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Established 1882

Vol. XVII.—No. 7.

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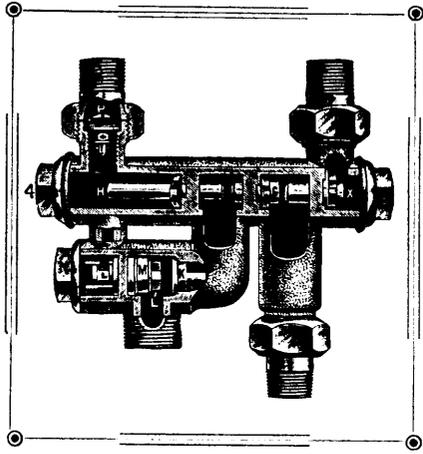
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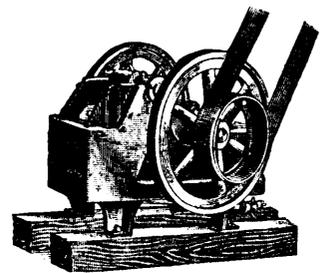
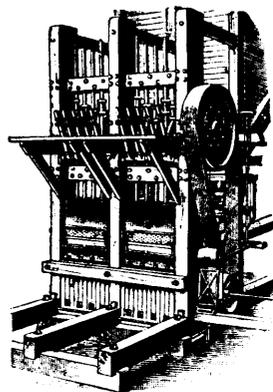
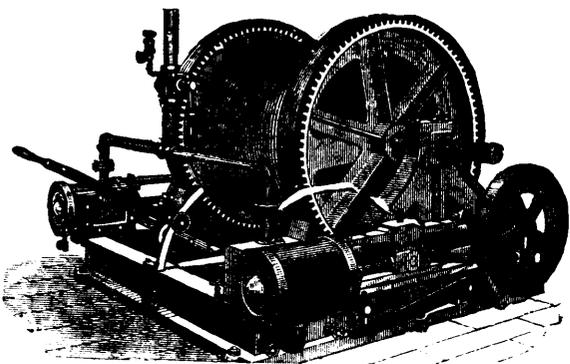
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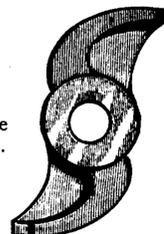
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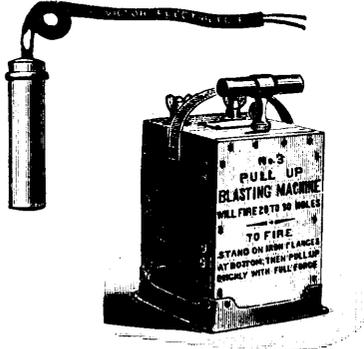
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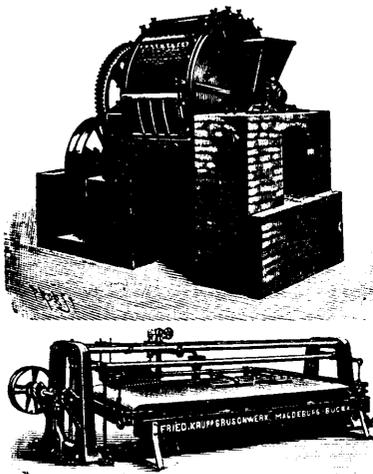
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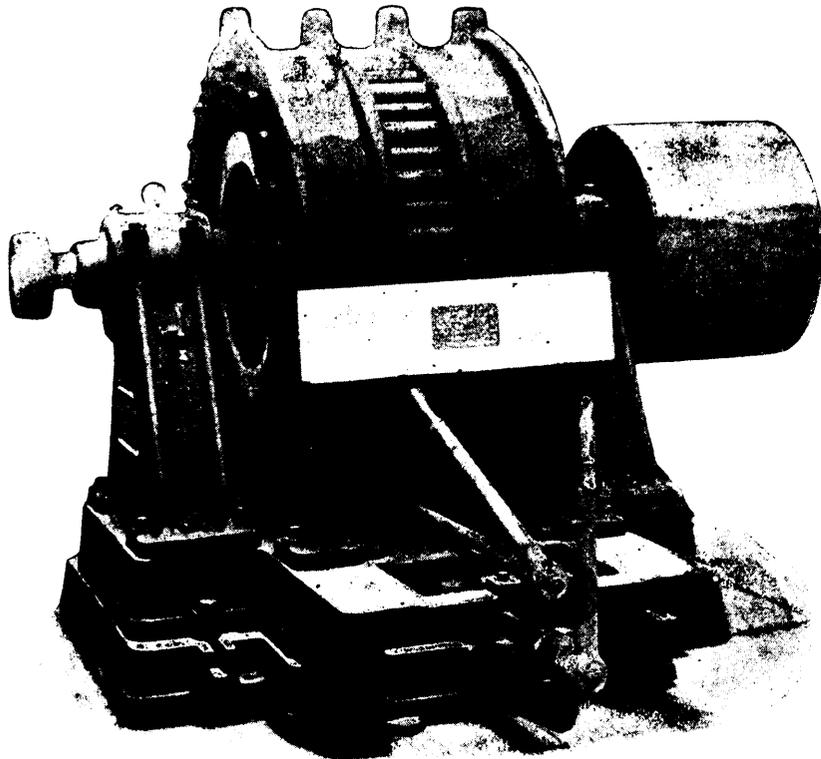
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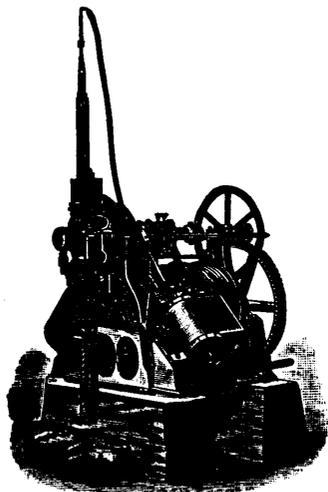


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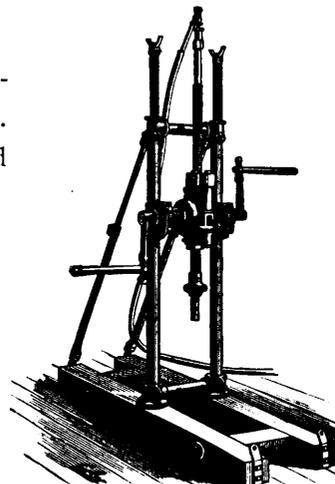
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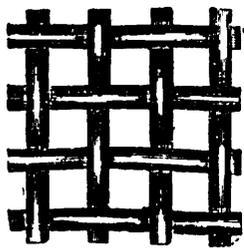
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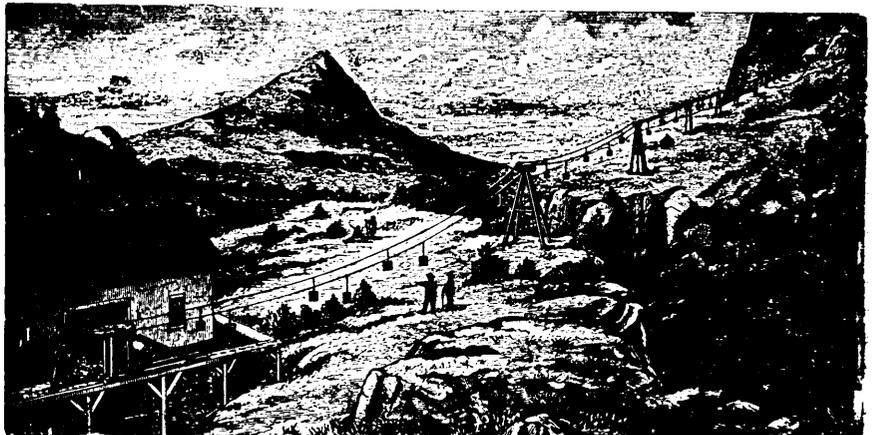
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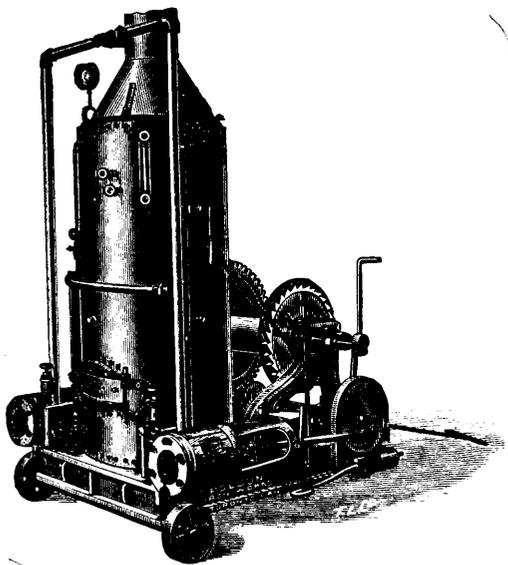
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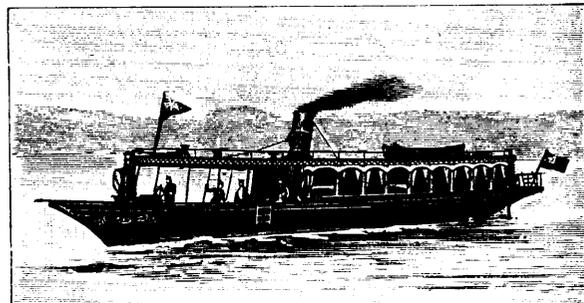
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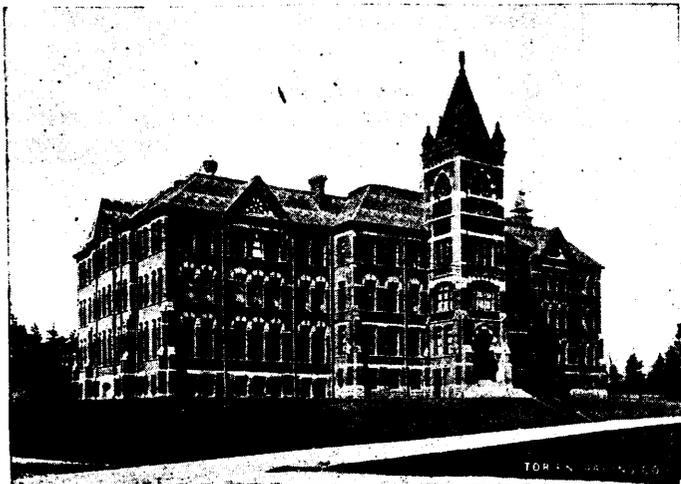
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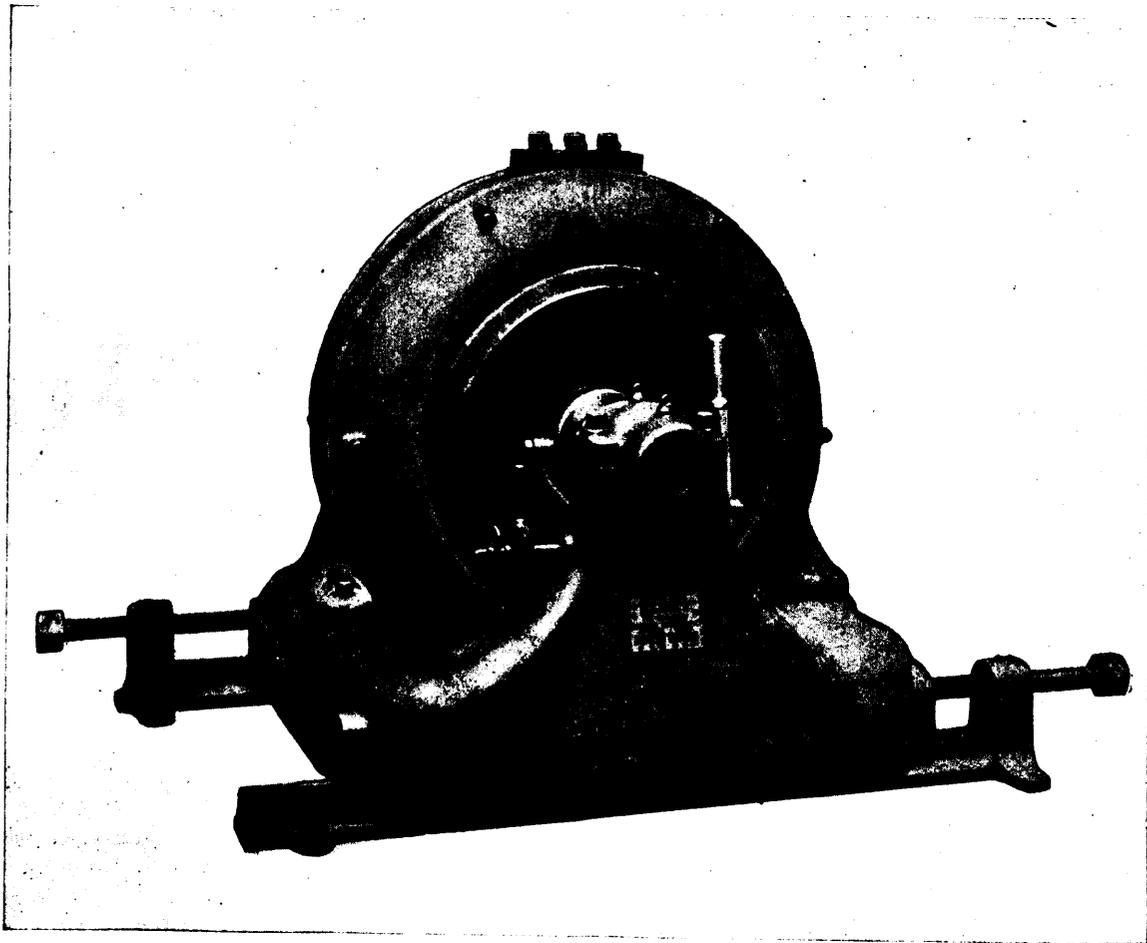
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AMOUNT AND VALUE OF MATERIALS PRODUCED 1896 AND 1897.

	Customary Measures.	1896.		1897.	
		Quantity.	Value.	Quantity.	Value.
Gold, Placer	Oz.....	27,201	\$ 544,026	25,676	\$ 513,520
“ Quartz	Oz.....	62,259	1,244,180	106,141	2,122,820
Silver	Oz.....	3,135,343	2,100,689	5,472,971	3,272,836
Copper	Lbs.....	3,818,556	190,926	5,325,180	266,258
Lead	Lbs.....	24,199,977	721,384	38,841,135	1,390,517
Coal	Tons.....	894,882	2,688,666	882,854	2,648,562
Coke	Tons.....	615	3,075	17,832	89,155
Other materials.....			15,000		151,600
			\$7,507,946		\$10,455,268

Production for 1890, \$2,608,608; for 1896, \$7,146,425; for 1897, \$10,452,268.

GOLD.

Gold-bearing lodes are now being prospected in many parts of the province, and at Rossland magnificent ore-chutes of very profitable gold-copper ore are being mined and smelted, the Le Roi having paid to date, \$725,000 in dividends, with a large and increasing amount of ore in sight as the workings attain greater depth, while systematic development on other properties is meeting with excellent results, mining having just fairly begun in this camp. Little doubt can now be entertained that Rossland will become a heavy producer of gold, and that excellent properties now only await sufficient and abundant capital to become paying mines, to further aid in which the facilities for cheaper transportation and smelting are being now supplied. At NELSON and at FAIRVIEW, CAMP MCKINLEY, GREENWOOD, CENTRAL and other camps in the southern part of Yale, important work is being done on the quartz ledges there, several new mills being under erection.

Exploratory work is also in progress in EAST KOOTENAY and in LILLOOET, ALBERNI, and on the Gulf islands and along the coast line of the mainland, as well as in other parts of the province.

In CARIBOO, several large undertakings, involving a large amount of capital, are at work exploring both modern and ancient river channels, the Cariboo Hydraulic Mining Co., on the Quesnelle river, proving, on development, to have in a channel of the latter kind, a great gravel deposit of exceptional richness, while other parts of this district now offer every inducement to capital.

Into CASSIAR, OMENICA, and the great area to the north, as well as Cariboo, there now promises to be a great exodus of explorers, incited by rich diggings now being mined in the YUKON, as on the KLONDYKE, to the north, and river and creeks long reported to be gold-bearing will now be made accessible, and well tested.

SILVER-LEAD.

Despite the drop in the price of silver, the SLOCAN mines are being much more extensively worked, while the shipments of high grade ore are constantly increasing, the higher price of lead more than compensating for the lower silver values. The production for 1897 has much exceeded that of 1896, as such mines as the "Payne," "Ruth," "Whitewater" and other mines increased their output.

At NELSON, the "Silver King" or Hall mines is shipping constantly a large amount of silver-copper ore, and the LARDEAU, TROUT TAKE, ILLICILLEWAET districts, on further exploration, promise to become rich districts. In EAST KOOTENAY large bodies of silver-lead ore will be mined on completion of the railroads now under construction.

COPPER.

Copper is being produced to a limited extent at ROSSLAND and NELSON, but the large deposits of at present low-grade ore in the BOUNDARY CREEK district will be fully tested when the railroad, now almost assured, is constructed. Prospecting is being done at KAMLOOPS, along the west coast of

the mainland and of Vancouver island, as well as at many other points, and TEXADA is producing high grade bornite ore.

COAL AND COKE.

The large collieries on VANCOUVER ISLAND are producing about a million tons of coal annually, and at COMOX an excellent coke is now being produced, much of which is shipped to the inland smelters. The great deposits of coking coal in East Kootenay, at the CROW'S NEST PASS, are now being opened, as the C.P.R. is now being built to the Columbia river to supply the great mining regions with cheap coal and coke.

SMELTERS AND RAILROADS.

The smelting industry is now beginning to assume large proportions, as preparations are being made to treat the ores of this province within her own borders, a most important factor in the increasing prosperity of this country, entailing as it does, and will, the employment of much capital and many men. The extension of the railroad systems to different parts is now in progress, and the next few years will see many parts in which the prospects for good mining are excellent, made easy of access, while ores can be shipped with facility to the smelting centres, where the assembling of the various interfluxing ores will make possible the treatment of all British Columbia ores at home.

CAPITAL.

Capital can now find here excellent and many opportunities for investment, if proper business care and the experience of qualified men are utilized, as the values placed on mines and undeveloped properties have reached a reasonable basis.

MINERAL LANDS.

Mineral lands are open to location to any person over eighteen years of age, who has obtained a free miner's certificate, and perfect titles to lode claims can be easily secured after \$500 worth of work has been done per claim. A great extent of territory has yet to be prospected.

YUKON GOLD FIELDS.

As the KLONDYKE and other gold fields in the Yukon in British territory is reached mostly via British Columbia, all SUPPLIES and OUT-FITS obtained at VICTORIA, VANCOUVER, ASHCROFT, KAMLOOPS, etc., can be taken in FREE OF DUTY, which otherwise WILL HAVE TO BE PAID if not purchased in CANADA.

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GOLD AND SILVER.

Under the provisions of chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at \$2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

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

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

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

MINES OTHER THAN GOLD AND SILVER.

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

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

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

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

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

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

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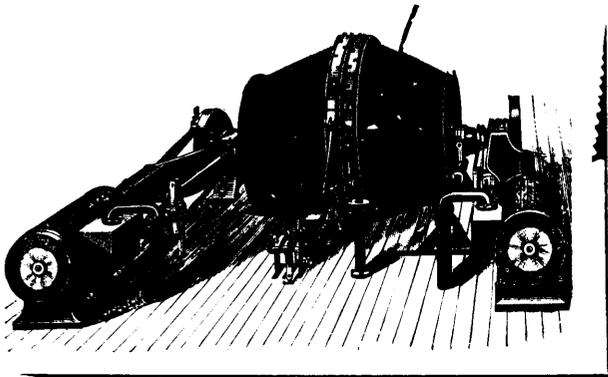
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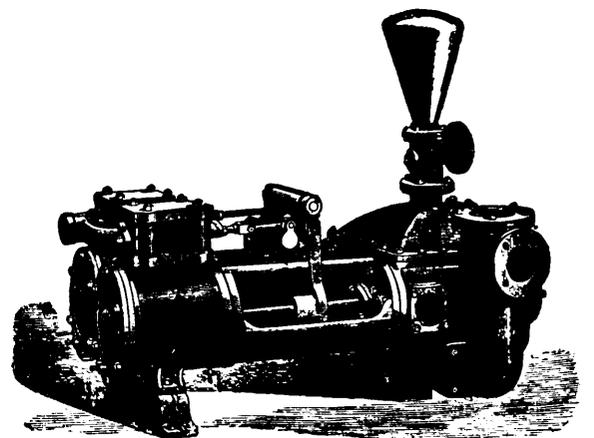


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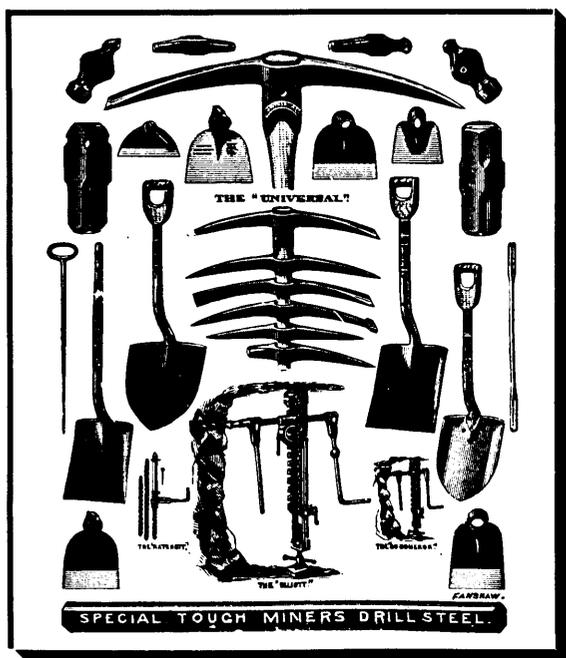
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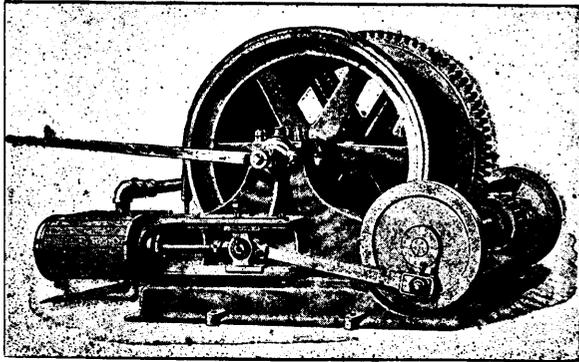
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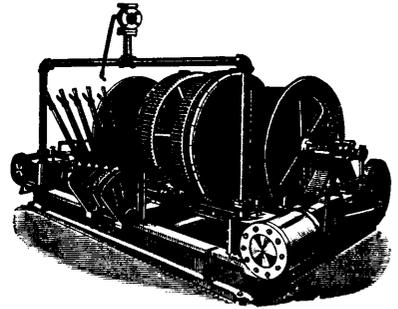
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VOL. XVII., No. 7.

The Law of Mines in Canada.*

In this volume, Messrs. McPherson and Clark have furnished a compendious (though necessarily not a brief) collection of the statutes of the Dominion, and its several provinces, directly bearing upon the ownership, tenancy, and operation of mines, together with the explanatory decisions of the courts, and a great mass of auxiliary material, including a useful glossary of mining terms, and several chapters upon subjects pertinent, though not exclusively pertinent, to the rights and obligations of miners and mineral land owners.

