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Vol. XVII.—No. 2.

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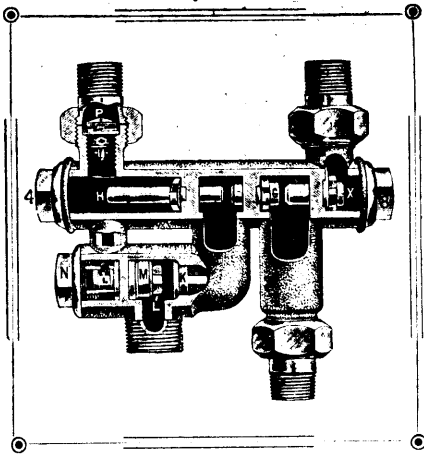
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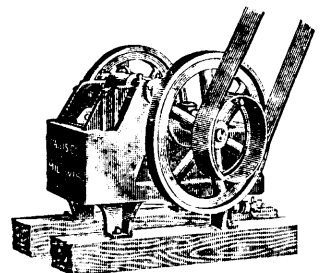
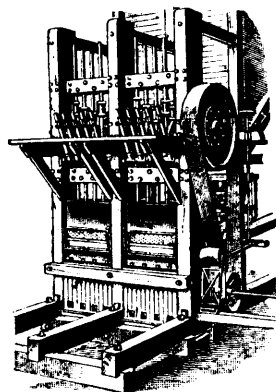
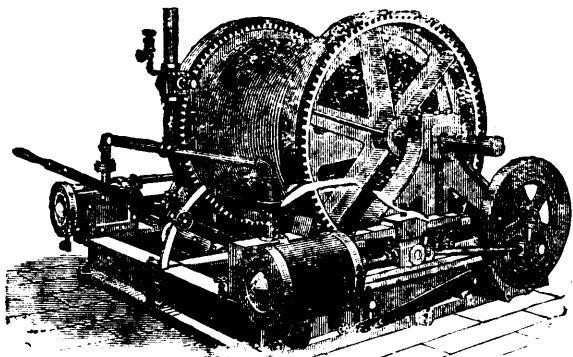
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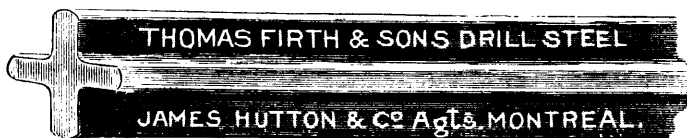
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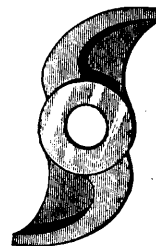
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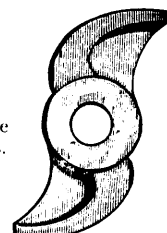
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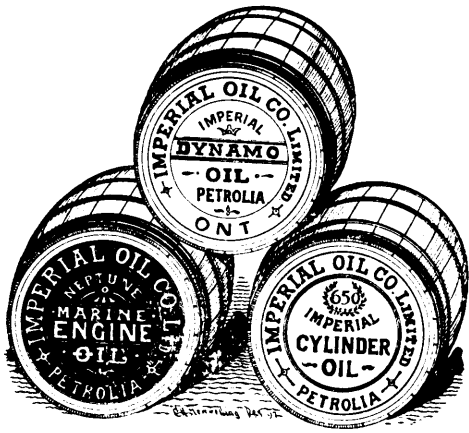
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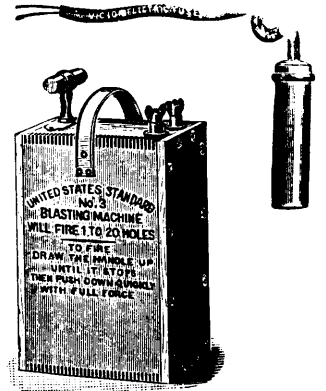
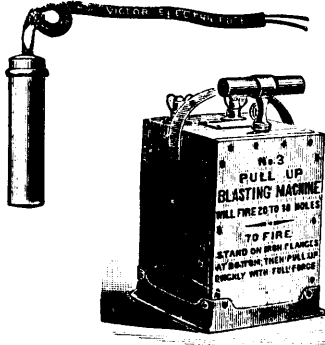
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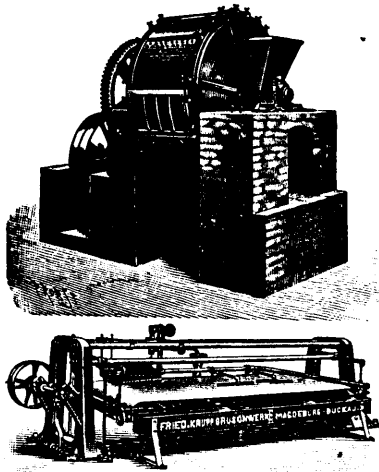
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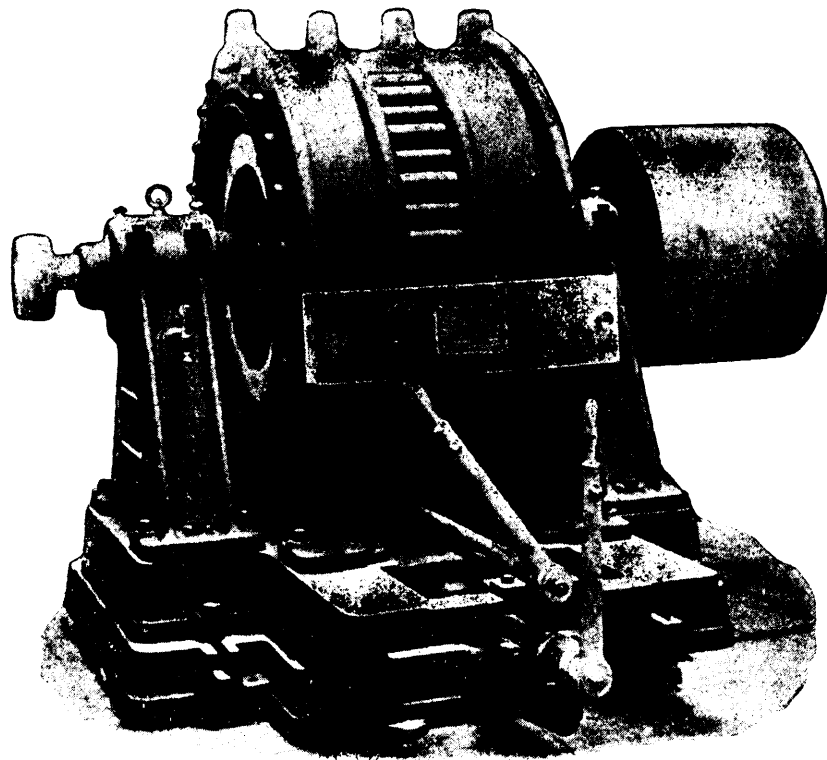
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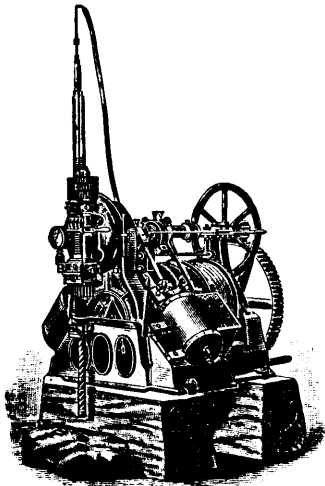


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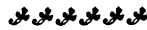
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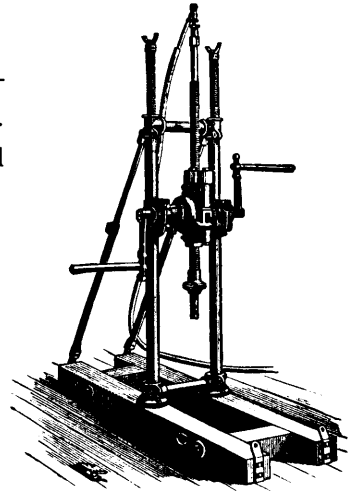
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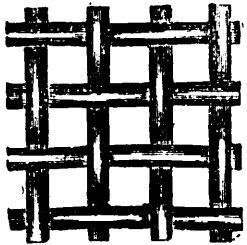
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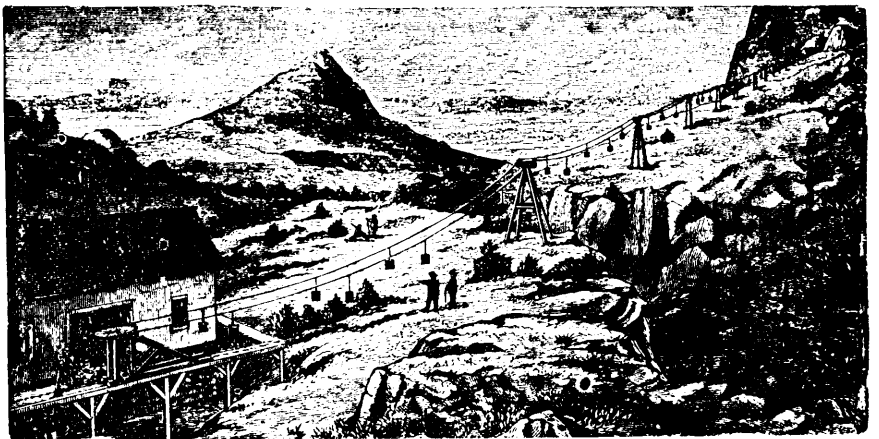
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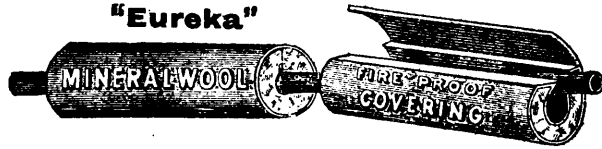
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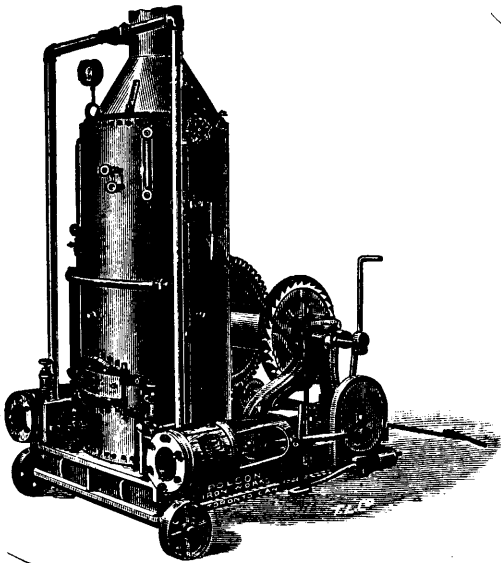
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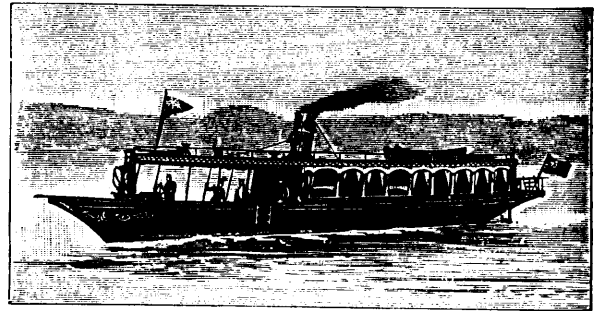
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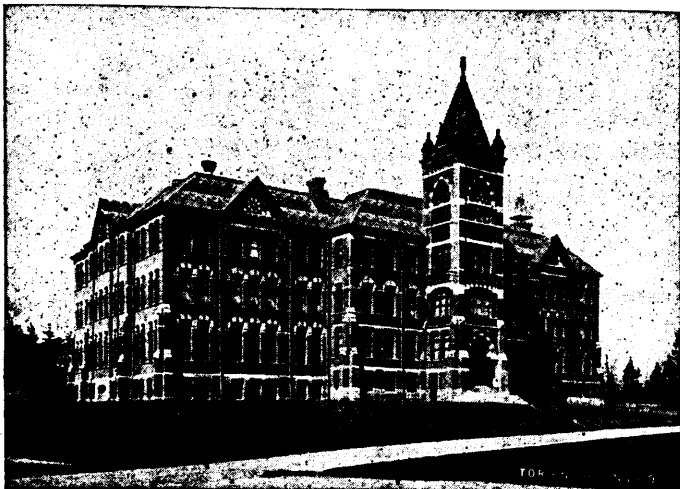
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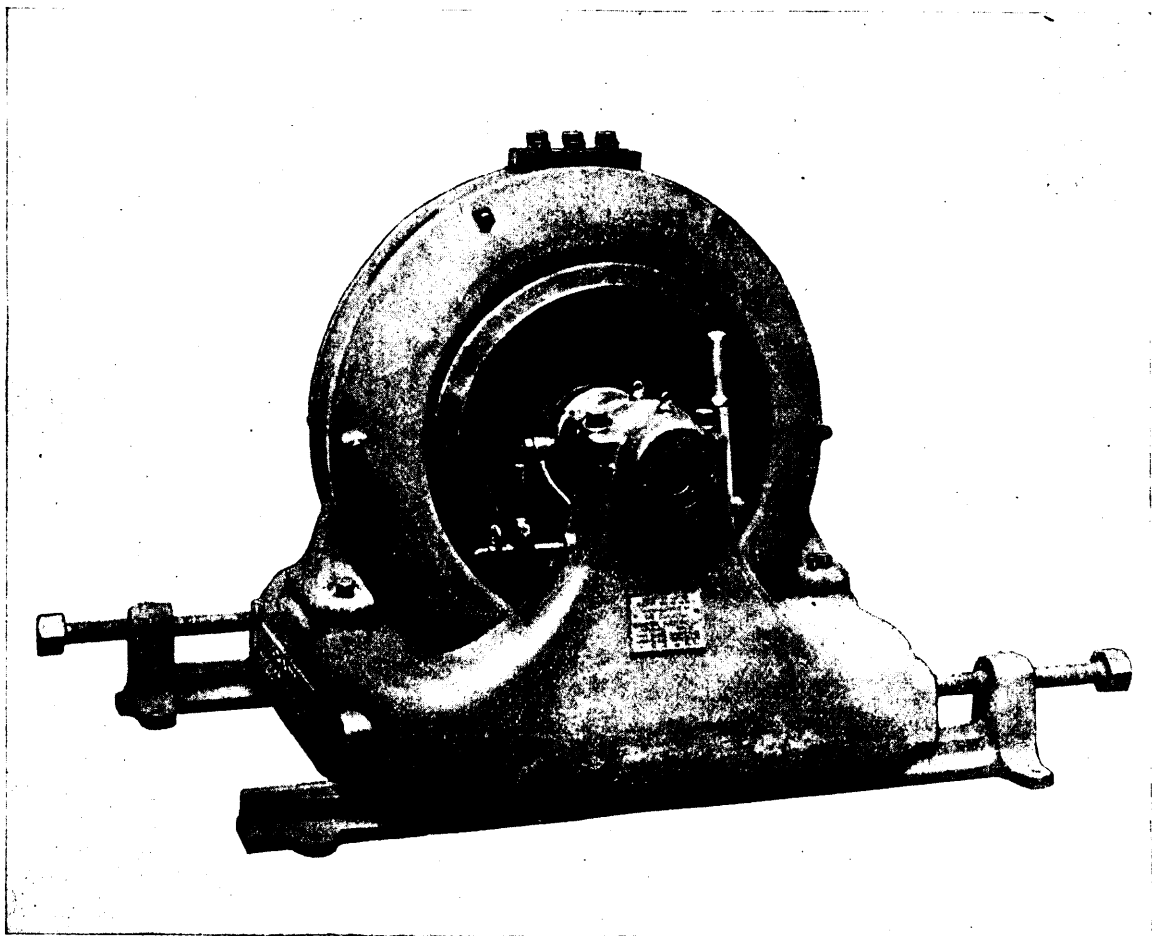
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Silver	Oz.	1,496,522	977,229	3,135,343	2,100,689
Copper	Lbs.	952,840	47,642	3,818,556	190,926
Lead	Lbs.	16,475,464	532,255	24,199,977	721,384
Coal	Tons	939,654	2,818,962	846,235	2,327,145
Coke	Tons	452	2,260	615	3,075
Other materials			10,000		15,000
			\$5,655,302		\$7,146,425

Production for 1890, \$2,608,608; for 1896, \$7,146,425.

