGH LAKE HAROLD STAMP MILL.

The stamp mill situated on a piece of rising ground on the shore of the lake is one of Fraser & Chalmers most modern and approved patterns. The crusher is a Gates make, with a crushing capacity of 100 tons daily. This Gates crusher breaks the quartz to the size of walnuts, but besides doing this it also shatters the quartz in such a way as to destroy its cohesive powers, thus making it much more easily reducible to powder by the stamps and increasing their capacity. The battery is of steel throughout with stamps of 850 lbs each. The mortar is of steel and of special design, being in two sections, an upper and lower portion, the former being composed of steel plates rivetted together and also to the latter or bed plate which is a solid piece of steel. According to Fraser & Chalmers this is the first mortar of this description which has yet entered Canada and so far it has proved itself equal to the solid mortar. Both outside and inside copper amalgamating plates are used. The outside plate is a 4 ft. 5 in. x 12 ft. copper, electro-plated with one ounce of silver to the square foot. The inside coppers are of little use however as they scour. This battery crushes 15 tons of ore every 24 hours.



The ore is brought into the top of the mill by means of a tramway. After going through the crusher it passes into an ore bin of 25 tons capacity. From this it is fed into the battery by means of a Tulloch automatic ore feeder. The pulp after passing over the plates, passes through the "quick trap," a device used to save any mercury or hard amalgam which may have escaped the plates. From the "quick trap" it is carried to a large settling tank where it is settled, the slimes then passing into the lake. The tailings thus settled are to be concentrated in the spring. Two frue vanners are being erected at present.

Besides the gold milling machinery there is a saw mill on the location, capable of sawing 10,000 feet of lumber daily, the consequence being that all the buildings are built of good lumber instead of the orthodox log shanty.

Power is supplied by a 28 horse power engine manufactured by Petrie & Co. of Toronto. There is an unlimited water power two miles from the mine on the Seine river, but an electric plant was considered too expensive for the present Company to undertake.

The mill has been under the charge of Wm. Peters, formerly millman of the Little American mill on Rainy Lake and also millman of the Homestake mill in the Black Hills.

The results so far obtained have been very encouraging to the owners, the result being that an additional five stamps with frue vanners are being taken in, while work on the different shafts and workings is being pushed rapidly. Sufficient ore has been taken out since winter set in to keep the mill supplied night and day next summer. The Company is also considering the erection of a compressor plant in order to facilitate the work of development.

The mine is owned by the Lake Harold Gold Mines Company, Limited, of Ontario, application for a charter of incorporation under Ontario statutes having been applied for. Authorized capital \$150,000. The directors are G. T. Marks, Frank N. Gibbs, F. S. Wiley, H. A. Wiley, all of Port Arthur, where the head office of the Company is located.

BRITISH COLUMBIA IN LINE.

The Western Province Organises its Mining Association.

Imitating the example set by the old provinces of Nova Scotia, Quebec, and Ontario, the mining men of British Columbia have succeeded in organising the "The British Columbia Association of Mining Engineers." The officers are:

President.

R. C. Campbell Johnstone, M. E., Vancouver.

Vice President.

S. M. Robins (New Vancouver Coal Mining and Land Co.) Nanaimo.

Secretary-Treasurer.

G. F. Moncton, M. E., Vancouver.

Council.

Howard West, A. R. S. M., New Denver.

A. H. Holditch (Hall Mines Limited), Nelson.

H. E. D. Merry, Rossland.

J. Newlands.

E. Bellamy.

and two others not yet appointed.

The Association comprises members who are actively engaged in mining in the Province, associate members who are not professional mining men but are interested in the development of British Columbia minerals, and students. The annual fee is \$5.00 and \$2.00 for associates and students. The Honorary members are:

The Hon. Col. Baker, Minister of Mines, Victoria.

Dr. G. M. Dawson, C. M. G., Director of the Geological Survey.

Mr. B. T. A. Bell, Editor of the CANADIAN MINING REVIEW,

Secy-Treas. Canadian Mining Institute.

The organisation of this Association is a step in the right direction and every mining man in the west should, not only become a member, but take an active part in its proceedings. The first regular meeting will be held at Nelson in April.

IRON MAKING IN ONTARIO.

Opening of the New Furnaces of the Hamilton Iron and Steel Co., Ltd. at Hamilton Ont.

The first blast furnace in Ontario was constructed about the year 1800 at the falls of the Gananoque river; there was also a forge for the construction of bar iron. Owing to poor ores used and cost of assembling materials, works were abandoned after running two years.

Twenty years later in Charlotteville Township, County Norfolk, a furnace was constructed and ran successfully for some 25 years, until the immediate supply of bog ore became exhausted. Mr. Van Norman, one of the promoters of the Charlotteville works, started another furnace in Houghton township in 1854, the main object being to supply the Great Western Railway with iron for car wheels, but the product proving unsuitable the furnace was blown out.

In 1820 a furnace plant was erected at Marmora to smelt the magnetites of that district. During the course of some 40 years, although lying idle for the most part, it managed to ruin or cripple three or four successive owners. In 1837, the plant, consisting of two stacks with a common cast house, forge for manufacturing wrought iron, stock houses, saw and grist mills, blacksmith shop, store, dwellings, &c., was offered for sale to the Government for the sum of £25,000 including lands. The idea being to remove the penitentiary from Kingston to Marmora to employ convict labor at the works. This having fallen through nothing further was done until 1847 when Mr. Van Norman, of the Charlotteville furnace, purchased the property, but want of experience in smelting magnetites again resulted in failure.

At Olinda, in Essex Co., a furnace was started in 1831 to smelt the bog ores of Colchester and Gosfield townships and after running about 6 years stopped for want of funds. In 1836-37 a furnace was built at Madoc which ran for some 9 years.

I am indebted to Mr. Archibald Blue's second report of the Bureau of Mines, Ontario, for the substance of the above short summary of what has been done up to date.

At first sight it looks bad for any future attempts. But all these trials were made with generally a limited amount of money and by men mostly wanting in experience and general metallurgical knowledge. The perusal of the records of some of their experiments will satisfy any one in this regard. The small chances and great cost of these "happy-go-lucky" experiments are now removed since furnace management has become a question of chemistry with the knowledge to apply it.

Transportation costs, increased market and many other things all combined make any comparison between these old days and to-day out of the question.

For the past forty years sundry attempts have been made to start smelting works in the province, but arrived at no results until 1893.

Inception of the Hamilton Furnace.

Mr. J. J. Moorehouse of New York while endeavoring to fix on a location in the province of Ontario for smelting works, obtained assurances of aid from the city of Hamilton if a plant was located there.

A company was organised with an authorized capital of \$1,000,000 in 10,000 shares of \$100.00 each; and a charter for the Hamilton Iron & Steel Co., Ltd., was taken out under the provisions of the "Ontario Joint Stock Companies Act."

The first officers of the Company were:—Wm. Foster Jr., New York, President; J. H. Tilden, Hamilton, Vice-President; Wm. V. Reynolds, New York, Secretary; J. J. Moorehouse, Treasurer and General Manager; R. Jaffray, Toronto, John Milne, James Moorehouse, J. G. Langdon of Hamilton, and A. M. Card, New York, Directors.

On the 24th July 1893, the city passed a by-law granting a bonus of \$75,000 for the establishment of iron smelting works in, or immediately adjacent to the city, and a further bonus of \$60,000 for the erection of steel works. The provisions demanded that the plant be in operation by December 31st 1894, capable of turning out, at least, 150 tons of pig iron per day, and that the sum of \$400,000 shall have been expended on the plant (bonus to be arranged as follows): The city agree to purchase lands to the value of \$35,000 for the erection of plant, and to give a cash bonus of \$40,000 in city debentures payable on completion of plant.

The lands transferred to the Company are 75 acres in extent and immediately adjoin the city limits, on Burlington Bay, in the Township of Barton. The Company has the right to fill in and occupy the water front out to a line of 8 feet of water. It is estimated that this will add at least 75 acres more to the property; and will also make an excellent cinder dump.

On the 28th of October 1893 the contract for the erection of a complete plant was given to the Philadelphia Engineering Company, of Philadelphia, Pa.

Work on the foundations was started in November 1893 but was not completed until October 1894. Cast house, walls, shell of furnace and stoves, were erected during the winter. The furnace shell was blown down during a heavy gale in March. This unforeseen event and the branch line from G. T. R. to works not being completed owing to the refusal of an owner to sell right of way, at a reasonable figure, it was decided to stop construction at the works for the time being until the completion of branch, when all heavy machinery, etc., could be cheaply and more conveniently handled.

Extensions of time to complete plant were given to the Company from 31st December 1894 to 1st July 1895, from then until October 1st and again to 31st December of last year.

These extensions were necessitated by many unfortunate and unavoidable delays, also possibly by the extreme depression in the iron trade during 1894 and part of 1895. Work was again resumed during the past summer and pushed through to completion as soon as possible. The fires to dry out stack and stoves were lit on December 30th 1895.

Furnace was filled and blown in early this month and is now making iron daily.

The New Works Described.

The writer visited the works during last month and was much pleased with the situation, set and general get up of the whole plant. The following description will likely be of interest to your readers connected with the trade:

"Contract calls for a furnace and plant to be in all respects thoroughly good and substantial, with all modern improvements, capable of turning out 200 tons with 60% ore and Connellsville coke, constructed in all respects to obtain very best economy in fuel consumption and handling of materials."

Starting with the furnace, the foundations consist of:—(1) Limestone blocks laid in bridge bond, upper portion 5 feet from hearth of well burned bricks, underneath hearth capped with hand-burned fire brick. Constructed on this the furnace is 75 ft. high, 16 ft. in the boshes and 10 ft. hearth.

Seven cast iron columns support the upper portion of the furnace. Shell is 21 ft. in diameter at bottom, and 19 ft. at top; thickness of plates ranges from $\frac{1}{4}$ to $\frac{1}{8}$ in., and all perpendicular seams are double-riveted.

The furnace is built and lined with best hard-burned fire brick, made to proper sizes for different portions of furnace.

Top consists of regular plate platform and bridge to hoist tower, with guard rail 3 ft. 6 in. high.

Hopper is 11 ft. 6 in. in diameter and 3 ft. deep. Bell, 8 ft. 4 in., swung by two links attached to lever with counterweight box, operated by a 12 in. steam cylinder, piston steam-cushioned top and bottom to guard against rough and careless handling of lever.

Downtake is 5 ft. in diameter, lined with $3\frac{1}{2}$ in. fire brick; has one bleeder 20 ft. high and 2 ft. in diameter, lined with $2\frac{1}{2}$ inch brick.

Dustcatcher at foot of downtake is 12 ft. x 11 ft., provided with bottom and side cleaning and explosion doors.

The general piping, bustle, waste and feed water trough are very well arranged so as to allow quick work to be done in removing tuyeres, also any other repairs to and around bottom portion of furnace. Water fittings are all brass, inlets to tuyeres are fitted with brass elbows and ball unions. Feed-water connections have 3 way cocks, with attachments for cleaning out and where hose may be connected for convenience in cooling furnace.

Bustle pipe 33 in. diameter, lined with 7 in. brick, connections for 6 tuyere pipes; these pipes have a clear diameter of 8 in. when lined, and are provided with Gordon patent ball joints.

There are 6 bronze tuyeres and blocks. Blocks are $26\frac{1}{2}$ in. long, $26\frac{1}{4}$ in. at butt and 19 in. at nose. Tuyeres are 6 in. Hearth jacket, steel, 1 in. thick, 6 ft. 4 in. high, and 16 ft. in diameter. Strengthened at cinder arches.