The first impression produced by this book is one of surprise that so large a treatise should be necessary; and this feeling is enhanced by the fact that the authors have devoted no space to the statement of their own views, or to critical remarks upon judicial decisions, or even to the exposition of general principles underlying the law of mines. They have confined themselves to clear and compact declarations of the existing laws, and decisions thereunder, with such brief notes of a historical character as may indicate the successive stages of progress in Canadian mining legislation. The book is, therefore, essentially a cyclopedia for reference, rather than a treatise suited for consecutive perusal. It contains the material for many treatises, and will prove invaluable, both to writers upon mining law and to mining lawyers and operators.

Our first surprise at its bulk disappears when we discover upon examination how multifarious are the codes and regulations which it must record. The first chapter, in its outline of territorial history, indicates a complexity of origins and methods which leads us to expect a great variety of legislation.

For instance: Ontario, Quebec, Nova Scotia and New Brunswick were united in 1867 to form the Dominion of Canada; the existing laws of each province were continued in force until repealed; and, of course, all rights acquired under such laws, prior to the union, were recognized. This left, as basis of right, the old grants of the French as well as the British crown, the custom of Paris, the French royal edicts, and those of the French colonial intendants, and the civil code of Lower Canada (framed after the code Napoleon), together with a vast body of provincial laws and ordinances, and the English common law and acts of Parliament, so far as these should be applicable. By various decisions of the courts, the applicable portions of the common and statute law of England have been gradually defined; but this has been done for each province separately. Lord Mansfield's famous dictum: "The colonies take all the common and statute law of England applic-

able to their situation and condition," has been construed according to particular circumstances of each colony.

We have already causes of diversity enough. But when we consider that in 1870 Rupert's Land and the North West Territories were received by surrender from the Hudson Bay Co., and that all land titles granted by that company up to March 8, 1869, were confirmed; that in 1871, British Columbia, and 1873, Prince Edward Island, were added to the Dominion, with special provision as to the force of preceding legislation; and finally, that in 1880 all other British North American possessions, except Newfoundland and its dependencies (*i.e.*, a part of Labrador) were likewise annexed to Canada, we shall find still greater complications. For each of the provinces thus added has received its separate rights over mines and mineral lands, yet the Dominion Government has such rights as to "Dominion" lands, including chiefly the public lands of Manitoba and the Northwest Territories, the Stickeen Territories (a part of the present Yukon district) have been administered since 1880 by the Dominion; and the Yukon district is now thus administered, contrary to the earnest desire of its inhabitants for home rule, and the local provincial control of the public lands.

An account of the law of mines in Canada must therefore deal separately with the laws of Ontario, Quebec, Nova Scotia, New Brunswick and British Columbia, and, finally with those of the Dominion itself, in its special relation to certain territories. The chapter on Prince Edward Island may be very short; for in that unique province there are neither mines nor mining laws.

All these systems of title and administration are more or less affected by the English statutes in force at the several dates peculiar to the several provinces (except Quebec, which has its own still greater complications of French and ecclesiastical origin). The wonder is, after all, not merely that this book is so large, but rather that any book could be large enough, and any authors patient and learned enough, to compass the intricacies of the field.

Yet we do not complain of this vast variety. It is the sign of freedom. Only centralized power could produce and enforce uniformity. If the Dominion, instead of the Provinces, had succeeded to the rights of the sovereigns of France and England in lands and mines, we might have had a single mining code. But our experience with Dominion regulations for mining does not make us wish we had had more of them. We must confess to a preference for the making of the coat for the person who is to wear it, rather than the manufacture of all coats after one pattern, which suits nobody. The uniform system is beautifully simple; but it does not fit.

There are, however, uniform principles of common law and common sense, underlying all statutes and statutory interpretations; and

* "The Law of Mines in Canada," by W. D. McPherson and John M. Clark, M.A., L.L.B., Barristers, Toronto. Royal 8vo.; over 1350 pages; calf. Price, \$20.00. The Carswell Co., Limited, Toronto, publishers.

the authors of this work have performed a valuable service to the lay reader by devoting several chapters to such themes. We refer to the chapters on "The Meanings of Terms," "Contracts," "Licenses," "Leases," "Sales, Dower, Mortgages, etc.," "Support," "Water, Ventilation, etc.," and "Wrongful Abstraction and Criminal Offences." Much of the material contained in these chapters is equally applicable to all forms of real estate, and it is true that professional students can find it elsewhere (though scarcely anywhere in more satisfactory form for reference); but the inclusion of it in this volume seems to us to be peculiarly useful to mining engineers and superintendents. For it is, perhaps, oftener through ignorance of such legal requirements and relations than through failure as engineers, that the managers of mining enterprises bring loss upon their employers. They incur legal liabilities, under contracts and leases, or damages for injury to neighbors: or they sacrifice their rights unnecessarily, not knowing what the rights of their situation are, accepting defective conveyances or agreements, or giving unconsciously ruinous guarantees.

To take a familiar and frequent instance: Mining captains, experienced as prospectors, are often authorized to take leases on mineral land which they deem promising; and, in many instances, their ignorance of the legal obligations of a lease, backed by a similar ignorance on the part of their employers, has involved the payment for long terms of large annual rents upon entirely unproductive and worthless property. They did not understand the fundamental principle of a lease, to wit, that the lessor, surrendering the control and the revenues of his property for a fixed term, gives thereby full consideration for the covenant of the lessee as to annual minimum or "dead rent;" and that the lessee, in consideration of this surrender, assumes all risks of profit or loss, in the absence of any specific agreement to the contrary.

It has been said, that the entire absence of iron-ore, for instance, in a property leased for the mining of iron-ore, at an annual minimum rent and (perhaps, even, the total exhaustion of the mineral deposit during the term of the lease) might justify the equitable annulment of the lease, as an agreement based upon a misunderstanding. But this is not perfectly certain. At least it has been held in important cases that "whether the minerals can be got easily or with difficulty, or even whether they exist or not, is immaterial where there is an absolute unqualified covenant to pay rent." In other words, the lessor has a right to make any bargain he pleases, reasonable or unreasonable; the terms of the bargain are determined by strict construction of the lease in his favor; and business losses and disappointments fall wholly upon the lessee, unless there be specific agreement to the contrary. Many firms and companies engaged in iron-mining in the United States have suffered heavily through ignorance or oversight of these principles. Probably it is best to follow in all such cases competent legal advice; yet there are many instances in which binding obligations may be incurred under off-hand oral agreement, and which call for some degree of legal knowledge on the part of the local manager. It not infrequently happens that the professional lawyer must be called in to help the concern out of an embarrassment into which it need never have fallen. We might give many other illustrations of this proposition, but we have said enough to warrant our opinion of the timeliness and value of these portions of the book before us.

Perhaps the most interesting chapter of those which describe the various provincial mining codes, is that devoted to Quebec, which begins with a brief sketch of the history of the French law, tracing it from the time of the Roman republic, through the later Roman law (as expressed in the fourth century), and the successive systems which followed in France the breaking up of the Roman Empire. Thus we have—according to Fleury's *Legislation Minerale sous l'Ancienne Monarchie*, cited by our authors—three periods before the French revolution. The first period—1413 to 1548—was that of free mining

upon payment of one-tenth to the King, and of indemnity to the surface owner, but nothing to the lord. This was inherited from the Roman system. The second period—1548 to 1597—was that of special royal grants or concessions, to stimulate mining. The grantee could mine in any man's land, paying indemnity to the owner, one-tenth to the king, and one-fortieth to the lord. The third period—1597 to 1791—was one of vacillation and transition, gradually tending to the recognition of a preferential or pre-emptory right in the owner of the soil, yet still rigorously enforcing the claims of the Crown as to revenue.

The history of French legislation on the subject after 1763, the date of the cession to Great Britain of the French possessions in North America, does not belong to the inquiry into the sources of present rights or customs in the Province of Quebec. It is interesting to note, however, the characteristic fashion in which the French National Assembly discussed and settled the matter. The field was admirably adapted to the high philosophic generalizations then in fashion. As our authors observe, "Every conceivable view as to the ownership of minerals was there urged: 1. That they are *res nullius*, and belong to the first occupant; 2. That they are *partes soli*, and belong to the owner of the soil; 3. That they are part of the royal prerogative and belong to the state." The last view seems to have been practically taken by the Assembly, which, substituting the nation for the king, was inclined in most questions to subordinate individual rights to the new sovereign, and which summarily decreed, *les mines sont a la disposition de la nation*.

In 1677, the King of France made a present for twenty years to Jean Baptiste de Lagny des Brigandieres of all the mines in Canada! This would indicate both an overrating of royal rights, and an underrating of Canadian resources. But it is settled that the King of England succeeded at the cession of 1763 to all such rights of the French King as the King of England could constitutionally exercise; and the doubtful rights of the French King no English sovereign could now claim. We have, therefore, as the result of a different chain of title, practically the same conditions in Quebec as in other British provinces. All mining rights belong to the Crown unless the Crown has been validly divested of them. Still, the Quebec Mining Act of 1892 exhibits peculiarities hinting of the curious history of the Gallic legislation on this subject.

We cannot, of course, review the voluminous statutes and forms of all Canadian provinces here set forth. This part of the book, which is doubtless the most directly useful, as it was the most keenly needed, of all, does not lend itself to critical comment of the authors' work. We can only say that its completeness, arrangement and notes seem to us admirable; and that we have found no points in which we would suggest amendment.

We can say quite as much for the well-intended glossary of mining terms which concludes the volume, and which, though useful, is not as comprehensive, well-proportioned or accurate as it might have been made. The definitions are often vague. For instance, "Course of Vein" is defined as "its direction"—a statement equally true of its dip. The course or strike is the direction of the intersection made by the vein with a horizontal plane, or the direction of a horizontal line in the plane of the vein.

Again, we find "dip" defined as "the angle which a lode or bed makes with the horizon." This is distinctly inaccurate. The dip is the angle enclosed between the plane of the lode and a horizontal plane. The angle which the lode "makes with the horizon" is a very different thing. If a lode be continued to the horizon (which is a linear circle) it will have the position of a radius intersecting the circumference; and the angle will be 90°.

But we do not care to make additional criticisms upon what is doubtless a hasty compilation, and constitutes, moreover, no essential part of this excellent work, which we heartily recommend to all miners and mining companies, as well as to lawyers. Under all these heads—though perhaps more particularly under the last—we would include residents of the United States as well as Canada; for although the nature of mining titles and the local regulations of mining in the two countries differ in many details, there are many principles of law (especially of the English common-law) which are common to both; and the decisions of British courts, though carrying only the authority due to the weight of their reasoning, are frequently cited, and are treated with great respect, in the tribunals of the United States. Every American lawyer who has to deal with a mining question outside of the peculiar statute of the United States, will be grateful for this comprehensive view of general principles and English decisions. It may furnish him with decisive authority; it will certainly give him valuable suggestions.

This volume is furnished with a detailed table of contents, and a table of all cases referred to in its pages, as well as an analytical index. It need not be remarked that these features perfect its usefulness for purposes of ready consultation.

Better Management for Gold Mines.

The present time, when a lull in the gold mining boom has occurred in both British Columbia and Ontario, and the markets of Great Britain and Canada are both surfeited with stocks of companies which have been formed to work gold mines, but which so far have not produced the dividends promised to their shareholders, seems an opportune one in which to raise the question as to the quality of the management usually given to these companies.

The primary idea that a gold mine is a manufactory of gold is one that does not seem to enter into the brain of more than a very small percentage of the men actually engaged in the business. That more successes are not recorded may be due to the fact that the appointment of mine managers is usually left to the promoting few who have succeeded in placing the property upon a public market, and but too often the man in charge has been directly, or indirectly, interested in the sale of the property, or is put there by someone having a "pull" with the board of directors. Previous successful experience, and previous reputation for honesty, economy and ability are not considered essential, but a man is chosen who perhaps has made a report upon the property, or who is perhaps more of a mining *expert* than of a mining *engineer*, the difference and distinction between which we do not think the average mine investor fully appreciates. Such a choice often leads to the grossest extravagance in the opening up and equipping of a property, since the manager has to be educated in the details of his work at the expense of the company. In many cases, it is true, mines have been so rich as to be able to pay for this preliminary education, and the men who have been in charge have developed into worthy managing men, but, on the other hand, this preliminary ignorance has more often caused such tremendous waste of money that the company's funds have been exhausted just at the moment when the manager has learned enough of his business to become valuable and economical, and the result often is that a property intrinsically valuable has been condemned, not because it was really valueless, but simply for lack of further capital with which to carry on operations.

Again, in many other cases, the board of directors (who are really the management when they are competent) are indifferent to details of which they should be informed, and only care to know whether a dividend has been earned. We have in mind a free-milling mine in British Columbia of which many of the eastern shareholders do not know the

name of the resident superintendent, and another mine in which the directors can tell you that their last clean-up was \$60,000, but cannot tell you how many yards were washed nor how much gold was won to the yard. In another instance one letter per month was the average communication that passed between the mine office and the head office.

Far too often is blame laid upon the resident engineer, after all the funds have been exhausted and the mine is closed, when the real blame should be laid upon the shoulders of the board whom the shareholders have elected to look after their interests.

Mining in Ontario.

We are glad to note the early appearance of Parts 1 and 2 of the Seventh Annual Report of the Bureau of Mines of Ontario. The first part appeared in March, and the second part was on our table in June. This certainly is a marked step forward on the part of the Bureau of Mines, and we extend congratulations.

The first part of the report deals with statistics, and contains short descriptions of mines visited by Inspectors Bow, Slaughter and Boyd, but there is little that needs comment beyond a few pages of Inspector Bow's report which shows that his knowledge of grammar is about as limited as is his knowledge of mining.

The second part contains notes by Dr. Coleman on the Western Ontario gold region and its petrology, with a monograph on the Huronian rocks of Ontario, and also a short description of the Michipicoton mining district by Professor Willmott. The creditable feature of the last report is the early appearance of a map upon which are located the various mining claims which have been surveyed.

One comment may be allowed upon the photographic prints published with this report, and that is that either the photographs themselves, or the reproductions, have been abominably executed, as there are very few of these prints which are free from indistinctness and mistiness; we fancy, however, that this is chiefly the fault of the printer, as we know (from experience) the difficulty of obtaining good reprints from photographs.

From the statistics furnished for the first three months of 1898 it appears that some \$86,000 worth of gold was obtained for the first three calendar months of the present year, the average yield per ton being \$6.18; from another portion of the report we gather that this sum was the product of seven mills. It must be admitted, as mentioned by Dr. Coleman in the "General Conclusions" at the end of his report, that the mines of Ontario "are producing ore of lower grade than was anticipated, and so have disappointed their owners." And the reason for this is perhaps best stated in the words of Prof. Willmott in his report on the Michipicoton division, viz., that assays alone have been available for the formation of an opinion and "these are at best uncertain." There is no doubt whatever but that the reports of assays (obtained from selected samples) have been the basis of most of the boom which Western Ontario experienced last year, and equally there is no doubt that nothing is so fallacious in determining the value of a free milling proposition as the assaying of samples which have not been selected by men thoroughly conversant with the principles of correct sampling. We know that the majority of engineers will agree with us in saying that the rarest man one meets with is he who can impartially sample a free gold vein.

We shall be curious to know whether the second three months of this year will produce as large an output as was made during the first quarter, because we have been reliably informed that only three mills in the whole of Ontario, viz., the "Sultana," "Mikado" and "Regina," were working in the month of June. We agree with Prof. Coleman in his conclusion that there are in Ontario one or two small but fairly rich veins, but that in general the ore bodies are of exceedingly low grade,

though frequently large in their dimensions; and that, therefore, the problems which confront the investor in Ontario's gold mines are first-class management, low mining costs and good metallurgical work. We note with regret the absence of any definite information respecting the success (or otherwise) of the bromo-cyanide method installed at the Marmora mines; from recent press notices, and other information accessible to the REVIEW, it would appear that this metallurgical method has not been found so perfectly satisfactory as was at first reported, and (although we quite recognize the privacy of this enterprise) it is of great importance to the future of Ontario's large mispickel deposits that the truth should be known regarding the economic success, or failure, of this process. It may, however, truthfully be said that Ontario made quite a step forward in the last twelve months. Undoubtedly she will have to pass through the same period of liquidation of fallacious values that other countries have had, and will have to import a still larger number of experienced men for the working and management of her mines. To one casually visiting the mining regions of Ontario last year and this year the difference in the character and ability of the principal mining men is most noticeable and gratifying, and now that the process is begun let us hope it will continue until it will be no longer possible to accuse Ontario of "An Epidemic of Mismanagement."

The War Eagle Flurry.

A phase of lunacy, sometimes exhibited by business men, has been on exhibition in Toronto and Montreal for nearly a month. We refer to the sudden and unwarranted jump of War Eagle stock from 90 cents to nearly \$3.00 per share. We say "lunacy" advisedly, though fully cognizant of the fact that the bulk of the trading has been done on legitimate stock lines—a man buying to-day in the expectation of selling to-morrow at several points advance. The lunacy comes in in giving to this stock hypothetical values that no living man, competent to judge, believes are in existence in the mine. The highest quotation reached puts a value on the property of about \$6,000,000.00, and we believe that we are quite within the mark in saying that no engineer of reputation or prominence in his profession would endorse the property to-day to his clients at one-half that figure.

Buyers for investment are certain to get badly left at present prices, for the return is barely 7 per cent., with no possible guarantee of its continuance. The most staple mining stock in the world (Calumet and Hecla) is returning better dividends than this rate, and the Anaconda, which is paying double this per centage, is not quoted above par.

For a mine that but lately showed more of \$10.00 ore than of a higher grade, that made a loss on last year's operations of over \$56,000.00, and whose past history has shown its pay ore to lie in comparatively restricted chutes, the present values given to it must be regarded as purely hypothetical and unjustified. A mine of such an uncertain character as the War Eagle should be expected to return from 15 per cent. to 20 per cent. yearly upon its par value, and upon that basis the stock to-day intrinsically is not worth more than par.

The whole of this phenomenal rise savors of Toronto's vagaries, and not the least significant feature is the fact that the stock could not be boosted until a certain Toronto Bank announced that it would lend upon the shares. The crash will come, and when it comes it may be found that certain Torontonians are not beneath; they will be found on top of the ruins, praying louder than ever and donating churches and missionaries to the heathen.

Latest advices are to the effect that the British America Corporation will not obtain the Le Roi after all. If this large mine with a dividend record of nearly \$1,000,000 cannot be sold at \$3,000,000, what a travesty to give a street value to its neighbor of \$5,000,000!

EN PASSANT.

The eighth annual edition of our *Canadian Mining Manual*, being for the year 1898, will be issued from this office about the 15th proximo. The new volume contains over 600 pages, profusely illustrated. Its principal features are a series of articles on the prominent mineral industries of the Dominion, complete statistical returns, and a mass of commercial information concerning the history, organisation and operations of the mines and mining companies doing business in the country. We are confident it will be found to be, more than ever, a ready and correct record of the progress of Canadian mining undertakings.

The Council of the Canadian Mining Institute have decided to hold the next meeting of the members at Nelson, B. C., early in October. Although it is yet too early to indicate a programme, we understand that already a number of papers have been promised, including: Messrs. W. Blakemore, M.E., Crow's Nest Coal Co., Coal Creek; Wm. Braden, M. E., Pilot Bay; J. C. Gwillim, M. E., Slocan City; H. Perry Leake, M. E., Revelstoke; J. L. Parker, Rossland; O. E. S. Whiteside, M.E., Anthracite; H. A. Guess, Keewatin, Ont., etc.

The midsummer meeting of the Mining Society of Nova Scotia will be held in New Glasgow and Westville, N. S., on 26th, 27th and 28th inst. The arrangements are:—

On Tuesday, 26th inst.—Members and their guests will leave Halifax by the 4 o'clock p. m. train (standard time), arriving at New Glasgow at 9.10 o'clock p. m. Rooms can be obtained at Hotel Vendome at New Glasgow, the headquarters of the meeting.

On Wednesday, 27th inst.—The party will leave by the 10 o'clock train and a visit will be paid to the works of the Nova Scotia Steel Co., at Trenton, and the Iron Mines at Ferrona, returning to New Glasgow by train. At 8 p. m. a meeting of members will be held for the transaction of business and the reading of papers.

On Thursday, 28th inst.—The party will leave by the 6.40 o'clock a. m. train (standard time) for Westville, to visit the coal mines of the district, after which they will be entertained at lunch by the President, Mr. Chas. Fergie, and will leave by the 3.07 o'clock p. m. train to return to Halifax, arriving at 8 o'clock p. m.

C. M. Dobson—the same old Charles Miles DeTracey—a "fakir" with a distinguished Canadian record, contributes to the *Cosmopolitan* an entertaining article on the noble (?) art of mine salting. Dobson's accumulated experience in "doing up" people entitles him to consideration as an authority upon the subject of which he writes, and he is able to let the public into many secrets which, if they ever dream of embarking on mining speculation, it certainly behooves them to know. Here is a sample: "In buying mines, as in buying horse-flesh, the maxim 'Caveat emptor' should be worn next the skin. The tricks of the horse-trader are many, but not so Protean as the mine-seller's. It is pleasant to think that but for the crawling snake, birds would not have had wings, for they would not have needed them. If miners had preserved a Boeotian simplicity and never 'salted' a mine, expert metallurgists would have been nearly as scarce as snakes in Iceland." Dobson then proceeds: "I was examining a 'proposition' in Shasta County, California, on the boundary line of Trinity County. The vein was of great size and was manifestly of low grade. I carried a map of the mine, and every ten feet I had the miners take out about one hundred and fifty pounds of ore, which was thrown on an iron plate, four by five feet, previously swept and carefully cleaned. The ore was piled up into a cone and quartered. The diagonal quarters were taken, and these in turn coned and the diagonal quarters taken, until I had about a pound of

ore thoroughly representative of each ten feet of the mine. Each sample was put into a \$50 silver sack of stout canvas and sealed with my private seal. The sack was numbered and a corresponding mark made on the map so that I should know just how the vein ran. As I took some two hundred samples, it soon became impossible to 'pack' these along the levels, down the shafts and up the upraises. To watch them would have required a detective to each sack.

"I went on to calculate the amount in cubic feet of ore exposed in the shafts, upraises and levels of the mine. To determine the tonnage of ore, it is necessary to remember that about fifteen cubic feet of quartz make a ton. I had the samples brought out by the miners, boxed up and sent for assay to an eminent firm in Chicago. I went to Chicago to learn what the assay showed as to the amount of gold and silver in the samples; the chemist said that the ore was of extreme richness. Gold had been recovered indicating between \$300 and \$400 to the short ton of ore.

"That can't be," I declared.

"It looks suspicious," he admitted. "It certainly is not in the ore if appearances go for anything." They do go for a great deal, for a competent man can often guess within \$5 or \$6 of the ton value of ore by merely making a rough pan test.

"Were the seals intact?" I asked.

"Oh, yes," he replied; "the sacks had not been tampered with."

"You've been handling some rich ore," I told him, "and probably have yourself 'salted' accidentally with some of the rich particles."

"No," he replied; he had been most careful. So samples of the pulp he had made were sent to New York for check assays. In this pulp the ore is reduced to such fineness that it will all pass through a mesh with six thousand four hundred perforations to the square inch, a little coarser than ordinary flour. The reports from New York verified the Chicago assays to the third figure in decimals. Crushing the ore in an iron mortar and panning the result showed that the assays could not be right. Yet how had the samples been 'salted'?