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, \$675,000 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 LILL-OOET, 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 will much exceed that of 1896, as such mines as the "Slocan Star," "Payne," "Ruth," "Whitewater" and other mines increase 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, ILLECILLEWAET 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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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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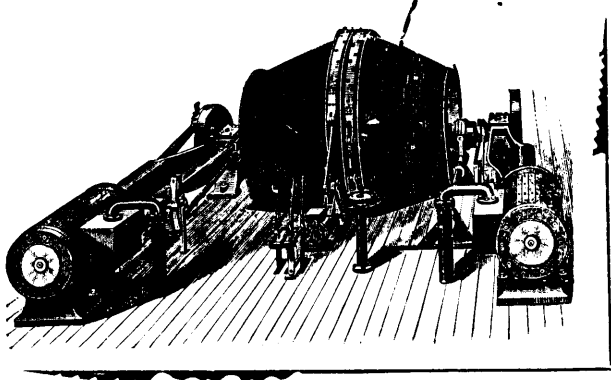
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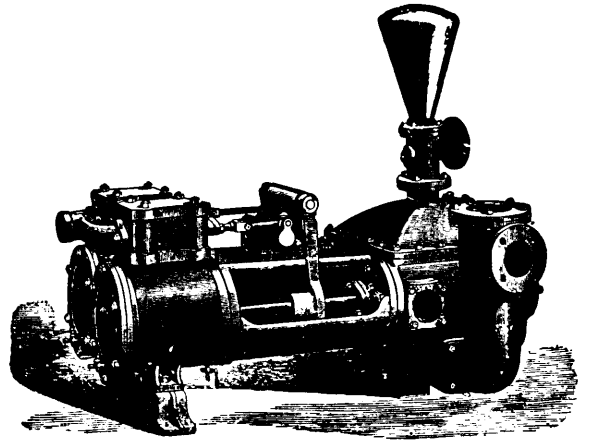
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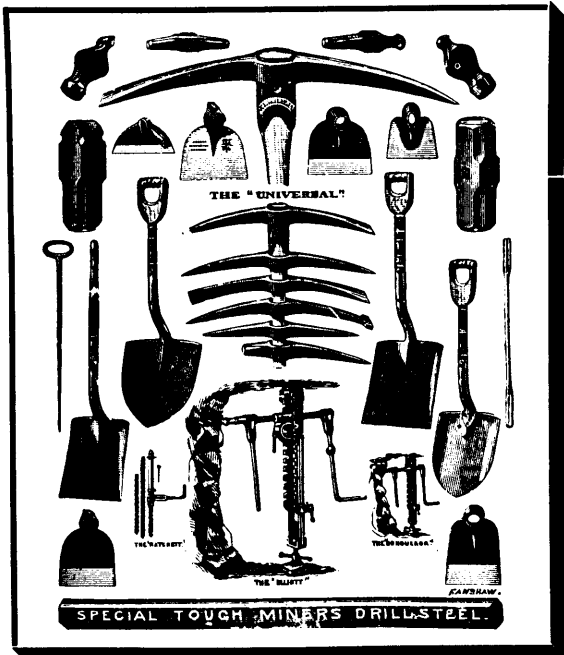


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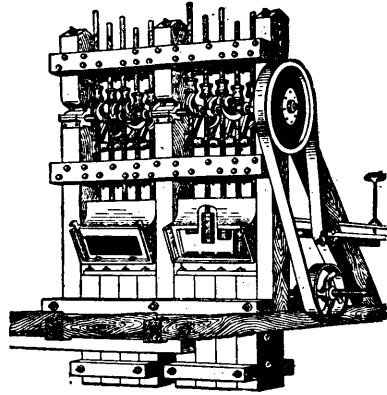
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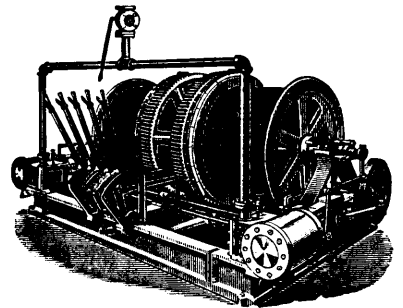
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The Mineral Act of British Columbia.

It is said that amendments are proposed to the mining laws of British Columbia. The report is probable enough, for the legislature of that province has found in the amendment of its mining laws a favorite and frequent occupation. Before the kaleidoscope takes another turn, it may be well to consider the present form of the law, and the features which really call for further change. It is not true that the amendments of the past have been mischievous. Most of them have been required to cure real evils. But we may, perhaps, say that these evils were themselves the products of earlier legislation, and that foresight might have obviated the necessity of retracing steps already taken. And change is a misfortune *per se*, apart from its wisdom or unwisdom otherwise. Every successive form of the law gives rise to vested rights, which survive to complicate the conditions of the future. In fact, the mining industry at any one time expresses in epitome the mining laws, past as well as present, which have governed its history.

British Columbia presents an interesting illustration of this proposition. The Provincial Mineral Act of 1891 was practically copied from the U.S. law. It provided for lode-claims 1,500 by 600 feet in size, with parallel end-lines, and it conferred upon the locator the extralateral lode-right. This feature of the law was abrogated in the following year. The Acts of 1892 and subsequent years have provided for locations 1,500 feet square, but without extralateral rights. But the locations made under the Act of 1891 acquired such rights, and could not lose them through later legislation. As I learn from the recent interesting paper of Mr Loring, the mines first located in the Rossland district (Le Roi, War Eagle, Centre Star, Iron Mask, Josie and others) belong in this category; and litigation, such as has so long cursed the mining industry of our West, is already in progress over the "apex-questions" thus unnecessarily and temporarily introduced into the system of mineral land titles. Fortunately, the legislative experiment was a brief one, but unfortunately, whatever harm it accomplished is a legacy which survives it.

The present law, including all amendments down to the end of 1897 is embodied, as to gold and other minerals, excepting coal, in the Mineral Act of 1896, as amended in 1897. I shall say nothing here of the Placer Mining Act of 1891, as amended

in 1894, 1895 and 1896, or of the Coal Mines Act (1888) the Coal Mines Regulation Act (1888) or the Inspection of Metalliferous Mines Act (1897). The two latter provide for the inspection of mines, to secure the safety and health of workmen. It is the Mineral Act of 1896 which defines the conditions of title, and corresponds in scope to the U.S. Revised Statutes.

This Act, like the U.S. law, contemplates two sorts of title—a possessory one (governed by certain conditions, and forfeitable through failure to perform them) and a complete ownership, as in fee, conferred by Crown grant. The theory, as to public lands, is that of the common law, viz., that the mineral right and the surface-right (including under the latter term everything except the mineral right) are separable estates, both owned by the Crown, and alienable upon such terms as it may fix. The value fixed upon each is \$5 per acre, to suitable purchasers. That is to say, the holder of a claim under valid possessory title may buy the mineral right at \$5 per acre; and the holder of such a mineral grant may add to it, at the same price, the remaining elements of complete ownership. This is an excellent arrangement.

Neither from possessory nor from permanent owners does the law require a royalty upon the product of mining. But it collects from all parties, including not only individual prospectors, but also corporations, and all employees of corporations, an annual fee (\$5 for each person, and \$50 or \$100 for each company, according to the amount of its nominal capital) for a "free miner's certificate." Failure to keep such a certificate in force by proper payments voids at once the whole possessory title of the person or company concerned. Section 9, which decrees this forfeiture, excepts from its operation the holders of Crown grants. But other sections make them liable for the payment referred to, and punishable by fine for working without a valid certificate. It is evidently this annual fee, rather than the small sums charged per acre for grants, that must furnish the revenue to support the administration of the law. It seems to me, on the whole, not unreasonable, yet experience may ultimately show that still greater liberality on the part of the government would be good policy. For instance, even if the certificate should still be required, it might be well to provide for the acquisition of a life-certificate, by a single lump-sum paid down.

Besides the maintenance of the certificate, the possessory title requires for its continued validity annual assessment work to the value of \$100 on each claim, or, in lieu thereof, the payment of \$100 to the government. This alternative appears to be unobjectionable and wholesome. There is little danger of its abuse. If \$100 can be expended to advantage upon a claim, the locator will certainly prefer to expend it in that way. If not, it had better be paid to the government than squandered *pro forma* in useless work.

This brings me to the three features of the law which Mr. Loring indicates as needing amendment, and to which, as I understand, amendments are to be proposed this winter. I refer to the size of claims, the proof of their mineral value, and the manner of their demarkation. These points I will briefly consider in their order.

1. It is said that a location 1,500 feet square, comprising over 50 acres of land, is too large, and tends to retard the development of a district. Closely analyzed, this statement is seen to refer to that phase of development which consists in intense activity of prospecting. A district cut up into small claims is "developed" when each claim has a hole in it, and a dump by the hole. A dozen years later, if the district be not altogether abandoned and empty, it will be found that a few concerns, having profitable mines, have absorbed the countless claims, and consolidated them into respectable properties. They have had to do this at great cost, because of the uncertainty of the titles thus acquired, and the necessity of paying for them over and over again to conflicting claimants. "Development" thus comes round, after all, to the large claims with which it might have begun.

Nevertheless, I think 50 acres is too large for a unit-claim. For I believe that the phase of intense prospecting, temporary though it be, is highly useful, as giving to the region the thorough overhauling likely to disclose its best deposits. If the "apex" and its fantastic rights are not involved, there is no harm in small claims. They can be consolidated as easily as farms or town lots. What is wanted is a clear title. Let the claims be as small as you please, but require the possessory title, kept up by annual work or payment, and then leave the question of consolidation to the operation of human nature. In this way, the prospector will be gratified primarily, and the capitalist will be satisfied ultimately.

2. Mr. Loring says "there is no provision in any of the British Columbia Statutes for development-work at the point of discovery." I do not find any such requirement as to the possessory holder, but Section 36 of the Mineral Act of 1896 requires, as one of the conditions precedent to acquisition of title by Crown grant, that proof shall be furnished "to the satisfaction of the Gold Commissioner," that a vein or lode has been found on the claim. In other words, a locator is obliged to work or pay annually a certain amount, in order to hold his claim. While he continues to do that, he is not obliged to furnish proof of actual discovery of valuable deposits. When he wishes to acquire an unconditional title, the government takes the precaution to ascertain that there is reason to expect that the claim will be developed. This calls for proof of its value for mining. It does not seem to me that the liberality thus shown to the locator would be likely to lock up much good property "on speculation." But in that connection, the size of the claims is

important. The opinion I have just expressed assumes that claims are not larger than 20 acres, and also that hopes of "apex rights" over neighboring bonanzas are not inspired by the law. In other words, land valuable for a big apex lawsuit may very well be held indefinitely at \$100 per claim per annum. But when all such vicious and visionary values are done away under a rational system of titles, the inducement to such speculation is gone.

Finally, as to the demarkation of claims, I think Mr. Loring is clearly right in his contention that the monuments required by this Act, namely, two posts "as nearly as possible on the line of the vein, and not more than 1,500 feet apart" are utterly inadequate. This is especially true for such large claims as 1,500 feet square. But even smaller claims should be in all cases marked with corner-posts, at least. The present British Columbian requirement simply amounts to this: that everybody else except the owner of a claim must make a survey to find where it is. He sits serene by his centre-posts and bids other people respect his unmarked boundaries, at their peril. In this respect, if in no other, British Columbia might well copy the United States, the government of which, after granting to the locator pretty much everything he can think of, musters courage to insist that his location "shall be distinctly marked on the ground, so that its boundaries can be readily traced"

Now standing in the middle and guessing at the edge is not tracing a boundary!

To recapitulate, without going into less important particulars, I must confess that if the size of lode-claims were reduced to say 20 acres, with a maximum length of 1,500 feet, and the boundaries were required to be distinctly marked, the Mineral Act of British Columbia would be, for substance, a very good statute. The requirement of free miner's certificates may be somewhat irksome, but I do not think it inequitable, coupled as it is with entire liberality towards aliens, who are put upon the same footing as citizens. At all events, before we of the United States criticize it, we should repeal our own foolish and futile discriminations against aliens.

R. W. RAYMOND.

A. Review of Coal Mining Operations in the North-West Territories.

The operations of the collieries of the North-West Territories for the year just closed may be regarded as fairly satisfactory when all the factors connected with coal mining in a new country are considered

The combined population of Manitoba and the North-West Territories at the time of the last census, 1891, was 251,473 so that even if the entire fuel consumed was supplied by the collieries in the Territories, it would not be regarded, in an older country, as a serious tax on the resources of one colliery. When it is borne in mind that the combined breadth of Manitoba and the North-West Territories is 1,063 miles, and that Winnipeg the chief point to be supplied, is distant 762 miles from the soft coal fields at Lethbridge, and 917 miles from the hard coal fields at Anthracite, as against 426 miles from Fort William and 473 miles from Duluth, both on Lake Superior, to which points coal can be shipped from Lake Erie ports, having low water rates, it will therefore be seen that the Territorial coals named are at

decided disadvantage, with their long rail haul, in competing with the American fuel in Winnipeg and eastern Manitoba points.

The consumption of coal has been exceedingly light during past years, even considering the sparseness of our population, and it has only been in the season of 1896, and especially the one just ended, that a marked increase in the coal trade of the country has been noticeable. The reasons for this bettered condition are quite plain. The population, practically composed of agriculturists, owing to the depression in wheat prices, covering a series of years, was forced to use native wood, which in some instances had to be hauled a distance of 40 miles.

The wheat crop in Manitoba and the eastern portion of the Territories, during the season just closed, has been characterized by its usual abundance, and with the marked increase in prices, over \$10,000,000 have found their way into the country and into circulation during the past four months. It can therefore be readily understood, after two such profitable years, that the farming community, as a whole, has passed out of what might almost truthfully be termed an impoverished stage and are now well on the road to prosperity, while many have become independently rich. However, considering the improved trade brought about by the conditions referred to, still the demand is necessarily limited, and taken in conjunction with railway rates based upon the long hauls, any profit is entirely immensurate with the amount, necessary to pay a fair interest on the investment in property and plant. From the foregoing it will be evident that the operation of collieries in the Territories has not been very profitable.

The next question to consider is whether the future looks more promising for those concerned in coal mining. This largely depends upon two factors, viz. :—

1. Immigration.

2. A consideration of the extent to which the lignites (of various grades, to be found in almost every section of the country) are likely to enter into competition with the higher grade of fuels of the western section of the country.

Dealing with immigration and the possibilities for home-making in the North-West, the thinking people of the country have always felt that the fate of Canada is bound up in Manitoba and the Territories. They are centrally situated in the Dominion and have the largest tract available for settlement on this continent. Manitoba No. 1 hard—known in the markets of the world—has demonstrated the capabilities of the soil and climate. There may have been times when those in the country have felt that they, as pioneers, would not live to see and share in the benefits that will accompany the development of this vast country, but the most pessimistic never lost faith in the grand future that ultimately is in store for these western prairies.

In reference to the poorer grades of lignites to be found in the eastern section of the Territories, nature has been very provident in this regard, and the abundance of these lignitic coals will serve a two-fold purpose in the development of the country, while at the same time they will not very seriously interfere with the output of the collieries engaged in the extraction of the better class of fuels. In the first place the lignites will not be used to any extent for steam purposes, and as a domestic fuel will probably be mined in a more or less desultory fashion for supplying a certain percentage of the demand in their immediate neighborhood. The presence of these lignites, so widely scattered

throughout the country, however, will be a guarantee to the settler that fuel can be had, and at the same time will protect the fuel-consuming public against excessive charges, either by the colliery operators of the better class of fuels, or the railway companies, who will have the hauling of these coals, or against overcharges by both of them.

In dealing with the possibilities of the future much depends upon the extent to which coal will continue to be employed, as that source of power, heat; however, nature having provided coal, it doubtless will have its use, though man's ingenuity in the development of electrical and other power, does make inroads upon the extent of its usefulness.

After considering, even in this superficial manner, the various phases of the subject, it is felt that the illimitable possibilities in the development of these western prairies will produce a market for vast quantities of coal, but, for reasons already given, the western collieries will have to be conducted with the strictest economy and their product favored with very low railway rates.

Turning back to the operations of the year just ended: there are the three old established collieries at Anthracite, Canmore and Lethbridge; the former an excellent hard coal, while the other two produce soft coals—Canmore being used exclusively as a steam coal, and Lethbridge better known as "Galt" coal, being both a domestic and steam fuel. In the eastern portion of the Territories, the Souris fields, producing a pure lignite, appear to be worked with more regularity than in the past and with an increased output over last year.

An estimate of the output for the year 1897 gives the following:—

Anthracite.....	23,000 tons
Canmore	85,000 "
Lethbridge.....	160,000 "
Edmonton.....	6,000 "
Knee Hill (near Calgary)	1,000 "
Souris.....	15,000 "
Other points	7,000 "
Total.....	297,000 "

The Edmonton and Knee Hill coals belong to the western group and are much superior to the Souris. The output "other points" refers to the settlers living in the neighborhood of deep valleys where coal seams are exposed, and who secure their own supply, and in this case 7,000 tons is a reasonable estimate.

Blue's Blue Book.

Director Blue of the Ontario Bureau of Mines is not pleased with the criticism of his sixth Annual Report which appeared in our December issue, and, through the columns of the *Toronto Globe*, descends from his high pedestal of dignity to overwhelm our personality with allusions to St. Peter and Balaam, comparing us first to the one and then to the other, and leaving a delightful sense of vagueness and uncertainty as the result. The REVIEW is sorry not to be able to make its remarks equally ambiguous, but its talent does not lie that way; if, however, any reader can suggest a "kindly" and ambiguous synonym for *old woman* we shall be glad to add it to our vocabulary.

The Director is in serious error in supposing that we have not read the whole of his report, some portions of it were read several times in the vain hope that one might see a change from the character of the proceeding reports.

We call the Director's attention to the fact that his own letter emphasizes the very point that we endeavored to make, viz. "that the manner in which the 'Summary of Mineral Production' is made out is open to criticism."

It was precisely because there were other figures scattered here and there amongst the text, which had strong bearing upon the economic aspect the statistics given and which should have been shown, that we wrote "The summary is open to criticism."

We beg to repeat what we said in our former article, and in proof of it bring forward the explanations Mr. Blue gives, that if one turns over the bulky pamphlet he will eventually find what he wants, but no where will he find it all summarized so that he may get a correct comprehension of Ontario's mining industry.

It is also a matter of sincere regret that the worthy Director acknowledges himself unable to "deal" with the editing of his annual report; that he cannot deal with extraneous matter, amounting to 45% of his volume, argues either that his hands are tied or that he is overworked.

That both mine inspectors are objects of ridicule to the mining men, that one has had no technical training (only that of a clergyman), and the other is a youth of no experience are well known facts. As the head of the department Director Blue is responsible for these officers, and to argue their competency or retain them is sufficient evidence of the Director's own knowledge, and of his ability to administer a Bureau of Mines.

Our criticism of the report is not misrepresentation, if it has the appearance of censure to the Director it may not be undeserved, and ridiculous things are legitimately open to ridicule.

Ontario is endeavoring to push forward her mineral resources and to induce capital to enter her doors. A wise policy would be to do nothing now that must subsequently be undone; to make no statements which later she would have to modify or withdraw; and if our efforts to show the antiquated methods of the Bureau a better path are not "kindly" they are honest, and are backed up by many prospective purchasers who expect Government publications to set forth the facts they contain in such a fashion that he who runs may read. Busy men, as most capitalists are, have no time to wade through page after page of verbosity to extract a fact which might, and *should*, be set forth lucidly in small compass.