Cinder arches 22 in. long, $13\frac{1}{4}$ in. at butt, and 11 in. at nose. Monkey is $4\frac{1}{4}$ in. long, $1\frac{1}{4}$ in. diameter. Hearth wall is 3 ft. thick and 4 ft. 4 in. high; from this bosh wall is 27 in. thick and contains 5 complete circles, double thick 1 in. pipe cooling plates. There are also 2 coolers between each tuyere arch. Bosh is strengthened by 5 bands 8 in. x 1 in., with two $2\frac{1}{2}$ in. expansion bolts at each joint.

Stock is raised to top in wrought-iron trestle-work hoist tower, supported on solid stone foundations, roof is covered with corrugated iron to bridge floor level. Automatic safety cages, double 1 in. wire rope, operated by an automatic hoist engine, cylinders 12 x 12 in., built by Crane Mfg. Co. Engine is placed in a brick building situated at foot of hoist tower.

Cast house is 50 ft. x 160 ft. from centre of furnace to end wall and surrounds back of furnace in octagonal form. Foundations are solid limestone, walls red brick, roof corrugated iron and fits furnace casing, has ventilator running full length, on apex of roof is 6 ft. wide, 4 ft. high. Roof frame is strong enough to support two overhead trollies, running over pig beds to remove the iron. The hot blast arrangements consist of three stoves constructed after the Gordon Cowper Whitwell patents, a 3 pass stove which has been well recommended by all furnace masters who have had experience in their use.

They are capable of sustaining a regular blast temperature up to 1600° F. Each stove is 60 ft. x 19 ft., surmounted by a conical casing, topped by a 40 ft. chimney 36 in. diameter in the clear. A circular platform 24 in. wide with hand rail at convenient height surrounds top of each stove, these coming together form a bridge from stove to stove. Valves are all of the Gate type (except air valve) and worked with rack and pinion.

Gas valves and hot blast valves are water cooled. In chimney valve the arrangement of valve and seat is such that the draft of the chimney induces passage of a strong current of air through them, protecting them from the heated gases.

These chimney valves are operated from the ground level by means of a $\frac{1}{2}$ in. wire rope with the necessary mechanical connections.

Flues in checker work are 9 x 9 in. clear. To a certain extent the stoves are self-cleaning, as every time stoves are released, compressed air will carry out a certain amount of dust with it. As to arrangements for general cleaning, a small crane pivoted on a truck travels around platform at head of stoves; jib of crane is long enough to reach the cleaning doors on conical top. These six holes are 12 x 20 in. Chain on crane has scraping-weight at one end and counter-weight at other end. At bottom of stove are a set of steam blowers and three 20 in. cleaning doors. From dust-catcher a 40 in. gas main runs across the face of the stoves; from this main are three down pipes 30 in. diameter, ending in conical balanced explosion and cleaning doors; attached to these down pipes are 18 in. gas connections (provided with expansion and ball joints), which extend to gas valve of each stove.

Hot blast main is 60 ft. long, 40 in. diameter and lined to 24 in.

Cold blast main is 24 in. in diameter, thickness of plate $\frac{3}{8}$ in.

Boilers built by Brownell & Co., Dayton, Ohio, are 12 in number, situated in a brick building 50 x 80 x 18 ft. to the square. $13\frac{1}{2}$ in. brick wall (and corrugated iron roof) provided with the necessary doors, ventilating arrangements, etc. They are 59 in. by 24 ft., with five 12 ft. lap welded flues. Running across each pair of boilers is a 30 in. by 9 ft. steam drum, connected with two 12 in. legs 3 ft. long. Each pair of boilers constitute a battery, and are set in one setting so any two may be thrown out while the rest are working.

A down pipe from dust catcher goes to underground flue running across face of boilers. Flue has an area of 14 sq. ft., lined with 9 in. fire brick, sustained by retaining walls and provided with necessary cleaning and explosion doors.

Gas from flue enters burner of the Gordon, Strobel and Lareau patents, that are situated to one side of the front of boilers. There is only one firing arrangement for each pair of boilers.

Discharge main for gases from boilers runs along top and front. It is 48 in. in diameter, lined with 2 in. circular fire brick. At either end is a 60 in. connection to draft stack, lined in same manner. Draft stack is steel, brick lined, 125 ft. high and 7 ft. in the clear.

The blowing engines, manufactured by the Philadelphia Engineering Company, are nice pieces of machinery, consisting of two vertical poppet valve engines, steam cylinders 42 in., blast cylinders 84 in. with a common stroke of 60 in. They are independent of each other and can be operated singly or together. Each engine has two fly wheels 18 ft. in diameter. Total weight of each engine is 100 tons; horse power each, 1200.

Foundations for engines are of hard burned brick, laid in hydraulic cement and flushed solid.

Engine house brick with corrugated iron roof. In the same building are the circulating and boiler feed pumps. Circulating pumps consist of two duplex steam pumps, steam cylinders 14 in., water 14 in., stroke 18 in. Water comes from lake through a 700 ft. line of cast iron pipe, so is well out in the lake and will be free from all shore troubles. From pumps water is discharged into stand pipe 60 ft. high by 12 ft. diameter, plates $\frac{1}{8}$ and $\frac{1}{4}$ in., well sustained by angle iron bracings. From here water is distributed to all parts of plant and all waste water is returned to lake by special connections.

Boiler feed pumps, (two in number) duplex steam plunger, steam cylinder 8 in., water plunger 5 in., stroke 10 in.; and they are so arranged that either can be taken

out while the other is working. Feed water heater contains 500 sq. ft. solid drawn brass tubing.

Blacksmith, machine shop and office are in a brick building to the south of boiler house. Consists of one building, but solid wall separates office from shops. This office will also be used as a laboratory *pro tem*, the works as yet being deficient in this respect.

Stock house is a good substantial building, but is already proving rather small and will have to be enlarged. It is 70 ft. span by 232 ft.; posts are 10x10 in., and 30 ft. high, strongly framed; main rafters are 8x8 in. trussed together and bound by iron bolts; 4 in. purlins 2 ft. 8 in. apart are fastened to rafters; sheeted with 1 in. board and all covered with corrugated iron.

Flooring is $2\frac{1}{2}$ in. pine, laid on 5x5 in. stringers.

Scales are Fairbanks latest locked beams, four posts with clear way to hoist tower. There are two railway trestles of easy grade in stock house for dumping supplies. Switch to G. T. R. is something over half a mile long.

All work is covered with a good substantial coating of red metallic paint.

The accompanying photos and rough ground plan will give a good general idea of the works.

Ore Supplies.

The present ore supply in stock consists of Wallbridge hematite, magnetite from Malone and Hastings Co., and some Rochester ore; about 1,000 tons of latter in case of emergency. This ore contains only 45 per cent. of iron, but no sulphur.

There are about 10,000 tons ore on hand and it is coming in at the rate of from 15 to 20 cars per day.

Magnetite from Malone is being picked out of a pile of some 30,000 tons mined some years ago by the Bethlehem Iron Co. Picked ore will amount to about 10,000 tons. This ore is very rich in iron, low in phosphorous, but contains about 0.25 per cent. sulphur.

Following is an average analysis of sample taken from five carloads of Wallbridge hematite:—

Iron	61.16 per cent.
Silica	7.52 "
Lime	2.22 "
Magnesia	1.05 "
Sulphur	0.34 "
Phosphorous	None.
Manganese	"

The company is opening up a prospect of brown hematite on same property at Malone. The ore is said to contain no sulphur.

Some ore is coming from McGregor Co., near Port Arthur. These ores will be brought in future by water during the summer months and enough stocked at works for winter. Vessels can come through Welland Canal with 1500 tons, and of course may have tows also.

Limestone is brought from Welland at a cost of \$1.00 per ton at furnace, the stone in the vicinity turning out to be not pure enough in present quarries.

Coke is obtained from Frick's, Connellsville, Pa., and is specially low in sulphur. There are over 12,000 tons in stock and it is coming in at the rate of 100 tons per day.

There is no doubt the furnace will create an ore market for itself in a short time and will be then enabled to choose its ores for different mixtures. When the filling in and wharves are completed something over the sum of \$400,000 will have been expended on the plant.

General Manager, Mr. E. Doud, comes from the United States with the character of having built and managed some of the most successful furnaces running on foundry iron in the States. The enterprise is now a Canadian one, the American shareholders having been bought out entirely a short time ago. The present officers are:—

J. H. Tilden, President; J. T. Milne, Vice-President; Directors: C. V. Birge, G. Hope, A. T. Wood, W. Southam and R. R. Morgan, of Hamilton; A. E. Jarvis, of Toronto; E. Doud, General Manager.

Not knowing the value of ores to be used, cannot make a very correct estimate of what will likely be used in way of year's supply. But will not be far from: Ore, 100,000 tons; stone, 25,000 tons; fuel, 50,000 tons; all this, with the exception of coke, will be won by Canadian labor. The question arises, "Will it pay?" and the general opinion seems about evenly divided. My ideas are:—The plant is a good one, will be run by men of tried business ability and most of them intimately connected with the foundry trade. It is situated in practically the centre of the Canadian market. Being thus situated and about equal distance from ore and fuel supply, also having facilities for rail and water carriage, it is well located.

In Ontario alone something over 400 tons of iron ore are melted daily, divided about as follows:—Hamilton, 75; Brantford, 20; Ingersoll, 10; London, 30; Chatham, 10; Woodstock, 15; Galt and vicinity, 40; Guelph, 10; Toronto, 75; Peterborough, 15; Brockville, 30; and other places about 100 tons.

Taking off say 100 tons as scrap used, this leaves a daily consumption of 300 tons pig in the Province.

The first cost of pig per ton, it seems to me, will be about \$13.00 to \$14.00.

Over Canadian furnaces it will have the advantage of freight rates, an average of about \$3 per ton. Over American furnaces the advantage will be greater owing to the duties and bonus, also of a slight amount in freight rates, amounting in all to about \$7.00 per ton.

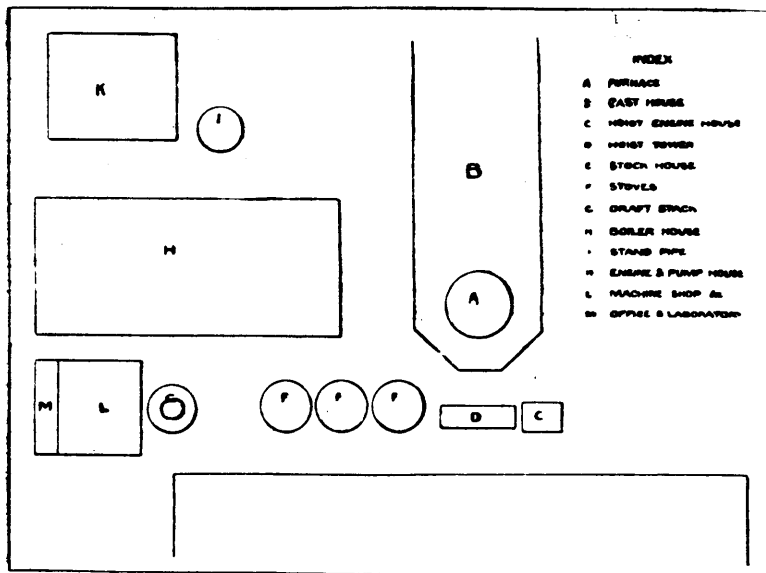
Besides the above there will be some advantage from the bonus given by the Ontario Government to the miner of \$1.00 per ton on all iron produced from his ore. But only \$25,000 per year can be spent on this, and if the production is greater than 25,000 tons per annum the amount will be divided *pro rata*. As this will likely be the case, estimated capacity of furnace being 60,000 tons per annum, something about 50 cents per ton will go to miner, and of course furnace will also derive an appreciable advantage from this. More especially in the impetus it will give in the way of prospecting work on some of the better and newer ore belts.