"At last an idea occurred to me. Had the sacks been preserved? Yes. We washed them in a solution of cyanide of potassium. We drew off the liquid a few days after that, and our tests for the determination of gold showed that these sacks were worth \$72,000 per ton of sacks. Afterward it was confessed that while I was figuring on the ore in sight, a man with a hypodermic syringe full of a solution of chloride of gold had thrust the needle through the canvas and injected the fluid on the samples of ore. It had dried on the cloth and thus gave proof of the fraud. The chloride of gold detained on the ore by the evaporation of the water in the solution was recovered by the ordinary methods of assay.

"A variation of this trick is to take a whitewash brush and paint with a solution of auric chloride the faces, roof, sole and fore breasts of standing ore. It will cost comparatively little to raise the apparent value of the ore very sensibly. For forty dollars thus expended the seller could make a fine showing, and after the chloride of gold is dry it would be hard to detect it if not overdone."

Mr. William Madden, of Westville, N. S., who has held the position of Deputy Inspector of Mines in Nova Scotia for many years, has been appointed, by the Dominion Government, one of the Mining Inspectors in the Yukon. Madden may not have been an ideal inspector in the East, but it is safe to say he knows more of mining than the aggregation of ranchers and political proteges who have been shipped to the Yukon to look after our interests in these far off gold fields.

We regret to announce the death of Mr. A. Slaght, one of the mining inspectors of Ontario. We understand that Prof. DeKalb, of the Mining School, Kingston, has succeeded to the vacancy.

The directors of the Dominion Mining Development and Agency Company, Limited, have resolved to divide amongst the shareholders, by way of interim dividend, a portion of the shares the company holds in the Queen Bess Proprietary Company, Limited, in the ratio of one fully-paid Queen Bess share for every two fully-paid shares in the Company.

The Velvet Mines, Limited, was registered on the 24th ult., with a capital of £100,000 in £1 shares, to adopt an agreement with the New Goldfields of British Columbia, Limited.

Objectors to mining investments sometimes plead the "transitory character" of a mine. The objection is not well taken, for, if extended, they would apply to every form of business. Indeed, few forms of investment are more permanent. How often one notes the going to pieces of some old-established mercantile business or the sudden cessation of what seemed a profitable enterprise in every line of business! Yet that is not used as an argument against embarking in trade or engaging in any line of business. In this regard the mining business will not suffer by comparison. It has of late years become similar to any other form of legitimate enterprise—has its successes and failures—just as has any other line of human effort.

One of the features of a recent issue of the London *Mining Journal* is an interesting sketch of the mineral industries of Southern British Columbia, by Mr. J. D. Kendall, Vancouver, B.C. In his introductory observations, Mr. Kendall comments on the notorious methods of "wild-cating" Canadian properties in England. He says: "Another of the animal productions of British Columbia is a fish called the 'sucker.' It possesses a huge mouth and is said to gobble up at sight and indiscriminately all kinds of food without pausing to inquire whether that which seems so is really safe and wholesome eating. The incautious action of this fish in feeding is so like that of some human beings in presence of a 'deal,' that here the *genus homo* is not inaptly considered as having its subdivisions of suckers. The fish, as already said, belongs to British Columbia, but its human correlative has a world-wide existence, and nowhere does it seem to be more numerous than in Great Britain. How otherwise can we account for the many unproved mining properties that have been floated on the London market as though they had large ascertained values? The British public know absolutely nothing about the mines of British Columbia. In only one instance to date have they been asked to invest in a dividend-paying mine, many of the others being more or less doubtful prospects, whilst a number are the veriest wild-cats. Yet there are many dividend-paying mines in British Columbia, but they are almost entirely owned by Americans. Why is this? Certainly not because Americans have any superior ability in mining, for many of the mines opened up by them here are about as rude specimens of the miner's art as could be found in a long journey. Mining is something more than mere drifting, rising, sinking and stopping. The man who simply carries out these works without studying carefully the structure of the ground through which he is passing, and has to pass, and without regulating the nature, direction and extent of his works thereby, has still to learn a most important lesson in mining. Nevertheless a disregard of geological structure characterises much of the work done in the mines just referred to. The reason of American success must, therefore, be sought in a direction outside of mining, and it is most probably found in the superior commercial methods employed by them. Englishmen are apt to look upon London as the dumping ground of every mine on earth that is for sale. No greater illusion can be fostered. Owners of mines that can be worked at a substantial profit have no need to seek for a purchaser. The purchaser has rather to look for

them, and that is exactly what the Americans do. Further, they keep track of the needy prospector and miner. When in this way they see a good thing (and no men know better how many cents are in a dollar) they buy at once on bed rock terms. Although the payment of small cash down for prospects is a most objectionable practice, yet the advantage of quick decisions and early or immediate payments, partial or full, is well known to all who have any experience in the Rockies, as the best means of securing the lowest possible terms. To these methods of procedure, undoubtedly, is due the almost general success of Americans in British Columbian mines; for in this way they get the pick of the field. The balance—consisting mostly of “wild cats” or properties requiring large sums for purchase or development—find their way, sooner or later, to London, accompanied, in some cases, by the reports of men styling themselves M. E.’s or E. M.’s, but who are frequently commercial travellers, insurance or land agents, or anything in fact but miners. Some of the properties so introduced, might possibly, with proper management, be made into mines, but if they seem to have any merit, their chances of success are, perhaps, ruined from the first by over-capitalisation. There is at least one very glaring instance of this kind among English companies operating in British Columbia. A great benefit would accrue to the mining world if engineers, in order to prevent over-capitalisation, would clearly and unmistakably state in reports, for prospectus purposes, their opinion as to the value of the properties that are to be offered to the public. Such valuations are not intended to represent the actual value of the properties to which they relate, but only what may be safely given for them, and if a properly qualified engineer of large experience cannot fix this sum, how can anyone rely on the valuation of a promoter. The uncertainty can in all cases be covered by adjustment of margin. If a proposed undertaking is a pure gamble, and the public are invited to provide the funds, they should be told by the engineer the exact risk they are incurring. If they choose to ignore his facts and opinions, the responsibility rests with themselves.”

The Gold Fields of Canada.—Continued.

(From Canadian Mining Manual, 1898.)

ONTARIO.

History.—The occurrence of gold in Ontario was first publicly made known through the publications of the Geological Survey (c). The first actual discovery seems to have been made by Mr. M. H. Powell, in Madoc township, in the county of Hastings, in August, 1866, at the spot which has since been known as the “Richardson Mine.” This discovery occasioned an influx of from three to four thousand prospectors into this section in the spring of 1867, and for a year or so considerable excitement prevailed, and some capital (chiefly American) came into the district. As soon as the zone of decomposition was passed, and the workings got into unaltered veinstone, the ore was not amenable to the amalgamation process, and failed to yield profitable returns, occasioning the excitement to rapidly fade away and since 1868 this gold field of Ontario has received only intermittent attention.

This is doubtless due to two causes, the first of which is the fact that the gold in these deposits is associated with mispickel, or arsenical pyrites, making its treatment difficult and expensive; and secondly, to the irregular character of the deposits, most of them having the form of gash veins, and upon exploitation proving to be segregations in the form of flattened lenses whose horizontal and vertical dimensions are but too quickly determined.

Several companies have operated in this field, the chief of which is the old Deloro Gold Mining and Milling Co., which was largely fi-

nanced in England and was under the management of a Mr. R. P. Rothwell, of New York. This company attempted the concentration of the mispickel as a primary process, subsequently roasting the concentrated and chlorinating the oxidized products it was contemplated to save the arsenic and to make the by-product of arsenious acid profitable. Unfortunately much of the gold in the mispickel was too coarse to be quickly attacked by the chlorine and the enterprise financially was not successful, although to this effort may be traced many of the modern improvements in the process of gold chlorination which is now so successfully used in the United States and abroad.

Recently (1896) this property was acquired by an English corporation known as “The Canadian Gold Fields, Limited,” which has secured large additional tracts of land, and has installed a plant for the treatment of the ore by a process known as the “Sulman-Teed,” which appears to be a modification or adaptation of the bromo cyanide treatment.

Other companies (the Crescent, Belmont, &c.) have operated in this county with partial success on surface ores, but none of them have made a financial success.

Gold was next discovered in Ontario, in the township of Moss, in the district of Thunder Bay, in 1871. The location has since been known as the “Huronian Mine,” and for a time (1882-85) it was vigorously worked having been equipped with a 10 stamp mill and other machinery, but since 1885 nothing has been done and no other discoveries of importance have been made in this section.

Other reported discoveries, in other sections, in 1872 and 1875 attracted little or no attention, until the finding of rich specimens on Hay Island in the Lake of the Woods in the summer of 1878.

Considerable prospecting around the shores of the island and bays of this large lake resulted in the finding of several bodies of auriferous rock (such as the Sultana, Ophir, Pine Portage and others) within a year or two, and from 1882 to 1885 a very considerable amount of work was done upon these and other properties.

The management then, as subsequently, was chiefly in the hands of men totally inexperienced and woefully ignorant of the arts of mining and milling, who produced results so disappointing and discouraging that the district was practically abandoned for several years.

A difficulty which largely operated to prevent development in this district was the dispute between the Ontario and Dominion Governments regarding the boundaries of Ontario, which dispute affected the titles to the lands upon which mineral had been discovered and locations made. In 1891 this dispute was finally settled in favor of the Province of Ontario, and the following year actual development in the Lake of the Woods district may be said to have begun.

The first, and still the chief, mine to be extensively worked was the “Sultana,” which after many vicissitudes and struggles, became a profitable enterprise to its present owner, Mr. John F. Caldwell.

In 1887 and 1888 discoveries of gold were reported in the township of Dennison (at the “Vermillion” mine) and on the shores of Lake Wahnapiatae respectively; the former has been worked out, and the latter has slowly developed into an industry, which, as yet has not been remunerative.

Although the discovery of gold bearing quartz veins in the schists surrounding Vermillion Lake in Minnesota, U. S. A., had been noted in that State’s official reports as early as 1866, the find was not followed up until the discovery of the “Little American” vein on an island in Rainy Lake in 1893

Following this discovery a large number of Americans came into the Rainy River District, and since 1893 this section has been the busiest one in the gold fields of Ontario.

(c) Report of Progress, 1867-68.

Production.—It is impossible to give an accurate estimate of the total amount of gold won in Ontario from 1866 to date, for the reason that no official records have been kept prior to the year 1892.

The Bureau of Mines came into existence on the 5th of March, 1891, but there was no reported production of gold for that year.

In the six years from 1892-97, inclusive, the total value of gold produced was \$465,509. The production for the twenty years from 1869 to 1888, inclusive, is estimated at \$9,943,000^(a), so that it may be safe to estimate the total production of the Province to December 31st 1897, as not exceeding \$500,000.00.

For the year 1897 the production was \$190,244, from 27.589 tons; an average yield of \$6.89 per ton. The value of the bullion produced was \$16.67 per ounce.

Area.—The gold bearing lands of Ontario may be classed into three different fields, if the Lake of the Woods and the Rainy River sections be taken as one.

The most easterly of these fields is the Marmora District in the County of Hastings, lying just north of Lake Ontario.

The area of this field is between 600 and 700 square miles, having a greatest length of about 36 miles and a greatest width of about 20 miles.

The second field includes the Wahnapiatae district extending from beyond Lake Koo-ka-gaming on the north-east, into the townships of Dennison and Creighton in Algoma to the south-west. Its area is indetermined but approximates a length of about 50 miles by a width of 12 or 13. So far this field has been the least important in the province.

The third field, if (as before said) inclusive of the Rainy River section, is by far the largest as it is the most important one.

It embraces an indefinite territory extending from the western shores of the Lake of the Woods to Lac des Mille Lacs on the east, a distance of over 200 miles, and from the International boundary on the south, northerly for nearly 100 miles; roughly speaking it includes nearly 20,000 square miles many of which, of course are under lake and river waters.

Geology.—Broadly speaking the whole of Ontario's gold fields may be said to lie in rocks of Huronian formation. There are no alluvial deposits known in the province of any magnitude or of any economic value, although gold bearing gravels occurring along the valley of the Mississaga, north of Thessalon, have been reported, and have received considerable attention. The gold of Ontario, therefore, is in the solid veinstone.

In the Marmora district rocks known as the "Hastings series," consisting of crystalline dolomites, mica schists and micaceous quartzites, are associated with and penetrated by granites and diorites. In the vicinity of these eruptives, and sometimes occupying the zone of contact, are found deposits of quartz carrying as minerals, mispickel, pyrites, pyrrhotite, with occasional small quantities of chalcopyrite, and more rarely specks of galena.

According to Dr. Adams' report ^(b) it is as yet uncertain whether these rocks are to be regarded as upper Laurentian or as greatly modified Huronian.

The form of these quartz deposits is that of gash veins, or local segregations of (comparatively) small dimensions, with, of course, notable exceptions *e. g.* the old "Gatling" mine. The general experience in this district has been that the continuity of the deposits could not be relied upon.

The average value in gold of the best of the auriferous veins seems to be about \$12 per ton. The future of this field will depend upon the

discovery of some process which will economically extract the gold from its arsenical associations, and also upon the opening of sufficient quantities of auriferous rock to assure a large tonnage of payable ore.

In the Wahnapiatae district the prevailing rocks are crystalline schists with massive fine-grained beds resembling volcanic ash rocks and patches of dioritic eruptives in the southern portion, to the north and east clay slates are mingled with the above. All this series is reported as Huronby Dr. Robert Bell. (*)

The quartz veins traversing these rocks are small, and resemble those of the Hastings district in the fact that their horizontal and vertical bounds are of small dimensions. Many veins seen can be clearly traced from beginning to end, commencing with a thickness of a fraction of an inch they expand to a greater width of eight to thirty-six inches and then thin out to a final end. The course of many of these veins is very irregular and serpentine, and to describe them as other than local gash veins would, we think, be an error.

Although small, many of them are very rich, and further development may find bodies of a more permanent character.

The third field, though underlain by rocks of Huronian age, presents some different geognostical features in the Lake of the Woods section than are exhibited in the Rainy River section.

The auriferous quartz of the northern shores of the Lake of the Woods appears to occur along, or in the vicinity of, the line of contact between the gray gneisses of Laurentian age and the hard green schists of the Huronian.

This quartz occurs both as segregations of lenticular shape enclosed within the schists (as at the "Sultana" mine) and as fissure veins, (as at the Gold Hill mine.) Usually the veins are schistose, or conformable in strike and dip to the enclosing schists.

In the Rainy River country ^(a) the veins likewise are frequently schistose or "bedded," but are always in the Huronian rocks or in the eruptives which have penetrated them, and are not dependent for their auriferous contents upon the immediate vicinity of Laurentian areas.

The Huronian rocks of this section show many various characters, varying from soft, greenish chloritic schists, through hard, massive greenstones to yellow and brown felsites, acid eruptives and conglomerates.

Through these rocks granites and other eruptives have been forced in many places and at different periods, and in one area of granite between Bad Vermillion lake and Shoal lake many of the most promising discoveries have been made; there occur the "Foley," "Ferguson" and "Lucky Coon" mines. These mines lie in a small area (of six or eight square miles) of modified granite in which the mica has been changed to chlorite or sericite and the feldspar has nearly disappeared, forming a "protogine granite." In this granite the auriferous quartz occur as true veins, having clean walls accompanied by a slatey gouge or selvage and frequently showing slicken sides.

Besides the segregated or "bedded" quartz veins (which are the most numerous) and the fissure veins, these Huronian schists are noteworthy for the occurrence of low grade auriferous fahlbands. Beds of pyritous, black or greenish schists, usually highly silicified, or with thin seams of segregated quartz, are not uncommon, the one upon which the most work has been done being known as the "Scramble" mine, which lies a short distance north of the railway line near Rat Portage. Here the width of the fahlbands varies from 25 to 35 feet, and from the latest information will average from \$2.00 to \$3.00 per ton. Some portions of the band, however, seem richer than others, and it is not unlikely that a rough sorting will give a gold tenor that will show a safe margin of profit.

(a) Mineral Resources of Ontario. Report of Royal Commission 1890, page 211.

(b) Annual Report Geol. Survey of Canada, 1892-93.

(*) Annual Report Geol. Survey of Canada, 1890-91.

(e) Fifth Report Bureau of Mines, Ontario, 1895.

Other fahlbands occur in the Manitou country (e. g. the Hammond reef) and in the region of Little Turtle lake.

It must be borne in mind that developments in this field have occurred only since 1893, and chiefly during the years 1896 and 1897, and considering the really small amount of development done and the vast area over which the gold occurs, it is yet too early to predict its future.

From the published returns the average values seem low, but from the advantages which the district possesses in the way of abundance of water and timber, and cheap water transportation in the summer time, it should be feasible to work low grade ores here at such a cost as to leave a satisfactory margin of profit.

Laws.—The laws of Ontario permit of acquiring deposits of minerals by direct purchase at prices ranging from \$1.00 to \$3.50 per acre, according to location within certain districts, and distances from railways. The purchaser, however, is required, within seven years from the date of the grant, to expend in *bona fide* operations upon the property, \$4.00 per acre if the grant exceeds 160 acres, or \$5.00 per acre if the grant is 160 acres or less. In default of this expenditure the grant may be forfeited and the property then reverts to the Crown.

In lieu of a grant a lease for ten years, with right of renewal for another ten years, may be acquired by paying one dollar per acre as rental for the first year, and 25 cents for each year thereafter in advance. Such leases are subject to the same expenditure per acre as in the case of granted lands, in default of which the lease is forfeited; forfeiture also follows default of rental payment.

Pine timber standing on such grants or leases is reserved by the Crown. The law made in 1892 also provides for the imposition of a royalty, not to exceed 3 per cent., at the expiration of a period of seven years from the date of the patent or lease.

There is also a provision for the pre-emption of mining land by "staking claims;" this provision is modelled somewhat after the British Columbia law, and has not, as yet, been availed of to any extent. Such claims may be staked by anyone having a "miner's license," the fee for which is \$10 per annum; the dimensions of claim shall not exceed 20 chains square, or 40 acres; the boundary lines must be brushed out or blazed, and must be run north, south, east and west *astronomically*; 130 days' labor are required upon each claim, in lieu of which no money payment is accepted.

BRITISH COLUMBIA.

History.—Gold was first discovered on the western coast of Canada in 1851, when an Indian woman found, by accident, a nugget upon the shore of Gold Harbour, Queen Charlotte Islands. This nugget found its way into the possession of officials of the Hudson's Bay Company, who made an investigation resulting in the finding of a quartz vein, about seven inches in width, carrying gold. In 1851 and 1852 some mining was done on this vein and some quartz shipped away from it, but reports vary as to the total amount produced, it being reported at from \$20,000 to \$75,000 in value.

The discovery which brought British Columbia into prominence as a mining country, however, was the discovery of alluvial deposits in 1857 upon the banks of the Thomson river, a little above its confluence with the Fraser. As the result of this discovery (which is said to have produced some 300 ounces during that year) a large number of people, estimated at from 20,000 to 30,000 in number, came into British Columbia the following year, and the deposits on the lower portion of the Fraser were vigorously worked. Comparatively few of the many thousands who had come remained during the winter, but the few who did remain gradually worked their way up these rivers, finding, in 1860, the Cariboo district and working upon the forks of Quesnelle river and upon Antler creek. In that same year the deposits on the Similkameen

river in Yale district were found by miners working their way up from the south.

The extraordinary richness of the two creeks known as "Williams" and "Lightning" established the reputation of the district of Cariboo as one of the richest placer mining countries ever found. This was particularly true after the discovery of the old channels of these streams, and in this connection it may be interesting to note that considerable portions of the old bed of Williams creek yielded as high as \$1,000 to the running foot of its length; and from some claims (which at that time were about 25 x 100 feet) gold was obtained in amounts varying from 70 to 400 ounces per day. It is reported that from one claim in one day \$40,000 was washed.

The discovery of rich placer deposits on Wild Horse creek in East Kootenay dates from the year 1863, and the production of this creek is variously estimated, but from the best records obtainable the amount appears to be between six and seven millions of dollars.

The auriferous gravels of the Big Bend country were discovered and opened in 1865, and the deposits of the Omenica were first found in 1869 but did not attract much attention until 1871. The following year (in 1872) prospectors reached the head waters of the Dease river and found gold in the Cassiar country.

The rich deposits obtained in the years 1861 to 1864 on Williams creek were followed by the discovery in 1871 of the rich deposits in the old bed of Lightning creek. Of the total product of \$59,000,000 obtained from placer gold from 1859 to the first of January, 1898, it is estimated that over \$20,000,000 was the product of Williams creek alone, and that nearly \$40,000,000 of the total amount is to be credited to the Cariboo district.

The working of the ancient alluvions on these creeks was attended with much expense, so that after the year 1879 the yield from placer deposits all over the province fell off rapidly, and, while slightly increasing again during the last four years, it is now only about half a million a year, although the returns from the capital which has been going into the Cariboo district during the last two or three years should soon be apparent and will probably restore this branch of mining to a semblance of its former prosperity.

From 1858 to 1893 the production of gold in British Columbia was entirely due to the working of its placer gold mines, but in 1889, 1890 and 1891 discoveries of auriferous iron sulphides were made in the southern part of the West Kootenay division in what is known now as the Trail district, about seven miles north of the International boundary line. These sulphides so found were not continuously worked until the winter of 1892 and 1893, since which time the production has been largely increased, until at the present time the yield from this district alone out-shadows any and all other gold producing districts in Canada. It must be borne in mind, however, that this gold field is of an entirely different nature and character to that found anywhere else to date in Canada; by which is meant that the major part of the gold contained is not free, but has to be extracted by means of a smelting operation, differentiating it from the gold found in the districts of the Provinces of Nova Scotia and Ontario.

About this same time a free milling gold vein was opened on Rice creek, a tributary of Rock creek, in Camp McKinney and about eight miles north of the boundary line. The first discovery of gold in this camp was in 1884, and the "Cariboo" vein was discovered in 1887, but work was not begun systematically until 1894. Free gold in quartz had been noted in the early sixties in veins occurring along several creeks and on mountains in the Cariboo district, and although primitive attempts were made to work some of these veins (particularly in 1877 and 1878) the results were unsuccessful, and vein mining has never been established as an industry in the famous placer district.

Production.—The following figures and tables are taken from the excellent compilation contained in the report of the Minister of Mines for the year 1897:

The total production of gold in British Columbia from the discovery in 1858 to the end of the year 1897, was:

From placer mines.....\$59,317,413
From lode mines..... 4,300,689

Or a total gold production of.....\$63,618,102

Yield of Placer Gold from 1858 to 1898.

1858.....	\$ 705,000
1859.....	1,615,070
1860.....	2,228,543
1861.....	2,666,118
1862.....	2,656,903
1863.....	3,913,563
1864.....	3,735,850
1865.....	3,491,205
1866.....	2,662,106
1867.....	2,480,868
1868.....	3,372,972
1869.....	1,774,978
1870.....	1,330,956
1871.....	1,799,440
1872.....	1,610,972
1873.....	1,305,749
1874.....	1,844,618
1875.....	2,474,004
1876.....	1,786,648
1877.....	1,608,182
1878.....	1,275,204
1879.....	1,290,058
1880.....	1,013,827
1881.....	1,046,737
1882.....	954,085
1883.....	794,252
1884.....	736,165
1885.....	713,738
1886.....	903,651
1887.....	693,709
1888.....	616,731
1889.....	588,923
1890.....	490,415
1891.....	429,811
1892.....	399,526
1893.....	356,131
1894.....	405,516
1895.....	481,683
1896.....	544,026
1897.....	513,520

Total.....\$59,317,413

The production of gold from lode mining began in the year 1893 and the product of the five years is given below:

Yield of Gold from Lode Mines from 1893 to 1898.