We are sorry that our comments should have so deeply wounded Mr. Blue's personal feelings, but we cannot regret them nor recall them, as we believe they are for the best interests of this Province, and if the interests of mining in Ontario clash with Mr. Blue's feelings, the greater interest must prevail. We trust there is no ambiguity about this sentence.

The statement of the affairs of the Dominion Gold Mining and Reduction Company, another Lake of the Woods venture, which we reviewed last year, while again showing no profits, indicates, we are pleased to observe, a healthier financial condition, for not only have all the old liabilities, amounting to over £5,500 stg. been discharged, but there was in hand at 31st August the sum of £6,809 5s. 10d. Now that Ahn has severed his connection with the enterprise, Mr. A. M. Hay, the chairman of the company, has assumed control and is proceeding cautiously with the exploitation of the various properties.

Opposed to Export Duties.

On Thursday, 10th instant, Sir Wilfred Laurier and Sir Richard Cartwright received the following deputation at Ottawa:—Judge Burke and H. P. McIntosh (Canadian Copper Co.), Col. Ridpath (Le Roi Mining and Smelting Co.), T. G. Blackstock (War Eagle Con. Mining and Development Co.), and B. T. A. Bell, Secretary Federated Canadian Mining Institute. The various speakers presented a strong argument against the proposed imposition of an export duty on Canadian ores. Judge Burke, of Cleveland, one of the principal directors of the Canadian Copper Company, thoroughly reviewed the history of nickel mining in Canada as an industry, and showed conclusively that any such impost on their ores would be disastrous in its effects upon their enterprise. In this connection the following correspondence to the REVIEW will be of interest:—

To the Editor:

SIR:—With respect to the proposal to exact an export duty on ores, permit me on behalf of our company to say:

Such legislation might be beneficial to *smelters* in the province that were engaged in treating *copper-gold ore*, but to no other smelting plants, except at an expense to the producer for the benefit of the smelter, and would mitigate against the development of our silver-lead industries at this time and should not be seriously considered for a moment, for the following reasons:—

1st. The duty on *pig-lead bullion* (the product of the lead smelter) to the United States is now 2c. per lb. on crude ore 1½c., and an export duty on this class of ore (silver-lead) would force the producer to pay ½c. more per lb. on lead duty to the United States than now, in addition to any tax proposed, and the owner of the smelter would be the only beneficiary, the general government would be the loser on account of the contraction of the development of such resources.

2nd. Whenever Canada has provided the proper metallurgical works, to not only smelt these ores, but refineries and works for manufacturing the bi-products of lead, *i.e.*, lead pipe, white lead, sheet lead, etc., and possibly a mint to care for the silver produced, then possibly such a tax might prove beneficial, but until then it would be oppressive to the producer, and work injury to the country with no corresponding benefits.

3rd. At present the producer of silver-lead ores in this province pays an import tax on lead to the United States of 1½c. per lb., to place it at the lowest possible cost where the bi-products can be manufactured and the Canadian consumer pays another tax on these bi-products to have them returned to where the raw material was produced.

4th. Canada probably consumes nearly as much lead as its mines produce, and yet foreign countries must continue to get the benefit of the industry until the people of Canada are prepared to receive the benefit of their own product by the operation of the necessary manufactories, etc. Any product of lead not taken up by home consumption would find a ready market in China and Japan.

This would free the producer from the tax imposed by the United States and give smelters here a better margin of profit than is now made by American smelters; but so long as the Canadian smelter is forced to send its bullion to the United States for a market it does not seem good policy to further tax the producer in silver-lead industries.

E. J. FIELD, Manager,

Wonderful Group Mining Co.

Sandon, B.C.

An export duty on mineral shipments to the United States, I consider *would not* contribute to the expansion of the mining and smelting industries of British Columbia, for the following reasons:—

1st. The import duty on lead ores to the United States, combined with the special mineral tax imposed by this province, have already been the means of closing down properties in this district, which were operated at a small profit, when the import duty on lead to the States was not as high as at present and when no mineral tax existed. This fact will be sustained by all reputable mining men in the district.

2nd. Under existing conditions, new discoveries are not being developed as in the past, as capital is afraid to venture where new mining laws are being made every year, thereby affecting investments made in the past.

3rd. The import duty on lead ores to the States as at present ought to afford ample protection to the smelting industry, and if it is intended to still further protect them, it should not be done at the expense of the mining industry, as the number of men employed smelting ores is very small compared with the number engaged in mining.

For the above and various other reasons I would suggest that your body proceed very cautiously.

A. W. McCune,
Vine Mining Co. of British Columbia.

Sandon, B.C.

As to my opinion as to the effect of an export duty on mineral shipments to the United States, I consider that such a policy would be injurious to the Canada, and a tax upon them for the benefit of smelters, similar in effect to the tax that has been imposed on mining machinery for the benefit of manufacturers, and of the same nature as the opposition to the opening up of mining districts by United States' railroads "that may be built some day." A progressive people should welcome trade from any point of the compass, and the long-suffering mining industry should say to the Government, "Hands off! Give us a fair field even if we have no favor!"

Yours, &c.,

ROBT. C. ADAMS, Managing Director,
Adams British Columbia Co., Ltd.

Montreal, 17th Jan., 1898.

I consider legislation looking to the placing of an export duty on mineral shipped from Quebec to the United States as being practically a notice to those engaged in mining to quit. Quite a large industry has been created, as you know, at Capelton and Rustis in the production of pyrites ore, almost every ton of which is shipped to the United States in competition with ores from Newfoundland and Spain, as well as those produced in the United States. Even under present conditions large quantities of Newfoundland and Spanish ores have found their way into this country, but if the least export duty should be put upon Quebec ores the industry would be absolutely annihilated. It cannot seem to me possible that the Dominion Government would seriously consider taking such an insane step.

Very truly,

Ww. H. NICHOLS, President,
Nichols Chemical Co.

New York, 12th Jan., 1898.

That C. E. Bill.

The high handed legislation promoted by the Canadian Society of Civil Engineers, ostensibly to raise the status of engineers, but really to increase the revenue of that society by the coercion of all other engineers, is having a rather hard time of it. Owing to the action of the Federated Canadian Mining Institute, which opposed the clauses of the Bill in so far as they related to the practice and profession of mining engineering, the Bill was thrown out last year by the Nova Scotia House of Assembly and by the Quebec Legislature. An amended Bill was brought up again the other day in Nova Scotia, leaving out the mining clauses, only however to share a similar fate, being defeated in the House by a vote of 21 to 8. The remarks of Mr. E. A. Macdonald, M.L.A., who opposed the Bill are worthy of reproduction. He said:—

He was opposed to the principle of the bill, as it was one which, to a large degree, restricted the freedom of the public. He was satisfied that the bill would work great injury to parties who proposed to invest their money in developing the natural resources of the country. It said, in effect, that no one should have anything to do with the construction of public works named in the bill, such as railways, bridges, roads, canals, river improvements and, in fact, everything that we must rely upon to build up the province, except the mining industry, unless he was a member of this society. Any gentleman who came into the province as a representative of capital to look about as to possible investments would be allowed to remain for the period of one month, but if he chanced to stay here for 32 days, he became liable to pay a fine of \$25 or to be sent to prison for thirty days. The bill went so far as to say that no man should lay out a road unless he belonged

to this society. It was true that provincial land surveyors were not supposed to come within the operation of the bill, but only a small proportion of the men so engaged came within that description. He knew of only one in the county of Picton out of a large number of competent gentlemen, who attended to that business. If a bridge was to be constructed either by provincial or municipal funds, it was made necessary to obtain the services of a gentleman who was a member of this society. If an incorporated town desired to make improvements of any character, they must do the same. In addition to the objections referred to, arbitrary powers were conferred upon the society in respect to the admission of members. A gentleman holding a degree from one of the best-known American universities could be forced to begin at the beginning and pass a preliminary examination. A gentleman holding the degree of bachelor of engineering from a British university could be required to serve for a period of two years under the tutelage of some member of the society. He thought the province had gone far enough in the direction of conferring exclusive privileges and should hesitate before conferring such privileges on any other body. If there was anything in the bill tending to advance the public interests of the province, the legislature could properly have regard to that fact but as there was nothing of that character in the bill, he moved that it be not now read a second time, but that it be read a third time this day three months.

EN PASSANT.

The annual general meetings of the members of the General Mining Association of the Province of Quebec will be held in Club Room, Windsor Hotel, Montreal, on the evening of Tuesday, 1st March. After the transaction of business the papers contributed by mining students in competition for the King gold medal and cash prizes will be presented.

On the following day, Wednesday, 2nd March, the second Inter-Provincial Conferences of Canadian Mining Engineers and Mine Managers, to be held under the auspices of the Federated Canadian Mining Institute, will open in the same place at 11 o'clock. Business only will be transacted at this session, and it is expected several important resolutions will be submitted. In the afternoon at three o'clock, Mr. George E. Drummond will open the public sessions with his presidential address, and the discussion of the various papers, of which there are close upon forty on the syllabus, will be proceeded with. The sessions will be continued on Wednesday evening and on Thursday forenoon and afternoon, terminating on Friday. The latest additions to the list of papers include Mr. Wm. Ogilvie, F.R.G.S., D.T.S., who will address the Conferences on "Experiences in the Yukon," and Mr. John Birkenbine, M.E., of Philadelphia, the well known specialist in iron, who will present a paper on "Commercial Progress as influenced by the Development of the Iron Industry." On Thursday evening, 3rd March, the annual dinner of the Institute will be held in the Windsor Hotel.

The arrangements made with the railways are of an exceedingly liberal character and should conduce to the largest and most representative attendance of Canadian mining men ever held in the Dominion. Members and their friends, and all who propose attending these meetings, will be carried over the Canadian Pacific, Grand Trunk, Intercolonial, Canada Atlantic and Quebec Central Railways for a single fare for the round trip, irrespective of attendance. To secure this special concession members and their friends must obtain a Convention certificate from their ticket agent, which must be signed by the Secretary at the meeting. The meetings will, as heretofore, be open to the public.

In consequence of these conferences the annual meeting of the Mining Society of Nova Scotia will be adjourned until Wednesday, 6th April, when, as usual, it will be held in Halifax.

Since the reproduction in the REVIEW of some of the papers on the metallurgy of gold published by the Chemical and Metallurgical Society of South Africa, we have had numerous enquiries from readers anxious to obtain copies of these very valuable transactions. To such we would say that the first volume, a demy 8vo. embracing the proceedings from the organization of the Society up to January, 1897, has just been published by Mr. R. W. Hunter, 19 George IV. Bridge, Edinburgh, Scotland, from whom copies may be obtained at ten shillings and six pence net (\$2 50). We are quite sure our mill-men and metallurgists will find this volume a valuable acquisition to their library of technical literature. Everyone engaged in the extraction of gold ought to have a copy.

The returns of the trade of our largest colliery operator, the Dominion Coal Company, are always interesting, particularly so for the last year, as they show a substantial increase of 47,227 tons over the previous year. A still larger increase may be looked for this year.

COLLIFRY.	COAL RAISED.		COAL SHIPPED.	
	1897.	1896.	1897.	1896.
Gowrie	41,873	50,166	30,436	39,183
Reserve	266,384	269,802	234,092	243,458
Old Bridgeport	129,913	140,539	126,904	133,922
Victoria	104,321	62,810	91,295	52,310
Caledonia	261,378	231,515	218,455	212,985
International	112,092	98,721	97,822	91,280
Dominion No. 1	234,977	161,528	219,746	151,796
Hub	100,357	137,721	87,218	133,821
Total	1,251,295	1,152,802	1,105,968	1,058,755

RECAPITULATION.

	1894.	1895.	1896.	1897.
Shipped	929,084	784,241	1,057,595	1,105,968
Land sales	2,644	558	1,160	1,407
Collieries and railway	43,849	51,615	56,339	52,632
Employees	14,490	18,738	18,237	20,551
Total	990,067	855,152	1,133,331	1,180,558

Prominent in our illustrated supplement this month we reproduce a photo of the new mill and surface plant at the Mikado—a Lake of the Woods gold mine, operated by an English company, which made a very gratifying record last year. The battery commenced crushing on 9th August last, and up to 30th September, 1,470 tons of ore had been milled, which produced 2,413 ozs of gold, being 1 oz. 13 dwts. per ton of the value of \$35,628. For the first fourteen months operations, the Directors, in their annual report, point out that there is a balance in favor of the mine of £2,633 18s. 5d., a result which may be considered as highly satisfactory and unique in the annals of quartz reef mining. The output of this mill for 1897, notwithstanding that it was only in operation about five months, will probably head the list of Ontario mines. It is worthy of note

that the capital of the Mikado Company, unlike most English investments, is the modest figure of £45,000, upon which, we doubt not, the shareholders will realize good dividends.

We are pleased to note the very encouraging character of the last report to the shareholders of the Regina mine. "The main shaft has now been sunk to a depth of 374 feet; the gold-bearing quartz vein at the bottom is 4 feet 6 inches wide, assaying, on an average, 17 dwts. gold to the ton. 1,600 feet of levels have been driven and the 6th levels north and south have been started at a depth of 360 feet from the surface. This extensive development work," says the report, "has opened up large masses of paying ore, estimated by the mine manager, Mr. H. A. Pringle, to aggregate 24,000 tons, worth, on an average, 10 dwts. per ton. This substantial reserve of ore is being rapidly added to as the work of driving the various levels proceeds. The persistent development work in the mine having justified the expectations of your board, and ample 'reserves' of paying ore being now in sight, the directors decided, in the summer of this year, that the capacity of the mill should be forthwith increased from 10 to 40 stamps."

The official returns of the smelting operations of the Hall Mines, Limited, at Nelson, B.C., for the four weeks ending 28th January, are as follows:—

27 days, 15 hours smelting.
5,675 tons of ore were smelted:
Yielding 375 tons of matte.
Containing (approximately)—
157 tons copper.
109,070 ozs. silver.
338 ozs. gold.

The surprise of the month is the announcement that Mr. W. A. Carlyle, B.A. Sc., M.E., Provincial Mineralogist for the Province of British Columbia, will shortly resign his position to assume a more lucrative appointment with the British America Corporation Ltd. During the short period Mr. Carlyle has been at the head of the Bureau of Mines, his excellent monographs on mining districts and the high character of his annual reports have won for him golden opinions among the profession, and have done much to create and stimulate a healthy interest in British Columbia's mineral resources. While the Government can ill afford to lose the services of an official of such excellent calibre, the shareholders of the British America Corporation are to be congratulated on the wisdom of an appointment which will do much to inspire confidence in their venture.

The *Financial Bulletin* of January 15th, devotes a column to endeavoring to set itself right in regard to its article on "Canada's Gold Fields" which we criticised in our December number. We find no attempt on the part of the *Bulletin* to answer our facts, or any of our statements, but on the contrary a decidedly apologetic tone running through its article, and very quick denial of an unexpressed inference that the *Bulletin* "held a brief" for any particular portion of the Dominion or particular group of financiers.

Another evidence of our contemporary's aberration is its use of the *Rat Portage Daily News* as an authority, a sheet of no reputation nor standing in mining matters in this country.

The attitude which is characteristic of irresponsible mining papers is clearly shown in this paragraph: "We ask our friends whether the line taken up by the editor is likely to conduce to the providing of capital from this side for developing the mining resources of the Dominion." This is the patriotic (?) attitude that every boom sheet strikes, and has been commented upon in these columns before. We take exceptions to the *morale* of the providing of capital for Canada, if that capital is introduced by means of such grossly misrepresenting articles as the one we criticised in the *Bulletin*. We think it is better to tell the truth about our resources, and to openly acquaint Londoners, and Britishers generally, with the schemes and devices that are being employed to obtain capital for decidedly unpromising ventures, and also to advertise the resources of the Dominion as a *whole*, without making depreciating comments on particular Provinces. We are well aware that no amount of preaching nor truth-telling avails against a man who has made up his mind to do a thing, but we want to see somebody stand up for the future good name of Canada, and we do not desire a repetition of the Westralian fiascos nor the South African dullness. We are not willing that all Englishmen should think all Canadians equally demoralized and lacking in principle when they have a mine to sell, and we contend that it is the duty of a paper, more particularly the duty of one which claims to be "financial," that it should ascertain the truth regarding the subjects on which it talks, as its publications are likely to have far more weight than if they came from a paper not professedly a financial sheet.

To conclude, the *Bulletin* admits "Certain slight inaccuracies may have appeared in our issue," and then invites "unbiased criticism" from this side. Let the *Bulletin* accept the first "unbiased criticism" it has had and learn a lesson from it. We shall keep an eye upon its columns and if there is room for any more "unbiased criticism," it may rest assured that it will get it, even though the *Review* be accused of "checking all enterprise on this side."

Our illustrations this month include three photos of the Oland gold mine, at Montague, near Halifax, Nova Scotia, which established a rather notable record for high mill-runs last season. These are a few of them:—

June.....	6 tons milled gave	73 oz. 13 dwt.
July.....	12 " "	181 oz.
August....	11 " "	140 oz.
Sept.	12 " "	150 oz.
October...	12 " "	135 oz.
Nov.....	13 " "	165 oz.
Dec.....	21 " "	76 oz. 6 dwt.

Or a total of .87 " " 921 oz. 3 dwt.