Taking these things into consideration I can see no reason why the enterprise should not be a successful one.

The men who devote and risk their money in such works as the Hamilton Iron & Steel Co. are of the class that make nations and certainly deserve every success.

WM. SMALLL.

The smelter at Pilot Bay B.C., commenced treating ore in March, 1895. From that time until December 30th last, 3,220 tons of bullion were shipped to Aurora, Illinois, for refining. During the year 1895 the smelter company transported 52,000 tons of ore and lime rock from the Blue Bell mine, and purchased 2,500 tons of ore, of the value of \$156,464, from outside mines. Since July 10th, 1894, the company has expended in cash for machinery, labor, and the purchase of ores something over \$650,000. During 1895 the company employed over 200 men daily, and paid out for labor \$170,000. It also paid out during the same time over \$85,000 for supplies, \$70,000 for duties, and \$92,500 for freights.



New Works of the Hamilton Iron & Steel Co. Ltd.

Hallidie Ropeway at the Hall Mines, Ltd., Nelson, B.C.

Among our illustrations of mining in British Columbia this month we reproduce a view of a portion of the ropeway just completed for the Hall Mines, Ltd., at Nelson, B.C. It was constructed by the California Wire Works under Mr. A. S. Hallidie's patents, and all the material was supplied from San Francisco. The ropeway passes over a very rugged country in that mountainous district, and is remarkable for the great length of the line and the difference in the elevation of the two ends is 23,797 feet, a trifle over four and one-half miles—and in that distance there is a fall of 4100 feet. Snow falls heavily at the upper end, sometimes attaining a depth of sixteen feet, and at times the wind blows at the rate of seventy miles per hour, and the cold is intense. Throughout the entire length of the ropeway the timber, which is very dense, was cleared off to the width of 200 feet. The ropeway is a continuous moving rope which measures in place 47,900 feet, and has attached to it 900 ore conveyors, which are rectangular in shape, contain 100 pounds of ore each, and are self-dumping. The steel rope is made from special material, specified by Mr. Hallidie for the purpose, and passes at each end around patent grip pulleys, ten feet in diameter, to which are attached strong brakes, to control the speed of same. Between the two ends, and located at suitable points, are 126 intermediate supports or stations, having projecting arms with sheaves on which the steel rope rests. The ore conveyors are attached to the steel rope by peculiarly designed clips, which are so shaped and fitted as to pass over the station sheaves and the end grip pulleys. The steel rope runs at a speed of three feet per second, and delivers ten tons of ore per hour. The ore dumps at the mine hold 8000 tons of ore, which contains forty ounces silver and five per cent. copper. About 2500 tons have already been transported from the upper to the lower ore bins by this ropeway, and the ore is ready for the smelter, which is about completed. Work was commenced on the ropeway last July and progressed well until a forest fire swept through the timber in September and delayed the work very much. A great deal of damage was done and some of the great coils of steel rope were en route to the top of the mountain in the line of the fire. With great forethought the engineer in charge, Mr. E. I. Parsons, had these coils buried in the ground and the fire passed over them.

The California Wire Works has constructed five other Hallidie ropeways the past summer, but this one is the longest unbroken line built under the Hallidie system. The cost of conveying the ore the distance of four and one-half miles will be from 30 cents to 35 cents per ton, and sufficient power is developed by the descending load to convey back free of cost all the usual supplies of such a mine.

COMPANY NOTES.

Cariboo Hydraulic Mining Co.—Incorporated 1893. Authorized capital, \$300,000, in shares of \$5.00. Directors: O. Plunkett, J. M. Browning; President, F. C. Innes. Head office: Vancouver. Works at Quesnelle Forks, Cariboo district, B.C. J. B. Hobson, M.E., Manager; L. F. Warner, Jr., M.E., Assistant.

The property is situated on the south side of the Quesnelle river, about four miles east of the town of Quesnelle Forks. It comprises eight mining leases, aggregating 426 acres of land which covers the auriferous deposits of an ancient river channel, which is separated for a considerable distance from the modern deep and canon-like gorge of the south fork of Quesnelle river, forms the north rim of the ancient river channel which is now found filled to a depth of 400 feet with a heavy deposit of high grade auriferous gravel.

Near the lower end of the property on Dancing Bill Gulch, successful hydraulic mining on a small scale, with 5 in. pipes and 1½ in. nozzles, was carried on by Chinese companies for a period of about eighteen years; about one acre of gravel 300 ft. deep was excavated without reaching the bed-rock or bottom of the channel.

The water is delivered and utilized through a system of ditches 7 x 13 x 3 ft. deep, 17½ miles in length from the mine to the source of supply at Six Mile creek, the outlet of Polleys and Boot Jack lakes, which have a storage area of about 2,200 acres, and have been converted into storage reservoirs by the construction of substantial dams 8 ft. high across their outlets. This supply is augmented by the water of numerous streams on line of main canal, which ensures a supply varying from 2,000 to 3,000 miner's inches throughout the season.

The mine is equipped with a portable hydraulic plant, consisting of two lines of 22 in. and one line of 18 in. steel pipe aggregating 4,000 ft. in length, also five No. 8 Giants, having nozzles varying from 5 in. to 9 in. in diameter.

The gold saving appliances consist of 526 ft. of 3 x 5 ft. sluices and 588 ft. of 3 x 6 ft. sluices, paved with improved iron riffles.

The water is delivered at the mine on the floor of the hydraulic excavations with a head of 300 ft.

During the progress of the work of equipment and installation of the heavy plant and opening the working hydraulic pits extending over the seasons of 1894 and 1895, water was used about 48 days in the removal of about 210,000 cubic yards of earth, gravel and boulders, a large percentage of which was composed of accumulations of tailings and boulders left piled in Dancing Bill Gulch by the Chinese miners, and the product therefrom has been \$65,467. Two working pits are now opened in the upper gravels, the banks of which are about 300 ft. in height.

The floor of these hydraulic excavations lie from 50 to 100 ft. above the bottom of the channel. This lower bench of high grade gravel will be opened and worked as soon as the upper workings are carried forward a sufficient distance to leave the lower workings safe from the danger of caves from the upper workings.

The mines are now on a basis for profitable production, and it is expected that during the ensuing season of 1896, the mine will be run nearly full time, and the output increased in proportion.

Horsefly Hydraulic Mining Co., Ltd.—Incorporated 1893. Authorized capital, \$250,000, in shares of \$10. Directors: W. F. Salisbury, F. C. Innes; J. M. Browning, President. Head office: Vancouver, B.C. Works at Horsefly, Cariboo district, B.C. J. B. Hobson, M.E., Manager; W. F. Bissett, Assistant.

The property is situated on the Horsefly river, about 53 miles north of the 108 Mile House on the Cariboo waggon road, and about 6 miles south of the Quesnelle lake, Cariboo district, B.C. It comprises 11 mining leases aggregating 1,475 acres of land covering the auriferous gravel deposits of an ancient river, a portion of which is similar in character to the famous ancient river deposits in California known as the Blue lode.

The hydraulic system now successfully completed brings water from Mussel creek, a southern tributary of the Horsefly river, by a ditch and pipe line 12½ miles in length, with a capacity for delivering 1,800 miner's inches of water.

The pipe line is of steel, 30 in. diameter, made in two inverted syphons aggregating 8,300 ft. There is also three sections of flume, 3 x 5 ft., aggregating 600 ft.

Water is delivered from the main ditch with a head of 168 ft., and from the pooling reservoir near the mine with a head of 106 ft.

The bed-rock constituting the floor of the hydraulic workings is about 90 ft. above high water mark of the Horsefly river.

The mines are equipped with a portable hydraulic plant, consisting of three lines of 22 in. steel pipes aggregating 3,000 ft., 2,000 ft. of 18 in. steel branch pipes, six No. 8 18 in. hydraulic Giants, with nozzles ranging from 5 to 8 inches.

The gold saving appliances are 800 ft. of 3 x 6 ft. sluices, paved with improved iron riffles.

Since the completion of the company's system of water supply, the work of the breaking cuts through the rim of the deposits, opening up of the working hydraulic pits, installing the gold saving appliances and hydraulic plant therein, was pushed with vigor.

During the progress of the above work an extremely hard body of cemented blue gravel fronting on the rim of the deposit had to be removed, one blast of 37,000 lbs. of black powder was exploded to disintegrate about three acres of the cemented material and get in shape for removal. The hard material has decreased to a thin stratum of high grade cement, varying from 1 to 6 ft., lying near the bed-rock.

During the progress of the opening work done during the seasons of 1894 and 1895, water was used 104 days, during which time about 450,000 cubic yards of rock, cement and gravel were removed and the gold recovered is valued at \$59,640, an average of about 13 cents per cubic yard of material removed.

Two working pits are now opened sufficiently to accommodate the use of six Giants for continuous work through the whole of the water season, and the mine is on a basis for a profitable production.

LeRoi Mining and Smelting Co.—This company has declared a dividend of \$50,000—10 cents a share on the capital stock of the company, 500,000 shares. This makes \$75,000 paid within the past few months.

Golden Lode Mining Co., Ltd.—At the second annual meeting of shareholders held at Halifax this month the following report was presented to the shareholders:—

"The record of your property at South Uniacke, for the past twelve months, has been such as enables your directors to congratulate you heartily on the result of the year's work.

"While this report deals with the year 1895, we beg to call your attention to a fact which must commend itself to all shareholders, viz., that two years have elapsed since the beginning of operations on January 2nd, 1894, and that during that period, notwithstanding the many difficulties which have arisen, the mine has been worked continuously without a day's interruption, which, we are sure you will admit, is somewhat unusual for enterprises of this nature.

"The plant originally erected, having been intended only for prospecting and developing the property, it became necessary with the increasing depth from month to month, and the consequent increase of water encountered—as in all operations of this nature, which increased greatly the labor to be expended in pumping and in hoisting—that steps be taken to provide increased steam and pumping plant. During the month of June our neighbors to the west, Messrs. Thompson & Quirk, closed down, which caused all the water in their mine to gradually flow into our lower workings, and it became necessary that immediate steps be taken to provide the additional plant above referred to if the continuation of the heretofore successful and uninterrupted operations was to be maintained.

"Contracts were at once entered into for the building and delivering of a large locomotive boiler, also a large compound duplex, outside packed plunger pump, having a capacity of 160 gallons per minute against a pressure of 300 pounds per square inch, and for the accommodation of this new boiler addition to our engine house was necessary. After the arrival of this machinery much time and labor was required in its erection, particularly the steam pump, which required an excavation to be made in the solid rock at the bottom of the shaft, 27 ft. x 16 ft. x 14 ft. In this cavity an engine house was constructed in which the pump is located. The steam is carried direct from the boiler and exhausted into a gravity condenser, and to supply this condenser with water, and to draw the water from the Thompson & Quirk mine, so as to prevent its running down and finding its way into our lower workings, a tunnel was driven 16 ft. from the shaft in a westerly direction. From this heading a drill hole was driven by a machine drill 16 ft., tapping the body of water in the Thompson & Quirk mine. The water was then led through a pipe to the condensers and from this into the main sump in the bottom of the main shaft.