YEAR.	Ounces.	Value.
1893.....	1,170	\$ 23,404
1894.....	6,252	125,014
1895.....	39,264	785,271
1896.....	62,259	1,244,180
1897.....	106,141	2,122,280
	215,086	\$4,300,689

Area and Geology.—The delimitation of gold-bearing areas in a new province like British Columbia, where by far the vaster part of its 370,000 square miles of surface is an untrodden wilderness, must of necessity be confined to those portions which are at present occupied, or have been worked in the past, and at the best can only be an approximation. When it is further considered that each year prospectors are

pushing ahead and opening new sections, this approximation becomes valuable only for the season in which it was made.

The region within which payable auriferous alluvial deposits have been found in the Cariboo country has a greater dimension of about 50 miles in a north and south direction, extending from Valley creek on the north to Beaver river on the south, along the 122d meridian, with a greatest width of 30 miles. The area is given by Mr Bowman (a) as an annular space surrounding the flanks of Cariboo mountain, having an average width of 10 miles and comprised within a circle 40 miles in diameter. The area may be taken as approximating 1,000 square miles, within which are included all diggings hitherto remarkable for their wealth or permanence

The gravels of this section are of recent post tertiary and tertiary age (b). The gravels first worked here, in 1860-64, are recent, being the detrital remains of older gravels washed down and re-arranged by the present streams and for the most part are worked out or now only worked by Chinamen. The high "bench diggings" or terraces of auriferous gravel lying from 100 to 800 feet above present river courses are put down as post tertiary, and constitute a large portion of the gravels now being worked by hydraulicing. The old channels of Williams and Lightning creeks belong to the tertiary period and all the old channels of this district are likely to be found of this age.

The greater part of the annular belt comprising the alluvial fields of Cariboo is underlain by a series of crystalline schists (named by Mr. Bowman "Cariboo schists") lithologically identical with the Cambrian and pre-Cambrian of Eastern Canada, and consisting of altered sediments - talcose, and chloritic slates, micaceous schists, some quartzites and occasional bands of calcareous shales, all contorted and much folded. It is only within this area of folded schists that gold has been found in profitable quantities.

Upon the hill sides and mountain tops in this area (as Mt. Tom, Island, Mt. Burns, Mt. Antler, Mt. Yanks Peak, etc., etc.) quartz veins, corresponding in strike with the enclosing schists, occur in large numbers. The attempt to work some of these veins in 1877 and 1878 has been alluded to, with mention of the unsuccessful results. Nevertheless it is altogether within the range of probability that further search and intelligent investigation will reveal some of the sources from which the placer gold was derived, and that a vein mining industry will be established in the Cariboo district which will ultimately rival in production the famous yields of the sixties. "The very 'coarse' character of much of the placer gold and the definite localization of the richer parts of the deposits, show that these must often be near their points of origin." (c) "It has often been recognized that belts of rock containing numerous small and irregular quartz stringers only will pay for mining and crushing as a whole," (d) and as the gold schists of Cariboo answers to this description, and do not afford such large auriferous quartz veins as would be likely to be the source of the coarse gold found in the gravels, it is probable that in such quartziferous schists will be found the material for a quartz mining industry.

The gravels of the Omenica and Cassiar district are in all respects similar to those of the Cariboo section. The areas of these northern districts are as yet undetermined, but with Dease lake as a centre, pay dirt in Cassiar has been found within a circle whose radius may be taken at 40 miles, and the productive portion of the Omenica covers not less than 200 square miles.

Large veins of quartz are represented to occur in both of these sections and to carry argentiferous galena, but there is no record of discoveries of free gold in veinstone.

(a.) Part C. Annual Report Geol. Survey, 1887.

(b.) Op. Cit., pp. 16, 17.

(c.) G. M. Dawson, Part R. Annual Report, 1887, p. 58.

(d.) Op Cit. p. 53.

The gravels of the Big Bend country occupy an area between the summits of the Rocky Mountain range and the Gold range extending from the 53rd parallel southerly some 50 miles. The most productive sections have been the valleys of Gold creek and Carnes creek and their tributaries, covering an area of about 35 by 20 miles, or between 600 and 700 square miles.

Since 1895 many discoveries of auriferous veinstone have been made in this district, some carrying free gold and others carrying sulphides of iron with which free gold appears to be associated. At the period of writing several attempts are being made to open up these veins which promise a substantial basis for a remunerative quartz mining industry. Difficulties of access have kept this region back, but the general progress of transportation methods, now so rapidly advancing in British Columbia, will soon remove obstacles.

The gravels of the southern portions of the Kootenay divisions do not appear to be so extensive, nor accompanied by such large areas of gold bearing formations as are seen in the districts north of the line of the Canadian Pacific Railway.

The most productive of these southern fields on the eastern side has been that occupied by Wild Horse creek on the western slope of the Rocky Mountains, and by Perry creek and Moyie river on the eastern slope of the Selkirk range.

The gravels which have been worked on these streams are chiefly of modern origin, although a portion of a tertiary channel was worked on Perry creek. The area embraced covers, for the three streams, some 40 square miles, underlain by slates and quartzites of probable Cambrian age, with patches of diorites included.

In this slate series occur schistose or "bedded" veins, often of large dimensions (on Perry creek reaching widths of 40 to 60 feet) carrying gold associated with iron pyrites, and occasionally with the higher sulphurets of copper. But the gold contained is fine and so intimately associated with the sulphurets as to preclude the idea of milling the ore; several extensive tests conducted in 1897 failed to discover the existence of paying veins and led to the conclusion that the gold in the gravels must have been derived either from richer portions of these veins, long since eroded, or that it had come from the outcrops of pay chutes now deeply buried beneath a heavy drift.

Small amounts of gold have been washed from recent gravel deposits in valleys occurring on the range of metalliferous rocks running north-easterly from Trail towards Kootenay lake, in Nelson mining division.

These gravels are the detritus of small quartz veins occurring in the granites and mica syenites of the country, one or two of which veins have been worked as lode mines in recent years and have made a small production. Their size however, is small and the free gold appears to be confined to the zone of decomposition, after passing which the values are contained almost entirely in iron sulphides.

The valley of the Similkameen and tributaries, in the political district of Yale, is the most important of the southern placer fields. Although one of the first fields discovered is has never been abandoned, and gravels on two tributaries (Tulameen river and Granite creek) are yet abundant and remunerative in grade.

In this district most of the gravels worked have been modern, but there are undoubtedly deep lying deposits of tertiary gravels there which may prove as high in grade as gravels of similar age have done in the northern districts.

The area of Similkameen country approximates 700 to 800 square miles, and although quartz veins have been found in rock exposures in the valleys, no systematic work has been done upon them; but from recent discoveries during the last twelve months there is every reason to anticipate the establishment of vein mining in this section.

The other southern sections of Okanagan and Rock creek are now abandoned to the Chinese, though in Rock creek, as previously mentioned, mining upon one vein has been profitably carried on for some years.

This vein in character is similar to those described as occurring in the granites near Kootenay Lake. It lies in a massive rock said to be diabasic (a), and other veins are found in the immediate vicinity. The region is one of flat dipping faults, and the values contained in the veins are associated with sulphides of the base metals.

A district to which reference has not before been made is that lying between, and embracing, Bridge river and Cayoosh creek in Lillooet. Gold bearing gravels were found here early in the sixties, and considerable quantities of gold were washed from them. The valleys of both streams have great exposures of rock, in many places narrowing to a rock gorge. These rocks are a series of slates, quartzites and schists, said to be of early Palaeozoic age, which have interstratified with them layers of quartz, the whole being more or less crumpled or folded, and traversed by a complex series of faults.

It was early acknowledged that these quartz bands were the original source of the gold found in the bars of both streams, and some of the early work in quartz mining was done on the "Bonanza" ledge on Cayoosh creek. In 1896 the discovery of an outcrop of quartz carrying very rich specimens attracted great attention, and the progress of the "Golden Cache Mines Company" formed to work this deposit, has attracted equal attention. The results which have been made public by this company regarding its operations have not been such as to inspire belief that these quartz veins will be found to be of high grade or specially remunerative. But attention has been directed to the field which covers some 400 to 500 square miles, and it is not unlikely that profitable ore bodies will be found there.

Large exposures of quartzose schists, associated with quartzites, and carrying interbedded quartz veins have been known (and worked to a slight extent) for some seven or eight years in the camp of Fairview, on the Okanagan river, but so far the various attempts to work these deposits have not resulted profitably, with the exception of one chute in the "Morning Star" mine.

Vein mining for gold in British Columbia is at present practically the monopoly of the Trail district, in which (as previously noted) the gold occurs so intimately associated with iron and copper sulphides as to make it a smelting ore.

Trail district, politically, covers about 600 square miles, but the area within which payable ores occur is less than 20. This district has so far produced a total of \$4,000,000 in the four years of its existence as a producing country. The ore bodies have been the subject of careful study by the Geological Survey (b). The deposits appear to have the form of replacement veins along lines of fracture occurring in an irregular area of eruptive rock which has for its centre a mass of gabbro surrounded by an area of fragmental volcanic rocks frequently appearing to be porphyrites. Along these lines of fracture or of fissuring have been deposited bodies of iron sulphides (chiefly pyrrhotite) associated with small quantities of chalcopyrite and arsenopyrite. In some cases two walls are apparent, but in most of the deposits there is but a single wall which does not act to define or limit the ore body, but is simply evidence of the channel through which the mineral solutions may have acted to dissolve away the country rock and deposit their metalliferous contents. Comparatively few of these deposits of iron sulphides are sufficiently auriferous to pay for their extraction, and so far no indication of values can be obtained except through assaying. Owing to the hardness of the eruptives in which

(a) Annual Report, Minister of Mines, B. C., 1897, p. 604.

(b) Summary Report, 1896, p. 23-29.

these deposits occur development is slow and expensive, and although this district is now in the fifth year of its existence not more than half a dozen properties can claim to have pay ore bodies of any magnitude. With the advent of a cheap method of extracting the precious metal from its matrix of base sulphides will come a tremendous industry, since the tonnage of ore (of a value at present too low to permit of smelting) already in sight is exceedingly large.

Similar bodies of auriferous sulphides occur south-westerly in what is called the Boundary district, but as yet only development has taken place and no production has been made.

It may indeed be said that as yet there has been no discovery of free milling quartz in quantity in British Columbia. While the "I. X. L." at Rossland, the "Poorman" and "Fern" near Nelson, the "Cariboo" near Rock Creek, and the "Morning Star" at Fairview, have worked for longer or shorter periods successfully, yet in all these cases with perhaps the exception of the "Cariboo," the free milling character of the ore has disappeared with increased distance from atmospheric oxidation, and the ore has become a concentrating, rather than a milling proposition. It is to the northern districts of Cassiar, Omenica, and Cariboo that one must look for discoveries of free milling ore if indeed British Columbia is to have such, or, perhaps to the quartz veins of the coast range above Vancouver, from which section come reports of discoveries of large veins said to be free-milling.

Laws.—The mining laws of British Columbia are being so constantly amended that it is difficult to give a synopsis.

(1.) The first prerequisite for acquiring, owning or holding mineral property is the obtaining of a "free miner's certificate," which is good for 12 months and which costs \$5; joint stock companies must obtain a certificate as well as an individual miner or mine-owner; a transfer of mining property to a person or corporation not holding a "free miner's certificate" is invalid.

(2.) In the development of mineral bearing lands the law of British Columbia divides into two parts—the Placer Mines Act and the Lode Mines Act. Lode mines are obtained by staking locations, the maximum size of which is limited to 1,500 feet square containing 52 acres. The locations must be marked by boundary posts, and a post erected at point of discovery, and the side end location lines must be brushed out or otherwise designated.

(3.) Each location is required to be recorded at the office of the Mining Recorder of the district within fifteen days after location is made, or if more than ten miles from the said office an additional day is allowed for each ten miles in excess of the first. After the location, and recording, a "free miner" is permitted to hold the same provided he shall perform development work upon the claim to the value of \$100 during the first year and each year thereafter, to which he shall make affidavit, and record that he has done the work. Upon showing evidence that this \$100 worth of work has been performed for five years, or that \$500 worth of work in all has been done upon any one claim, he is entitled to have a Crown grant issue for the same, after it has been duly surveyed, &c. &c.

NORTH-WEST TERRITORIES.

There are two other portions of Canada which should, perhaps, be mentioned in any account of her gold fields; both of these districts are outside of any provincial boundary, and are territories under the administration and jurisdiction of the Dominion Government.

The first of these is the territory drained by the North Saskatchewan and some of its tributaries, and extends westerly from Edmonton some 200 miles, and easterly for over 100, gold having been obtained from washings at Battleford. The gold found has occurred entirely in

the modern gravels of the Saskatchewan, and only the bars and beaches left dry at low stages of the water have hitherto received much attention.

Discovered by Sir James Hector in 1858 when making his reconnaissance survey through the Rocky Mountains, the work of mining was begun in 1865, and from that year down to the present the river bars have received more or less attention. The production in some years has reached \$50,000, but in others has fallen much below that amount, and no authentic record of yield is available. The season of low water during which the bars could be worked by hand is comparatively short, and sudden rises of the water are frequent, so that for many years now the average earnings of the men who have used a sluice-box or rocker have been under, rather than over \$1.50 per day. The gravel on these bars runs from 4 to 8 feet in thickness.

Some two years ago dredges were put upon the river, and attempts made to handle the gravels of the submerged portions of the river bed, but owing to the inexperience of the operators, and many deficiencies in construction of the machinery their operations were financially unsuccessful. There is being made this year, a series of comprehensive tests, under the able management of Mr. A. E. Hogue, M. E., with a dredge of 500 cubic yards per diem capacity. Calculations have been made with due reference to the fine character of the gold and to the low grade nature of the gravels, and the management feel sure of a successful venture.

The source of the gold in these gravels is undetermined, but as post tertiary gravels are known to cover large stretches of the country to the westward, even to the slopes of the Rocky Mountains, it is to be supposed that the various branches of the North Saskatchewan have cut their banks through these auriferous gravels, and that at each flood time, portions of them are washed down and rearranged or redistributed in the bars of the present river; certain it is that the gravels appear to be enriched each time the river is flooded.

In this connection it may be pertinent to remark that not only the North Saskatchewan river but those portions of the McLeod and Athabasca rivers lying between the 53rd and 54th parallels, also carry auriferous gravels, and that there is a large area between the Peace river on the north, and the north branch of the Saskatchewan on the south, which may be expected with the advent of roads and better transportation, to become an important factor in the production of gold in Canada.

The other portion of the North-West Territories which has not been mentioned is the now famous "Yukon Region," concerning which there are three sources of information available, viz:—(1.) The Reports of Dr. G. M. Dawson and Mr. R. G. McConnell in the volumes of the Geological Survey for 1887-8-9. (2.) "The Klondike Official Guide," by Wm. Ogilvie, and, (3.) "The Appeal of the Yukon Miners to the Dominion of Canada" 1898.

The following brief account has been compiled from the first and third sources, and the mass of ill-digested hearsay information contained in Mr. Ogilvie's book has been disregarded. The first mining done in this region, in the valley of the Yukon proper, was in the year 1880, on a tributary of the Lewes river and the production amounted to very little. In 1881 remunerative bars were found on the Big Salmon river. In 1885 mining on the Stewart river produced gold of an estimated value of \$100,000, but the finding of "coarse" gold on Forty-Mile creek in 1886 drew off most of the miners from the Stewart, and since 1887 this river has been practically abandoned. The Stewart river has never been explored to its source and the work done on its tributaries so far has not demonstrated the existence of very rich gravel. The total number of miners in the Upper Yukon Basin in 1887 was estimated at 250. In the early nineties rich gravel was found on two tributaries of Sixty-Mile creek (Miller & Glacier creeks) and the total gold yield

of these to 1898 is estimated at \$200,000. Between the discovery of gold on Sixty-Mile and that on the Klondike river in July, 1896, there was little new ground opened.

In July and August, 1896, discoveries of rich gravels carrying coarse gold were made on Gold Bottom, Bonanza and El Dorado creeks tributaries to the Klondike river which is a stream of between 200 and 300 miles in length (of which only about 100 miles from its mouth has been explored) flowing southwesterly and emptying into the Yukon river about the 64th parallel of latitude.

These are the discoveries which have attracted the attention of the world, and have induced a mad "rush" into this inhospitable country during the last twelve months. So little is, however, definitely known of the vast region of the Yukon district (covering over 190,000 square miles), and the areas of exceptionally rich ground thus far discovered are so small, that it is not within the region of probability that one per cent. of the people thus "rushed" in will find profitable diggings. Although water for sluicing and mining purposes may be obtained for at the most) four months in the year, the cost of working frozen ground, and for subsistence during the other eight months will prevent the working of any but very rich gravels for some years to come. With the cutting away of the timber and the burning of the moss whenever dry enough, some portions of the ground may thaw out sufficiently to permit of small hydraulic operations, but at the present time the only method of work feasible is by "drift mining," which is a matter of individual effort and cannot be materially cheapened or increased by capital, nor the operations of "companies."

The pay dirt, where found, averages from two to five feet in thickness lying beneath two feet of moss and from 12 to 20 feet of muck and barren gravel. Beyond the affluents of the Klondike and Indian rivers practically nothing is yet known of the value of the gravels to be found, and although the gold bearing gravels of the region have been shown to be widely distributed and extensive in area they have not been shown, with a few exceptions, to be very rich. As yet no places comparable in richness with many places in California, Montana and the Cariboo district of British Columbia, have been found, and it needs no second thought to comprehend that costs of extraction in the Yukon will always be greater than in the more favored sections to the south.

In regard to the discovery of rich gold bearing quartz veins in this region, there is no evidence that such has yet been found. Numerous quartz veins have been seen and prospected, but as yet no veinstone of payable grade has been opened.

The rocks of the Yukon valley, between Forty-Mile creek and the Stewart river, are chiefly hard crystalline schists and slates, and gray granites. Along the region of the Klondike river runs a belt of clay slates with interbedded lime stones traversed by quartz veins, and above this (to the south) occur schists more or less micaceous (*a.*) The age of these schists and slates has not been determined, but they have the lithological characteristics of Archean rocks.

Much may be expected from the development of this Arctic field, but time and many other conditions will be required to assign to it its relative place amongst Canada's gold fields; and her fame and future, as a gold producing country, must rest on the development of the more accessible fields, which, for investment purposes, have certainly many features of preferment.

JOHN E. HARDMAN.

(*a.*) Report 1888-89 Geological Survey of Canada, p. 142.

Orders for the eighth edition of the *Canadian Mining Manual* should be sent in now. All previous editions sold out.

Developments in Gold-Extracting Machinery, and Some Causes of Failure.

By JOHN W. JAFFRAY.*

(Continued from June issue.)

Ore concentration, as we all know, is a very knotty subject, and has led to a lot of enthusiastic discussion, especially by the representatives of some of the more popular machines. Some have even gone the length of issuing challenges with heavy stakes under specified conditions, to decide at a public test the premier position of certain machines, but for some reason or other the challenges have never been taken up, and so we are left to form our own judgments from what we ourselves have seen. No doubt the work of concentrating machines would be very much simplified if all our mills that have concentrates to deal with, would introduce some system of sizing the pulp as it comes from the crusher; and of late years this is receiving more attention and its advantages appreciated from practical experience. The old German Spitzkasten or V box classifier as introduced by Rettinger many years ago, is still one of the simplest means of sizing before concentration, and, if used in connection with some trommel arrangement and jiggling apparatus, vastly improves the concentrating results. Those who have seen some of the classifying outfits at work in Tasmania and Victoria cannot but be struck with the efficiency and advantages of such an arrangement. The question of first cost is of course often an important factor, but if the funds will not extend to a complete system such as demonstrated in the Luhrig, then the simpler means that are available and that can be got at little cost, ought to be taken advantage of as far as possible.

The "Frue" Ore Concentrator or Vanning Machine is perhaps one of the most popular of its kind, and there are ample opportunities to refer to its work in practical application and varying circumstances. Its main feature is a revolving rubber belt, travelling on an up grade with a side shaking movement, which the makers claim to be an improvement on the old revolving canvas belt arrangement with lateral or end shake. If manipulated intelligently as to feed, supply of water, speed and suitable grade, it is, and has proved itself, a concentrator of universal efficiency, and as such has had a good innings; but there are possibilities of improvement that want attending to if it is to keep pace with the times. I find that in a good many cases, a canvas belt is being substituted for the rubber belt and is found to act better on some classes of ore; and lately at the New South Wales Government Metallurgical Works, I saw a new composition belt on trial which is said to be an improvement on the rubber. The new patent lip flange on the rubber belt lately introduced by the makers is an improvement and they claim that the new belt will last as long as two of the old style.

The Luhrig Vanner claims that not only does it separate the heavy metalliferous particles in the gangue, but that by its system greater perfection is attained by the classifying of all particles according to the different specific gravities of the ore under treatment, producing various classes of middle products to any degree that may be deemed necessary to preserve the purity of the concentrates and the cleanness of the tailings. In erecting plants on the Luhrig system, special attention is directed to classification, and the makers say that no vanner should be called upon to treat ore of different grades; patent hydraulic classifiers should be used, and then the various grades distributed to their respective vanners, two or more as required. The belt in the Luhrig is horizontal and travels from right to left with a quick, sharp percussion in the direction of line of travel and is so arranged as to draw off several classes of ore products instead of one only as in most of the other vanners. Its arrangement is based on the principle of, and necessity of

* Australasian Institute of Mining Engineers.

gradual sizing, so as to render the ore amenable to automatic and economical treatment. Jets of water from a pipe placed diagonally over the belt and adjusted to the necessary angle flows on to the pulp, thus creating a side delivery in various grades along the length of the belt. The alteration in the angle of feed water pipe in this machine is the substitute for the grading of the inclination of the belt in the Frue and other similar machines.

It is contended by some authorities that concentration cannot be properly made without previous classification, which theory would be in favor of the Lulrig system; but it is also a fact that good results with some classes of ore have been got by vanners without classification, and so it would be invidious to attempt any adjudication on the comparative merits of any such machines, unless they were actually put alongside each other under precisely the same conditions and fed from the same crusher over an extended practical test.

The Broadway Vanner is in all essential points similar to the Frue in action, but differs in construction; the details partaking of the English character, where iron is used instead of wood, as in the American Frue; and the means of adjusting the speed and the grading of the belt, etc., are accomplished in a more mechanical way, and remain steadier after having once been adjusted as required. I am surprised that this machine has not been more heard of in Australia; perhaps the price has something to do with it.

The Victory Slimer and Concentrator is another example of the travelling belt machine, but differs considerably from any of the others. It claims to be capable of treating ore too light to be dealt with by any other vanner, concentrate cleaner, and with less loss. The makers say that floating minerals, which would be lost on other machines, can be saved on the Victory. In principle it is a series of sluices made out of corrugated metal and fixed crosswise on belts, and as these travel forward the whole frame receives a shaking motion which keeps the gangue moving. Copper and silvered or galvanized iron sluices may be used, and every provision is made for adjustment. I give these particulars because a good deal has been said and reported of this machine, but I am unable to refer to any practical good it has done.