Mr. S. J. Ritchie, of Akron, Ohio, continues to wage war against the Canadian Copper Company. Having been utterly routed in his litigation with the Company in the United States he now seeks, through the agency of a paper organization, recently incorporated by the McLaren family, to have the company's charter in Canada revoked on the grounds that they have not established treating or smelting works in the Dominion, and in order still further to harass their enterprise he has started an agitation to impose an export duty on their ores and matte. Now as to the facts. The Canadian Copper Company

is an Ohio company which owns and operates a large tract of valuable copper-nickel deposits near Sudbury, Ontario. Nearly two millions of dollars have been invested in the enterprise in the opening up and working the mines and in the construction and operation of an important smelting plant. Since 1884 the mines and smelters have been operated continuously, at first one, then two, and now three furnaces, giving employment during all these years for about eight months of the year to about 500 persons. Refining works have, however, not been established in Canada, although we believe an experimental plant was put up and tried by the company a number of years ago near Cleveland, Ohio. The bulk of the matte, therefore, is refined at the works of the Orford Copper Company at Constable's Hook, N.J. The location of the refining plant is chiefly dictated by economic considerations, and has been partly brought about by the circumstances attending the historical development of the industry. Besides that there are involved in the refining of nickel special methods and skill which could not be so readily transplanted. Ritchie's idiosyncrasies are very well known at the capital and it is not likely the government will seriously consider his representations, nor will they enact any legislation likely to cripple and interfere with one of the most important mining enterprises in Canada.

The mica exports from the Ottawa Valley during 1897 are declared by the Customs authorities to be of a value of \$67,840, but as it is well understood that the statistics of this product are notoriously under-estimated, and we would be quite within the mark in placing the real value in excess of \$100,000. In fact, so notorious has become the custom of undervaluing the exports of mica to the United States, not only from Canada, but from India and other countries, that the producers across the line are endeavoring to secure a specific instead of an *ad valorem* duty. They claim, and with some degree of reason, that only experts can place a proper valuation on this mineral. This is especially true when the mica is imported in rough or unmanufactured condition.

In a brief, but very excellent monograph on this industry contributed by Mr. Edward W. Parker to the recently issued *Mineral Resources of the United States*, edited annually by Dr. Day, of the United States Geological Survey, we gather that the mica mining industry across the line does not show any improvement on previous years, the whole output for 1896 being valued at \$67,191. The condition of the industry at the mines in North Carolina, the principal producing State, has not been one to encourage the investment of large capital and the introduction of modern methods. Chief among the obstacles to large investment is the general uncertainty as to the character of the deposits. Mica occurs in pockets, some of which are very rich, while work may be carried on upon promising prospects, for weeks or months, without finding merchantable mica. Mining, therefore, has been for the most part carried on by the native mountaineers in a primitive manner, the uncertainty of reward, but chance of good returns, acting as a sort of gambling incentive to effort. Taken as a whole, Mr. Parker thinks it to be doubtful if the mica mined in North Carolina has paid average daily wages for the labor spent upon it. As in the hunt for gold, it is the chance of an occasional rich find which induces the mining.

India, as is well known, contributes the largest portion to the United States' consumption of mica. During 1884 and 1885, when India mica first began to be used in the United States, the value imported was \$28,284 and \$28,685 respectively. In the thirteen years from 1884 to 1896, inclusive, the value of the imports has averaged \$112,072, as compared with \$4,658 for the preceding fifteen years. Canadian phlogopite, we are glad to see, continues to gain favor in the United States, the bulk of our output finding a ready market at a good price.

The last returns of the asbestos industry of the United States show a decline of 54 per cent. in value, the product in 1896 having fallen to 504 short tons, worth \$6,100. As is well known, nearly the whole of the world's supply of this mineral is drawn from the Province of Quebec. Before the development of the asbestos mines of Quebec, Italy furnished the markets of the world. The Italian asbestos was considered the standard. The flossy asbestos fibre used extensively in gas stoves is from the northern mountain slope of the Lusa Valley in Italy. Mining is carried on at a height of from 6,000 to 10,000 feet above sea level. The Italian asbestos industry is on the decline. Mining is very difficult and expensive. The best grades have become very scarce, and this, with the high cost of mining and transportation, militate against the industry. In fact, at the present time consumers of asbestos look to Canada almost entirely for their supply, although European consumers procure some fibre from the recently discovered deposits in eastern Russia and Russian Siberia, and large quantities are reported as existing in South Africa. The Russian deposits are said to be of enormous extent, but the fibre is of inferior quality when compared with the Canadian, with which it is mixed when making textile products. The Canadian asbestos possesses all the qualities to meet the requirements of the many new and exacting uses to which it is applied.

Free mining machinery to the value of \$128,780 was admitted into Canada during the fiscal year ended 30th June last, having been supplied by the following countries:—Great Britain,

\$9,266; Denmark, \$2,451; Germany, \$2,864, and the United States \$114,239. Of this amount Ontario got \$30,308; Quebec, \$24,812; Nova Scotia, \$22,529; New Brunswick, \$452; Manitoba, \$695; British Columbia, \$44,087, and the Northwest Territories \$5,897. In addition to these should be mentioned diamond drills purchased in the United States of a value of \$19,880. Among the dutiable articles we find 184 steam pumps, valued for duty at \$24,860.

The imports of bituminous coal during the same period show the following consumption by provinces:—Ontario, 1,450,667 tons of a value of \$3,057,985; Quebec, 72,194 tons of a value of \$130,864; Nova Scotia, 1,255 tons of a value of \$2,669; New Brunswick, 1,995 tons of a value of \$4,244; Manitoba, 12,005 tons of a value of \$31,467; British Columbia, 5,360 tons of a value of \$26,988, or a total of 1,543,476 tons of a value of \$3,254,217.

The mineral exports, many of the figures of which are open to question, are reported to have been:—Coal, \$1,102,067 of a value of \$3,330,017; chromite, 2,048 tons of a value of \$24,487; felspar, 2,357 tons of a value of \$6,321; gold, \$2,804,101; gypsum, 180,540 tons of a value of \$183,376; copper ore and matte, 6,466,527 lbs. of a value of \$540,439; asbestos (all grades), 10,969 tons of a value of \$510,916; copper (other), 3,663,790 lbs. of a value of \$10,023; lead (ore), 30,053,360 lbs. of a value of \$522,327; lead (pig), 70,144 lbs. of a value of \$1,854; nickel, 7,527,472 lbs. of a value of \$498,515; platinum, \$190; silver, 4,097,212 oz. of a value of \$2,613,173; mica, \$58,989; pigments and ochres, 535,474 lbs. \$6,081; mineral water, 20,965 galls. of a value of \$6,003; oils (crude and refined), \$11,430; iron ore, 1,320 tons of a value of \$2,492; manganese, 81 tons of a value of \$4,348; phosphates, 23 tons of a value of \$275; graphite, 1,728 cwt. of a value of \$3,584; pyrites, 15,673 tons of a value of \$29,403; salt, \$84,040; sand and gravel, 188,556 tons, \$75,134; limestones, 23,408 tons, \$25,545; grindstones, 910 tons of a value of \$4,607; other minerals, \$19,672. The total value of these exports for the year ended 30th June last is quoted at \$11,298,915.

NOVA SCOTIA COAL TRADE IN 1897.

The REVIEW is indebted to the courtesy of the various managers for the figures from which the following comparative statement is made of the coal raised and sold in 1897. In addition to the returns given below, the Dominion Coal Co. sold 38,721 tons to Newfoundland and 7,741 tons to St. Pierre, while its steamers, railways, colliery engines and employees consumed 128,540 tons. The returns of the Cumberland Railway and Coal Company, owing to the strike in the early part of the year, are somewhat smaller than usual.

COAL COMPANY.	Coal Raised, 1897.	Coal Disposals, 1897.	Sold to Nova Scotia.		Sold to P. E. Island.		Sold to N. Brunswick.		Sold to Quebec.		United States.	
			1897.	1896.	1897.	1896.	1897.	1896.	1897.	1896.	1897.	1895.
Dominion Coal Co.	1,251,295	1,180,558	194,587	183,079	16,223	16,359	43,542	41,940	672,041	556,306	79,163	162,489
General Mining Association	268,000	266,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Acadia Coal Co.	219,706	220,124	136,942	121,220	25,472	23,540	13,172	4,214	4,658	1,020	.....	.....
Intercolonial Coal Co.	203,052	187,819	94,130	109,151	15,941	15,832	13,351	1,903	58,078	39,801	204	.....
Cumberland Ry. & Coal Co. . . . .	.....	244,505	83,788	107,048	.....	.....	130,105	172,188	18,528	58,182	12,084	18,469
Canada Coals & Ry. Co.	74,504	74,080	7,463	4,638	.....	118	45,490	30,782	16,409	13,260	.....	555
Cape Breton Colliery. . . . .	.....	15,159	5,892	5,094	1,361	535	294	580	4,077	7,391	.....	.....



Mikado Gold Mining Co. 20-Stamp Battery and Surface Works. Lake of the Woods, Ontario.

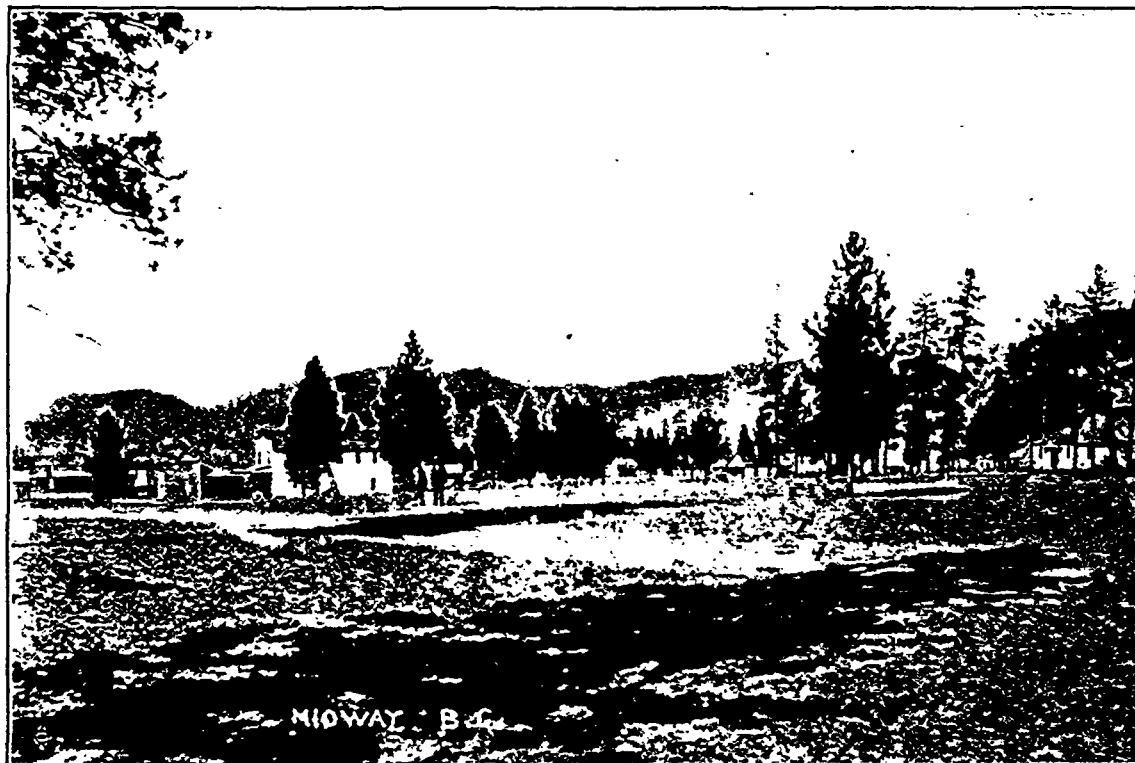


New Reduction Works of the Ottawa Gold Milling and Mining Co., at Keewatin, Ontario, showing Locke-Miller Cableway, crossing railroad, for taking ore from lake barges to sampler.

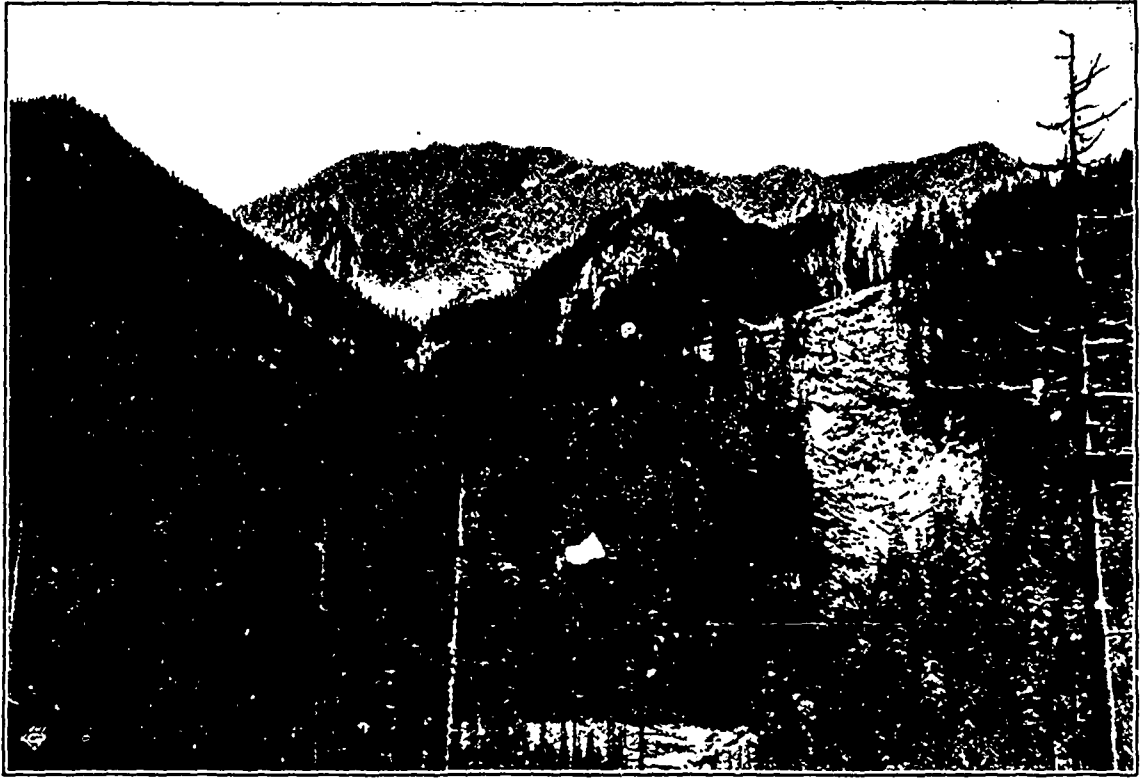


Tunnel on Midnight Claim, Mount Adams Group, Sandon, B.C.

Mr. Walter Adams, M.E. Capt. R. C. Adams, Managing Director.
Mr. Robert Cordick, Mine Foreman.



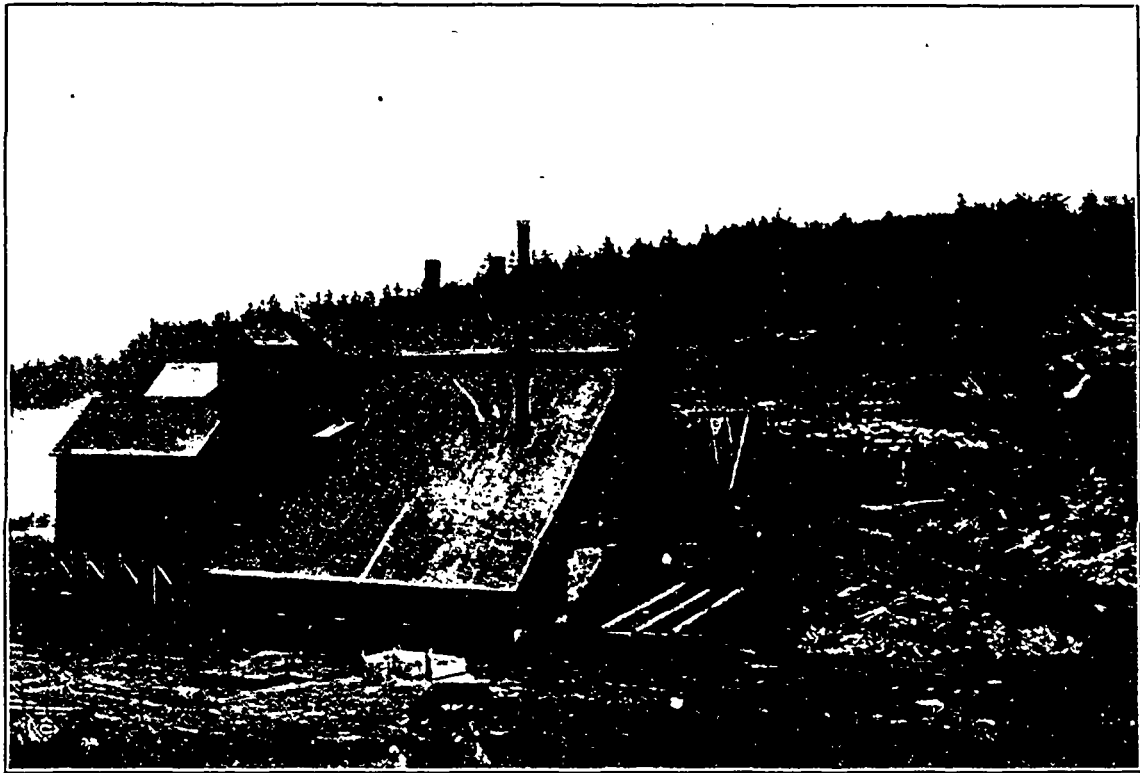
The Town of Midway, Province of British Columbia.



Mountain Adams Silver Mountain Range, B.C., from railway, one mile west of Sandon, B.C. To the left of the picture is the highest clump of timber, on the Survey Summit is the tunnel of the Mount Adams Mine. To the right are the cabins of the Wonderful Mine and the ground that has been sluiced for galena ore.



Mount Adams Mine, Sandon, B.C. Pack Train shipment of Galena Ore to Omaha Smelter.