"During the accomplishment of this work the mine steadily continued to produce and to pay its regular dividend, and to-day we have a pumping plant sufficient to work the property to a depth of 2,000 feet, unless an extraordinarily large body of water is encountered.

"During the year other improvements have been made. On the surface, an extension to the boarding house, equal in size to the original building, has been built and some improvements and repairs have been made in other buildings. Underground, an upraise has been driven from the lower streak to the upper, at a point 150 ft. from the shaft. In passing, we would say, that a test of the ore made from this upper streak gave 6 ounces per ton.

"This lode has now been worked about five years, during which period no serious disturbance has been encountered, and this in mining operations is the exception rather than the rule.

"During the year the mill has continued to give every satisfaction, and to save a very high percentage of the gold in the ore. From assays made of the tailings the average loss is about \$4 per ton, and as the average value of the ore is about \$180 per ton, it will be seen that the percentage of loss is extremely small.

"The average amount of gold per ton has been about 9½ ounces.
 "The mine has produced 1,955 ounces of gold, from which we have paid nine monthly dividends of 5 per cent. each, which makes 45 per cent. on the par value of the stock for the year. We have also expended a large sum on capital account. This result can, we think, be pointed to as being seldom equalled by any joint stock enterprise in our Province, and is strong evidence that the gold mining industry is capable of being redeemed from the rank of purely speculative ventures, and placed among the steady dividend-earning industries of our Province."

Richmond Developing and Mining Co., Ltd., has been formed in British Columbia to adopt and carry into effect an agreement dated 29th October, 1895, and made between Alexander McLeod, Charles Barney, and J. P. Errington of the one part, and Adolphus Williams, on behalf of the company, to acquire by gift, preemption, purchase, &c., mineral or placer claims and to carry on the business of miners. Authorized capital, \$120,000 in shares of \$10. Head office: Vancouver. Directors: Alexander McLeod, Charles Barney, and J. P. Errington.

Nip and Tuck Gold Hydraulic Mining Co., Ltd., has been formed in British Columbia to acquire the placer mining lease and property known as the 'Nip and Tuck' claims, situate near Wild Horse Creek in the Kootenay district, in the Province of British Columbia, and to carry on the business of mining. Authorized capital, \$55,000, in shares of \$5. Head office: Vancouver, B.C. Directors: A. M. Creery, J. M. Buxton, and W. H. Carnsew, all of Vancouver.

Golden Gate Mining Co. of Granite Creek, Ltd., has been formed to purchase the Golden Gate mining claim, on Granite Creek, in the district of Yale, Province of British Columbia, and to carry on the business of miners. Authorized capital, \$60,000, in shares of \$1. Head office: Vancouver, B.C. Directors: H. De Pencier, D. G. Macdonell, and Melville P. Thomson.

Nestegg Mining Co., Ltd., has been incorporated in British Columbia to purchase the Nestegg mineral claims, in the district of West Kootenay. Authorized capital, \$500,000. Directors: Patrick A. O'Farrell, Rossland; A. B. Erskine, Victoria; and G. A. Kirk, Victoria. Head office: Victoria.

The Halifax Chrome Co., Ltd., is applying for charter of incorporation with an authorized capital of \$60,000, to acquire and mine chrome ores. The property to be acquired is understood to be in Newfoundland. The directors are: C. E. Willis, Halifax; T. R. Gue, Halifax; F. G. Burnham, Morristown, N.J., and G. W. Maynard, M. E. of Morristown, N.J. Head office: Halifax.

Ontario Graphite Co., Ltd., is being incorporated under Dominion Statutes with an authorized capital of \$200,000, in 2,000 shares of \$100 each. Head office: Ottawa. Directors: G. P. Brophy, C.E., Ottawa; S. H. Fleming, C.E., Ottawa; J. W. McKae, Ottawa; J. P. Brophy, Ottawa; and Hector McKae, Ottawa. The property, which is now being vigorously developed, is at Black Donald, near Perth, Ontario.

Hamilton Iron and Steel Co., Ltd., gives notice of application to the Ontario Legislature for an act to legalize and enforce By-Law No. 792 of the City of Hamilton, to extend the time for the completion of the iron smelting works passed on the 24th June, 1895, and for the purposes related to in the bonuses referred to in same by-law.

Hall Mines, Ltd.—The following smelter returns are reported to the shareholders under date of 17th and 28th ult. "The furnace has been blown in today; doing very well, in the 24 hours smelting 113 tons ore has realized 11 tons matte. Assays average:—

	Per Short Ton.
Copper	47 per cent.
Silver	300 ounces.
Gold	10 dwts.

For the week ending 25th January 720 tons of ore were smelted, producing 58 tons of matte, assaying:—

	Per Short Ton.
Copper	50 per cent.
Silver	287 ounces.
Gold	Trace.

Some alterations are being made to furnace, which it is expected will give still better results.

In the annual report of the Directors, from which we quoted last month, the work of the year is recorded as follows:—

"During the past year development work has proceeded very satisfactorily. In the second or main ore body in No. 4 tunnel, Winze F. has been sunk to the depth of 135 feet, and is in ore at its depth, and the ledge is being crosscut preparatory to drifting east and west upon it. In the first ore body a shaft G has been sunk to the depth of 65 feet, also in ore, which is likewise being crosscut. A tunnel (No. 5) has been driven from a point 210 feet below the entrance to No. 4 tunnel and on a line with it, on the main vein of ore, which shows on the surface. This tunnel is now in about 85 feet on the main ledge, and shows more or less of ore on the whole of its length, and beyond this point, good ore has been proved by the diamond drill, leading to the supposition that the ore body is continuous, and extends to the main ore body under No. 4 tunnel. Besides this the level between Winzes B and F has been completed, and other works.

The prospecting work has also been vigorously pushed forward by diamond drilling, and from the surface on the south of No. 4 tunnel on the Silver King, the existence of two separate ore bodies has been proved. The first ore body was struck at 280 feet from the surface, and continued to 340 feet, with stratas of barren ground appearing here and there, and the character of the ore shows yellow and grey copper with traces of peacock. The second vein was struck at 416 feet from surface, and

continued to a depth of 449 feet. The ore shows heavy yellow and grey copper and traces of peacock. Another hole was bored to endeavor to prove the depth of the vein, and at a depth of 820 feet ore was tapped showing grey copper, but at this depth the work had to be suspended till next summer, as this was the extreme length of the boring rods. On the Kootenai Bonanza also the diamond drill boring showed ore at 24 feet from surface, and continued to 56 feet: from 82 feet to 112 feet another body of mineralized ground was passed through, 20 feet of which showed a good deal of grey and yellow copper: from 144 to 159 feet, vein showed mineral grey copper chiefly, which, may be considered satisfactory.

As intimated to the shareholders by circular in the month of May last, the directors came to the determination to erect a tramway from the company's mine, and to connect this with smelting works at a favorable point close to Nelson, on land belonging to the C. P. R. Co. and in immediate connection with this company's line of railway, via. Robson. Steps were at once taken to secure the land necessary, and the chairman, who was at Victoria, entered into negotiations with the C. P. R. officials, and secured a lease of land for a period of 99 years, together with a block of about two acres, on fee simple, on which to erect the smelting works. The chairman also entered into negotiations with the Victorian Government, and in consideration of the works to be erected, obtained from them, as a bonus, a free grant of 50 allotments of land in the town of Nelson, and should the town of Nelson develop to be a large mining centre, these allotments may prove later on to be of great value to the company. The chairman further applied to have the company placed on the list of beneficiaries for the grant in aid of the smelting industries, and his application has been favorably received. This will give the company a bonus of about 50 cents per ton on every ton of ore smelted by the company up to the year 1900.

The tramway has now been completed, and, although some hitches occurred at the start, is now in operation and bring down ore to the bias at the rate of ten tons per hour.

The smelting works also are approaching completion. As regards the gold lead discovered on the Daylight claim and mentioned by the chairman at last general meeting, the works have been suspended on account of a large influx of water which would necessitate pumping machinery, the expense of which the directors are not prepared for at present. They, however, think so favorably of this lead, that they have acquired several of the adjoining claims, through which it has been traced.

The reports from both the manager at the mine and the manager at the smelting works have not yet been received, owing to the time of these gentlemen being so much occupied pressing forward the various works under their charge in order to take advantage of the fine weather so long as it lasted, but these reports are expected shortly, and copies will be at once forwarded to the shareholders."

Temiscamingue Lithographic Mining Co. Ltd., seeks incorporation with a capital stock of \$100,000, in shares of \$100, with the object of carrying on mining and quarrying works and operations. For the said purpose to acquire by grant, purchase, lease or other legal title, and to hold, alienate, sell, lease or exchange and develop or otherwise deal in mines or minerals in the Province of Ontario; and to quarry, mine, smelt, &c., or otherwise dispose of lithographic stone, gold and silver concentrates, gold and silver ores, and to purchase and sell ores, crude, refined or otherwise; to manufacture electricity, electric power and appliances, compressed air or other power, and to carry the same to the quarries, mines and works of the company. The operations of the company are to be carried on in the Township of Jarvis, in the District of Nipissing and elsewhere in the Province of Ontario. Chief place of business, Village of Vankleek Hill, in the County of Prescott. Directors, Dr. Richard, P. Lattee, Bernard Kelly, John Mode, Donald McLeod, all of Vankleek Hill, Ontario; Nehemiah McCollem, of the Township of West Hawkesbury.

The Doherty Process Co. Ltd. of Hamilton, seeks incorporation with the object of acquiring and working any patents of invention in connection with the processes of melting iron or iron ores. Capital stock, \$120,000 in \$2,400 shares of \$50. Directors, A Zimmerman, Peter Crerar, Hon. J. M. Gibson, F. J. Muir, A. Campbell, all of the city of Hamilton. The operations of the company are to be carried on in Hamilton, which will be the chief place of business.

Algoma Copper Mining Co. seeks incorporation with the object of exploring for, developing, mining, smelting, refining and treating, gold, copper and other ores or mineral substances, and erecting, maintaining of buildings and machinery necessary for the proper working of said mines and the reduction and assaying of ores as a smelting furnace or furnaces. Operations of the company are to be carried on in the Townships of Gould and Gladstone, in the District of Algoma and elsewhere in the Province of Ontario. Capital stock, \$1,000,000, in 40,000 shares of \$25 each. Directors, Emery S. Drake, J. W. Call, Em. H. Peters, Geo. McCann, D. W. Payne, P. F. McLaren, S. J. Hall, H. S. Ressey, J. B. Coykendall, all of Elmyra, N.Y. The chief place of business of said company is to be at Thessalon, in the District of Algoma, Ont.

MINING IN NOVA SCOTIA.

(From our own Correspondent.)

We thank Mr. E. R. Faribault for the following geological maps of Nova Scotia:—Guysborough Town sheet; Whitehaven sheet; Isaac's Harbor sheet; Gegorgan sheet; Sherbrooke sheet; Country Harbor sheet; Roman Valley sheet; Pomquet Harbor sheet; Cape George sheet; Antigonish Town sheet; Lochaber sheet; West River, St. Mary's, sheet; Liscomb River sheet; Moser River sheet. These maps include the important group of mines in the Stormont district. They are accurate and well gotten up, a characteristic that has made Mr. Faribault's surveys so popular in Nova Scotia.