The Embrey Concentrator and the Triumph Vanner—like the Frue Vanner—have endless belts, but differ mainly in having end shaking motion instead of the side shake. The speed in these has to be higher than the side shakers to make them effective.

The Bilharz Automatic Percussion Vanner, which I understand is a modification of Stein's table, is well spoken of in some districts. It is of the endless rubber belt class, the belt passing over rollers at each end but instead of small intermediate rollers, to support the belt as in the Frue; it is in this machine supported on a table across which several diagonal channels are cut and along which water is forced, which spreads over the surface of the table, thus diminishing the friction between the belt and the bed. One of the advantages claimed for this machine is that in treating ores with a variety of minerals, say gold, galena and blende, etc., it will save all the minerals and reject the quartz only. The Rettinger Vanner is another very similar to the above.

I have already mentioned several circular concentrators and buddles, but must briefly notice another as a distinct type. It is known as Zenbach's Continuous Circular Concentrator. The distinctive feature of this buddle is that the distributors of the pulp revolve whilst the hearth is fixed, the latter being conical and about 20 feet in diameter. An iron revolving frame-work suitably geared carries a circular feeding trough, four arms of spray pipes, and a spray box at the circumference, which all revolve over the surface of the hearth. This machine is giving very good results in some of the Victorian mines.

The Bartsch System Improved Percussion Circular Vanner is a comparatively late development of its class, and has found its way to some mines, but I am not in a position to say with what success.

The Woodbury Ore Concentrator is one of the latest advents in belt vanners, and it comes with special claims of merit as compared with some of the older and better known machines. It is made both for side and end shake, but so far we have only had experience of the latter. Instead of one wide belt, say 4 ft. or 6 ft., this concentrator is practically composed of a number of narrow belts, made in widths from 3 inches upwards to suit the requirements of the case. It is claimed that this arrangement gives twice the capacity of an equal area of wide belt for the reason that if the wide belt were fed as lavishly as the same area of these narrow belts, the pulp would seek a channel of its own in the bulk and the current cause it to flow off the belt unseparated, whereas the pulp being divided equally in these narrow belts, is prevented from running from one side to the other beyond its limited bounds, and so regulates the mass equally over the whole surface. The edges of these rubber belts are all made corrugated to prevent the edges cracking as they pass around the drums; a very good idea, as it will give longer life to the belts. Smooth surface belts are recommended for fine and close work: the usual American custom of wooden framing is substituted in this by a good iron frame. It is perhaps too soon to say much about its merits, as so far we only know its results on the Hillgrove ores. The evidence, however, from that district speaks well in its favor; some of the reports (which are not contradicted) show that it gives nearly double the results of some of the better known machines working under similar conditions.

The Hendy-Norbon Concentrator gives the choice of either side or end shake by a very simple adjustment; the inventor's idea being to enable millmen to experiment and find out what motion is most suited for their particular class of ore. Tulloch's Vanner and the Golden Gate Vanner are other examples of the belt type, but are not so well known in Australia as some of the others.

Johnstone's Improved Concentrator is somewhat different; it is suspended from four hangers with a motion adjustable to suit the grade of ores to be treated. This motion resembles more nearly the Bates than any other concentrator; it is a cheap machine and effective. White's Wimmera Canvas Vanner is perhaps the simplest of the lot, and yet not the least effective. It may briefly be described as an intermittently revolving endless canvas belt, over 100 ft. long by 3 ft. wide; it also gives very good results.

Sig. Ferrari's Concentrator or Washing Plant is another of the belt type, but without a shaking motion; the author's idea being that a violent shaking movement is not necessary for separation, and that it does not improve the work, but increases complication for no useful purpose. It is a side delivery machine and the drums and rollers that carry the belt are slightly inclined towards the front, giving the band a slope downward at the delivery edge. The ore with plenty of water is fed near the upper edge and gravitates towards the delivery edge, over which the different grades fall into receivers.

The number of inventions of concentrators is legion. Many of them have good points and contain in them the principles of gold saving; but after all the question is, how many of the later inventions are really improvements on some of the older methods? And if I had to answer that, I would say: Very few indeed. If this is not correct, then with all the developments in this line, which are available to-day, the escape of the precious metals ought by this time to be pretty well circumvented; but we find mills saving only 50 to 60 per cent. of the assay values and the balance going to the creek. Why is this? Surely there is room for yet just another, better than the best.

Having saved the concentrates, let us now see what methods there are available for their treatment; under this head I will do little more

than mention some of the better known roasting furnaces. The subject is of sufficient importance to form a long paper itself. The principal objects to be attained are briefly: automatic action to save labor, economy in fuel, utilization of all the products, simplicity in construction, few working parts, durability, and thorough desulphurising and chloridising of the ores, so as to secure efficiency in whatever process is to follow. Heap roasting in piles is still in practice in some parts of America; and the old Reverberatory Furnace, with hand rabbling, although of old date, is still popular in Australia, notwithstanding the many more modern devices available.

Then comes the kiln and shaft type, including the Stetefeldt Shaft Furnace, which is the first of its class, wherein the pyrites is roasted in its descent from the feed hopper, but this is not adapted for heavy pyrites. Fauvel's Furnace with sloping shelves comes next as an advance on the above, and then the Cosmo Newbery adaptation of this class of furnace, with inclined floors, which is doing good service in Victoria; but none of this class is adapted for heavy concentrates.

There are three classes of mechanical roasters, namely: rotating cylinders, fixed hearths with mechanical rabblers, and rotating beds or hearths with fixed rabblers. As examples of the rotating cylinders—

Bruckner's Rotary Furnace comes first, and after successive alterations has been extensively used, and found suitable for "dead" oxidizing; but it is not continuous and not equal in temperature all through. Hoffman's comes next as an improvement on the above, and besides having other advantages gives a more equal heat all through. Some of the Cornish Rotary Furnaces, including Oxland and Hocking's improvements, are amongst the earliest of the continuous process class; but so far as I can trace they were not known in Australia until the advent of White's Continuous Rotary Roaster and Howell's Patent Desulphurizing and Chloridizing Revolving Cylinder Furnace, which feeds and discharges continuously and automatically, and is very economical in every sense of the word and thoroughly efficient. The inside of these roasters is fitted with longitudinal projecting ribs, which are continuously lifting and dropping the ores in their passage from the feed to the discharge. This subjects them to many hundred feet of drop action, and these roasters are thus efficient for the heaviest as well as for the lighter concentrates. Molesworth's Cylindrical Roaster may also be mentioned amongst the class.

Fixed hearths with mechanical rabblers and the later improvements are becoming more popular. The O'Hara Furnace is one of the oldest of this class; it has two hearths and an endless chain with an arrangement of ploughs as rabblers; it went through several stages of improvement and was considered a very serviceable tool in its day. It was followed by the Spence Roasting Furnace, which is referred to as the best shelf furnace of its day, numbers of Buckner's Rotary Roasters having been discarded in its favor. It has a series of beds or hearths one over the other, and an arrangement of mechanical rabbling rakes. The McDougall Furnace is another of the same kind with a series of floors, mechanical rakes and feeders. Denny's Automatic Rabbler is another development of this class, and has from its design the advantage of the drop action. Pearse's Turret is a reverberating furnace with a column in the centre: this column revolves and a set of arms on it carry the rabblers. I had almost forgotten the Ropp Straight Line Furnace—one of the latest developments of fixed hearth with mechanical rabblers. There are several of them at work in Australia, giving good results. They are made from 30 ft. to 105 ft. long, and in widths varying from 8 to 14 ft., with 2 to 5 fire-places and 2 to 6 rabblers as required.

(To be continued.)

Mr. W. Pellew Harvey, F.C.S., has withdrawn his name as consulting engineer of the Associated Gold Mines of B.C. Ltd.

The Corundum Lands of Ontario.

In his well known work on the Geology of Canada, published 35 years ago, Logan notes an occurrence of corundum in the township of Burgess, in Lanark county, being on the second lot in the ninth range. There, in contact with crystalline limestone, is a rock made up of feldspar, quartz, calcite, silvery white mica and sphene, and disseminated through it were found small grains of a mineral whose color varied from light rose-red to sapphire-blue, while a hardness of greater than topaz showed it to be corundum. Small crystals of light-blue corundum were also found in the limestone of the vicinity. But so little interest did the discovery awaken that for many years the place of occurrence was forgotten and unknown, and it was only the circumstance of a much greater and far more valuable find of the same mineral in Carlow township, Hastings county, that led as a matter of curiosity to the re-discovery of the Burgess corundum a few months ago.

More than 20 years ago a little girl and her father were sitting on the rocks to rest after a walk through the woods at their home in North Hastings, and an oddly shaped stone which she picked up suggested to her mind the form of the glass stopper of a cruet stand bottle. It was a crystal of corundum, which had been weathered out of its matrix; but neither the child nor her father had then a suspicion of its name, nor that it had any relation near or remote to sapphire or ruby.

Still later other discoveries of the mineral were made in the same region, and it was mistaken for apatite or the phosphate of lime. The nearest guess to its identity was made by a University man who had studied mineralogy under Chapman, and he thought it was emery.

Finally it happened that a lot of rocks were sent down to the Geological Survey by some curious collector in Carlow, and having lain for several years in a storehouse there they were turned over by Mr. Ferrier, the lithologist of the Survey, who discovered in one of the specimens a crystal which he identified as corundum. This was two years ago, and it was the beginning of the end of the romance. Mr. Ferrier proceeded from Ottawa to Carlow township under the instructions of his chief, Dr. George M. Dawson, and with Nesbitt Armstrong of the New Carlow mills for guide, he succeeded in finding the corundum in place. This was on lot 14 in the fourteenth concession of Carlow, and although Mr. Armstrong's discovery there was made seven years before he had never been fortunate enough to get a man who could call the mineral by its name, or tell him of its uses and value, if it had any.

A few days later information of the discovery was communicated by Dr. Dawson to the Bureau of Mines at Toronto, and in view of its importance and the possibilities of other deposits in the district, the mining rights in the lands were withdrawn from sale pending the carrying out of a well-planned exploration.

This was late in 1896, and the work could not be undertaken until the following year, when it was placed in the hands of Prof. Willet G. Miller of the Kingston School of Mining. Prof. Miller had the help of two students from his school, and on beginning systematic work a few days were first spent in a study of the known deposits in Carlow and their associated rocks. As the district is a very hilly one, and as the rocks are to a considerable extent covered with brush and soil, it was at first feared that difficulty would be experienced in making out the relations of the rocks, and consequently that the discovery of new deposits of the mineral would largely depend on chance. But after an examination of two separate ore bodies at some distance from each other—one in Carlow and the other in Raglan—it was found that the mineral occurred under the same conditions in both. After determining the strike of the rocks in both localities it was concluded that the deposits belonged to one band, and subsequent examination showed that this was the case, for the mineral was found at numerous points between the two localities. The tracing of the mineral then became an easy matter, and by the middle of October Prof. Miller had located occurrences throughout seven different townships and over an area of about 100 square miles. These townships are Carlow and Bangor in Hastings, and Brudenell, Lyndoch, Raglan, Redcliff and Sebastopol in Renfrew.

The length of the corundum belt from east to west is about 30 miles, and its average breadth is about $3\frac{1}{2}$ miles. It embraces over 60,000 acres in all, but a few thousands of which the mineral rights are held by the Crown. Another area has been partially explored in the township of Methuen, in Peterborough county, where corundum of fine quality has been discovered, but the extent of it has not yet been determined. There is also a probability of its being found in the townships of Duggan and Faraday, where the rock formations are favorable. These several belts are shown on the accompanying map.

The geological formation of the country is described as Laurentian, and the band of rocks in which corundum has been found may be said to be made up of three important kinds, viz., gneiss, syenite and quartz, pegmatite. The gneiss, which is the oldest rock in the belt, is cut through by a series of dikes or masses which consist largely of felspar or feldspathoid minerals in which occurs the corundum. Along the greater part of the strike of the dikes the rock has sometimes the character of coarse syenite, but in some cases it passes into nepheline syenite—nepheline playing the part of felspar in the rocks and being a comparatively rare substance in many portions of the world. In general it may be said that the corundum occurs more abundantly in the ordinary syenite than in the nepheline syenite, but the crystals are usually much better formed in the latter than in the former. The dikes of course vary much in width, and it is difficult without long and very careful exploration to form an accurate idea of their extent and of the proportion of ore they carry. At one place Prof. Miller found the corundum rock to have a width of 10 yards and at another place about 50 yards, but often the dikes have a width of only a few feet. Numerous occurrences have been noted by him over the explored area, and on most of them rock may be obtained carrying not less than 15 per cent. of corundum.

Under arrangement made by the Crown Lands Department several tons of ore were mined in November of last year, and taken to the Kingston School of Mining, for a mill test under the direction of the Professor of Engineering, Mr. Courtenay DeKalb. The tests were designed to show not merely the proportion of corundum in the dike rock from which it was mined and the quality of it, but also the methods by which the ore could be most successfully treated to separate the mineral from its gangue and prepared for placing it upon the market. There seems now to be no doubt that operations can be economically carried out upon a commercial scale, and assurances are equally satisfactory as regards the quality of the corundum. The tests made at Kingston show that the rock carries 15 per cent. of corundum, and the proportion might be considerably increased with careful cobbling at the mines if this was desirable. If treated on a large scale the cost of milling the rock ought not to exceed \$1 per ton, and under careful management it might be reduced to 60 cents per ton of rock—or say of 300 lbs. refined corundum, with an average of 15 per cent. ore. What gives assurance of cheap production is the existence of abundant water power in the heart of the corundum belt, on the Madawaska river and its tributaries, which may be electrically developed with a moderate investment of capital.

At present one of the chief uses of corundum is as an abrasive; yet owing to its scarcity and cost no great quantity is available. The best known deposits are in

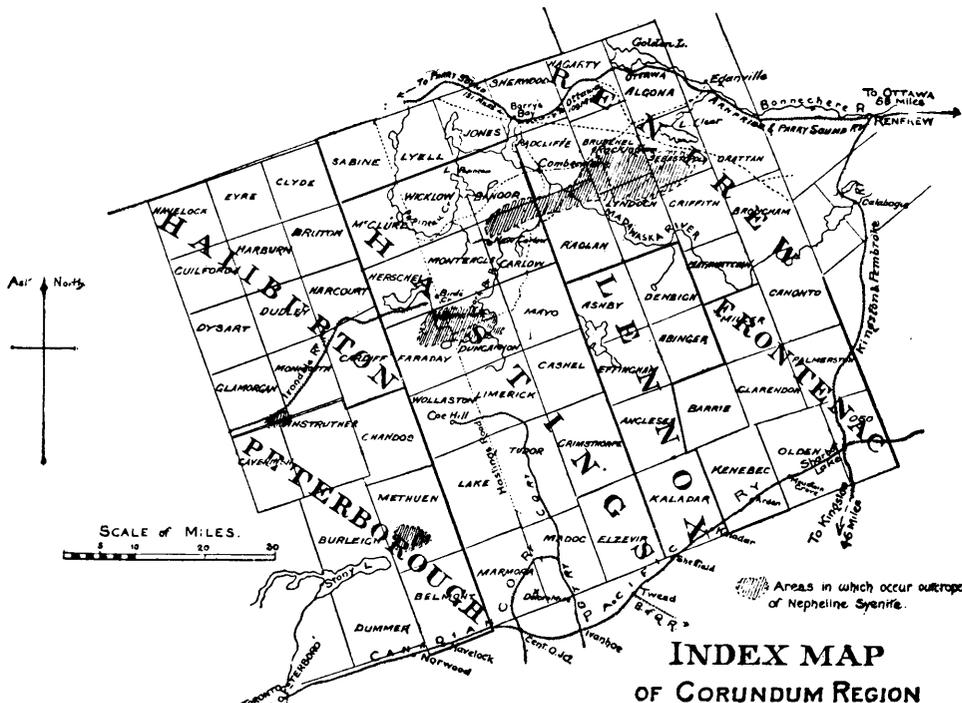
Georgia and North Carolina, but these are limited in extent and are practically controlled by a combine. Emery has accordingly been the chief natural material used as an abrasive, being found in several countries in large abundance. In recent years too, an artificial product known as carborundum has grown into favor, and manufacturers of it are inspired with confidence that they can supply the market to the exclusion of every other kind of abrasive. But experiments recently made go to show that for the best lines of work corundum is much superior to carborundum, and with the prospect of the opening up of large deposits in the Ontario fields corundum should have nothing to fear in the competition. If cheapness and efficiency can secure the market, the establishment of works in this province may yet drive carborundum and emery to the wall. Corundum almost certainly possesses one great advantage over its rivals, in that it may be put to other uses. As an ore of aluminium it has a great future if some present difficulties which appear to be only of a trifling character are surmounted. Pure corundum, which is alumina, is composed of 46.8 per cent. oxygen and 53.2 per cent. aluminium, and in the treatment of ore at the Kingston School of Mining corundum has been produced 99½ per cent. fine. The obnoxious elements consists of silica, sulphur and iron, all three not exceeding the half of one per cent, and means can no doubt be found to separate these from the corundum. At the present time cryolite and bauxite are the principal ores of aluminium, the former carrying about 13 and the latter about 26 p.c. of the metal, or say one-quarter and one-half respectively of the metallic aluminium in pure corundum. Three analyses of the Hastings corundum made by Dr. Goodwin give an average of 96.82 alumina, and the average of corundum concentrates obtained by Prof. DeKall from a treatment of 1,200 lbs. of rock was over 90 per cent. pure. And besides the corundum, there is recovered from the rock in the process of treatment about 5 per cent. of magnetite, containing 69 per cent. metallic iron suitable for the manufacture of the finest steel, or a quantity sufficient to pay the whole cost of milling.

by the same person, partnership, syndicate or company within a block of 4,000 acres or two and one-half square miles, the whole value of the mining operations required to be done in one year may be expended on one lot or location at the discretion of the lessee, and so for every additional 600 acres or fractional part thereof that the same person, partnership, syndicate or company may hold within the same block.

3. In the event of failure on the part of the lessee to carry on mining operations as required in the foregoing section in each and every year of the first term of ten years the lease shall forthwith cease and determine, and all interests of the lessee in the land or lands shall revert to the Crown; nevertheless it shall be competent for the lessee to prove that during one or more preceding years of the term the extent of mining operations carried on has been adequate to cover the requirements for the year in default, in which case the lease shall not be cancelled, and the lessee may also defeat forfeiture by an undertaking with satisfactory security to expend the full amount required for working conditions within the next succeeding year, including the expenditure in default.

4. At the expiration of the first term of a lease it may be renewed for a further term of ten years at the same rental and under the same working requirements if the covenants and conditions have been performed and fulfilled, and thereafter it may be renewed for successive terms of twenty years on such conditions and at such rent as the regulations may provide.

5. The person, partnership, syndicate or company to whom the mining rights may be awarded of any lands which have been located or sold under the Free Grants and Homesteads Act, or sold for agricultural purposes, shall compensate or settle with the owner or locatee of such lands for injury or damage done or to be done to the surface rights thereof before beginning work thereon, and if the parties fail to agree upon the amount or method of compensation, the Director of the Bureau of Mines shall have power to order and prescribe the same.



It is the policy of the Ontario Government in dealing with the lands in the corundum belt to encourage the founding of an industry which will bring the greatest good to the province, and to that end the following regulations have been framed and adopted:

Copy of an Order-in-Council approved by His Honor the Lieutenant-Governor, the 4th day of July, A.D. 1898, and published in the *Ontario Gazette* of 9th July:—

Upon the recommendation of the Honorable the Commissioner of Crown Lands the Committee of Council advise that the accompanying conditions and regulations proposed by the Director of the Bureau of Mines to be adopted and followed in connection with the disposition of corundum-bearing lands in the Province of Ontario be approved of by Your Honor.

Certified,
(Sgd) J. R. CARTWRIGHT,
Clerk, Executive Council.

MEMO. FOR THE COMMISSIONER OF CROWN LANDS.

The mineral corundum having been discovered on lands situated in a number of Free Grant townships in the eastern parts of Ontario, and the mining rights in those lands having by Orders-in-Council been withdrawn from sale or lease pending exploration and the adoption of a scheme for developing the deposits and utilizing the mineral to the best advantage of the Province, the undersigned begs to submit for the consideration of the Commissioner that the disposal of such lands be made subject to the following terms and conditions:

1. All corundum-bearing lands the mining rights of which have been already or may be hereafter withdrawn from sale or lease, or in which the mining rights are or may be otherwise reserved by the Crown, shall, subject to the general provisions of the Mines Act, except as herein provided, be disposed of under the leasing provisions of the said Act, and shall continue to be held as leasehold lands only.
2. During the first period of ten years the lessee shall expend in stripping or in opening mines, in sinking shafts or in other actual mining operations, or in milling or otherwise treating the ore or mineral taken from a lot or location to prepare it for the market, exclusive of all roads, houses, mills, machinery and other like improvements, a sum not less than at the rate of one dollar per acre per year; and where an area of not more than 600 acres, consisting of two or more separate lots or locations, is held

6. The Lieutenant-Governor in Council shall have power to fix and determine the maximum price at which corundum taken from lands leased under these terms and conditions may be sold for use in the Dominion of Canada, whether the ore or mineral be in the natural state as raised from the mines or in any stage of treatment or manufacture.

7. The Lieutenant-Governor in Council shall also have power to require that all corundum mined from lands leased under these terms and conditions shall undergo certain processes of treatment and milling at works to be erected in the Province to prepare it for market; and may further require from time to time, as circumstances appear to warrant, that works be established in the Province for the manufacture of all useful or commercial products for which the mineral or ore is economically adapted.

8. The Commissioner of Crown Lands may receive tenders for mining lands and mining rights in the explored belt to the 15th day of September, 1898, which tenders shall be in the form of a cash bonus to be paid to the Treasury for each lot, part lot or location applied for in addition to the first year's rental; but in considering the bonus so tendered for a lot or location, preference in the selection of mineral lands may be given to parties who will undertake to conduct mining and treating operations on the largest and completest scale, and who can furnish satisfactory assurance that they possess the requisite capital for the proposed operations—including separation of the ore from its gangue, milling for abrasive uses, manufacture of abrasive goods, and the production of aluminium.

A. BLUE, Director.

The policy laid down in these regulations should be effective in adding one more to the important mineral industries of the Province. It possesses this distinctive feature, that capital and labor will be employed at home to convert raw material into manufactured product, and there is no apparent reason why the policy should not be successfully carried out, if skill and enterprise are available to meet the opportunity. With the extensive deposits of corundum she is shown to possess, Ontario ought soon to be in a position to supply the world with abrasives and aluminium.

It remains only to say a word on the terms upon which mineral lands in the territory may be acquired. Under the Regulations they can be held only as leased lands—at first for a term of ten years, renewable for a second term of ten years if the conditions as to payment of rent and carrying on of mining operations are complied with, and thereafter indefinitely for terms of twenty years. For the first year the rent charge is 60 cents per acre, and for subsequent years 15 cents per acre, payable in advance; or one-half these rates respectively if the surface rights have been acquired by settlers.

Notes on Sinking.

METHODS OF DEALINGS WITH THE WATER.

(Continued from last Month.)

On the continent the piles used are three feet long, 4 to 5 in. broad, and 1 in. thick, driven into the ground with an outward inclination of 10 or 15 degrees. When driven down their full length the earth on the inside is excavated to a depth of about 2 ft. 6 in., and before the thrust of the earth has brought the piles into a vertical position a second curb is placed to support them.