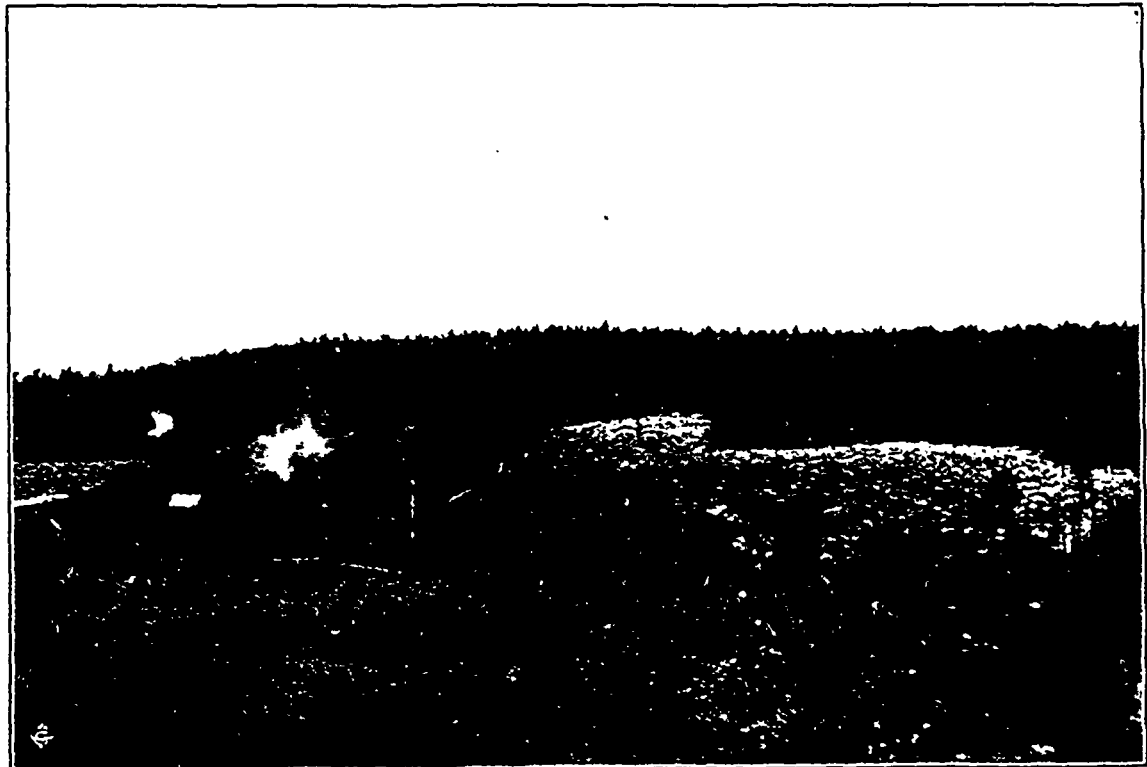
The Mineral Products Co., Hillsboro, N.B. Manganese Mill, looking from the north, showing branch of the Salisbury and Harvey Railway.



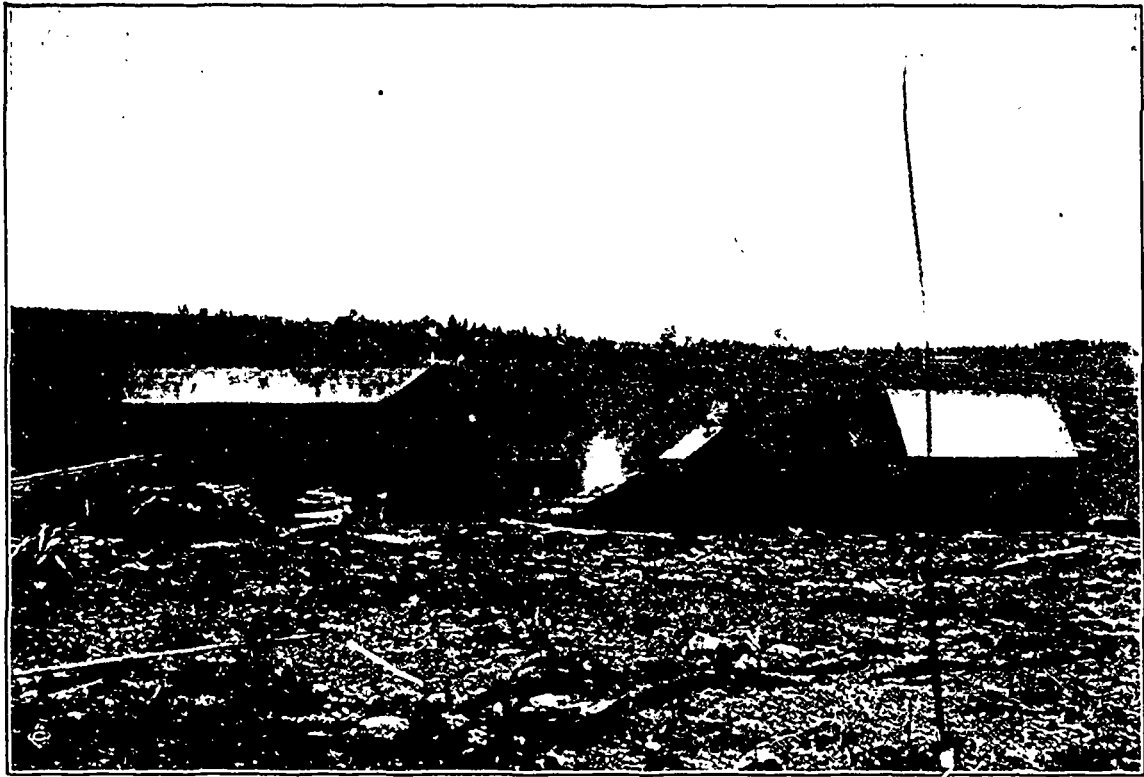
Mount Adams Mine, Sandon, B.C. Mouth of Tunnel on Midnight Claim.



Mineral Products Co., Hillsboro, N.B. Cut into Deposit showing the Manganese Ore from Grass Roots down to the clay and a face 30 feet deep.



Mineral Products Co., Hillsboro, N.B. Manganese plant, deposit 30 ft. deep over an area of 17 acres.



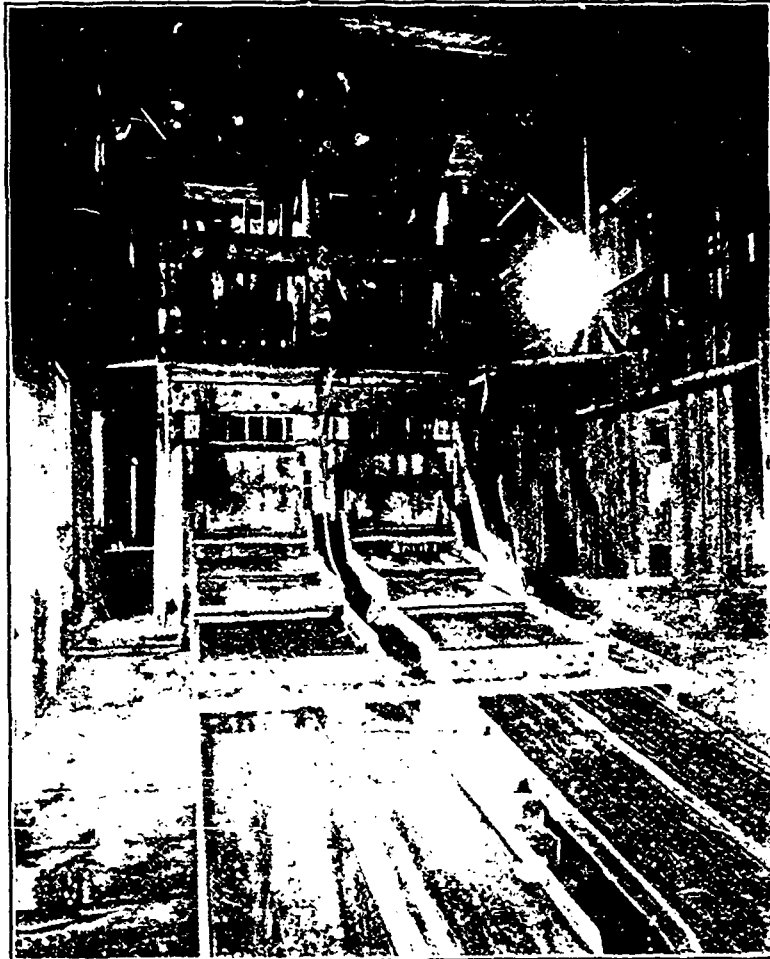
Mineral Products Co., Hillsboro, N.B. Buildings and Ore Pits in the foreground.



Oland Gold Mine, Montague, Nova Scotia.



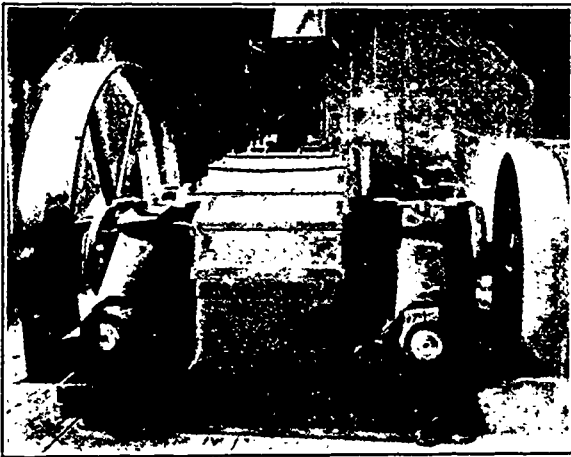
Oland Gold Mine, Montague, N.S. Southwest view of Boiler and Pump House and Mill.



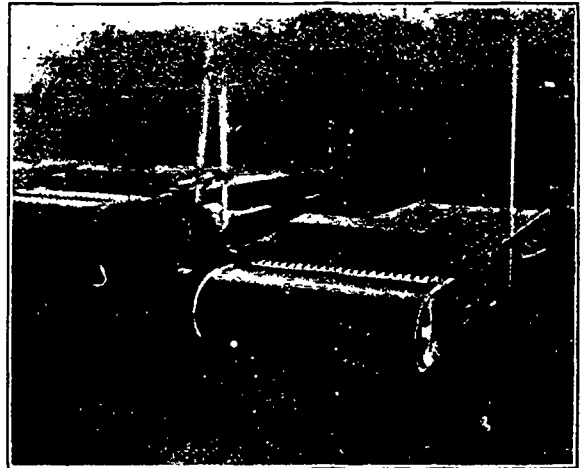
Interior of 10-Stamp Battery. Oland Gold Mine, Montague, N.S.



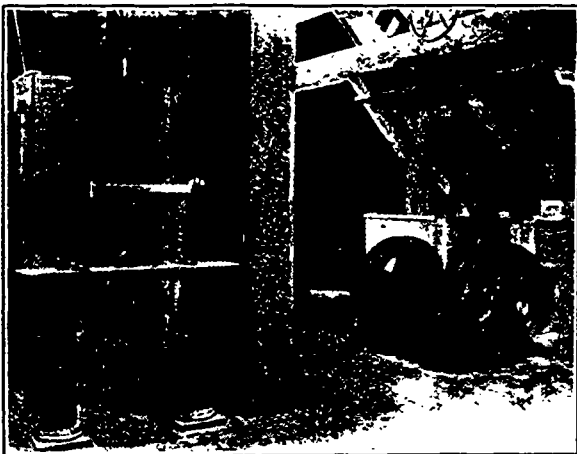
Oland Gold Mine, Montague, N.S. West view of Boiler House and Mill.



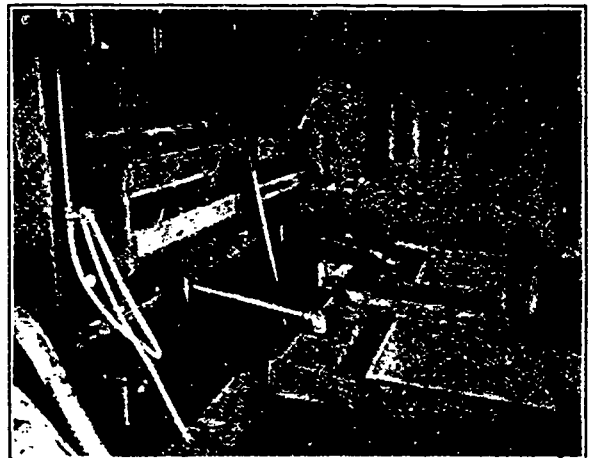
36" x 16" Crushing Rolls.



Gyrating Vanner. Drive side. Frue Vanner in background.



Sampler House. showing Sampler-Housing, Hopper Scales, Crusher and Hopper.



Front of Battery showing connection between Battery and Gyrating Plates.

NEW REDUCTION WORKS AT KEEWATIN, ONT.—OTTAWA GOLD MILLING AND MINING CO.

Librarian Gosnell, of the Legislative Assembly, is to be congratulated upon the publication of the first issue of this Year Book of British Columbia—a capably gotten up volume containing a mass of condensed and handily arranged information respecting the Province—historical, political and sociological. The volume is lavishly illustrated and is arranged in such a form as to be readily serviceable for reference. As a manual of provincial information it supplies a want and is certain of a large sale. Our readers will find much in it respecting the mineral resources and mining industries of the Pacific Province to interest them.

Our illustrations of the Mount Adams mine show the difficulties to be surmounted in working some of the silver-lead properties in the Slocan district of British Columbia. At an elevation of 7,500 feet large surface shows of galena were discovered on a summit of the Silver Mountain Range above Sandon B.C. A perilous snow-slide made it impracticable to prosecute direct work, and a tunnel was started in a protected position nearly a thousand feet away. Work was commenced in the end of July. The vein was struck at 80 feet from the mouth of the tunnel, and has been followed a further distance of 370 feet, with good bodies of solid or concentrating galena ore for a considerable proportion of the way. When the tunnel is in 50 or 100 feet more, it is hoped that the surface shows will prove their continuity by appearing at depth. If this is the case it will indicate the probable existence of 600 to 1,000 feet of overhead stoping ground. Snow made the trails impassable in November and the work had to be suspended; but men were found who took a contract to continue operations by blasting out a chamber in the tunnel and living there. They watch their chance on a cold day, when the snow is not likely to slide, to go out and pack up supplies on their backs. The work is superintended by Walter C. Adams (B.A. Sc., McGill), who resides at Sandon, and when conditions favor he ascends by the trail, four miles, to inspect the progress.

The picture of Midway shows the site of one of the new towns of the west, which is expected to have a distinguished future. It is the valley town of the Boundary Creek district in British Columbia. It is situated near the junction of Boundary Creek and Kettle River, and at the meeting of three mountain passes. Being surrounded with mines, it is looked upon as a future site for smelters, and the railways are aiming for it both in Canada and from the United States. The townsite was originally acquired by Capt. R. C. Adams, of Montreal, and it is now owned by the Midway Co. Limited, of which Capt. Adams is the President. An extensive system of irrigation has been introduced and the outlying land will be put under cultivation, making the valley attractive as a residential place as well as an industrial centre.

The Reco Mining and Milling Co. of Sandon, B.C., paid on January 1st another dividend of \$100,000, making the total dividends paid within a year or two \$287,000.

The Standard Mica and Exploration Company, Limited, has been registered in London with a capital of £120,000 in £1 shares, to carry into effect an agreement with the General Securities Corporation, Limited, to acquire by purchase certain mines and

mining rights in the Province of Quebec. This, we take it, is the latest move in the deal for the Wallingford mine in Ottawa County.

The shipments of coal from Vancouver Island, B.C., for January figured 56,696 tons, of which the New Vancouver Coal Mining and Land Company contributed 27,376 tons, the Wellington Collieries 20,920 tons, and the Union Colliery 11,400 tons. The total output for the year ended 31st December is reported to be 798,458 tons, as against 845,269 tons in 1896. The figures will be materially increased this year by the output from the new colliery of the Crow's Nest Coal Company in the East Kootenay district.

A few of the features of Mr. Sifton's amended Yukon Regulations recently issued are worthy of remark. The first is that no one can locate or work a claim unless he holds a "free miner's certificate"; nor can any company or individual employ a miner who does not hold such a certificate. There is no limitation of citizenship or nationality upon the granting of such a certificate, and the fee charged is moderate—\$10 a year—but its possession is absolutely necessary to any man entering the country, whether he is prospecting for himself, or looking for employment by others.

The size of a "river claim," under the new regulations, is limited to 250 feet in length, parallel to the general direction of the stream, and not exceeding 1,000 feet in width. A "hill claim" has the same dimensions. A discoverer has the right to locate two claims, and the holder of a river claim may locate an adjoining hill claim; otherwise no one can locate more than one claim in a district. Nor can any individual—person or company—hold more than ten adjoining claims, since each alternate block of ten claims is reserved by the Government, to be disposed of hereafter. Purchasers, or intending purchasers of Yukon claims should remember these limitations; and should also understand that the regulations governing ownership are exceedingly strict. Thus a claim may be forfeited if, during the "open" season—the duration of which is fixed by the mining recorder of each district—it remains unworked for three consecutive days; if miners who do not hold certificates are employed; and if royalties on the product are unpaid. Further, a placer claim entry is practically good for one year only; that is, the entry must be renewed each year, and a new entry fee paid. It will be seen that a claim, however well located, may be easily lost, and the purchaser may find himself the nominal owner of property, which has been legally forfeited and legally taken up by others.

The royalty payable to the Government under the new regulations is fixed at 10 per cent. of the gross output, with an exemption of \$2,500 yearly. Ten days' default in payment will forfeit the claim, and severe penalties are provided for fraudulent statements of production.