We have received the Report of the Department of Mines, Nova Scotia, for the year ending Sept. 30th, '95. To say that it is an improvement on last year's production is, we must admit, but a poor compliment. We notice that the returns of gold for the Stormont district in last year's report have been revised by the following note:—"In last year's report the returns from the Stormont district were 1980 ozs. Owing to the dilatoriness of those required to make returns, the Department, although making every effort, was unable at the date of the report passing into the hands of the Queen's Printer, to give the full returns. Whatever advantage may accrue to the miner, the investor and the general public from the publication of the annual yield of each district, there can be no doubt promptness is very desirable. The reputation of each district in this respect rests entirely with the mill owners."

These returns, when finally made up, showed a yield of 5402 oz., 13 dwt., 17 grs., making the total yield for the Province for the year 1894, 18402 oz., 16 dwt., 12 grs. I append the returns from Stormont as finally compiled.

RETURNS FROM STORMONT GOLD DISTRICT FROM OCTOBER 1ST, 1893, TO SEPTEMBER 30TH, 1894.

Months.	Tons.	Ozs.	Dwts.	Grs.
October.....	1692½	628	7	12
November.....	1493	705	16	..
December.....	1354½	544	8	18
January.....	1480	476	19	10
February.....	1229½	396	..	..
March.....	1423	370	18	..
April.....	1197½	348	17	..
May.....	1173½	297	8	..
June.....	689	229	17	..
July.....	496	124	15	..
August.....	1016	181	15	..
September.....	1485	256	8	..
One return from January to September	2424½	841	4	1
		5402	13	17

It will be noticed from the foregoing that the returns of gold for the first four months are in excess of the returns given for the whole year in last year's official report. It may therefore be assumed that the majority of the mines in this district made no returns for the last eight months of the fiscal year. Such a state of things must of necessity impose a much heavier liability on the guarantors of the mill licenses than they were ever intended to bear.

A noticeable feature in the gold returns is that the two districts which have produced the largest amounts of gold, namely, Stormont, with 4225 ozs., 6 dwt., 11 grs., and Cariboo and Moose River, with 3189 oz., 11 dwt., 1 gr., were working on 5 dwt. 2 grs. and 5 dwt. 12 grs. ore respectively. We hear from time to time a great deal of rubbish from both England and the States about the auriferous veins of Nova Scotia being narrow and the quartz expensive to extract. These two districts stand out as a bold contradiction to such a statement, and should remove the fears of capitalists on this point.

The districts of Sherbrooke, Fifteen Mile Stream, Uniacke and Renfrew all show a very marked improvement on last year, while Brookfield has shot up like a mushroom in the night with a magnificent record which it promises to far surpass in the coming year. There has been a serious falling off in Lake Cacha, Waverley and Stormont, while Tangier and Mooseland, Whiteburn, Malaga and Salmon River appear to have been either relegated to the "Unproclaimed and other districts," or have given no returns at all.

Peter Dunbrack's find at Brookfield looks as though it will turn out to be a real bonanza. He has some of the most lovely specimens of quartz shot evenly through with gold. The lead is about a quarter of a mile from the famous Brookfield mine and is thought to be a continuation of the same lead.

Mr. W. L. Libby, during the last month, has had to move a quantity of the county rock in the neighborhood of the lead, and this was put through the crusher in the hope that it might contain a few pennyweights of gold—the result will be a surprise to everyone—over 300 oz. were cleaned up for the month's run, and we think we are safe in saying there was not 10 per cent. of quartz in the rock crushed. The average yield was sixteen pennyweights. Mr. Libby expects to be crushing quartz again in the latter part of the month. It is needless to add that the country rock will also be crushed so long as it continues of the same gold-bearing nature as that crushed last month.

Mr. Turnbull has been having some very encouraging results at Malaga, and the mine is now being worked at a profit.

Mr. C. E. Willis is in England on business.

The Golden Lode mine paid its ninth monthly dividend of five per cent. last month. This is a splendid record considering that a large amount of the money earned from the mine has been put into new plant.

Tribute work has been started in the Lawson mine, owned by the Golden Group Mining Co., and ounce to ounce and a quarter ore is being raised.

A New Glasgow syndicate intend starting work in Goldenville on the Caledonia and Coburg lead. It is with pleasure that we hail any new enterprise in what was once the finest district in Nova Scotia, and which many of our best mining men consider has greater possibilities than any other district in the province.

The Coburg lead was worked some years ago. On this property the lead is 4 feet wide on the surface, and is good for from 2 to 4 pennyweights of free milling gold per ton, but the lead thins down considerably as it goes down and increases in richness, at a depth of about 140 feet the lead is only 1 foot thick, but is good for about half an ounce of free milling gold per ton. We have little doubt that with proper management, this venture will be successful.

There are few districts in Nova Scotia which would stand working on a big scale so well as Goldenville, with its huge belts of low grade ore, which, if worked with strict mining economy, it would be difficult to imagine failure to be possible. Rumor is in the air that a strong syndicate are considering a proposition there, and we would like to see them go in and win.

We hear that a rich find of gold has been made in Newfoundland, of which we hope to give more particulars later.

The annual general meeting of the Nova Scotian branch of the Canadian Mining Institute will be held on March 11th. We are informed that there will be a good number of papers.

The committee of the Mining Society on Mining Legislation, have been advised by Council to let the proposed amendments stand over until next year, this has caused a considerable amount of grumbling on the part of some members who have devoted a large amount of time and trouble in suggesting amendments. The opinion of those who should know is, that if the matter were brought up this session, it would be simply ordered to lie on the table, and it is therefore considered advisable to leave it until next year and then push it for all it is worth.

A new find of antimony has been made in Hants County. A trial lot has been shipped to New York which produced \$48.00 per ton.

A new find of barytes is also reported from Hants County. We have seen a sample of this mineral, which is exceptionally pure and of a semi-translucent character.

In our notes on the Drummond colliery in the last issue of the REVIEW, the interposition of a hyphen on the part of the compositor has altered the meaning of the sentence referring to the quality of the Drummond coke with regard to the amount of sulphur. Our note reads, "The moisture and volatile matter rarely amount to one-half of a per cent., while the sulphur ranges from five to eight-tenths of a per cent." By this we meant from five tenths to eight tenths of a per cent.

The Joggins miners have been on strike owing to a reduction in their wages. Some of the miners have returned to work, while other are still holding out.

Mr. C. Sidney Harrington, as trustee for the bond holders, has ordered the sale of the properties owned by the Beaver Dam Gold Mining Co. The sale will take place March 19th, 1896, at 56 Bedford Row.

At the annual meeting of the Mining Society the following papers have been promised:—"The Belle Island Iron Deposits," by Mr. Chambers; "Coal for Steam Purposes," by W. G. Matheson, with notes on and analyses; and "Caloric Powers of Nova Scotian Coals," by F. H. Mason, F.C.S. There will be a discussion on air compressors, on which subject members are requested to post themselves, and there will probably be other papers.

MINING IN BRITISH COLUMBIA.

(From our own Correspondent.)

Trail Creek.

The smelter in course of construction at Trail for the reduction of Rossland ores is nearly completed, and Superintendent Wedekind expects to blow in the cupola within the next two or three days. The power which is furnished by a Mansfield circular cut off engine, already running, is now being utilized in running the sampling works, which have for the past week been working steadily on Le Roi ore. The blast, a Root centrifugal fan, is in good working order and will soon be introduced to a charge. The ore bins both at the yard and at the sampling works are already up, though excavations for 16 more bins, to hold ore which has been crushed and sampled, are well under way. A good plant of double-decked O'Hara roasters is situated in the northern building and is nearly completed. The main stack, connecting with the gas flume, is finished and is over one hundred and fifty feet in height. The four reverberatory furnaces, probably the largest ever constructed for this class of smelting, are practically finished with the exception of the bridges, reverberatories and the uptakes to the stacks. The designer has placed a stack to each furnace, showing that he does not believe in the shortsighted economy of working two furnaces to one stack.

A new and distinct feature has been introduced in utilizing gravity in the charging of the reverberatories. Each furnace is supplied with a battery of four cylindrical calciners, supported on iron pillars above the furnace. These calciners, which are of a new design, being vertical iron cylinders lined with fire brick, revolving round a vertical shaft, have their tops placed on a level with the ore bins, which facilitate the charging. After calcination the charge is run through the bottom into a hopper communicating with a still lower hopper which discharges directly into the reverberatory, thus eliminating any hoisting or handling, otherwise necessary. This is the first time the combination of a cylindrical calciner and a reverberatory has ever been used in smelting, consequently their use here is almost a test case of their practical application.

There is a large supply of fuel on hand, and everybody and everything about the smelter has a business-like air. The laboratories, which are most complete in every way, as well as the general offices, are finished and in use. The whole plant will be going full blast in three weeks time.

The machinery ordered from the Ingersoll Rock Drill Co. for the Josie mine is expected any day now. In the meantime the company are still driving the lower tunnel ahead. It is said to be looking well at the face. The company will let a contract for the immediate delivery of three hundred cords of tamarack wood for the firing of the new boilers. The tenders expire today.

Everything is going on nicely at the Le Roi, the hoist being worked to its full capacity daily, and though the freighters have been hauling over 100 tons a day, the ore bins are again nearly full, while the visible supply in the mine of good shipping product is daily increasing, there being fully 15 feet of the best ore yet struck in the mine in the shaft at a depth of 485 feet. The old air shaft, some fifty feet to the east, is being thoroughly overhauled for the introduction of a first class "skip." The old hoist in position at this shaft, is being utilized for the lowering of timbers and vails for the skipway. As soon as the shaft and skip are finished the big hoist, which was purchased last summer, will be moved to this point. The skip, it is calculated, will double if not nearly treble the daily output. The old shaft will be utilized for the pumps, air pipes and pipes from the compressor, as well as a manway. The company is also replacing the old six ton scales with a new set of ten ton Standard scales, the old ones being found to be too light for the work required.

The War Eagle is doing development at present and only shipping whatever ore is extracted in the prosecution of this work. Both the No. 2 tunnel and the tunnel from the bottom of the shaft on the Iron Mask are looking well. In the latter opening the miners are drifting on an ore body six feet wide. In tunnel No. 2 a contract will be let for 100 feet of work. The machinery for this company's big compressor is being put in position as fast as it arrives from Trail. The tunnel near the compressor house at the head of Centre Star gulch is again in ore. This tunnel and the one across the gulch on the Virginus, are both being worked day and night by hand. Compressed air drills will be put in as soon as possible.

The ore body recently struck in the east drift in the Nickel Plate is more than holding its own, and today there is a face of solid ore. There has been a great change in the appearance of the formation in the crosscut to the north, and a recent water-course, together with some ore that is making its appearance, leads Superintendent Williams to believe he is not far from the long sought ledge. About 80 tons of ore that runs well both in gold and copper, is on the dump awaiting shipment.

The owners of the Kiur, a property situated on the south side of Trail Creek, almost at the junction of Tiger Creek, have struck the ledge after running 125 feet in a crosscut tunnel. So far ten inches of ore, in some of which an occasional speck of free gold is visible, has been uncovered.

Fred. Ritchie and T. O'Farrell, have one of the most promising looking prospects in the camp in the Montreal. The ore is the usual sulphide ore that is so peculiarly characteristic of the whole camp and district. On top the vein is seven feet wide, the whole being heavily impregnated with iron and copper pyrites. At a depth of six feet a solid chute of chalcopryite ore, three feet wide, has been encountered.