Around this curb a second course of piling is driven as before, and the earth again excavated. If these piles preserve their inclined direction, another set is driven down vertically behind the curbs, and the space between the sets filled in with pieces of wood.

Straw will frequently have to be used to close all open joints and prevent the inflow of sand. This system has the advantage of not reducing the size of the shaft, if the piles driven down preserve their original direction.

Wooden Drums. These are found more economical than the system of piling. A curb 14 or 18 in. broad by 6 in. thick is first laid truly level on the bed to be sunk through, and some 3 ft. of masonry built upon it, when a second curb is laid and connected to the first by iron tie rods. A lining of beech planks, carefully planed on back and face, is placed all round it to assist its descent. A cutter is sometimes attached to the bottom curb, to help it pierce the strata. On the ground in the centre of the shaft being removed, the cylinder sinks, and fresh masonry, curbs, tie rods and planks have to be added. The great difficulty is to keep the drum vertical and prevent cutting and sticking. A large boulder is capable of doing this, and the levels have to be carefully watched by a man on the drum, who directs where earth must be removed to keep it vertical.

If the wooden drum pierces the bed of quicksand, there is little reduction in the size of the shaft, and then this system has a great advantage over the ordinary system of piling; but the wooden drum very frequently sticks, and a fresh one has to be put down inside the other, entailing much loss of shaft area.

Cast-Iron Drums get over this difficulty. They are built up of a number of segments 4 to 5 feet long and 2 feet high, fastened together on the inside with bolts, with a thin sheet of lead in the joints, and strengthened on the inside by vertical and horizontal ribs. The outside surface is quite smooth, and a cutter is added to assist its progress. If it does not sink on the removal of the ground, weight has to be added to ribs cast on the inside; if this be not sufficient, a platform is built upon the inside and additional weight placed on it. Cast-iron drums seldom stick, and if they do little room is lost, a second one being easily passed down inside the other. Owing to their smooth surface they are more inclined to sink too fast, and are therefore frequently suspended by four chains and lowering screws to ensure their even descent.

While the iron drum seldom sticks, takes up less room than the wooden drum, and sinks more rapidly, it does not stand heavy pressure so well as the wooden drum.

CAST-IRON TUBBING.

On reaching the solid strata it will be necessary to put in two or three wedging curbs, and to carry up cast-iron tubing through the bad ground to the walling above.

A bed impervious to water is first selected and dressed truly level all over; on this $\frac{1}{2}$ inch pine sheeting is placed, and on this the cast-iron curb. This is of box section, probably 18 in. by 6 in., in six segments.

Pine sheeting is also placed in the vertical joints. The curb first having been placed in its proper position by means of the centre line, radius rod or lath, and eight or ten lines hung from the walling above, it is fixed there by wood blocking.

The space behind is then filled with well-dried pine timber free from knots, with the grain upwards.

As many pine wedges as possible are then driven into the joints of the timber, props being set during this operation from the joints of the curb to the shaft side to prevent it lifting.

Steel chisels are next inserted, and more wedges driven in until no more will enter.

The same operation is repeated with the second curb. This has a ledge cast on its upper edge, against which the tubing plates rest.

The tubing plates are generally 2 ft. high by 4 ft. or 5 ft. long, and of thickness depending on the depth and diameter of the shaft. They are cast with a central boss and hole, and have vertical and horizontal strengthening ribs and brackets. The top flange and one of the side flanges have on the outside a projecting ledge to keep the joint sheeting and adjoining segment in position. Thin pine sheeting is first placed on the wedging curb, and a ring of tubing plates above this, with thin pine sheeting in the vertical joints. Each plate is tightly wedged up; and after a few rings are built up the back is also well packed with concrete.

A wedging curb is placed at top if the water rises to the top of the tubing; if not, a making-up piece is cast where necessary, sufficient ground being cut away from the strata supporting the walling curb above to allow of its insertion.

Both vertical and horizontal joints are then wedged from bottom to top and the holes plugged up. This operation is repeated as long as a chisel will enter. It should be added that the end grain of all sheeting must face the shaft.

Occasionally wedging curbs have to be put in at intermediate places, if suitable beds can be obtained, in order to tub out a portion of the feeders. The tubing is then carried up in several lengths through the water-bearing strata.

It is not usual to tub off feeders met with within 40 yards of a workable seam of coal.

In order to prevent the tubing bursting, it has been found necessary to carry open pipes up from the top of the tubing to a height sufficient to balance the water pressure, or to fix a short pipe with a loaded valve, or to insert a valve or valves in the top wedging curb; the latter are closed some little time after the wedging of the tubing is completed.

If the pressure is not great, *coffering* is often adopted. This may be of stone, brick and cement, with joints broken vertically and horizontally, concrete or concrete blocks with cement in the joints and concrete behind.

It has an undoubted advantage in being cheaper than tubbing, but takes up much more room, and therefore requires additional excavation.

It is often very difficult to keep the water off the work while it is being put in, and in consequence it frequently leaks more or less.

Wooden water boxes full of holes are carried up at intervals behind the walling in order to carry off the water, and the openings afterwards plugged.

THE KIND CHAUDRON PROCESS.

If this is adopted after some other method has been tried, it will be necessary to lower a wrought-iron tube of $\frac{1}{2}$ inch plate, as was done at Marsden, reaching from the surface of the water to the bottom of the shaft; to prevent falls of the side, and to make good with concrete behind.

The boring was done at Marsden in two stages, and for the 14 $\frac{1}{4}$ ft. shaft a 4 ft. 10 in. centre hole was bored with a trepan weighing 7 tons, and for the completed shaft a 16-ton trepan was used.

The centre hole is always kept 50 or 60 ft. ahead of the finished shaft, and at Marsden was put down at once to the coal measures.

It was necessary to either rime out this central hole or to decrease its diameter near the bottom, in order to form a ledge upon which to rest the kibble, into which the debris falls, owing to the teeth of the larger trepan cutting an inclined plane.

Steel cutting teeth are inserted in sockets in each trepan and tightened up with set-pins; the teeth of the smaller trepan are level, and it is fitted with two guides, which are also furnished with cutting teeth. The large trepan has a loop or guide filling the central hole.

Pitch-pine rods 5 in. square, with male and female ends, connect the trepan to a massive lever by means of a chain and swivel; the other end of this lever is connected to a steam cylinder, actuated by a valve worked by hand. The rods are lifted by steam and then drop back a distance of 6 to 18 inches.

Nine to eight en strokes are made per minute, and four workmen twist the rods two to four degrees each stroke by a crosshead lever.

A sliding piece, with 12-in. slot and a spring beam, eases the blow on the rods; a free fall is sometimes attached for this purpose.

After boring for three hours the trepan is withdrawn, and a sludger of 10 tons capacity lowered by a rope; on its withdrawal boring is again continued. Before inserting the large trepan, the kibble or sludger is lowered on to the ledge already described by means of a double hook; on the rods being turned half round the hook left leaves the sludger, which is picked up again when required by the same means, thanks to an inverted funnel guide.

A special headgear with rails and travelling carriages, 37 and 52 ft. from the ground, removed the boring rods and heavy tools when required, and greatly reduced the usual labor cost of sinking.

Among safety tools are a catching hook for broken spear rods, a spear catcher, and a grappling tong.

On the completion of the boring the tubbing is put in in complete rings 4 ft. 6 in. high, with joints made by bolts and an $\frac{1}{8}$ in. sheet lead.

The two bottom ones are telescopic; the space between the flanges is filled with moss, which is tightly compressed by the weight of the descending tubbing. A false bottom capable of being withdrawn up the interior of the tubbing is attached to the third ring, and a central pipe carried up through it. These three pieces are lowered by screw rods and winches into the water, and tubbing added till they float, when the screw rods are withdrawn; as additional rings are added water is run inside the tubbing to cause it to sink. The back of this tubbing is afterwards ingeniously filled with concrete, and after setting the water is pumped out, the false bottom removed, and, if all is tight, sinking continues in the usual way to another water-tight bed, in which fresh wedging curbs are laid and tubbing carried up and made good against the moss box.

POLTSCH'S AND GOBERT'S SYSTEMS.

By this means quicksands and shifting strata are frozen before being sunk through.

Poetsch's System.—Around the shaft a number of holes are bored at distances of 1 ft. to 4 ft. apart, and 8-in. wrought-iron tubes of slightly tapered form are driven down.

On reaching the solid rock, the end of each tube is closed by a lead plug and covered with cement and pitch. Inside of these pipes 2 $\frac{1}{2}$ -in. pipes are suspended, open at the bottom. Both sets of pipes are connected together and so arranged that the freezing liquid is forced by a pump down the small pipes and returns up the large pipes, being controlled by valves.

The freezing action is produced by the rapid conversion of liquid ammonia into vapour by an air pump. The ammonia at once boils, and the vapor produced is absorbed by suitable means. This produces still more rapid evaporation, and communicates intense cold to the freezing mixture, a solution of calcium chloride, which freezes only at -34 C.

When the ground is frozen the sinkers deepen the shaft in the usual way, the use of explosives only being forbidden. In many cases it is not necessary to even temporarily secure the sides.

The fault of this system is that, should there be a faulty pipe, which is very difficult to recover, the freezing mixture escapes, owing to it being under pressure, and greatly adds to the difficulty of freezing the ground.

Gober's System.—Liquid ammonia is forced through small tubes of a spiral form, pierced with holes at intervals, and is evaporated by the heat of the strata and the reduction of pressure caused by an air-pump. It is then again condensed, and again circulated in its liquid form.

Condensers are necessary to rob the liquid ammonia of the great heat produced in the act of condensing the gaseous ammonia.

Again in this case there are two rings of pipes placed round the area of the shaft, and it can be so arranged that the bottom of the shaft only shall be frozen, and that any tubbing close above it shall not be affected.

Should leakage take place water will simply enter the tube and in no way interfere with the working of the process, and freezing will soon stop this.

The joints in the pipes—which have hitherto been a weak point—are in this system much strengthened. It is claimed also that the freezing by M. Gober's process is more rapid than with the Poetsch process.

These various systems of sinking have their special applications, and it would be unwise to discriminate between them.

It should be added that a capstan engine, with four drums or so, will be required for each pit, and also a steam winch for loading pipes, etc.

During the sinking the erection of the permanent winding engines and headgear will have been completed.

English Letter.

LONDON, July 6, 1898.

Canadian mines have not been so much before the public recently, but it must not therefore be assumed that the interest aroused in the potentialities of the Dominion's mines has ceased, or that the European investor is regarding less kindly the exertions of those who have been your champions in this country. The fact of the matter is that Canada has felt the adverse influence of the series of political developments which have kept enterprise in check, and caused capitalists to view with shyness even those most tempting stories from the wondrous Klondyke. Markets have been dull for a long time now, and Canadian investments, after their brief spell of activity, have eased off again. Disappointing traffic and the continuance of the rate war have weaned a certain amount of support from Canadian Rails, although an exception has to be reported in the case of Quebec & Lake St. John Bonds which have been freely bought by well informed people on the happy issue out of all their afflictions. Hudson's Bays have not maintained their quotation at that high level created by last year's gamble, but this is not surprising when we remember the steady character of the company's business and its modest dividends. Canadian banks, however, are firmly held and a glance at the following table which I have prepared will show you that English investors are by no means ignorant or neglectful of the field opened up by Canada for the investment of their spare cash. That there is ample capital available for all the reasonable requirements of the Dominion may be gauged from the fact that the Bank of England minimum rate of discount which was lowered to 3% at the beginning of June, on the last day of the half-year just ended was further reduced to 2½%, at which it now stands. In the open money market they are discounting 3 months bank bills at the absurdly low level of 1% per annum. According to the latest return the Public Deposits of the Bank of England are £10,080,000 and the Other Deposits (which include the general Banks' reserves) £45,405,000 while the reserve percentage works out at 48%. All this shows that we have plenty of capital only awaiting employment in sound investments. Canada can certainly be as freely supplied as less desirable customers; but it is to be hoped that the nefarious tricks practised on the public by South African and West Australian promoters will not be allowed to hinder the development of the mines of a Colony which has of late been so much in men's minds.

In the appended representative list I give the prices current at the end of June, while the interest yield at those prices is calculated on the basis of latest dividends.

	p. c.		
Canada 2½% Inscribed price.....	£ 92	yield	£ 2 14 0
B. C. 3% Inscribed price.....	100	"	3 0 0
Newfoundland 4% Inscribed price.....	106	"	3 8 3
Quebec 3% Inscribed price.....	94	"	3 3 9
Canadian Pacific R. shares.....	85	"	4 13 6
Grand Trunk Pref. Deb. stock.....	140	"	3 11 0
Bank of B. N. America.....	64	"	3 17 0
Bank of B. C.	19½	"	4 10 0
Montreal (City of) Perm. 3% Deb. stock..	95	"	3 1 9
Quebec (City of) sterling 4% Debs.....	108	"	3 11 6
Toronto (City of) 3½% bonds.....	105	"	3 5 6
Winnipeg (City of) 5% Debs.....	117	"	3 11 9
Brit. & American mort. 4% Deb. stock..	101	"	3 18 6
Hudsons Bay.....	20½	"	3 3 6
Trust & Loan of Canada.....	4½	"	6 6 3

A glance at the above table will show how we esteem Canadian investments of every description. It will be seen that with only three exceptions we are so well satisfied with the securities offered as to be prepared to pay prices for them which will only yield us from 3 to 4% upon the capital. Making every allowance for the favor with which Canada is now regarded, these figures furnish eloquent, flattering, and incontrovertible testimony as to the high place now occupied by the Dominion and its securities in the chief financial centre of the world.

There have been several appeals for capital this month. Newfoundland,—whose Premier Sir James Winter, and Mr. Morine, the Receiver General for the Colony have been staying here on a special mission to the Imperial Government, having particular reference to the French Treaties—has been issuing through the Bank of Montreal £200,000 of 3% Sterling bonds, ranking *pari passu* with the issue of £492,500 similar bonds. The price at which applications were invited was 96½%.

Then there was the issue of £151,200 Five per cent First Mortgage Debentures by the Cobourg, Northumberland & Pacific R. Co. at 102%. The Canadian Pacific leases the line for 999 years and contracts to pay the Cobourg Company 40% of gross earnings, providing rolling stock &c., and paying all rents and taxes.

Among the more recent Canadian mining floatations on this side are: The Associated Gold Mines of B. C. Ltd.; The London, Yukon and British Columbian Mining and Investment Corporation Ltd.; The Klondyke 20 miles Concession Ltd.; and The Pacific North-West Mining Corporation Ltd.

The last named has a capital of £200,000 in £1 shares, 180,000 of which are now offered to the public. This company proposes to prosecute mining undertakings in B. C., and the adjacent parts of the United States, locally known as the "Pacific North-West." The company has acquired 7 properties in the region named, for which it is paying £130,000.

The Klondyke 20 miles Concession Ltd., with its capital at £100,000 proposes to acquire and work a concession over 20 miles of river beds in the Klondyke Yukon Gold Zone from the Dominion Government. I don't think it got much of the £50,000 asked for, and I am not surprised at this. Mr. Franklin S. Wiley, Managing Director Sawbill Lake Gold Mining Co. Ltd., of Ontario, is apparently the vendor, while another of the directors is Mr. H. Chester-Master connected with the Morris Cutton-Turner Pooley grab. £60,000 was asked for the concession, but I do not think the issue was a success.

Regarding the remaining two concerns a little independent testimony may be worth quoting, if only to show that, despite Mr. Hooley's charges, we have a few independent financial organs in the city. For this purpose I have selected the expressions of opinion of our two leading financial weekly newspapers, the *Statist* and *Economist*, both journals having long and deservedly enjoyed the confidence of the investing community. Criticising the London, Yukon & B. C. Mining & Investment Corporation, the *Economist* says:—

"Formed with a capital of £175,000 for the exploitation of claims and properties in the Klondyke district, and for carrying on the business of a financial and development company in British Columbia, the enterprise presents no new features, as compared with many that have preceded it, and investors would be well advised not to put funds into undertakings of the kind until something more definite is known as to the capabilities of the district."

As the Associated Co. is the work of Mr. Hardiman of Vancouver, the *Statist's* comments will be interesting to your British Columbian readers. The criticism is as follows:—

ASSOCIATED GOLD MINES OF BRITISH COLUMBIA LIMITED.

A duke, (sic) an earl, a baronet, a knight, and a major figure on the London board of eight directors in this concern, and the secretary is a gentleman who is apparently permitted to issue with the prospectus a syllabus of a book he has published, and who in another work, eulogised the facilities offered by the Universal Stock Exchange (a firm of outside brokers). The capital is £500,000 in £1 shares, to be apportioned as follows:

Purchase price for properties.....	£ 375,000
Working capital.....	30,000
Working capital reserved for future.....	75,000
	£ 500,000

Of the 405,000 shares to be issued, 200,000 go to the vendor, who, if the public subscribes the rest of the offered capital, may get £175,000 beyond in cash. The vendor seems to be an intermediary who acquires properties from two colonial-registered companies called the London and B. C. Gold Venture Syndicate, Ltd., and the B. C. Mining Prospector's Exchange, both to become agents of the Associated Co., at Vancouver. Is it not, therefore, the case that a London promoting company is formed that will give an intermediary a profit, and the two original colonial promoting concerns cash and shares, the latter, perhaps, to be more readily disposed of to the public than their own shares? This procedure of promoting and finance companies passing on properties to another similar undertaking is getting really wearisome, and instead of assisting a colony that requires capital for developing mining properties, creates the idea that financing, and not real mining work, is too much the basis of the majority of companies that come to England for public support. The present undertaking represents it has 95 properties. These are shown to be scattered in little groups all over B. C. The assertion that "clean solid ore in sight can be shipped in large quantities immediately" and the alleged richness of some of the "partially developed and proved" properties, raises the question of why the colonial companies owning them have not gone a little further and produced ore, before parting with "what are believed to be among the most promising mining properties in B. C., the large majority of which are gold mines."

Mr. Mabson of the "*Statist*" seems to have got hold of an early prospectus, for in that published there appears no duke as director. As a matter of fact the Duke of Manchester was to have graced the board with his presence, but apparently he decided that it was not good enough. Several other leading men were included in the draft prospectus or approached, but finally they were not secured. It will be interesting to see how much Mr. Aubrey and Mr. Hardiman's exertions draw from the public. They ask for £205,000, but I heard from a gentleman who has been following the whole thing very closely that they only got £28,000 subscribed. I very much doubt myself whether they got so much as this. The issue was largely underwritten, I hear, and it seems probable that the underwriters will get stuck with a very large proportion of the £200,000 they are said to have guaranteed at 70%.

A company is now being formed with a capital of £80,000 under the title of the Klondyke & Kootenay Venture Syndicate, to enter into two agreements, and carry on a general business. The Chairman is Sir Albert Rollit, the President of the London Chamber of Commerce.

The Canadian Mining section closes with a dull appearance. The weakness of B. A. C's, has been a feature, the shares having been down to ¼, owing to a sharp attack on the Whitaker-Wright group. It is rumored here that after all the B. A. Corporation has not secured the Le Roi. If this prove correct it will be another reverse for the financier who has attached himself to B. C. and the Klondyke, with so far but indifferent results. The Morris Cutton-Turner Pooley grab, which includes the Klondyke and Columbian Goldfields, the Dawson City Trading Corporation and the New Golden Twins, have been weak, largely, no doubt, on the reproduction of your sensational article in last month's issue, about the last named company, by Mr. Hess' journal "*The Critic*". Mr. Hess commented on your comments, and at once called upon the group for an explanation. The New Goldfields (Tupper) Co. have been firm, and it is announced that since Sir Charles Tupper's arrival a new company has been formed with a capital of £100,000, to acquire the Velvet property on Sophie Mountain. Hall Mines have been very close to par, but Whitewaters were kept steady by the satisfactory statements made at the statutory meeting, held on the 6th of June. War Eagles have been in strong demand, on the Canadian reports regarding the promising prospects of this mine. Ontario shares have seldom been dealt in and there is no life in this section, and but little movement in either B.C., or Klondyke companies. I am told that the Canadian Pacific Exploration Ltd. have ordered the plant for their Porto Rico property, recently recommended by their local managers. Fraser & Chalmers have, I believe, got the order. Hudson's Bays have not benefited much from their report and close at 20½, Bank of B. N. America at 64, and Bank of B. C. at 19½. Canadian Asbestos and Asbestic 4. Canadian Pacific Ry. 86½. Grand Trunk guaranteed 77½. Canada Co. 30. Canada N. W. Land Co. 4. British American Land 22.

I am pleased to be able to report that several British Columbian companies have arrived at the decision to open London Registers for the facilitation of the transfer of stock held by European investors. The Dundee, (a Ymir Co.) has opened a London office, with Mr. Donald Kennedy, of this city, as London Director. The Wild Horse Gold Mining Co., acting upon the advice of Mr. Frank Scurlton of the well known Stock Exchange firm of Scurlton & Son, who has been appointed London Director, have initiated a Register at 53 Victoria Street, Westminster, in charge of Mr. H. E. Baker. This is a step in the right direction. Up to the present, those who have been over here peddling out script, have never seemed to bother themselves about the possibilities of purchasers bye-and-bye finding it necessary to realize their shares. Where there is no London Register of course the holder will have to send out to some Canadian broker, entailing delay and disappointment. It is absolutely imperative for those who wish to have a good sprinkling of English investors among their shareholders, that they should open a London office, and a London Register. It would, of course, also be necessary to have someone to act as London Director to sign all documents, but leading companies, with any pretensions to either respectability or influence, would find no difficulty in accomplishing this. As for the expense, it should be moderate, for Secretaries of other companies, possessing all the machinery in the way of offices, clerks, &c., would be pleased to undertake the duties at an inclusive figure. It would, of course, be advisable for the Canadian company to set aside a certain number of shares for the London Register, with distinctive numbers, which could only be transferred through the London Register, while, of course, the Canadian moiety

would not be a good delivery in this country. By this means, those who might be induced to make a market for the shares in this city would be safeguarded against a deluge of shares, which they might be both unable and unwilling to digest.

There has been no cessation of the registration of Canadian Mining companies since my last letter, but as you will gather from the list, promoters are still chiefly concerned with the fine field presented to their energies by the Klondyke and British Columbia. The B. A. Corporation has through its solicitors filed particulars of a number of concerns with huge capitals which it is proposed to form with the object of acquiring the chief properties bought at Rosland by Mr. MacIntosh. Ontario finds little favor with the English promoter, and the Companies already in existence have hitherto been such "silent" workers that this is not surprising. Ontario has a few friends in the city, but where there are probably twenty people interested in the Pacific Province and the North West Territories, there is not more than one concerned in the exploitation of the mines of Ontario. Is this because the Government of the latter does not advertise sufficiently? It looks very much as if this were so.

Asbestos and Asbestic Co., Ltd.

THE POSITION AND OUTLOOK AS DEFINED AT THE FIRST ANNUAL MEETING OF SHAREHOLDERS.

The first annual meeting of shareholders of this company was held in London on 27th ultimo, Mr. Gilbert Bartholomew, Chairman, presiding.