So much skepticism has been expressed respecting the value of the Gaspé oil territory, in Quebec, that the following excerpt from the last annual report of the shareholders of the Petroleum Oil Trust Limited, will be read with interest:—

"The directors have further to report that 21 drilling derricks have been erected in the neighborhood of the prospecting wells; 14 wells are sunk to the petroleum deposits in the overlying porous sandstone. Eight are pumping wells, with a daily

average output of about 8,000 gallons. Six others contain oil which will flow without pumping when connected by short pipe lines to the main pipe line to receiving tanks. It is estimated that the daily output from these six wells will average 7,000 gallons. Seven other wells are in the course of being sunk, and are at the depths of from 900 to 3,090 feet. As these wells reach the oil deposits the output will be largely increased. Three more new derricks recently erected in the amber oil district are being fitted with the drilling plant necessary for reaching the oil. The directors, in view of the increased output from additional wells, consider it most important, and in the interests of the shareholders, to construct, at the company's wharf property, a refinery capable of treating up to 40,000 gallons of crude oil daily; and this the directors have now under consideration. The treatment of only 20,000 gallons daily of the company's crude oil would, apart from the by-products, for which there is a profitable market, give a daily production of about 12,000 gallons of refined oil or kerosene, or 3,600,000 gallons per annum, from which a profit of £72,000 per annum could be obtained, and double this sum would be realized if the refinery was worked to its full capacity." This information must be a revelation to the chief of the division of Mineral Statistics at Ottawa and the Inspector of Mines at Quebec, whose reports fail to show that there has been oil produced in Gaspé of any economic importance. Surely it is time the public had some reliable information respecting this field and the highly mysterious operations of the Petroleum Oil Trust, Limited.

From statistics furnished to the REVIEW, we estimate the total output of coal during the calendar year 1897 to have been as follows:—

Province of Nova Scotia	2,332,557 tons.
New Brunswick	7,000 "
Manitoba and N.W.T.	297,000 "
British Columbia	798,458 "

Or a total of 3,435,015 "

The need for reliable data respecting this oil field is emphasized by the endeavor of the Petroleum Oil Trust, Limited, to sell a portion of its lands to a new concern known as the Irish Proprietary Oil Fields of Gaspé, Canada, Limited. This company was brought out in London last month, with an authorized capital of £100,000, to carry on and develop an extensive property in the "prolific oil belt at Gaspé." A contract has been entered into for the purchase of "freehold oil fields," comprising an area of upwards of 1,500 acres and 500 acres of mining rights in perpetuity, situated in the "now famous new amber and green oil districts of Gaspé" and partly in the immediate vicinity of the "recent great oil strikes in the amber oil district" by the Petroleum Oil Trust, Limited, the owners of the properties. The purchase price for the property has been fixed by the London and Dublin Finance Corporation, Limited, who are the promoters of the Company and are re-selling at a profit of £66,000, payable as to \$33,333 in fully paid shares, £2,500 in cash, and the balance in cash or shares at the option of the Directors. It may be remarked that absolutely no evidence of the value of this so-called oil territory is given by the promoters beyond brief quotations from the very ancient reports of the Geological Survey of Canada by the late Sir William Logan, the late Dr. Sterry Hunt and

Dr. Robert Bell. Our readers will be amused to learn, however, that great prominence is given to the following quotation from that insignificant sheet the *Montreal Sunday Sun*: "The public can hardly appreciate the immensity of this remarkable find. It is estimated by good judges that up to the present the strikes are valued at not less than \$20,000,000, and this, it is thought, is but a commencement of what is to come. People in Gaspé regard it quite as important as the Klondyke,"—and, we might add, quite as big a white elephant. Again we repeat, the moment is opportune for a thorough investigation and report by the Government.

The directors of the Fern Gold Mining and Milling Co. are to be congratulated on a five per cent. dividend, their first, and a very promising return for the few months the mill has been running.

Probably the most lavishly managed mining company in the world is the De Beers Consolidated Mines. Here are a few of the items: The auditors' fees for 1896-7 amounted to \$7,000, while the directors' fees attained the still heavier total of \$77,250. In addition to this the life governor's remuneration for the year came out at \$601,825. Donations were presented to public institutions during the year to the amount of \$107,695, and altogether the general charges of the year aggregated \$464,690. In the twelve months ending 30th June, 1897, the diamonds made available for sale realized \$11,166,297. The working expenses of the year, including \$917,075 debenture interest, and \$877,620 written off for machinery and plant, were \$8,487,690, leaving a balance of \$10,162,805, increased to \$11,313,150 by the balance brought forward from 1895-6, dividends on investments, rents and miscellaneous items of revenue. Out of the final balance of \$11,313,150, dividends were distributed to the amount of \$7,897,910, leaving \$3,415,240 to be carried forward to the credit of the ensuing year.

CORRESPONDENCE.

The True Interests of Mining.

The Editor.

SIR,—I want to thank you, "right out in meeting," for the fearless, honest, independent and very able manner in which you criticise and discuss all matters pertaining to the legitimate mining industry of the country at large. In fact, it is a rather fortunate thing for Canada that we have one journal that may be fully relied upon in this respect, and is not afraid to expose all delusive and fakir schemes. The wild, reckless way the leading daily papers of Ontario have been exciting and misleading the general public on mining for the past two years—and mostly for the sake of the advertising patronage of boomers and sharks—can only be described as a wicked shame. First it was Rossland wild-cat schemes and rotten stocks, and now it is the Klondyke craze. They do not seem to realize or even care to know that the only way to promote the true interests of mining is to protect the honest investor from all such fraudulent schemes. He is the man that should be thought of first, last and always.

Then how much better it would be for the country in the end, if, instead of filling peoples' heads with false hopes of sudden fortunes to be made in mining, these papers would use their influence to send our young men to the Canadian North-West to settle on land and make permanent homes of their own. It is estimated that the Klondyke

gulches will likely yield \$70,000,000 in placer gold, but this amount, large as it looks, is not much over the value of one year's crop in Manitoba alone, and evidently a far greater number of men will try to get into the Klondyke this year than there are settlers in Manitoba all told not to mention the disappointments, sufferings, waste of time and money, ruin of health and loss of life that must of necessity result from such a mad rush, mainly of tenderfeet, to such a hard region to explore and live in.

The article in your last issue on the Report of the Bureau of Mines for Ontario is right to the point, and especially the part dealing with "the old man and the boy," who are our inspectors of mines. What the miner working under ground wants to know is, not whether the inspector can write a long-winded report, or has a pull on the Government in any way, but that the mine is in proper condition for him to work in with the least danger to his life; and some of the mines of this district, though *visited* by the inspector every year, are very far from being so. I, for one, can heartily appreciate your much-needed criticisms on this and other features of the peculiar administration of mining affairs in Ontario, as it has fallen to my lot to have been almost alone through many long years in denouncing the obstructive mining policy of the Ontario Government, and also in keeping a sharp eye in this district on fakirs of all kinds and their wretched schemes. A pleasant time I have had of it too.

Yours, &c.,
Sudbury, Jan. 15th, 1898. A. M.

Mining in the Saskatchewan.

The Editor:

SIR,—An old friend has asked me to send you a line or two respecting mining operations on the Saskatchewan. I have been on the river a number of years and have made as high as \$12.00 per day and as low as 20 cents, and I presume the other miners have had much the same experience. Pick and shovel ground is not plentiful, so that now we have to look for the use of machinery to make things pay. So far, however, whatever dredging has been done has not been successful, the people having no experience in the business and the Canadian-made dredges being unsuitable for the work. Ground that yielded \$2.00 per cubic yard has been worked at loss owing to these causes and the crass stupidity of the operators

Several dredging schemes are now, I believe, being promoted in England, but if one may judge from the statements made respecting them in our local papers, they are not likely to be successful.

The Dominion Government should enlarge the size of "bar claims"—and if they will do there is little doubt that the right men will be found to work them successfully. A number of Australian and New Zealand people were here last year and it is not unlikely that work on an extensive scale may be done by them this season.

An application was made last year to the Dominion Government for a grant of fifty-acre bar claims—which is not large when we remember the gravel only runs from 4 to 8 feet deep—by people willing to spend money on a proper up-to-date dredging plant, but owing, I believe to the influence of a number of saloon and hotel-keepers and others at Edmonton who had a "pull" on the Government, the grant was not entertained.

I will write you further during the season.

Yours, &c.,
South Edmonton, Alta., 1st Feb., 1898. J. SCHMER.

ANOTHER SLOCAN DIVIDEND.—The Whitewater silver mine paid on 18th instant another dividend of \$30,000, bringing the total dividends to date \$154,000.

Some Modern Forms of Mining Machinery.

FREDERICK T. SNYDER, Keewatin, Ont.

(Paper to be discussed at the Montreal meetings of the Federated Canadian Mining Institute, 2nd, 3rd and 4th March next.)

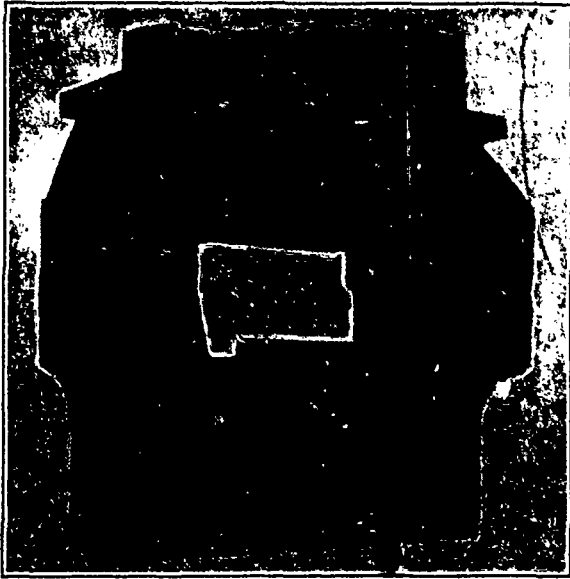
The time has happily gone by when directors of mining companies order a mill "ready made" like a suit of clothes, and it is not unusual to have a mill designed to fit the ore it is to treat, as carefully as the development aims to explore the lead. The machinery, whose description follows, is a case where designing to meet specific conditions has been carried somewhat further than is customary.

The problem was to plan a custom plant to handle the gold ores of the Lake of the Woods, many of which are low in grade, but contain streaks of high values. The absence of copper or lead in addition to the low tenor, put smelting out of the question. A site was selected at Keewatin, having ample water power with the lake for a mill pond. The ore is brought in from the mines to the plant in barges, carrying thirty tons. It was decided to build the mill, to unload the ore, crush it, and sample into storage, then run over amalgamated plates and vanners; all the ore handling to be automatic. It will be seen in the following description that nothing radical was introduced, and that the principal features worth noting were improvements in the detail of existing methods.

The ore is unloaded from the barges by means of a Locke-Miller cableway of four hundred and fifty feet span. This hoists the ore in skips to an elevation of seventy feet and carries it across the main line of the Canadian Pacific Railway into the sampler building. The skip is automatically dumped into a two hundred ton bin, by means of a spring hook. The bottom of this bin is shaped like the letter W, having a gate at each point, so that each side may be used as an independent bin. Both discharge into a crusher feed hopper in the form of an iron cone, thirty inches in diameter at the bottom, placed with the open end thirty inches from the crusher feed floor. The gates being open the ore forms a cone on the floor around the bottom of the hopper, and automatically works down as it is fed into the crusher.

This crusher is of the "Invincible" type. Tension strains are carried by wrought iron, and all compression strains by cast metal. The movement of the jaw is parallel, the top and bottom moving equal distances; and not, as in the Blake, where the bottom moves more than the top; or, as in the Dodge type of crusher, where the top has the greater throw. The usual arrangement is reversed and the outside jaw made moveable, with the result that the common massive frame is done away with. This brings the weight of a ten inch by eighteen inch machine, which is the size used in this plant, down to nine thousand pounds, while the customary weight of the cast iron frame machine of the Dodge or Blake type is from twelve thousand pounds to eighteen thousand pounds. Each portion of the jaw moves over an elliptical path, the long axis of which is so inclined that during the moment of crushing the hanging jaw plate moves directly towards the stationary plate, and only at the end of the stroke moves down and back to feed the material through. The result is a minimum amount of cutting of the plates by the ore, there being no sliding movement at the time of greatest pressure. The tension strains are taken by four wrought rods which run through the frame of the machine to the rear and end in nuts. By tightening independently the rods holding the top and bottom of the hanging jaw, the inclination of the moving plate with reference to the fixed one can be altered. It is profitable to have the opening of the crusher as large as possible that sledging may be avoided, while the angle between the jaws must be so sharp that the rock will not jump up when the jaws come together. These independent adjustments allow the angle between the jaws to be the largest practicable for any particular ore, and once placed, does not change during the operation of the crusher. In the design of this machine the parts

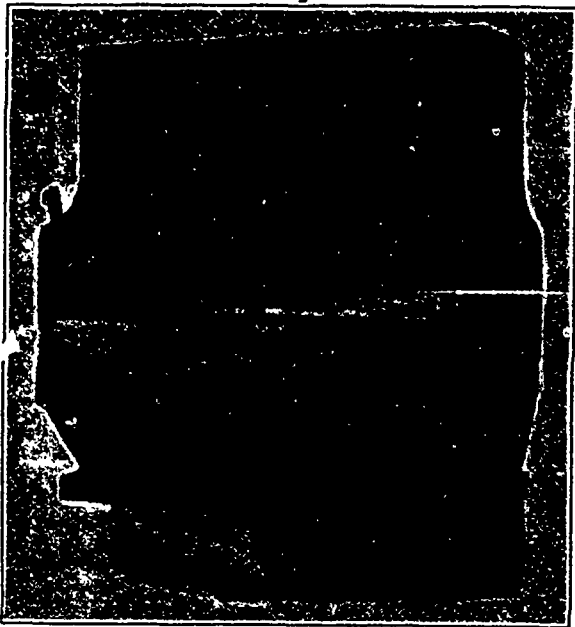
SOME MODERN FORMS OF MILLING MACHINERY.



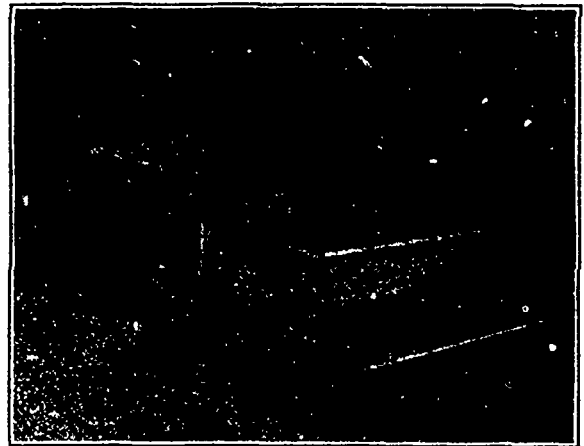
Ottawa Mortar. Feed Side.



Back of Battery, showing Back Screen and clear space left by Hanging Feeder.



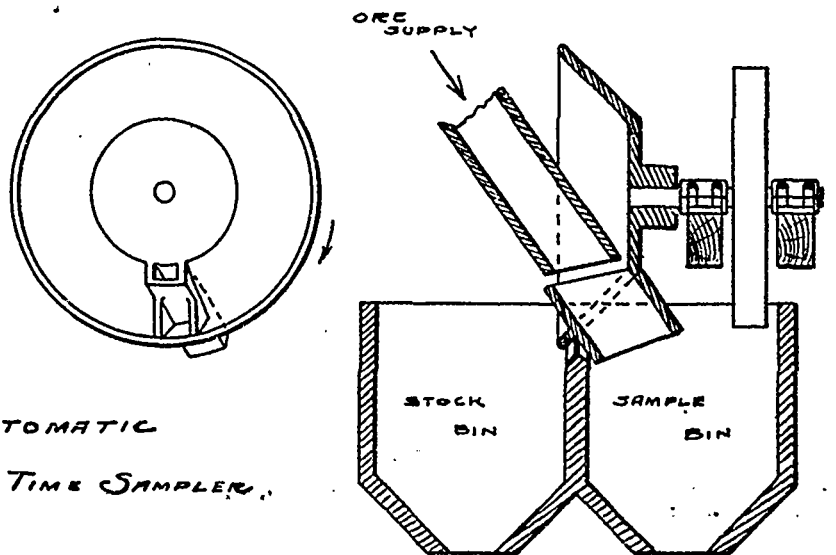
Ottawa Mortar. Discharge Side.



Gyrating Vanner. Feed Side.



AUTOMATIC
TIME SAMPLER.



SOME MODERN FORMS OF MILLING MACHINERY.