The South Belt has always been looked upon as an unknown quantity. In fact, by many, it has been openly disparaged. Recent development work, however, has proved that veins on the south side are as well defined, permanent, and even richer than the Red Mountain mines. A good showing in argentiferous galena is a very peculiar and characteristic component of the ore.

The Homestake is the nearest property to town, and probably has the best showing of the lot. Since the new company took hold, rapid strides towards turning the Homestake from a first-class prospect into a mine, have been made. Solid ore has been exposed in every opening, shafts and tunnels alike. This ore runs well in silver and gold, and shows a small percentage of lead. Two carloads of ore have been shipped to the United Smelting Co. at Great Falls, Montana.

Adjoining the Homestake on the south, lies the Bluebird, which is owned by Joseph Bousquet. The vein is well defined, and good ore is found, with pyritic iron and galena its chief characteristic. Bousquet is now engaged developing his property by driving a cross-cut tunnel to tap a first-class surface showing of galena. He says that the tunnel ought to tap the showing at a depth of seventy feet. The tunnel is now in fifty feet, but surface water is very troublesome, and as a consequence the drift is going slower than he expected.

Further to the south lies the Lily May, famous as the first location in the Trail Creek camp. Oliver Bordeau, the owner, and his partner, have for some time past been engaged in sinking shafts and driving a tunnel to thoroughly demonstrate the value of the claim. Shaft No. 1 is down sixty feet and shows two feet of solid ore, a healthy mixture of chalcopryite and galena. Bordeau says that he has obtained assays in silver as high as 248 oz. from this shaft. To the south of this shaft, a tunnel has been driven in some forty feet. A vein of nine inches of solid steel galena has been exposed here. No assay has yet been made on this ore. Shaft No. 2, which lies to the west of No. 1, is down about thirty feet and is in ore.

With the exception of the Homestake, more work has been done on the Zilor, the property of Messrs. Brown and Perdue, than on any other claim in this neighborhood. This claim lies to the south and alongside of the Lily May. The ledge has been uncovered and stripped for 400 feet, and shows strong and true the whole distance. No. 1 shaft, in which the owners worked all summer, was proved by the stripping of the ledge to have been sunk on a stringer, and though it is down seventy feet, and two crosscuts run, one twenty feet in a northerly direction, the other twenty-five feet in a south easterly direction, nothing of importance was ever encountered.

Shaft No. 2 is down seventy feet, and at the bottom shows a solid body of ore five feet wide. Surface water has been found very troublesome in this shaft, and at present the owners are sinking shaft No. 3, which will effectually drain the upper works. It is down twenty-five feet, and shows three separate stringers of high grade ore. Mr. Brown, who is in charge of the mine, says this is the best ore yet struck. The vein matter in this shaft is deeply impregnated with iron.

The Fairview, a prospect owned by W. J. Harris and Frank Watson, of Spokane, is a very high class prospect. Considerable work has been done and two leads, one evidently the same as found on the Zilor, and a quartz lead in addition have been uncovered. The owners predict big things for this prospect.

Other properties in this immediate vicinity, upon which much work has been done, and which are standing the ordeal well, are the Gopher, which adjoins the Homestake on the east, and which in a shaft, at a depth of sixty feet, shows five feet of good copper ore. The Monday has a thirty inch vein of \$50 ore in a drift, and the Curlew has a solid bottom of ore in the fifty foot shaft. All these last mentioned are all owned by Rossland people.

The action of the Canadian customs officers in declining to receive the War Eagle machinery, though Canadian made, which passed through the United States in bond, and allowing it to remain at Waneta, B.C., for four weeks before delivery, will only work harm to Eastern Canadian manufacturers. Owners of Trail Creek mines declare they would sooner pay the duty on American machinery than be subjected to such a long delay and petty annoyances as did the War Eagle Co. It would pay eastern manufacturers to unearth the cause of this last piece of unpleasantness, and have it remedied, if they hope to compete with American machinery firms.

A. B. Irwin, the local manager of the Trail Mining Co., has just returned from Chicago, where he attended a directors' meeting of his company. This company own the Columbia claim, and have just paid the money, \$40,000, to Phil. Aspinwall, for the Kootenay, Tip Top and Copper Jack, the adjoining claims on the east. Experienced mining men pronounce the Kootenay and Columbia the best developed mining property in Trail Creek. Mr. Irwin says that his company have arranged for the development of these properties on a large scale, and will ship a 30-drill Ingersoll compressor from Chicago at once. This plant will be installed upon the Copper Jack ground on its arrival here. Mr. Irwin expects to have the entire plant in operation by the first of May.

It is reported here that a compressor plant for the Cliff has been ordered and is on its way here from Chicago.

It is openly stated here that the War Eagle Company have definitely decided upon the erection of a matting plant for the reduction of the ores from the War Eagle, Iron Mask and Virginus claims. The plant is to be built at once. James Ereen, the well known smelter man from Montana, and Patrick Clark, the President of the War Eagle

Co., have left for Chicago to purchase the necessary machinery. The exact location of the smelter is not yet known, though it is thought that it will be built in close proximity to the mines.

Oliver Durant, the general manager of the Centre Star, says that the erection of a matting plant for the treatment of ores from the Centre Star and Idaho mines is almost an assured fact.

Work on the Morning Star is proving that claim to be a wonder. A contract for 50 ft. of work in the shaft has just been let.

Work has been resumed on the St. Elmo.

The Le Roi mine is shipping 100 tons a day to the Trail smelter, as well as filling some small outstanding contracts with American smelters.

Judge Spinks has issued a condemnation order putting the Rossland and Trail Creek Tramway Co. in complete possession of their right of way, as surveyed. Construction work will start at once, and it is declared the road will be completed by the first of May. It is sadly needed.

No decision in the Paris Belle vs. Nelson and Fort Sheppard Railway Co. case yet.

The tunnel on the Indiana Consolidated is nearing the ledge. Small stringers of galena are making their appearance in the breast of the tunnel.

Slocan District.

The harvest time of the Slocan mines is now in full season. There are between twenty and thirty producing mines, but of these many ship in only an intermittent way. The usual method of taking the hand-picked high grade ores to the railways is by raw-hiding, each animal taking about a ton of the ore.

The "Ruth," an ably conducted and valuable mine, half a mile northwest of the "Slocan Star," is being operated by the original locators. The motto over the tunnel mouth reads, "Never get discouraged." This is more inspiring than "No admittance," to be seen upon one or two Slocan mines. A force of twenty men work the "Ruth." The ore is hand-picked and raw-hided into Sandon.

At present four mines ship at Sandon, the favored Slocan town which has two railways and no sunlight. The shippers are the "Slocan Star," "Reco," "Ruth" and "Ivanhoe," in order of importance. Some eight mines ship at Cody Creek, the present terminus of the Kaslo and Slocan Railway, two miles farther up the creek. The chief shippers are "Noble Five," "Deadman," "Last Chance" and "Good Enough."

Development work has been going along quietly upon the range east and south-east of Slocan lake. This district was well prospected and located last season. Already several small shipments of high grade ore have gone out. The assessment work of the coming summer will prove whether the promise of its prospects will be fulfilled by producing mines.

The "Enterprise" group, upon Ten Mile Slocan lake, is showing up very favorably under the bond of J. A. Finch. Its success will be of great benefit to the district. The "Arlington" and "Burlington" upon Springer creek, under bond for \$50,000 to the same well known mining man will be developed during the coming summer.

The following are the deliveries for the week of first February at the Kaslo station:—

	Pounds.
Slocan Star mine.....	150,000
Goodenough mine.....	33,000
Washington.....	31,500
Robert E. Lee mine.....	43,000
Payne group of mines.....	195,670
Deadman mine.....	132,000
Northern Belle mine.....	100,350
Noble Five mines.....	121,840
Last Chance mine.....	158,000
Wellington mine.....	90,000
Ruth mine.....	126,024
Lucky Jim mine.....	54,000
Black Fox mine.....	8,650
Gibson mine.....	18,570

This makes a total of 676 tons. During one day of twenty-four hours, when the road was clear of snow, the delivery amounted to over 350 tons. The larger portion of the ores goes to Great Falls, and the balance to Everett and Omaha. The Black Fox and Gibson are on the south fork of Kaslo creek, and these are the first shipments from the mines in that vicinity.

The Blue Bell mine, owned by the Kootenay Mining and Smelting Company, operator of the Pilot Bay smelter, produced during the past year 51,361 tons of ore. From March 16th to December 31st the company produced 6,440,000 tons of bullion. This immense and profitable concern is under the direct supervision of Andrew R. Hendryx. After a short close-down for repairs the plant is again in full operation.

Boundary Creek.

Mr. Turner, who recently bonded the "Gold Drop," has since bonded the "Monarch," Greenwood camp, for \$12,500. The ore carries a high percentage of copper.

The Parrot Smelting Co. have purchased the remaining interest in the "Stem-winder," which they had bonded. Operations have since been suspended.

The Morrison Copper Company has just been stocked in Spokane for \$1,000,000.

The deal in progress with the American Metal Co. is not yet completed. Mr. John Weir, Vice-President Montezuma Concentrating Co., was in this week in connection with it, and is reported to have purchased six properties, of those in camp most developed. Although this report cannot be definitely confirmed at present, it is known that Mr. Weir will be in the spring to commence extensive development work.

Gold in British Columbia.

By R. C. CAMPBELL-JOHNSTONE, Vancouver, B.C.

In recounting the formation and geology of the rocks and in relating the past history of mining in British Columbia from its first known discovery in 1851, and from 1858, when first practically mined, the authority *par excellence* referred to is unanimously Dr. George M. Dawson, C.M.G., F.G.S., now head of the Dominion Geological Department, whose energy and quick perception in the field have done so much to attract attention and open the way to further research and development of the minerals scattered throughout the length and breadth of the Province. Alfred G. Lock, F.R.G.S., also has collected and compiled much useful information; and the annual reports of the Minister of Mines for the Province detail the fresh work accomplished in each district year by year through the Government officials acting locally.

The object of this article is to prove the soundness in investment in gold mining in this Province, and the possible returns in dividends to be obtained, not to the detriment of other minerals, but, for the time being, writing only of the most sought for metal, gold.

To lead up to the object desired it will be best to note briefly the method of occurrence in nature of the metal; then what steps have been taken in the past to win that metal; what districts have been proved by actual work to contain it in the greatest quantities; the most profitable methods to win it in the future; and so the chances for profitable investment of capital in the industry. In recounting the occurrence of gold we will follow Mother Nature in her works, who first deposited it in the rocks in veins, then through her natural phenomena elevated or depressed these rocks, ground and disintegrated them by snow, frost and water, concentrating and washing the noble metal into alluvial deposits, and repeating these operations to the end of time. In some cases Nature has secreted gold unalloyed and alone in veins, thus constituting what is known as free milling ores. In other cases the gold is mechanically mixed throughout the gangue with small quantities of sulphides of other metals, forming a milling and concentrating ore. Again it occurs alloyed with masses of metals of various kinds, as copper or lead, in which case the ores have to be smelted. Those veins of milling ores so far discovered have been described as generally occurring in formations consisting of a series of talcose and chloritic, blackish or greenish gray slates or schists, which in places become micaceous, and for the most part more metamorphosed than other Pacific auriferous rocks. The veins and walls not often distinctly separated, but carrying gold side by side indiscriminately. The veins of smelting ores developed, which carry gold, occur generally in the diorites or granites, following the characteristics of the prevailing mineral. From the milling ores are derived the alluvial deposits of auriferous gravel, so widely distributed in the old and present water channels. The history of the bravery and perseverance of the pioneers of the Province, who since 1858, without interruption, have scattered, and of the others who are now following their example, facing the dangers of snow, flood, hunger and fire, while penetrating the fastnesses of the mountains in Cariboo, Cassiar, Yukon, Kootenay and throughout the Province, searching for mineral, overcoming hardships and often getting lost—all this has been ably recorded elsewhere, and deserves to be repeated again and again.