The Chairman, in moving the adoption of the report and accounts, said that some shareholders had written expressing regret that the directors had not published the details of the company's profit and loss account. The Board's only reason for having refrained from publishing those details was that they did not wish to furnish the company's competitors with the particulars of their business. (Hear, hear.) Every detail, however, was at the disposal of the shareholders. The Chairman then handed several copies of the profit and loss account to those present. Proceeding with his remarks, he explained the items contained in the balance sheet in detail. In reference to the investment in the American Asbestos Company's shares taken at cost, £3,101, he wished to explain that, in accordance with the contracts originally made with the H. W. Johns Company of New York, that company had the right to pass on its asbestos contract to another company to be formed for the purpose of working it, and in the early days of the existence of the Asbestos and Asbestic Company the H. W. Johns Company decided to exercise that right, and the American Asbestic Company was formed with a capital of \$250,000. \$100,000 was subscribed by the Johns Company, \$50,000 by the managing director of the Asbestos and Asbestic Company, Mr. Bias, \$50,000 by the Asbestos and Asbestic Company, and the remaining \$50,000 of stock was held in reserve. It was held out to them at the time of the formation of that company, not only by their managing director, but also by Mr. Martin, the present president of the Johns Company, that the American Asbestic Company had very bright prospects, and would be likely to make large profits; and inasmuch as the Asbestos and Asbestic Company were naturally very largely interested in the sale of asbestos, they thought it right, acting upon those recommendations, to take the interest stated in the American Company's capital. Unfortunately, however, the sale of asbestos in the United States, although it was considered by the American Company to be going on satisfactorily, had proved very much lower than was anticipated, and consequently that company was not able to take delivery from the Asbestos and Asbestic Company of the contract quantities of asbestos. At first they felt they ought to compel the American Company to take delivery of the full quantity specified in the contract, and that they should request the American Company to call up such further capital as was necessary for this purpose, only 30 per cent. of the capital having been called up at that time. They soon found, however, that they could not do this, for the Johns Company absolutely refused to pay any more calls on account of their shares. Much against their wish, therefore, they were compelled to make other arrangements, which, however, they hoped would ultimately prove to their material advantage. They had taken over the balance of the Johns Company's interest in the American Company, which gave them control of the latter company's affairs. As a result they were now chiefly interested in the sales of asbestos, which would be made by the American Company at higher prices, and a larger proportion of profit would come to them. Since they had assumed the control of the American Company their managing director had been devoting himself to the establishment throughout the States of agencies for the sale of asbestos. Several agencies had been already established and were working satisfactorily, and it was anticipated that large quantities of asbestos would be consumed as a result in the near future. Although, therefore, this investment had as yet been unproductive, he was sanguine enough to hope that asbestos would find a free sale in the States in the near future, and if it did they would benefit very largely.

With reference to the profit and loss account, he was certain the shareholders must be very disappointed, because the profit was so small. The directors not only shared that feeling, but were even more disappointed than the shareholders could be. The reasons for the smallness of the profit were easy to understand. They had neither produced nor sold a sufficient quantity of asbestos and asbestic. They had failed miserably in their deliveries of asbestos to the Johns Company, that failure being due to the disorganization and interruption which was occasioned in putting in the new machinery. In the early days it was intended that they should generate electricity by the water power they proposed to acquire on the River Nicolet, but as soon as they had taken possession of the property and got to work, they discovered that they could not get possession of those water rights for a long period. Their managing director therefore advised that they should for the present, at any rate, give up the idea of working by electricity and that they should immediately put in a duplicate steam plant, so that they might produce the larger quantities which they expected to require. The quantities produced, however, had been very small, especially of the Nos. 1 and 2 grades, of which they had not produced sufficient to fulfil their contract with the Johns Company. He had himself been to Danville and inspected the property, where he had seen abundant indications of the presence of these grades of fibre, but he was of opinion that by their present method of getting the fibre out of the rock they were not likely to produce very large quantities. They had therefore instructed their managing director to revert to the old method of getting out the longest fibres, but it could not yet be said whether sufficient would be obtained to enable them to fulfil the Johns contract, although the managing director himself was sanguine that he would be able to accomplish this before long. So far as the fourth grade was concerned they had reached their contract quantity, and there were indications that in the very near future they would also reach their contract quantity in respect to the third grade. They had, in fact, exceeded the contract quantity in the production of the fourth grade fibre, and within the last ten days, for the first time in the existence of the

company, they were in a position to offer to other buyers that grade of asbestos. With regard to asbestic they were now producing more than sufficient to satisfy the contract, although the buyers were not in a position to take the full quantities. Under these circumstances they had been looking about very energetically for fresh fields and markets for this article, and he was pleased to say that up to the present time asbestic had received no set-back.

Every architect and every builder who had tried it, whether in this country or elsewhere, had expressed unqualified approval of the company's asbestic as being the finest wall-plaster known. The prejudice among architects and builders, however, against new materials was very strong, and tremendous difficulty was experienced in inducing them to take up this fresh wall-plaster. Therefore their sales up to the present had been miserably small, but they had received many promises of custom, which they had reason to believe would be realized. The new Carlton Hotel at the bottom of the Haymarket—a very large building—was to be plastered throughout with their asbestic, and this was a matter of very considerable importance to the company, because if they once got their material used in some substantial building they would experience much less difficulty in getting it into general use. They had established a very good agency in Germany, where their asbestic had been put to a very severe test, and had come out magnificently. The leading authorities were represented at the test, and were all delighted to find out how great were the fire-resisting properties of the asbestic. The authorities there had already taken a very considerable quantity of the article. They were now very busy in France, where an agency had been established, and where they were very hopeful of good results. Tests both in Paris and Lyons would be completed within the next three or four weeks, and upon their satisfactory determination they had every reason to believe that a contract would be immediately forthcoming for the buildings to be used in connection with the Paris Exhibition in 1900, as well as for other important work in Paris and elsewhere. He wished to express the Board's thanks to shareholders who had interested themselves in the use of asbestic, and he hoped other shareholders would do what they could in this direction. They might recommend its use with perfect confidence, for no fault whatever could be found with it. It was a magnificent wall-plaster, answering everything they claimed for it, and he felt certain that those to whom they recommended it would be in every way satisfied. It was a matter of patience, and, he was afraid, of much more patience than he originally expected. Still, the property was undoubtedly there—the asbestos and asbestic existed in it—and if they could only make sufficient sales, which he felt confident they would do if they gave themselves time, he had little doubt the result would be satisfactory to the shareholders. Considering the smallness of their sales and the unexpected difficulties with which they had to contend, they could not be surprised that their first profit was not larger, but they saw clearly that, given a larger sale, their percentage of profit would be sufficient to enable them to pay a reasonable dividend, even though they might not fully realize the anticipations of those experts upon whose reports and assurances the statements in their prospectus were based.

Mr. A. Naylor seconded the motion.

In reply to questions, the Chairman repeated that he did not think there was much prospect of their being able to produce sufficient of the higher grade of asbestos to fulfil their contracts, but if they could produce and sell sufficient of the lower grades they would still be able to earn a satisfactory profit. In producing the lower grade of asbestos they also produced far larger quantities of asbestic than they could at present sell. It all depended, therefore, on how far they could find the market for the asbestic, and he had every hope that with patience they would succeed in pushing the sale of this article. There was no question as to the solvency of the Johns Company: they had faithfully fulfilled their contract and had taken all the asbestos that this company had been able to deliver.

The resolution was then unanimously carried, and Messrs. Tarquand, Youngs & Co. having been re-elected auditors, a vote of thanks to the Chairman closed the proceedings.

MINING NOTES.

Ontario.

LAKK OF THE WOODS.

RAT PORTAGE, July 12.

There is not among the mines, or in mining matters generally, much that is fresh to record. A new company, however, is commencing operations on their property in Camp Bay, where they have a gang of men putting up camps and doing other preliminary work, preparatory to the inception of active mining. I hope to say much more about them in my next.

Cameron Island.—Drifting has begun on the 2nd or 120 ft. level. The mill run of 220 tons, made some time ago, averaged over \$12.00 to the ton—so I was informed by Mr. Caldwell, the manager at the mine. Besides this, the condensate showed a value of \$4.80, making the total value about \$17.00.

The Sentinel.—The most important mining deal made in this section this spring was effected last month when an option on mining locations W. A. 7, 8 and 9 was given by the owners, the Coronado Gold Mining Company of Rat Portage, to the Sentinel Consolidated Gold Mining Company, Ltd., of Toronto, represented by Nassau B. Eagen, barrister, of that city. This property has an area of about 120 acres and is situated on the south shore of Labyrinth Bay of Shoal Lake, being about two miles, as the crow flies, south of Ash Rapids. The deal was negotiated by John McAree, M.E., and L. C. Smith, barrister, of Rat Portage. The terms of this option are somewhat unusual for this district, but they are along common sense business lines for this species of transaction. Nothing is paid on the option until the expiration of three months, when one-tenth of the purchase money becomes due; three months later a further one-fifth is payable; three months after this another one-fifth, and the remaining half at the end of twelve months from the date of the option. This refers to W. A. 7, being the location upon which the only development work had been done; the price of this is to be \$9,000.00. The option on the other two locations runs for thirteen months, payment being made at the end of that time if they are taken; the price of the two is \$6,000.00, or \$4,000.00 for either one singly. The optionees are to develop the property by continuing the shaft begun on W. A. 7 to a depth of 60 ft., the shaft being already 10 ft. deep. Work was begun at once and is to be carried on continuously and the depth of 60 ft. shall be attained within three months; the shaft is to be timbered. Favorable terms have been granted with regard to mill tests of the ore.

It will be noticed that by this form of option the person seeking a mining property is not called upon to advance any money upon it until he has had a reasonable opportunity of testing its value, while on the other hand he cannot simply tie it up and then proceed to speculate with his option, and if unsuccessful in his efforts to turn it over to some one else at a profit, throw it back as it was to the owner, who may in the meantime have lost an opportunity of disposing of it to another party.

These properties were wholly undeveloped except for the incipient shaft on W. A. 7, and also a pit upon the same about 6 ft. in depth. The vein is about 9 ft. wide, the strike S.E. and dip N.E., at an angle of about 70°. Next the footwall is a band of white opaque quartz, with very little "mineral," and more or less "frozen" on. This band is from 3 to 4 ft. wide and the few assays that have been made show an average value of about \$15.00 per ton. The remainder of the vein is slaty matter, with some quartz. The hanging wall is smooth and even, and is as yet free from the gangue; but solid, undecomposed ground has not yet been reached.

The country is a narrow belt of Keewatin granite, fine grained, of dull aspect and reddish brown in color. On the south-west of the granite is a mass of trap, and the vein runs about parallel with the contact, at the distance of about 100 ft.

A contract for sinking 50 ft. has been let at \$21.00 per ft.; this is perhaps pretty high for the surface part of a vein, but the shaft is being made the full width of the vein, 9 ft., and this involves an extra amount of hoisting; a change may be made, however, when solid ground is reached. J. McAree, M.E., of Rat Portage, is looking after the work for Mr. Eagen.

At the recently concluded session of the High Court of Justice at Rat Portage and presided over by Justice Falconbridge, a number of cases relating to mining matters came up for trial. In one case a miner brought an action for damages against the Foley Mine. This miner, in passing up or down the ladder in one of the shafts, missed his hold and fell; he struck against another man lower down the ladder, and then dropped on to the platform at the foot of the level, slipped off this and fell 60 ft. to the bottom of the shaft; fortunately there were a few feet of water in the shaft, or he would have been killed. He alleged negligence on the part of the company in having the ladders so close to the wall that the rungs could not be readily grasped—the rungs, moreover, being unevenly placed—and in neglecting to have a railing around the platform. Judgment was reserved. A similar case from the Clara mine was settled out of court. In this case the ladder fell with the miner, owing to the pins breaking from which the ladder was suspended by a rope. It is thought the pin must have been damaged by a flying rock. The man had three ribs broken, which laid him off six weeks. The mine representatives paid him \$315.00, I believe, which sum would pay his lawyer's and his doctor's bills, his wages for the six weeks, and leave him something over.

The other case specially interesting to mining men was that of the owners of the Bad Mine, situate a few miles east of Rat Portage, against W. T. Love, of Buffalo, N.Y., who took an option on the property last winter. According to the terms of the option Love was to develop the property by sinking, and he was allowed to mill a certain number of tons of ore as a test. In the course of time the owners found that the optionee was departing from the terms of his agreement by stoping more ore than he should, at the same time that he was neglecting to sink. The owners applied to the court and obtained an injunction, inhibiting Love from doing anything more until the matter could be adjudicated upon by the proper authorities. At the present court judgment was given for the owners on every point; the option was cancelled, and the proceeds of a mill run that had been embargoed were also handed over to them: they got costs also. It should be mentioned that Love paid \$1,000 for the option, and that the total sum to be paid for the property was \$50,000.00. This is the third option that has fallen through; a sum was paid down each time.

RAT PORTAGE, July 19, 1898.

Mikado.—In one of the south drifts on No. 1 vein a large bunch of rich ore was struck recently. Samples of the tailings have been sent to England, I believe, where experts are deciding upon the best system of treatment. The full capacity of the mill suffered a check for a while this spring owing to the breaking down of the crusher, but everything has been in full swing for some time now.

Toronto and Western.—This company has two locations, D 410 and D 411, adjoining the Mikado property. On the former lot two shafts have been sunk to a depth of 62 ft. and 57 ft. respectively: on D 411 is a shaft 55 ft. in depth. At the 60 ft. level of the deeper shaft of D 410 drifting has been begun. A steam hoisting outfit was taken out to this property on the 16th July. The company has its own tug.

Fox Island, Shoal Lake.—The shaft is down 35 ft. on a 3-ft. vein. The quartz pans gold. Mr. La Rose, of Norman, is one of the owners.

Triumph.—A contract for drifting at the 100-ft. has been let.

The Burley.—The excavation inside the coffer dam has reached solid rock, and drilling will be the next thing in order.

A very good find has it seems been made by Captain Pritchard at Deer Lake in the country southeast of the Regina. The vein is reported to be from 7 to 10 ft. wide and to pan gold fairly at several points.

The water is slowly rising in the Lake of the Woods, and small steamers can now, by the practice of a little warping, pass through to Shoal Lake. The stop logs are to be put on at the great dam, and the work to be completed by August 13th. This will give high water all around the lake. Shoal Lake will then be merely a bay of the Lake of the Woods.

J. M.

Nova Scotia.

The Modstock Gold Mining Co. of Forest Hill returns for the month of June are 201 oz. This makes a total output for this mine of 6,500 oz., value \$128,500, produced since the summer of '95. The net profit to the owners is about \$40,000.

While these figures are not large, yet when it is considered that these results have been attained entirely without the aid of any power plant except in the milling of the ore by a 10-stamp steam crusher, the showing is certainly very good indeed.

There are known to be 12 quartz veins running through this property all showing gold, only three of which have been worked—the "Ophir," 8 in. thick, the "Mill," 2 inches thick, the "Salmon," 2 to 6 inches thick. The average yield from these veins does not exceed half an ounce to the ton.

The above excellent showing speaks well for the management of Mr. W. J. McIntosh. Probably no mine manager in the province is better acquainted with the details of this business, and sticks closer to it than this gentleman. Three years ago he went into the district in the heart of the wilderness; now there is a most flourishing village, with good streets and a good waggon road to it. Everything about this camp shows the touch of the hand of a practical man.

Other smaller companies than the Modstock have for some time been operating with more or less success in this district.

The returns from Goldenville for June are again large, as follows:—Blue Nose and New Glasgow, 310 oz.; Geo. A. Hirschfield, from the Stuart-Hardman property, 183 oz. The profits on these workings are most satisfactory.

The Richardson Mine, Isaac's Harbor, keeps up its record in a most satisfactory manner. The returns for last month were 283 oz. Manager Cox has just installed a Wilfley concentrator, and the sulphurets, which by demonstration have been proved to contain a good percentage of gold, will now be saved for future treatment.

The old district of Tangier is deservedly attracting attention again. Mr. Miner T. Foster succeeded some time ago in securing by purchase and option almost the entire district. He then erected a small pumping plant and unwatered the old Leary lead. Several crushings of from 50 to 100 tons taken out have yielded from 1½ to 2 oz. to the ton. The mine is now 130 ft. deep, and the best ore ever seen from this vein is now coming out. A new vein of 10 in. in thickness on the north dip of the district has recently been found by Mr. Chas. McClare, which shows some very rich ore. This consolidation of areas has been sold to a Boston syndicate, and the principal part of the purchase money paid. The purchase price is understood to be \$60,000. Mr. Geo. Rawlins is now on the ground re-constructing a 20-stamp mill. Mr. Fred E. French, of Boston, one of the purchasers, is also on the ground to instal a complete plant for working this property on a much better system than heretofore attempted. Mr. French has had experience in the Western States and comes here no novice in the mining business.

The Napier mining property at Wine Harbor, owned by J. J. Snook and Dr. John H. McKay, of Truro, is now under the management of David Steele. The Donald Marcus belt, 16 ft. wide, has been opened farther to the west than previously worked and is showing good ore. Mr. Steele thinks the entire belt will give half an ounce to the ton. Rich drift has also been found from a lead yet undiscovered. An efficient mill will, it is understood, soon be erected on this property, when it will become, it is hoped, a large and profitable producer.

The Eureka, in this district, is reported sold to English parties.

Just before closing this letter I am informed that the North Brookfield Company's yield for June was 553 oz.

G. S.

British Columbia.

NELSON DISTRICT.

It really seems as if the Provincial election, through the strife of which British Columbia has just safely passed, has put all thoughts and talk of mining matters entirely in the background. In whatever paper one picks up in the hope of finding good (or any) news, there is nothing spoken of except the enormities that the Government or the Opposition have been guilty of committing. The result seems to be that the old or Turner Government will be in a distinct minority this coming session, though it is doubtful if the Opposition can depend upon a working majority, and in that case presumably we shall be worried with another election shortly. Well, it is probable that a change may be beneficial, it is worth trying anyhow, and if the candidates stick to their promises there will be much less giving away of public land for a wretched side track called a railway, and more discrimination in tax matters in favor of the miners. Let us hope for the best.

Notwithstanding the lateness of the spring this year, a great number of prospectors are out on the hills around Nelson and near the Salmon river, and many new locations are recorded weekly here, some in such good company that they are liable to be all right, and some, of course, that no one can say anything about till more work has been done on them, but which the locator, with the true prospector's rosy hopes, stakes, records and does his assessment on without going through the harmless but necessary formality of having an assay made. There is no doubt that far too little assaying is done. Because a man finds a strong vein of iron pyrites it does not follow that it is valuable, and the same may be said of "very nice-looking quartz"; nothing but an assay can decide whether the vein is now or is ever likely to be of any use. It is, however, very difficult to instil these ideas into prospectors' minds; as a rule, they have studied mineralogy and mining whilst working the brakes on a freight car for some years, and the knowledge thus acquired is infinitely superior to anything a trained mineralogist can say. Tell a man that a blue stain of copper is copper, and generally he tells you, with a pitying smile at your ignorance, that you know nothing about it: that is "bromides," and not copper at all. In such cases I generally apologize and request further information as to bromide of what? but am met with the simple and dignified statement that it's "bromides."

It is too often that this very slight smattering of chemical phraseology makes a man think he has the whole earth and the richness thereof in his claim, and his ideas of its value rise in proportion; but while capitalists themselves took innumerable very risky ventures in times not long gone by, they will not do it now, but will insist on a very thorough examination of the property offered and then place their own value upon it—perhaps one-tenth of that asked. And surely no sensible man can blame the purchaser for wanting to know beforehand whether he will be likely to have a "run for his money" or not—in mining especially there is the strongest element of uncertainty.

As regards the mining proceedings around this neighborhood, there does not seem much that is new to record. Those well managed properties, the Fern and the Athabasca have been steadily worked and the latter has now been formed into a company.

The Athabasca deserves more than a passing notice on account of the economical (genuinely so) way in which it has been managed; as enough ore has been sold at intervals to largely assist in paying expenses of development, the said development being steadily pushed along.

The Fern people, I believe, have not got their cyanide plant working yet, but from private advices they are experimenting as to the best modification of the process before finishing the construction of the plant generally. These shares are pretty firm in the market.

The Hall Mines have been having some trouble both at the mine and at the smelter, resulting in the mine greatly restricting its output, reducing it indeed from 250 to 100 tons daily, and a proposed cut in wages at the smelter producing a strike there. All, however, has now been satisfactorily arranged at the smelter which has blown in again and is working steadily. It certainly seems as if directors sitting in London, Eng., were hardly able to manage a big works out in B. C., as conditions are so different. Then, the boss says he is going to cut wages, and does so; if the hands don't like it they can go, and plenty more will come in to fill the vacancy; but that doesn't go out here, and wages are low enough in proportion to the cost of living without any reduction being made.

On the Poorman (near Nelson), which has been worked more or less continuously for several years and has returned very fair profit to its owners, it is reported that the ledge (free milling gold) has been struck in the 600 ft. tunnel at a depth of 300 ft. Presuming this is correct, and there is no reason to doubt it, it is a valuable discovery in more ways than one, principally, to my mind, in proving the continuity of the ledges in the gold belt in the Nelson district. So few mines so far have been worked to any depth, that one example like this is most encouraging.

Work is being continued on the Granite, adjoining the Poorman, and it is probable that the same ledge extends through both claims; at any rate the Granite people are busily working, and are preparing to instal quite an extensive plant.

Nothing startling has been reported from Ainsworth. The latest news is that the Skyline is to be re opened, which had to close down on account of water some time ago. It used to be considered a first rate property, but the closing of the smelter at Pilot Bay may easily make all the difference between a paying concern and a losing one.

The Wilson Bros. are employing a large staff of men on their Last Chance group (Toad Mountain), and being fully alive to the fact that a mine takes time to make, are content to go on developing till they have something worth looking at. At present all the indications are most favorable, and it will probably turn out a very fine copper property. Meanwhile, they are determined to open it thoroughly.

Your Slocan correspondent can give you the Slocan news, but Trout Lake (in the Lardeau) seems to be coming forward at last.

The Silver Cup still holds its own in value, but capital reports are to hand concerning the many other known claims in that district; while it is difficult to pick out one individual property, but the Bad Shot seems doing well, also the Spokane Boy and the Klondike group on the Glacier, some four miles away from the lake.

It was on Gainer creek that the rich ore was discovered (supposed to be telluride—not "bromides" this time) that ran some \$200 in gold last year, when the Lade Bros. sent a trial shipment to the Nelson smelter. Trout Lake district will be more favorably heard from in the very near future; there is a lot of good stuff there.

In the Ymir district great activity prevails, new locations are being daily recorded and development carried on uninterruptedly on the better known properties. The Flossie R. seems the best so far, but the Big Patch is good and so are many others, notably, perhaps, the Porto Rico and the Tamarac, while the Wren is said to be giving great satisfaction to the owners.

From all accounts, copper is the metal now wanted, even in preference to gold properties; and if this is so the Boundary Creek district will certainly be a great producer. The new railway into that country from Robson is commenced, and with the Crow's Nest line now far advanced, Boundary Creek should surely be an ideal place for smelters. At the risk of repeating myself, however, once more I say, don't start smelters till you have enough to smelt, at least two years' supply on hand and in sight, and then with intelligent management the smelter will be as valuable as a Klondike.

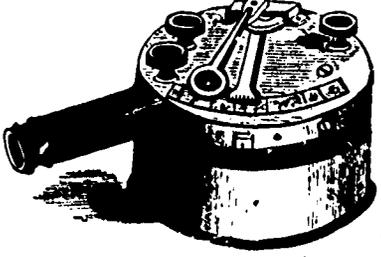
A. H. H.

Quebec.