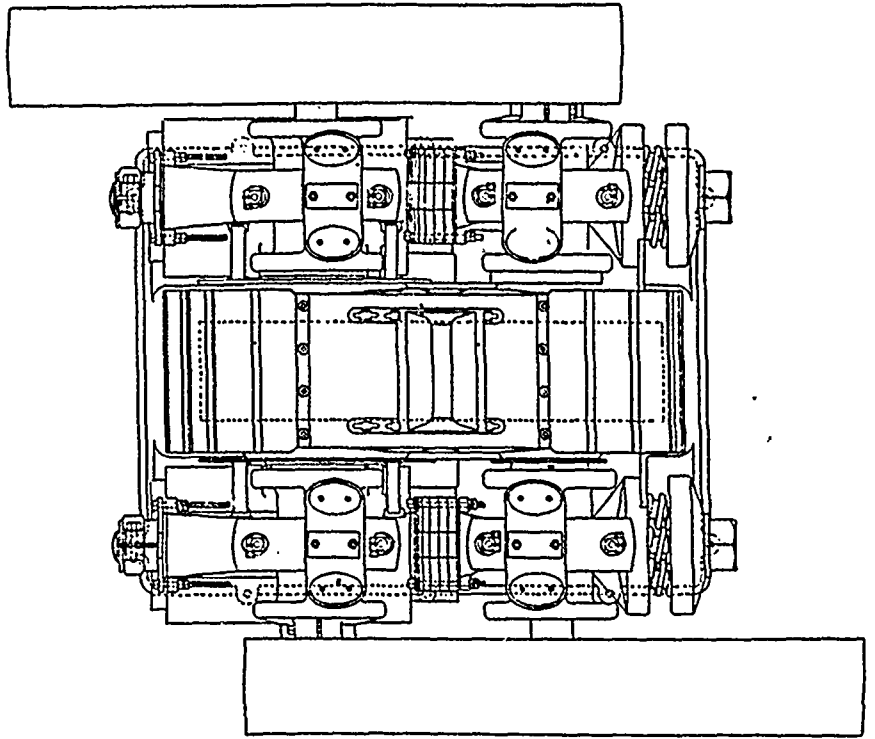


GYRATING —
— VANNER

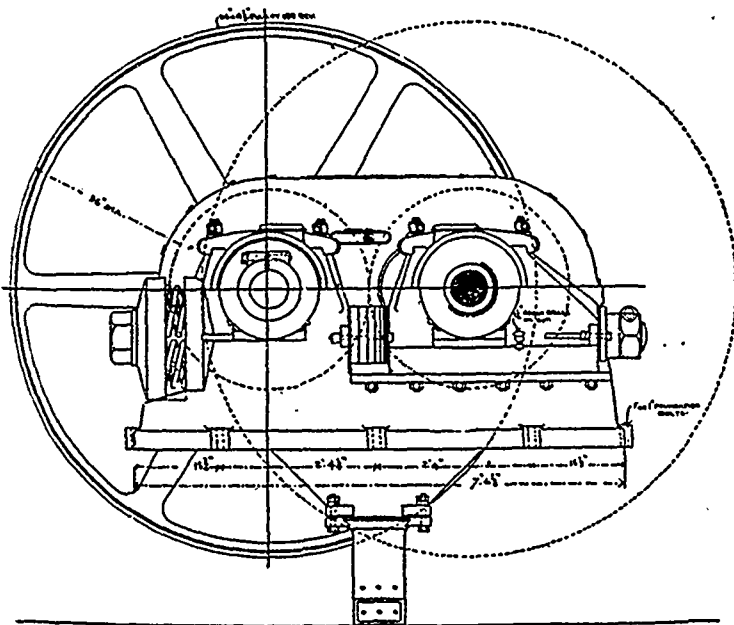


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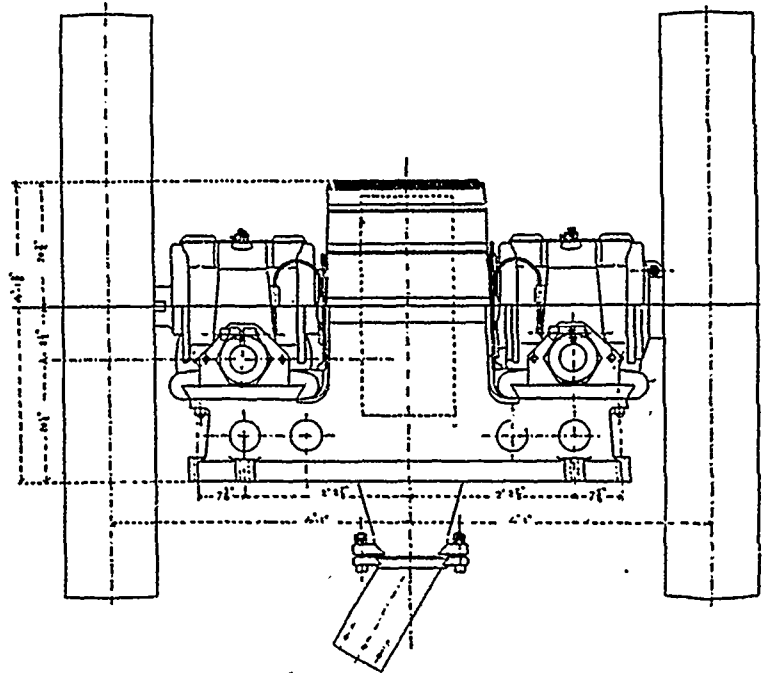
FULL SIZED DIAGRAMS TRACED BY
STATIONARY PENCIL ON MOVING BELT



Crushing Rolls. Plan View.

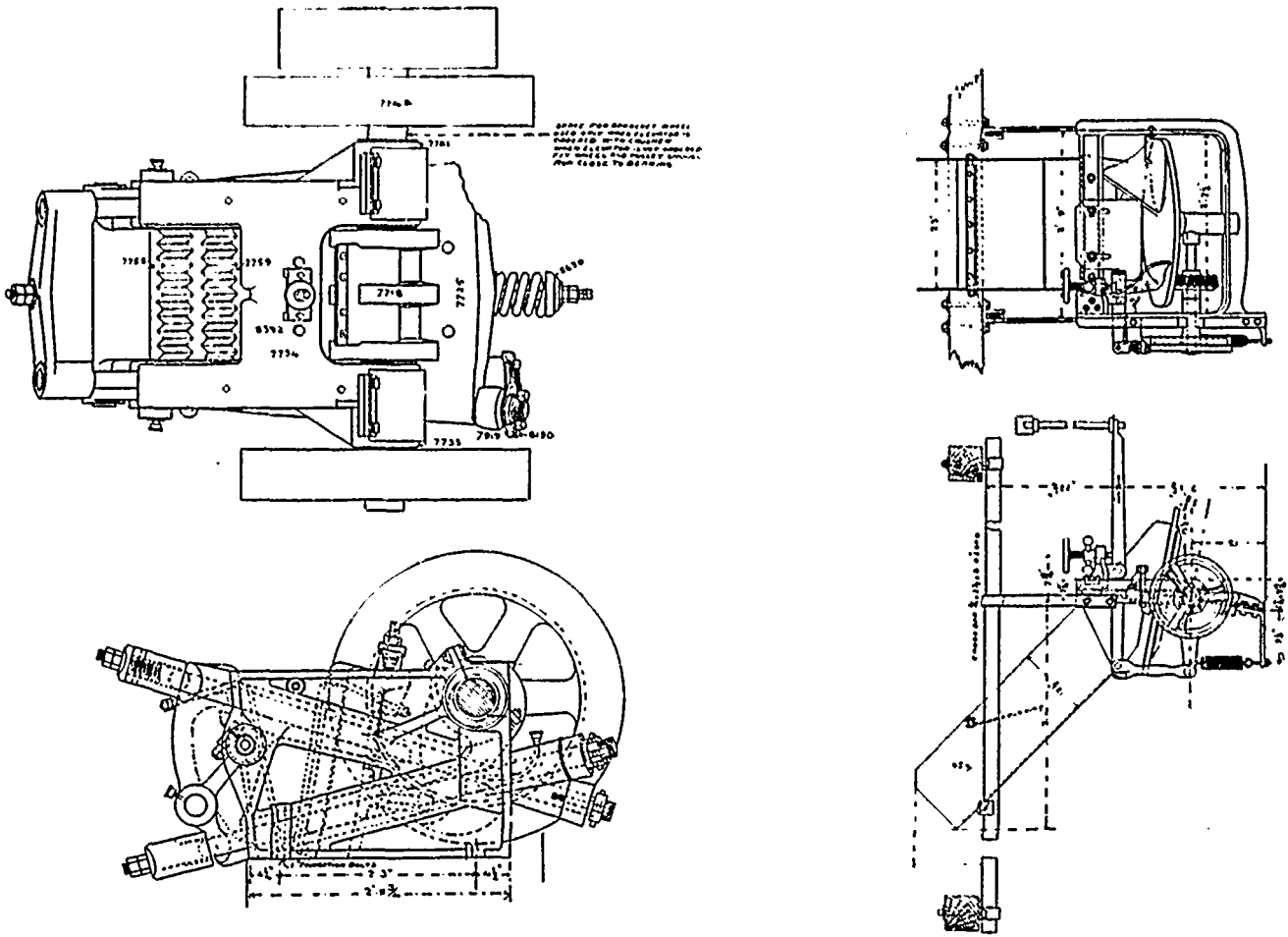


Crushing Rolls. Side Elevation.



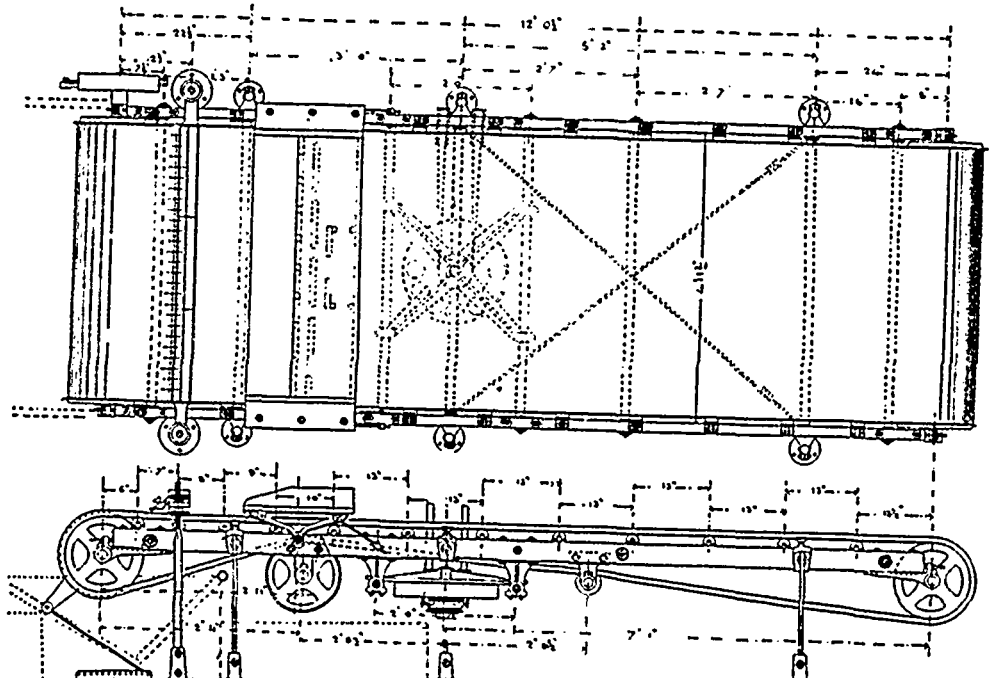
Crushing Rolls. End View.

SOME MODERN FORMS OF MILLING MACHINERY.



Suspended Challenge Feeder.

10" x 18" Invincible Jaw Crusher.



Gyrating Vanner.

which require attention have been concentrated at the back, so that the jaw end can be built into the feed floor, placing the jaw opening where most accessible, and at the same time bringing together within easy reach and out of the dirt and dust from the ore all oil cups and adjustments requiring attention. The inertia effects in this machine were planned to make it as free as possible from longitudinal shake, and in this plant, where it is set twenty feet or more from the ground, produce little or no vibration of the building.

The ore from this crusher is carried by bucket elevator to a screen, which deserves especial notice, its use removing the list of troubles attendant on handling crushed quartz dry through a revolving trommel. It is an ordinary gravel screen, set up at an angle of forty-five degrees, and furnished with a cover. But it is this cover that makes the difference, as it prevents the ore from taking long jumps, and thus permits the use of a screen of almost double the mesh of the product desired. That is, to get half inch mesh ore use a one inch screen, the ore particle striking the screen at so small an angle as not to fall through if more than two-thirds the size of the opening. Particles of ore which get wedged in an ordinary screen do not get into the openings of this screen at all, but jump down over it to be further crushed. The screen surface used in this plant is five feet long and ten inches wide, and readily handles six tons of ore per hour.

What fails to pass the screen goes to a pair of rolls, in which the best results of the experience of a number of mining machinery designers have been utilized. These rolls having shells thirty-six inches in diameter and ten inch face, weigh twenty-six thousand pounds, and when taking rock from a three inch screen and crushing to half inch mesh, run smoothly without jar. The frame is cast in one piece, extended below to form a hopper. The moving roll is of the sliding yoke type. The bearings are nine inches in diameter by twenty inches long, and are patterned after the journals of a railroad axle, which seems to be the best type for heavy service under repeated strain. They have a solid shell and are babbited on the side supporting the strain. The other half is chambered out to form a recess to hold waste, soaked with oil. In addition, back of the babbit is cored out a water jacket, which, in the event of heating, can be connected by hose with the water supply, and the operation of the rolls continued. The shell on the outside is but partially formed in the shape of a ball and socket box. It allows the box to adjust itself to any horizontal angularity of the shaft, such as is produced when one side of the roll is fed and the other side is empty, but prevents the shell from tipping out of a horizontal plane so that the babbit in one end of the bearing cannot wear out without wearing out the other end at the same time. These bearing shells are supported in yokes, which, in the case of the moveable roll form the sliding part, and in the fixed roll are cast in the frame. By removing the caps of the yokes a roll, together with its bearings, can be lifted out at any time for repairs without disturbing the tension of the springs. One bearing of each shaft is furnished with collars on both ends, each of which, in the case of the ten inch by thirty-six inch roll used in this plant, has a bearing surface of two hundred and sixteen square inches. Between these collars and the ends of the box are loose brass rings, making the total thrust bearing surface in each direction, on each shaft, four hundred and thirty-two square inches. These collars are threaded upon the shaft and by screwing them in or out, the shaft is adjusted endways to keep the rolls in alignment. The housing above is a prolongation of the frame furnished with openings covered with canvas curtains, making all dust tight. The shaft of the moving roll passes through sliding plates, which are held against the housing by springs. All the principal nuts on the machine are split and provided with clamp nuts, so that they can be securely held in adjustment, yet readily be loosened for move-

ment. In operation, the rolls are set apart by means of cast iron plates, against which the sliding box is screwed up solid. When running it does not jump. Each yoke of the sliding boxes has a bearing surface under it twenty inches wide by thirty-eight inches long, in the form of a steel plate two inches thick, removeable when worn. To provide against the accidental introduction of a piece of steel too large to go through the rolls safety springs are provided which, however, do not yield until the pressure per lineal face of roll exceeds four thousand pounds, giving a spring pressure for this size of roll of forty thousand pounds, which will flatten out a wrought iron nut, but will allow a cold chisel to go through. The feeder for these rolls has no moving parts, but consists of a series of four inclined steps facing in opposite directions, from one to the other of which the ore slides, and is so spread evenly over the width of the roll shells. One of these steps is hinged, and by means of a short lever can be thrown up against the step above it to shut off the ore supply in case of trouble with the rolls or with the spouting above.

That portion of the ore passing through the screen goes to an automatic time sampler, which was designed for this plant. It consists of a casting about the size and shape of a miner's gold pan which is mounted to revolve on the end of a horizontal shaft. The ore to be sampled is allowed to fall on the inside of the sloping flange, and slides off into a receiving bin. At one point of the sloping flange is a narrow slot, which, as the sampler revolves, passes under the spout and allows a portion of the ore stream to pass through to the back of the sampler into a second bin, where it forms a sample of the lot. This sampler was designed to avoid the mechanical complication of the Bridgeman sampler, which was recognized as doing theoretically correct work. An attempt was also made to reduce the head room necessarily occupied by a sampler, with the result that the seven feet required for a Bridgeman sampler of the same capacity, has been reduced in this machine to twelve inches. It is probable that this machine, while making but one cut on the material, does theoretically the same work as the Bridgeman, which makes three. Referring to the accompanying diagram, figures one, two and three, represent successive cuts that are made by a Bridgeman sampler on an ore lot, the shaded portions being the parts successively removed. Figure four represents the portion which is reserved as a sample. Figure five shows how the same result is arrived at with this machine, the entire reject being cut out in one operation, the result, shewn in figure six, being the same.

From this sampler the ore drops into one of two, three ton hopper scales, where it is weighed and delivered by flat belt conveyor to one of the two hundred ton storage bins. When required for reduction it is drawn off from the bottom and carried by another belt conveyor two hundred feet into the stamp mill. These are flat belts, twenty inches wide, eight ply rubber, running at a speed of three hundred feet per minute, and have proved entirely satisfactory. The surface wears but little, the ore being given the same forward velocity as the belt, before it is allowed to drop upon it. This belt has carried over sixty tons of ore per hour on a space not over eight inches wide in its centre. The belt goes uphill and delivers the ore into the ore bins above the stamps.

From these it is fed by automatic feeders of the suspended "Challenge" type, which are without the usual frame and hopper, the disc with its rotating mechanism being hung on two iron bars at the back of the mortar. A light iron spout connects it with the ore bin gate, and the ore bin proper forms the hopper, thus giving free access both to the back of the mortars and to the mechanism of the feeder.

These deliver the ore into the mortars, which were designed solely as crushing machines intended to give a maximum output when fed

with ore which has passed a half inch screen. They are double discharge, provided back and front with splash boards. The discharge from the back screen is carried through a channel cored out in the base of the mortar so as to issue, together with the discharge from the front screen, through a short spout on the front of the mortar. These mortars weigh six thousand pounds apiece, the base being ten inches thick. They are furnished with steel liners on the sides and ends, and the wear of the shoes compensated for by false bottoms of steel. The screen's stands at an angle of seventeen degrees from the vertical, and are twelve inches by fifty-two inches giving a total discharge area of twelve hundred square inches. The stamps dropping in these mortars weigh nine hundred and fifty pounds each, and drop eight inches one hundred times per minute.

The pulp passes from the mortars to the distributing box of a gyrating copper plate, four feet long and six feet wide. These are silver plated, coated with amalgam, and by a simple mechanical arrangement, each point in the surface of the plate is caused to gyrate around a circle about three-quarters of an inch in diameter. This causes each particle of ore, in place of running over a straight path of amalgamated copper six feet long, to go over a spiral path about thirty-four feet long, before it reaches the bottom of the plate. The gyrating shake enabling the table to be operated at about one half the incline necessary without it.