According to the Minister of Mines' report for the year 1894, the actual result of gold mining has been that \$54,349,000.00 (fifty-four millions, three hundred and forty-nine thousand dollars) worth of that metal has been taken out between the years '58 and '93, a period of thirty-five years. This was an average of considerably more than a million and a half dollars per annum. All this was won by comparatively few men from alluvial deposits occurring near the surface. The quartz veins were neglected.

What districts have been proved by work to be the best sources of gold next come under notice. Considering that British Columbia contains 390,344 square miles of land, and this for the most part a sea of mountains, consisting of four distinct parallel ranges running north and south for eight hundred miles, in its average width from east to west of four hundred miles, there is in this area plenty of scope for mineral wealth and no districts have failed to show gold in ample quantities. Taking first the northern districts, Yukon, Cassiar and Omineca, into these parts the hardy prospector has penetrated, followed later by members of the Geological Survey, and all unanimously proclaim the riches stored up in these parts. However, until communication is made easier, the capitalist will hardly seek for investment there, as the richness would have to be phenomenal to set off the short season to prospect in, and the cost of transport for machinery and supplies.

In describing the other accessible districts, we must begin with the localities paying for quartz mining. In Cariboo, quartz veins are expected in quantity, on account of the coarseness of the alluvial gold. Owing to the expense of transport in the past, any quartz yielding less than \$18 per ton, could not have been worked profitably. With the improvements of the present day in saving over 50 per cent. of the assay value, it is possible to make \$8 rock pay, when the veins are wide.

Mr. Amos Bowman, of the Geological Department, carefully examined and wrote on the quartz veins in Cariboo round Barkerville in 1887, and his descriptions call for rich wide veins, refractory from the presence of pyrites. Finds of quartz, assaying rich on the outcrops, have been made on Pixon Creek, the Quesnelle River and elsewhere to the Rockies. Quartz mining as an industry is not at present pursued in the Cariboo, though rumours of claims being bonded to capitalists for development are rife, and fresh discoveries plentiful.

The next district we come to is Lillooet. Here many quartz veins are evident on the surface, among the most noteworthy being those on Cayoose Creek, which at present are bonded by an English company, who shortly propose erecting stamp mills. The Big Slide mine on the Fraser is idle, though a stamp mill was built there formerly with chlorination works.

Other veins also show along the Fraser and Bridge Rivers, and finds are reported from the Anderson and Duffy Lakes.

In the Yale district, the zone around Anderson and Salmon rivers is recommended by Dr. Dawson as a promising locality, rich float rock having been picked up there. In the south of the district good strikes have been recently made along the Tulameen River. On Siwash Creek and back in the Hope mountains, quartz veins show up conspicuously.

In the Westminster district, along the coast, on Seymour Creek, and in the interior on Stave, Pitt and Harrison rivers, quartz veins have been located. On Vancouver Island, the Allerni and China Creek camps are being developed, upon favourable reports by the government.

Returning East again, around Shuswap Lake and down through Vernon and Kelowna, veins have been staked. Further south we come to the Fairview camp in the Osoyoos district, certainly one of the most promising gold milling camps in the province. Much development has been done here, proving the veins deep and rich enough to pay well from crushings of a thousand tons and more, but for some unaccountable reason the working of these mines is delayed.

Cherry Creek, east of Kelowna, was at one time looked on as a promising camp, but has failed so far to materialize. Prospectors, however, are out again industriously searching between Okanagan Lake and the Columbia River, through Fire Valley.

Rock Creek camp, near the boundary, has been proved, but crushing has not commenced regularly.

In the West Kootenay district, to the north in the Big Bend country, veins with quartz showing much gold to the eye have been located, but from difficulty of communication, work is not in full swing. Coming south the ores on Cariboo Creek carry gold, but whether a smelting or milling ore, has not yet been demonstrated. Around the south end of Slocan Lake this year were discovered veins in granite carrying native silver and gold, but these will probably open into smelting ores to be concentrated. West of Nelson a short distance, there is a promising group of claims with milling ores, and stamp mills have been erected. South of Moyea, Salmon, Boulder and other Creeks are refractory ores carrying gold.

Trail Creek, on the west of the Columbia, is the great gold ore shipping camp of the Province, extending west on the Kettle River and Boundary Creek, and their tributaries.

The gold here is contained in pyrrhotite, and is a smelting ore of paying grade, and the lodes are large and massive. All along the eastern side of West Kootenay, from Duncan River, the Illecillewaet, the Lardeau, and down the east side of Kootenay Lake to the boundary, many of the ores carry gold. Coming now to East Kootenay, the McMurdo country is the most promising as so far proved. Up the Columbia to the international boundary gold has been found here and there.

The above is a rough sketch of the localities so far located, where gold ore is being worked. In many places development is showing up the claims exceedingly well, and a short time only will suffice to prove their richness and justify the erection of machinery.

Now to relate what is being done with hydraulic mining on a large scale, that is washing down auriferous gravel banks by means of monitors or nozzles, and running the gravel through sluice boxes. In the north the Quesnelle River is receiving most attention. Large companies own ground its entire length from the mouth to the north and south forks, and up each of these.

One company especially have completed all their works and started washing with their full complement of water the third week in August. They cleared up \$42,000 worth of gold in 29 days, of fourteen hours. Other companies have thoroughly prospected their ground and gauged its value, commencing to dig ditches many miles in length to bring in water. On the Horsefly one company is in full work and doing well, and others are building ditches and laying pipes. On other creeks the ground is being prospected preparatory to operations. In the south of the Yale district on the Similkameen and Tulameen Rivers, one company have their ditches built, and others propose washing in the spring. There platinum is plentifully mixed with the gold in the gravel, the coarse, unrefined metal averaging 75 per cent. of platinum, 5 per cent. iridium, and other rare metals, which is 10 per cent. higher than the average Russian alluvial platinum. In the Kootenay on 49 Creek, hydraulic mining is being successfully carried on. In the Lardeau and south of Nelson on the Moyea, Salmon, Boulder and Pend d'Oreille, are hydraulic grounds. In the east Kootenay on Wild Horse Creek an English company are washing some rich ground.

In the Yale district at Lytton a company have been hydraulic mining, but have not their water supply perfected. Other companies below Yale have been operating, but with insufficient pressure. On the Vancouver Island hydraulic mines are being opened in the Alberni district. The good results obtained on the Quesnelle and Horsefly should give hydraulic mining an impetus for 1896, and large sums are now being spent preparatory to operating.

We next have to consider hydraulic elevating. This class of mining consists in raising gravel up a height where dump and drainage are insufficient by means of water under pressure playing through nozzles into cylinders, up which the gravel is forced.

The height obtainable is roughly reckoned at 10 per cent. of the pressure. For example water under 300 feet pressure will raise gravel 30 feet. The most conspicuous companies about to engage in this class of mining are those having their ground on Williams' meadows, an English company, and one on Horsefly, a Californian company. This system of elevating has been proved a success in New Zealand and California, and has all in its favor in this province, with the bountiful supply of water and rapid grade of channels, giving a high pressure in a short distance.

Next to come under consideration is river dredging. This is raising the phenomenally rich deposits under the water of present rivers, and passing the gravel through sluice boxes after removing the large boulders by gratings or grizzlies. The class of machinery so far built is a large scow or barge to float on the water and carry the dredgers over their place of operation. Some of the plants use only centrifugal pumps; others clover-leaved, ball or skeleton dredgers to remove the larger boulders, and then rely on their centrifugal pumps to raise the gold and gravel; others again are using bucket and scoop dredgers. Four hundred miles of river bottom in the province have been staked out for this class of mining.

Expensive plants costing twenty-five thousand dollars each, have been built, and are being built, and divers in some cases are working in conjunction. There can be no doubt that when, by experience, the right method of working has been demonstrated, this kind of mining will be lucrative, as it has been on the Molyneux River in New Zealand.

Lastly, we have to consider deep drift mining, where heavy pumps are necessary to drain out the water, or long tunnels run to reach old dry channels. In Cariboo several companies have sunk shafts from 200 to 300 feet and more to reach bed-rock, under an upper stratum of clay, impervious to surface water. On bed-rock they branch out into long drifts, raising the rich gravel by hoisting machinery to the surface and washing it. In many cases valuable pockets are found, yielding hundreds of dollars, but there is danger of the water overcoming the pumps for a time in the wet season, when the snow melts. Drifting by tunnels along old water courses is profitably carried on in many parts of the province. In Cariboo, Lillooet, on Granite Creek and other tributaries of the Similkameen and Tulameen Rivers, in the Big Bend country and in East Kootenay wing-damming streams to divert the current to the opposite side and then drifting, is carried out in several locations, a ten ounce nugget having just been taken out by this class of mining on Granite Creek, worth nearly \$200.

What methods are best adapted to treat the ores of British Columbia? The milling ores, all so far developed, come under the head of refractory, carrying sulphides of iron, (pyrites); lead, (galena); copper, (pyrites); zinc, (blende); and arsenical pyrites, (mispickite), in small quantities. These have to be stamped and concentrated. A most successful method now in vogue in Australia is stamping, concentrating on frue-vanners, and treating the concentrates, either by shipping to smelters or roasting and chlorinating on the spot. The tailings are treated with a weak solution of cyanide of potassium, which dissolves out the fine gold and cleans the coarser, allowing the latter to be amalgamated on quicksilver silver plated copper plates. This process has saved 98 per cent. of the assay value of the ore. The above is only one suggestion, as every ore must be experimented on in its individual case, according to the richness of the concentrates and tailings. In hydraulic mining all the coarser gold is saved if the set precautions of regulating grade and flow in the sluice boxes are observed.

The black sand, however, often carrying \$100 per ton and more in gold, would pay to save and treat chemically, instead of being washed away on the dump.

Undercurrents and other mechanical appliances could be cheaply placed at the outlet of the sluice boxes to catch this black sand. The smelting gold ores goes to the smelters, fetching their market value of contents, minus a small discount for loss in smelting and returning charges.

Smelters exist already and others are being erected in the West Kootenay.

In considering the soundness of investing in gold mining in this Province, there is no question of the profits being great if circumspection is used in investigating and prospecting the property before buying.

The following remarks apply to mining all the world over, and ought not to be necessary. However, business men investing in mining so often lose their business methods, and listen to fairy tales, letting their fancies and dreams run away with them.

A sensible man buying a valuable horse would naturally apply to a reliable veterinary surgeon to examine that horse before purchasing, as he does not deem himself capable of doing so on his own behalf. A sensible man buying a mine, in the same way, should consult a reliable mining engineer, and get him to report on that mine before purchasing.

How common is it for a business man, sensible in his own line, to lose his head and plunge into mining speculation without consulting a man brought up to mining, theoretically and practically, and so capable of passing an opinion.

Plenty of water and timber, generous mining laws, and comparatively cheap labor and living, all go to make the cost of mining low in British Columbia.