A shipment of several carloads of silver-lead ore from the Grand Calumet mine in Pontiac was made this month to Belgium. The shaft has now a depth of 126 ft. At 120 ft. a crosscut has been made towards the east in the direction of the vein called "Middle" vein. At 12 ft. from the shaft the quartz vein has been cut. A recent report to the shareholders says: "On the surface our manager has made a few exploring openings in the direction of the vein, which work has exposed ore holding from 150 to 200 ounces of silver to the ton of lead. These works have been pursued in lost moments and have given us about 300 tons of mineral holding 20 per cent. of lead and 35 ounces of silver. This mineral will have to be concentrated and is from the 'Middle vein.'" Another report by Mr. Leopold Meyer, the mining engineer in charge, says: "To mine this mineral with the maximum of speed and economy I have ordered to commence on point A, and to advance towards the B opening on the surface; we will continue to work on the vein towards C, and further if the metallization continues. By so proceeding we will enter into the vein without having any water to embarrass us. The teams will thus be able to load in the trench without needing to hoist the mineral. We know now for certain that the rich streak of the vein runs from A to C. The bottom of the hole presents a compact metallization and has a width of at least 18 ft. To establish the quantity of mineral in sight we have to valuate the metallized block between A C and a c. In supposing the metalli-

zation to remain even to that mined in A, the block in place represents 12,000 tons. Let us lower this amount 25 per cent. to allow a reduction in metallization, we will still have 9,000 tons of mineral (mixed) which can easily be mined before the winter sets in, and they will net the company 450,000 francs. In taking out this quantity we will also have about 2,000 tons of galena, which after concentration will give 500 tons of galena, 60 per cent. of lead and 4 kilos of silver, the value of which will net 440 francs per ton, so the 500 tons will net 220,000 francs. The last amount cannot be realized before the concentrating plant is put up. From all the above the result is that each blast on our concessions demonstrates more clearly the value of the deposits and gives a greater guarantee to our success. Only a few months that we have worked with small expense, and we have arrived already at such a point that we have on foot a large production that many great and wealthy mines would envy."

The Le Roi Sale Off.—The sale of the Le Roi to the British America Corporation has fallen through. A despatch from Kossland says:—"Last Tuesday night at Kossland the deal for the purchase of the Le Roi by the British America Corporation for \$3,000,000 was declared off by all the parties to the transaction. A cable was received in the afternoon from London from Whitaker Wright, stating that unless the deal could be put through by the 12th of July, the \$500,000 put up as earnest money by his company should be withdrawn. The British America Corporation went to those who were upholding the sale and asked if they could deliver the property by the 12th of July. The reply was that they did not think they could do so. Then the British America Corporation people went to the Turner faction and said they desired to draw down their check for a half million. The Turner faction joyfully acceded to the proposition. Those who favored the sale requested that all injunctions, etc., be declared off. This was agreed to, and the check was withdrawn from the bank by the British America Corporation people. The latter directed that the pooled stock which was in escrow in the bank be delivered to the trustees of the Le Roi pool, Senator Turner, Colonel Turner and Colonel Peyton. This was done. Thus the deal is completely off, and Senator Turner and his friends have won the game that has been so long before the public and which has been so full of dramatic details. It is asserted by those who so determinedly opposed the deal that the Le Roi is the greatest and most valuable mineral property in B. C. or anywhere in the northwestern portion of this continent, and that prior to the attempt to sell the property for \$3,000,000, the stock was quoted in the market and could be readily sold for \$7.00 to \$8.00 per share or on a valuation of \$3,500,000 to \$4,000,000. It is alleged that many thousand shares of stock have been sold at these prices, and that the property is really worth more than \$5,000,000, and is more valuable today than at any other time in its history. It is said that the attempt to sell for \$3,000,000 was an effort to dispose of the property at such a grossly inadequate price as to constitute an attempt to defraud the stockholders not agreeing to the sale.



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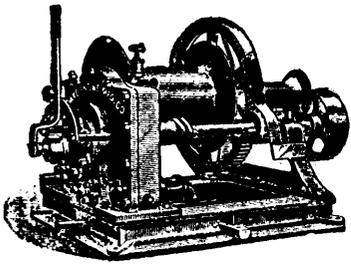
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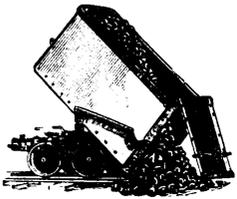
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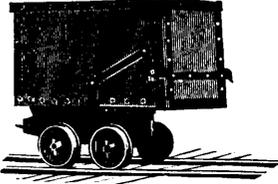
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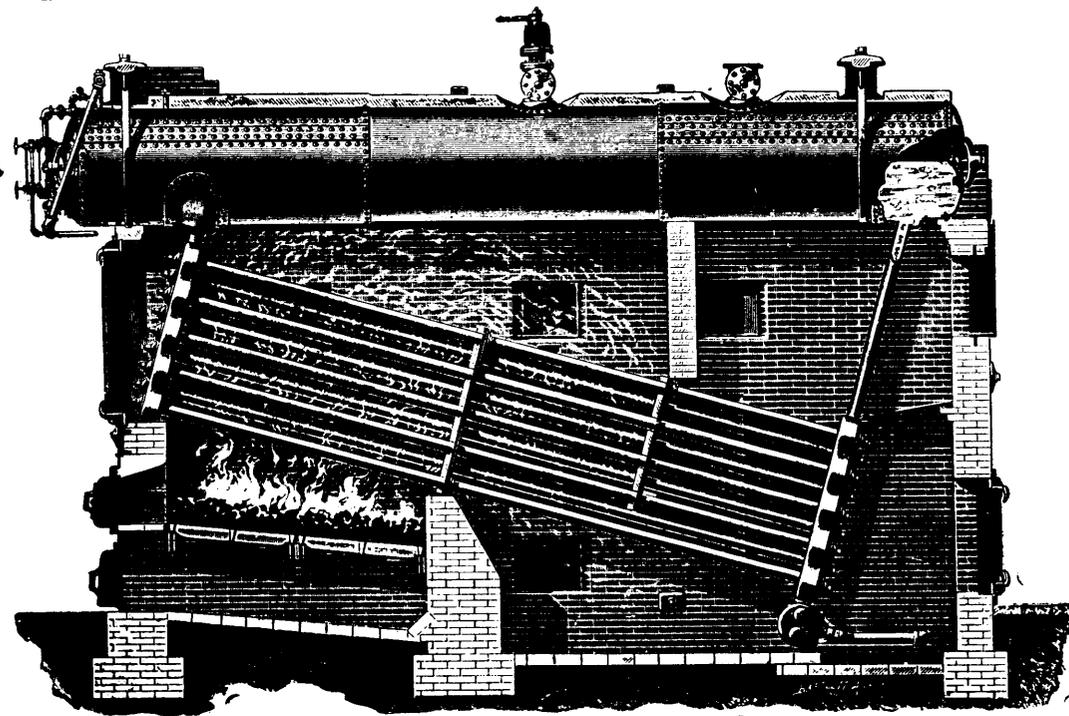
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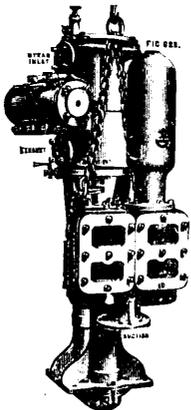


Fig. 620—"Griff"
Sinking Pump.

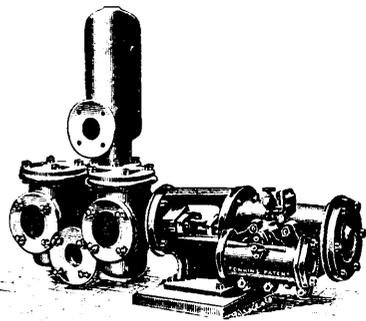


Fig. 598—"Cornish" Steam Pump
for Boiler Feeding, etc.

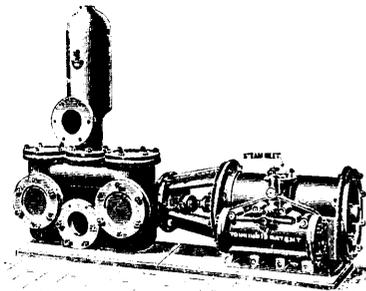


Fig. 600—"Cornish" Steam Pump
for General Purposes.

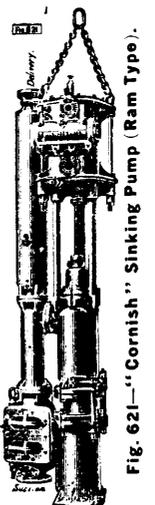


Fig. 621—"Cornish" Sinking Pump (Ram Type).

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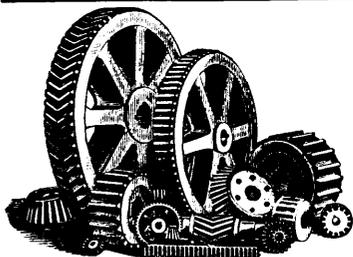
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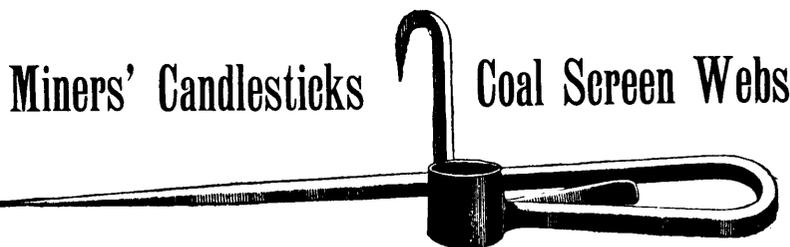
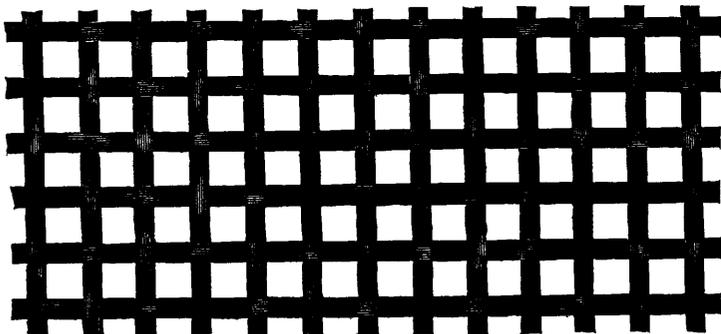
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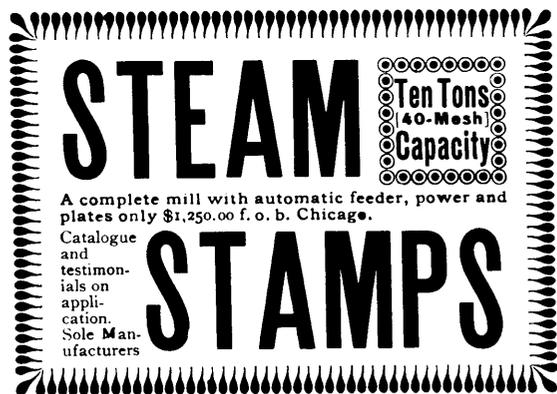
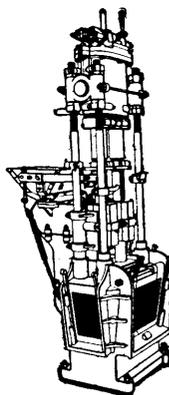
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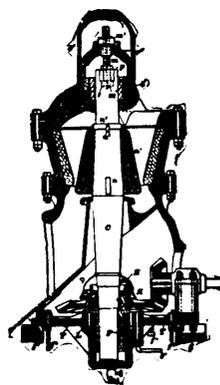
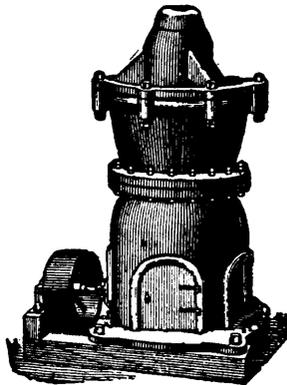
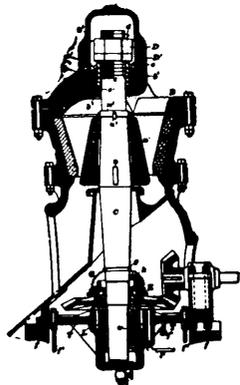
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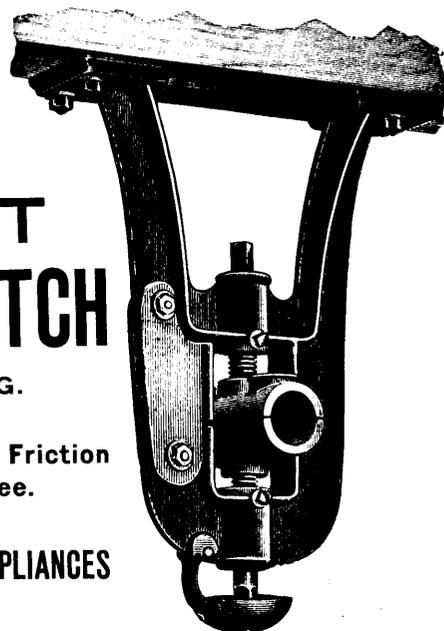
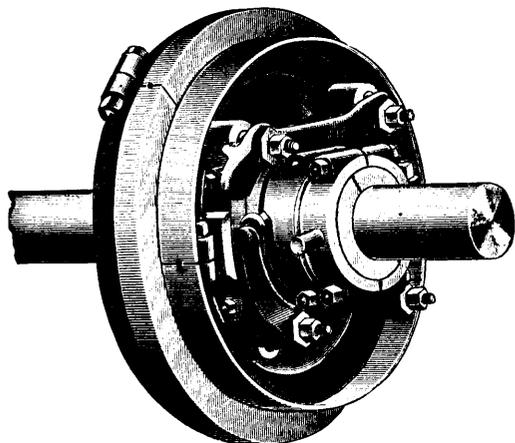
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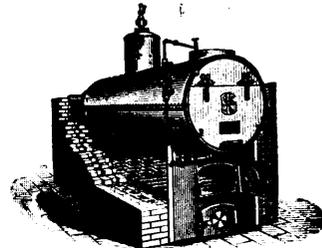
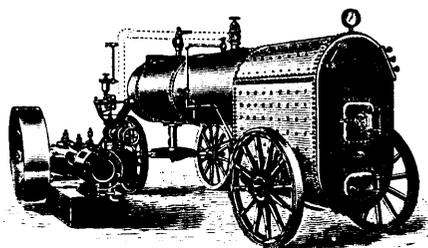
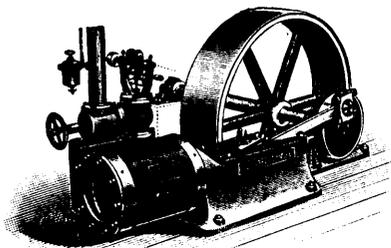
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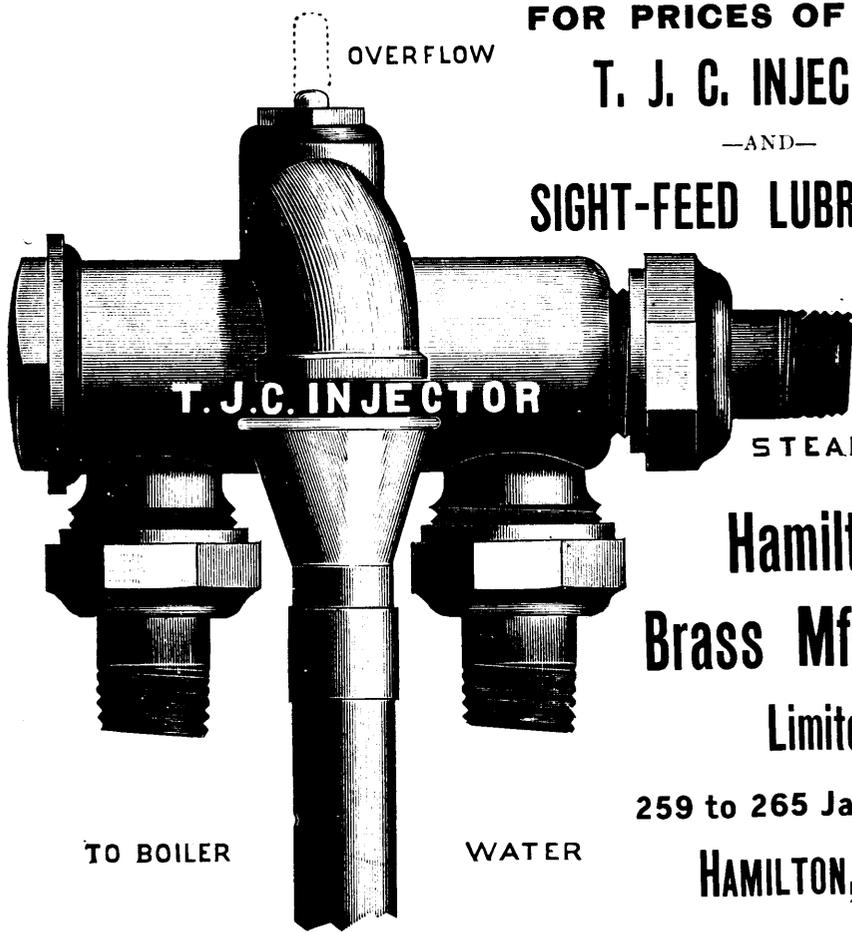


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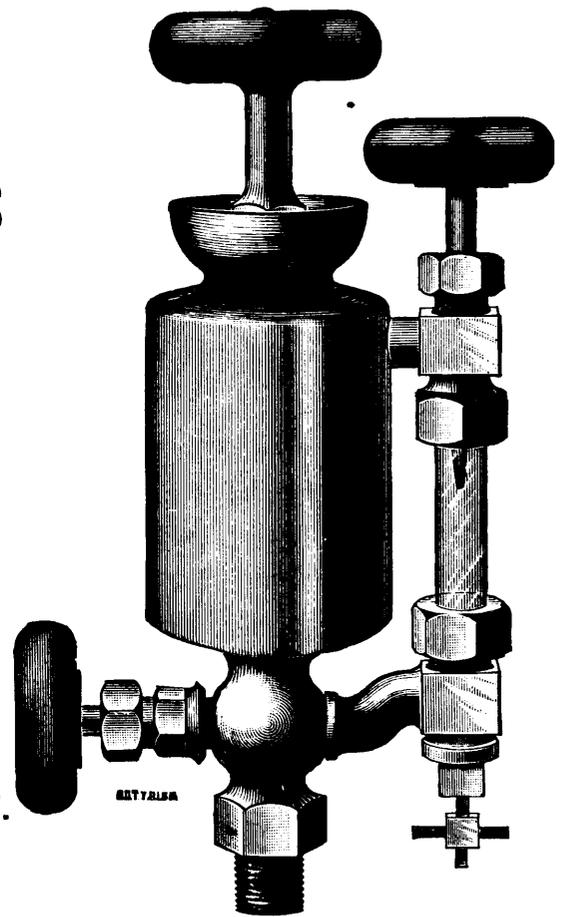
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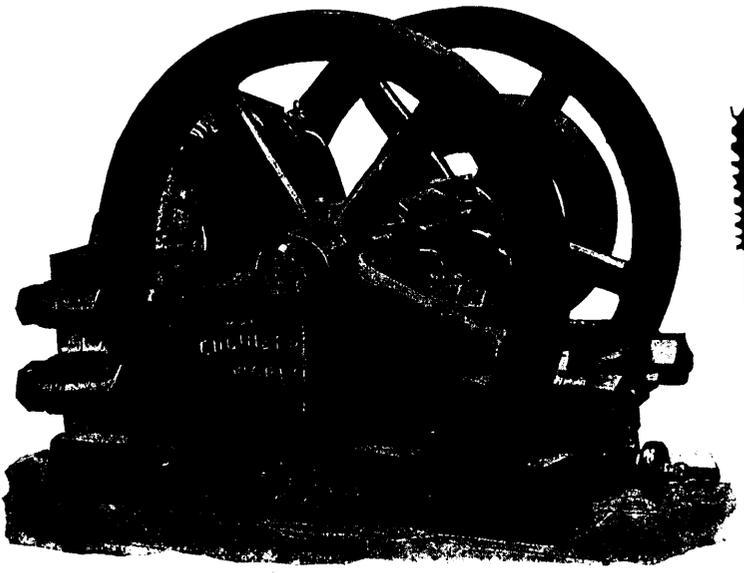
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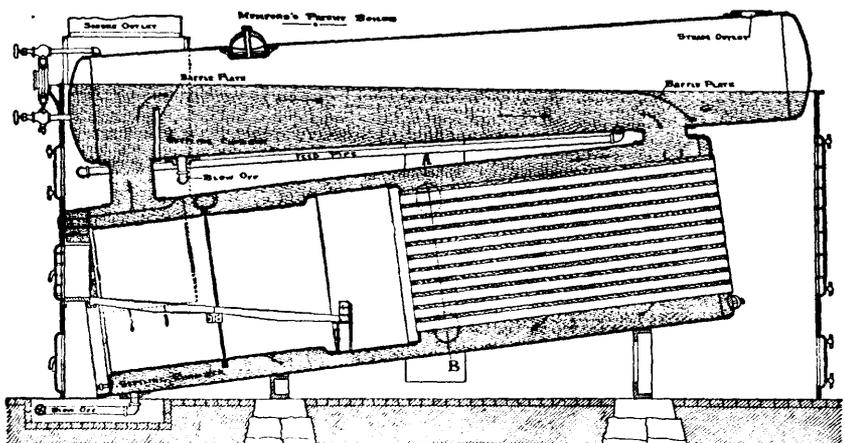
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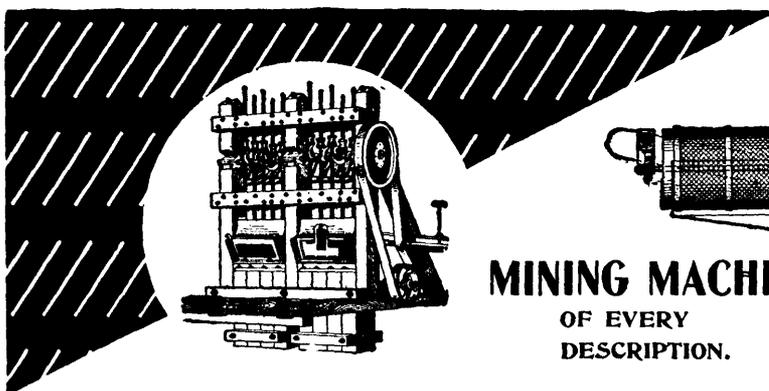
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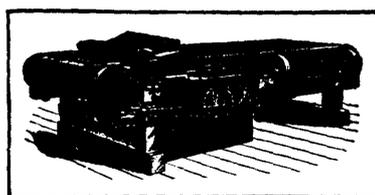
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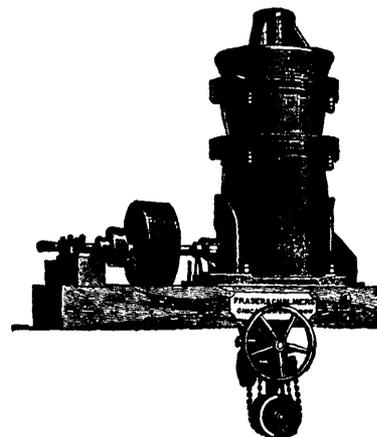
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