A man can choose which class of mining he prefers, from the different methods enumerated in this article, and with sound management by an experienced mining man should reap a rich harvest from the bountiful supply of gold, kindly scattered by nature throughout the length and breadth of British Columbia.

Notes from La Seine, Ont.

From our own Correspondent.

Notwithstanding the extremely low temperature prevailing in this section during present month, exceedingly good progress has been made at the Ferguson and Foley camps—particularly at the former—where, so far, the work of development is *al fresco*. Their "No. 1," or the "Finns" shaft, is down 54 ft., upon a splendidly defined lode of 4 ft. 6 in., the ores of which carry much visible gold. This shaft is upon mining location AL 110, which with AL 111, comprises the original "Kelly-Mosher" claims recently bonded to Mr. Ferguson, of London, for \$30,000, 10 per cent. of which has been paid owners. Opposite the "Finns" shaft is another pit driven to a depth of 25 ft., upon a 5 ft. lode, the ores of which are marvellously rich in coarse and fine native gold. There are also two other shallower pits upon this claim, averaging 10 to 13 ft. in depth, where the veins measure 4 ft. 6 in. and 5 ft. in width respectively, and where also the same excellent showing of auriferous quartz is visible.

The work at this camp to the present time has been hand labor contract. It was long past the close of navigation ere the preliminaries were arranged. Their progress has been steady, their work practical and economical, and it goes without saying, the result most encouraging.

At the Foley camps, upon AL 74-5, very good progress has also been made, especially in the north shaft, now down 125 ft., with drifts of 16 and 20 ft. on their 5 ft. lode from the first level at 100 ft. This lot, AL 75, was acquired by purchase from Col. Ray & Co., this month, and judging from the rich ore—all of which is free milling—it may well be considered "the most eligible of the Foley claims." At shaft No. 5, upon AL 74, a depth of 103 ft. has been attained and drifting commenced both ways upon the lode, which, by the way, is opening out from 22 in. to nearly 3 ft. of solid and highly auriferous quartz. Mining operations here are by Ingersoll drills. The elevation of this shaft above the level of La Seine river, (expansion) distant 2900 ft., is 138 ft.

Between Bad Vermillion and Turtle Lakes are situated mining claims 237-8E, owned by Mr. Rodie, where a very fine showing of free milling ore is being quarried from surface outcroppings and treated by a rather primitive milling and amalgamating plant erected there for the owners (Rodie and his "Swedes") by their neighbor, Mr. W. E. Stone.

The "New Zealander."—This embryo mine is also in the green slates, and although no appreciable amount of sinking has been done upon these series of parallel veins, they can be traced eastward and westward along the "base line" for long distances, and consequently since Stone and Rodie have "struck it rich," almost everyone in that section, regardless of the strike or dip of this supposed bonanza, claim to be "right on its production," etc. Mr. Stone and his son came here last spring. They are immediately east of the "Swedes," and unlike MacCauley's creation, *our* New Zealander sees no ruin ahead; on the contrary his motto is "construction," and his views clear and *couleur de rose*.

Through the efforts of Colonel Ray an appropriation was obtained and a winter route established between Ignace on the C. P. Railway and this place. Mr. Cobb, of Ignace, is the contractor. Two trips *via* this route have already been made by stage. Stopping places (two) have been organized, and if we could but have our mail travel this way it would leave little to be desired. At present our letters remain at Fort Frances (unless sent for specially) from 15 to 19 days, the government courier invariably leaving the "Fort" from 3 to 5 days in advance of the incoming mails *via* Lake of the Woods.

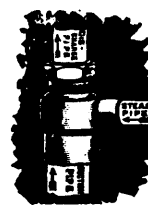
Immediately adjacent to the present Foley claims now under active development, are the other partially developed, and thoroughly prospected claims of Colonel Ray, banker, of Port Arthur. This estate includes block K198, examined by William Hamilton Merritt and other metallurgists, with the result of determining its ores to yield an average of \$33 per ton. This block is traversed by the "Ray-Foley" and other auriferous lodes, now about being systematically developed.

The Bull claims, including J. O. 12, 13, 14, 15, 669P and others, all located upon Timber Berth 34, have at last been granted a clear title! These claims are in the green slates of "Keewatin" or Huronian age, and traversed as they are by at least three lodes that everywhere tested pan rich in gold, and in many places show splendid samples of coarse and fine gold to the naked eye, are naturally attracting considerable attention. Pits to the depth of 12, 16 and 18 ft. have been excavated upon the middle locations (13 and 14 JO) of this estate with good results in free milling ores.

Large Compressor for the War Eagle Mine.—The War Eagle Gold Mining Co.'s air compressor is rapidly being put in place. The plant was purchased from the Canadian Rand Drill Company and shipped from its works at Sherbrooke, Que. It is an immense piece of machinery, weighing 74,000 pounds, and will run some twenty drills. The Le Roi Company has also ordered a lot of labor-saving machinery and when in place this mine will have ten drills in use.

The Desulphurization of Iron.—Many efforts have been put forth to arrive at a perfect means of freeing iron from sulphur, and any suggestion for the solution of the problem cannot fail to be of great interest, for the presence of even a small percentage limits the use of the metal. Dr. B. Torres, of London, Eng., has constructed a special convertor which combines some of the features of the reverberatory furnace and the Bessemer converter. It is lined with baryta, which at a high temperature is said to decompose the graphitic carbon and silicon found in ordinary grey pig iron. The furnace in use at the laboratory, which produces about 2 cwt., taking three hours to each charge, and using Cleveland iron with 1½ per cent. of phosphorous and 1 per cent. of sulphur, produced bars regarding which Messrs. Kirkaldy made the following report:—Bar 1 in. x 1½ in. x 13¼ in. long of 0.564 in. area, turned, gave an ultimate stress of 9.39 tons to the square inch. The second bar, 15 in. long of the same dimensions, gave an ultimate stress of 10.99 tons per square inch.

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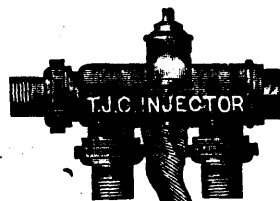
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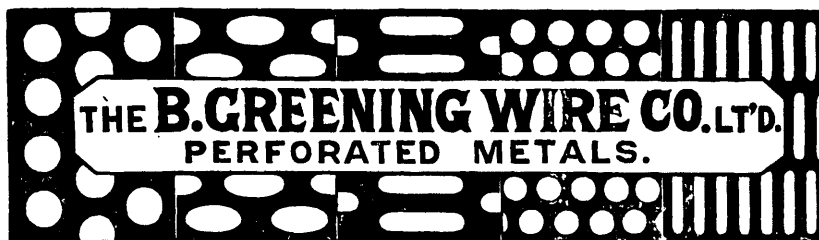


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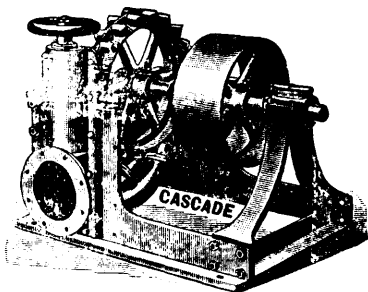
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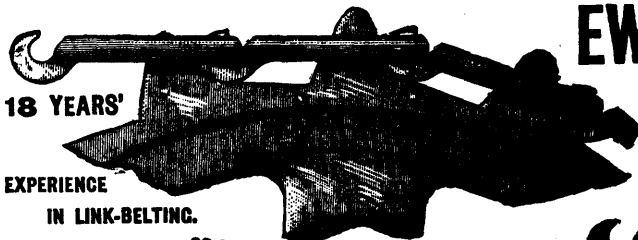
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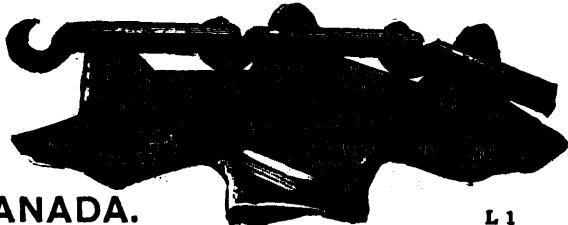
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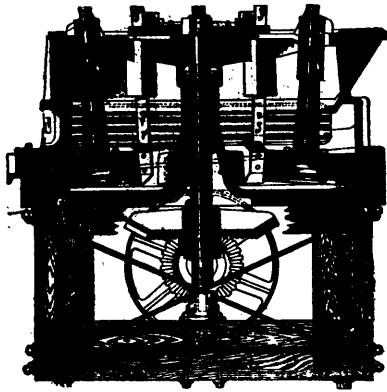
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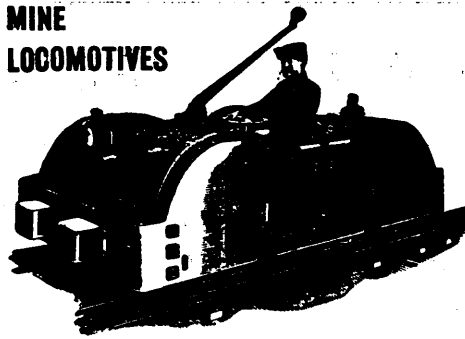
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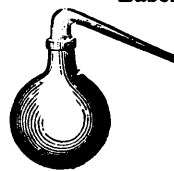
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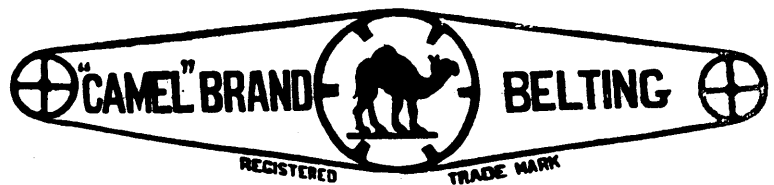
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CHAPTER I.—Asbestos.
 CHAPTER II.—Gold Mining and Milling.
 CHAPTER III.—Coal Mining and Trade.
 CHAPTER IV.—Iron and Steel.
 CHAPTER V.—Copper and Nickel.
 CHAPTER VI.—Silver.
 CHAPTER VII.—Mica.
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Licenses 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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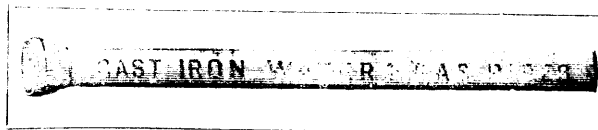
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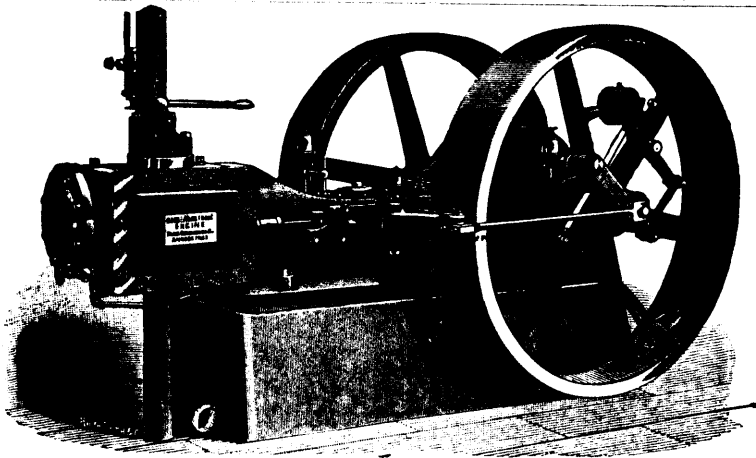
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