From these plates the tailings pass to vanners with four feet plain belts. These vanners in place of the customary side shake of the "Frue" are given the same gyrating shake as the plates, that is, each point in the belt moves over a circular path about three-quarters of an inch in diameter. The reason for this circular shake in place of the customary side shake of the Frue vanner will be apparent to anyone who has attempted to settle the contents of a gold pan; or in a hand screen, has tried to get the coarse material on top. The advantage of this shake is so apparent, that the question arises why it has not been used before, especially as it was patented some seventeen years ago in the United States. The difficulty has been to build a practical machine that would not shake itself to pieces under the varying strains brought about in producing this gyrating motion. Success was obtained in the vanners of this plant by stripping them of the customary heavy frame, supporting them on six round steel rods, one end of which was screwed to the floor, the vanner resting on the upper end free to float around in any direction. The belt is stretched over rollers in the usual arrangement and below it is supported, on a short vertical shaft, an unbalanced weight. When this weight is caused to revolve by a two inch belt the amount that it is out of balance causes the vanner to swing around in a circle, whose radius multiplied by the weight of the table equals the radius of gyration of the unbalanced weight multiplied by the amount that it is out of balance. In practice it has been found desirable to use a gyration about three-quarters of an inch in diameter, and to run the table at a speed of about two hundred and twenty-five shakes per minute. Owing to the fact that the table is just balanced by the amount the gyrator is out of balance, no jar or shake is transmitted to the floor, and no racking strain is set up in the vanner itself. The feed of the belt is obtained from a Challenge feed clutch on the head roll. The tail of this clutch is attached by a flexible link to a point on the floor, the gyration of the table furnishing the necessary movement. By changing the point of attachment of the link to the floor the feed of the belt can be altered from nothing up to twenty-five feet per minute. The heavy frame of the Frue vanner, the side shaft with its three eccentrics, and the complicated "G" spring feed is avoided. From the vanners the tailings are divided over two more sets of gyrating copper plates, each four feet wide by six feet long supported in a similar manner on flexible steel rods, and gyrated by the revolution of an unbalanced weight supported below each.

The Possibilities for Smelting in B. C.

By MR. R. A. HEDLEY, Nelson, B.C.

(Paper to be discussed at the Montreal meetings of the Federated Canadian Mining Institute, 2nd, 3rd and 4th March next.)

This subject is a large one, and in undertaking it, I wish the Institute to understand that I do so, because I think it a subject, the discussion of which will benefit the country. My knowledge of the country and my study of its ores, enables me to make certain statements, which I feel myself qualified to make somewhat authoritatively. My data, however, are insufficient to handle the subject very thoroughly.

Lead smelting offers some difficulties for any plant possible with present production of the lead producing mines:—

First, its capacity would not warrant the erection of a complete refinery, and without it, lead must be refined in the United States, paying a duty of two cents per pound, while lead in ore pays but one and a half cents per pound. As the bulk of the lead ore shipped is of high grade (over 65% lead) this renders it difficult to compete with the smelters of the United States, as the difference in freight paid is but slight.

To illustrate this point, let us suppose that ore is shipped to the United States carrying 65% lead. Assume freight at \$8.00 per ton, duty is \$19.50, making \$27.50. Smelted here, bullion shipped at same freight rate will pay \$5.20 and duty will be \$26.00, making \$31.20. It would seem then, better to leave a high grade lead ore severely alone, unless the product can be disposed of to better advantage than by refining in the United States, paying duty on the lead.

Suppose a 40% lead ore shipped: it will pay freight \$8.00 and duty \$12.00, making \$20.00. Smelted in this country and bullion shipped, freight will be \$3.20 and duty on lead \$16.00, making \$19.20.

This is in favour of smelting as regards these two items of cost. Now the ores carrying 40% lead or less are as yet but a small item, and generally speaking, carry a high percentage of zinc, or else the gangue is a barren silica, making fluxing costly.

The production of the whole Slocan district may be roughly stated at 100 tons per day, of which 60% is of high grade, over 65% lead, and 25% at least, carries fully 15% zinc.

The question of flux is an important one in considering the treatment of these ores. Lime is very abundant, of good quality and cheap, but iron oxide of fair purity does not occur, and metallic iron as scrap is procurable in but limited quantity at the rate of \$15.00 per ton. The ores of Rossland district have been spoken of as suitable for fluxing lead ores, but that is a very questionable point. An average Rossland ore will carry excess silica and no little arsenic, and they strike me as an expensive flux when the cost of roasting is considered. Also the difficulty of making a good roast cuts some figure in the cost of treatment. A complete roast on a mixture of galena and pyrites, enables one to charge a certain proportion of raw galena ore, a manifest saving.

Until recently, I was firmly convinced that a blast furnace matting plant would handle the ores of Rossland camp very economically and to great advantage. I still believe so, though I consider the difficulties are not few.

I have no definite information regarding the treatment of Le Roi ore at the Trail smelter. Would like to be able to state, to what degree of concentration they attain, and what proportion of calcined ore they use on the charge. Having analyzed samples from many of the mines, I am of the opinion that, given an assortment of ores from different mines, matte smelting can be successfully and economically carried on. The consumption of fuel and flux should be kept very low, and as these two items form by far the major portion of the cost of first concentration, it is of importance to determine whether 10 or 15% is necessary. A year ago I was told that they were using but 10% of coke, and I analyzed a piece of slag produced without extraneous flux, finding:—

Silica.....	49.2 p.c.	} Gold .015 ozs. per ton.
Ferrous oxide.....	23.2 p.c.	
Alumina.....	14.9 p.c.	
Lime.....	5.7 p.c.	
Magnesia.....	5.4 p.c.	

It would be very interesting and instructive to see pyritic smelting thoroughly tested on these ores, with a well adapted plant. It may be said that pyritic smelting has never yet proven a success, but it has never yet had a fair trial. In Newfoundland, it has been stated that purely pyritic smelting was successfully carried on, but the ore treated, if I understand aright, carried very little slag forming material, and, therefore, the concentration was low. Professor James Douglas made a trip expressly to see that plant in operation.

Mr Robert Sticht wrote at length on the subject, and described the operations of plants at Boulder, Kokomo, and Toston, stating that there were obvious reasons why they were not successful, either through faulty plant or ores unsuitable.

As yet we do not know what the Rossland mines are capable of producing. Wild statements have been made on this head, but I believe that a 500-ton plant, erected at such a point and run so economically, that it could make a smelting rate of \$7.00 per ton f.o.b. Rossland, would soon have to increase its capacity. If these ores will smelt with a concentration of 10 to 1, using 12½% coke and 10% barren flux (limestone), that figure will leave a profit to the smelter.

Speaking of possibilities, however, I consider that they are far greater in the Boundary Creek district. There, the variety is greater, and a perfectly self-fluxing ore is obtainable. I do not pretend to say that there is an abundance of ore of such grade as to maintain a large plant, but I do say that there is every indication that such will prove to be the case. Once transportation is had, development will be pushed and plants will follow. Ores will be treated, both by direct smelting for matte and by previous concentration. There are very clean ores of mixed pyrites, chiefly pyrite and chalcopyrite, that will carry 8 to 12% copper and low silica; others of low pyrites, and gangue, that will form an excellent slag.

Should the coal, on development, prove to be of good coking quality and in sufficient quantity, a plant with large capacity will treat ore as cheaply as anywhere on the continent. Even, bringing in coke, at a cost a \$12.00 per ton laid down, I have no hesitation in stating that a 500-ton plant (two furnaces) using steam power, will smelt at a cost not to exceed \$2.75 per ton of ore.

This of course will produce matte, the grade of which will depend on the degree of concentration and the percentage of copper in the ore.

In order to get at the margin on treating a ton of ore, let us assume certain values, and figure the cost by shipping matte, and also converting to copper, and shipping for electrolytic treatment, assume:

4 p.c. copper, at 10c.....	\$ 8.00	
4 dwts. gold, at \$1.00.....	4.00	
4 ozs. silver, at 50c.....	2.00	
		\$14.00

Shipping matte: 40 p.c. copper, conc. 10 into 1.

Freight to New York.....	\$18.00
Deduction: 3½c. per lb copper.....	28.00
5 p.c. of silver.....	1.00
	\$47.00

Representing 10 tons of ore, or per ton....	\$ 4.70	
Blast furnace treatment, per ton.....	2.75	
Losses, say 7½ p.c. (excessive).....	1.00	\$ 8.50

Leaving a margin to miner on \$14.00 ore... \$5.50

Or converting 40 p.c. matte to metallic copper.

Roasting and reverberatory furnace work, per ton of copper.....	\$30.00
Marketing one ton of copper.....	40.00
	\$70.00

Representing 25 tons of ore, per ton.....	\$ 2.80
Blast furnace treatment.....	2.75
Losses on treatment, say 10 p.c. (excessive)	1.40

\$ 6.95

Leaving a profit to miner on \$14.00 ore... \$ 7.05

You will observe that for the purpose of facilitating these calculations, I have taken my copper value at 10c. per pound. It is customary to figure at \$1.00 per unit, or 5c. per pound in ores, which would make this a ten dollar ore.

That there is every indication that such grade of ore will be developed in enormous quantity, I am sure most mining men familiar with the country will agree.

With East Kootenay I am not familiar, but I believe that the range between Kootenay Lake and Fort Steele will produce ores that after concentration will materially assist smelting operations in the country. West again of Boundary Creek, in the Okanagan country, I have seen evidence of ores in veins of unusual size, that will yield handsomely.

The Coast too, if report be true, has its ores of character suitable for smelting, and exceptionally situated for economical treatment.

My figure on converting 40% matte to copper and marketing that, seems abnormally high, but it is based on roasting in the hearth furnace by expensive hand labour, and can be greatly reduced by automatic machinery.

The New York market being the best, necessitates a high freight, and if all values are paid for they must charge a good treatment rate.

The Mineralogy of the Carboniferous.

By HENRY S. POOLE, Assoc. R.S.M., F.G.S., &c.

(Paper to be discussed at the Montreal meetings of the Federated Canadian Mining Institute, 2nd, 3rd and 4th March next.)

Within the geological horizons grouped as carboniferous in the Maritime Provinces there are, in addition to the regular stratified deposits, mineral infiltrations of later ages.

To these references in this paper will be made irrespective of their frequency or economic importance. Little more is proposed than to note the mere presence of certain minerals in the rocks of this formation. Touching the production of those that are found in marketable quantities, statistics are furnished in the Annual Reports of the Geological Survey, and as these statistics are freely supplied to all interested, it would be superfluous to here give extracts from them.

Coals.—The workable beds are all bituminous, no anthracite or smokeless varieties are known, and most of the bituminous seams are "coking" and with but few exceptions yield "coking" coals. A few only are dry and non-coking. Some "cannel" beds are known, but of a value yet undetermined. The variety "jet" occurs with fossil plants showing tissue with mineral infiltration, in strata overlying the well-defined New Glasgow conglomerate.

The bituminous coals in some of the fields graduate into shales rich in hydro-carbons; some of which were, about the year 1860, tested as oil producers, and subsequently thought of for enriching illuminating gas. All the beds so worked were spoken of as "oil coals," and one of the richest was named "Stellar coal," and then "Stellarite."

Dr. How, in his Mineralogy of Nova Scotia, speaks of "petroleum" occurring with the plaster deposits of the lower carboniferous; doubtless these viscous patches were of contemporaneous deposition, so too may have been the smaller blotches of similar material found associated with calcite in the fire-clay beds between some of the coal seams of the Albion section. So far as known none has been analyzed. When freshly exposed the odour of kerosene was strong; in appearance generally like petroleum residue, only somewhat thicker, but in one

case the material had the colour of rosin and the consistency of wax. In the form of inspissated drops associated with crystals of brown-spar and calcite, petroleum occurs at McKay's ford of the East River. Usually these round globules are hard and brittle, but a few have the elasticity of elaterite. Allied to this last form of deposit is the well known "Albertite" of Hillsborough, occurring in quantity in veins which have been apparently exhausted.

To the specimen collector the Hub seam supplies handsome specimens of peacock coal.

Gold.—The rocks of the carboniferous are not usually regarded as gold-bearing, but in the basal conglomerates resting on the Cambrian slates coarse gold has been worked at Gay's River, and in times past yielded some fair returns.

Copper.—The higher horizons of the carboniferous system according to the classification that has hitherto been current;* the strata that have the New England conglomerate at their base, while yielding no coals of workable thickness or shales of value, produce some copper and lead ores associated with plant remains. "Chalcocite," in nodules or grains, generally encrusted with "malachite" and occasionally associated with "covellite" and jet, is found disseminated through certain beds of sandstone at Cariboo River, New Annan, French River, etc. In search of these ores, spasmodic explorations have been conducted for the past 60 years, † but nowhere has the distribution been found uniform over a large area.

Occasionally in the limonite at Bridgeville fibrous malachite in small quantities has been detected.

Iron.—The ores of this metal occurring in sedimentary deposits are spathic, clay ironstone and black-band ironstone, not one of which is mined at the present time.

"Spathic," in the varieties "ankerite" and "sideroplectite," occurs in the veins at Londonderry in rocks of Devonian age, but in the carboniferous the spathic is less abundant and is only known as an occasional accompaniment of limonite with the carboniferous limestone.

"Clay ironstone" appears as nodules and bands in the coal measures, and as long ago as 1829 diligent search was made by trenching across the outcrops in the Albion mines district, and some of the ore got was used in the trial furnace then erected.

"Black-band ironstone" is reported in both the Sydney and Pictou coal seams, and in a very limited way only was that of the latter tried as an ore.

"Limonite," of which important deposits are associated with the carboniferous limestone, occurs in veins about the contact of that division with older formations, ‡ often appearing as though it replaced an original deposition of spathic ores. Limonite occurs fibrous, columnar and stalactitic, sometimes coated with the less hydrous varieties, "turgite," "gothite" and "przibramite."

These ores of iron are associated with, or replaced, in the veins by the ores of the allied metal—manganese; either as mixtures, earthy compounds or as distinctly crystallized minerals, in the compositions of "pyrolusite," and "manganite" and "psilonulane," with possibly "pellanite."

The non-metallic vein associates are calcite and barite, with an occasional small crystal of white "mica." Both the former furnish crystals of interesting forms.

It is interesting to note the relation of these minerals to one another. Limonite seems the foundation on which all have been deposited. "Turgite" and "gothite" always appear as superficial deposits

in the former; while barite and pyrolusite seem to be still later, often acting as cements to displaced fragments of all the ores of iron and to have been contemporaneously deposited in distinct crystals. Evidently series of movement have passed through these limonite deposits, crushing parts into coarse fragments and disturbing the vein matter from its original position.

No systematic observations have yet been made of the directions in which the stalactites of limonite incline, so that the evidence of movement which they might furnish is not yet available.

Lead.—Occupying the same relation to the carboniferous limestone in contact with older formations as do the hydrous oxides of iron and the manganese ores elsewhere mentioned,* galena is found disseminated throughout the limestone at several places, as Smithfield, Gay's River, Arichat, etc., but nowhere is it worked at the present moment.

Isolated crystals have been found in the coal measures at the Joggins, Cumberland County, and at Port Hood, Cape Breton.

Zinc.—Twin crystals of "sphalerite" occasionally appear with pyrite in the cracks of strata between the coal seams of Pictou County.

Sulphides.—Pyrite is commonly disseminated and amorphous in the coal seams, sometimes preserving plant tissue, at others crystallized in veins and cleat planes, or as filamentous radiations in the coal strata. Pyrite often appears as part of the lenticular masses of coaly clay ironstone, occurring in some seams which masses have been noticed as large as 8 feet in diameter by 10 inches through the centre.

Occasionally the pyrite takes the form of "marcasite," cockscomb pyrites, notably in the strata of the Spring Hill mines. Calcite is a common associate with pyrite on the cleat faces; in that position it may be more or less converted into brown-spar, which rusts on exposure to the air. The plates are generally thin, though they do occur up to 3/16ths of an inch in thickness.

Where decomposed from exposure in old workings "melanterite" is formed as an efflorescence or as stalactites. There also appears as a product of decomposition in the pits at Port Morian the mineral "almogen."

Lime and Magnesia.—The lower carboniferous series supply limestones in quantity suitable for blast furnace uses, and plaster in quarries of great extent. They are extensively worked † and furnish several varieties, anhydrite, blue gypsum, bird's-eye plaster, alabaster, and crystalized selenite, the latter sometimes in large, clear sheets. Fluorite in blue crystals occurs in the limestone of Plaister Cove, Strait of Canso. The plaster beds also contain besides petroleum, elsewhere mentioned; the salts—holite and mirabilite.

The Borates.—"Howlite," named after Professor How, of King's College, Windsor, N. S.; "ulixite," "winkworthite," and "cryptomorphite," appear occasionally spotted through the gypsum and anhydrite.

Baryta.—Well crystalized forms as well as amorphous bodies of barite occur in the limonite veins at Bridgeville, and with calcite and copper pyrites at Five Islands.

Saline Waters occur in the gypsum beds and in some of the deeper coal workings. They have not been noticed at a less depth than 1,000 feet in the land-locked coal basin of Pictou, and they give rise to the suggestion that they may be in such a place preserved samples of seawater current in carboniferous times. Analyses of the waters from the gypsum and other places have been published, but the following by Mr. Mason, of Halifax, is new. It is from the McGregor seam at Stellarton:—

	Parts per 1,000.
Sodium chloride.....	6.5545
Magnesium chloride.....	1.8405
Calcium chloride.....	0.9992
Calcium oxide.....	0.1176
Carbonic oxide.....	0.3294
Silica	
Alumina	
Sulphuric oxide	} traces
Total solids in solution..... 9.7053	

* See also Mr. Fletcher's Reports in the Geol. Surv. Reports of Progress.
 † How's Mineralogy, 1868. Mineral Statistics: Geol. Surv. Annual.

* The recent reports of officers of the Geological Survey touching this district question the classification in vogue and seem disposed to place the strata affected still higher in the scale.—N.S. Instit. Nat. Sc., 1893: P. 201c, p. 213.

† Gesner, Jackson, and Alger.

‡ Fed. Can. Mg. Instit., 1878, p. 211.

Some Concentrated Foods for Miners, Prospectors and Explorers.

By J. T. DONALD, M.A., Montreal.

(Paper to be discussed at the Montreal meetings of the Federated Canadian Mining Institute, 2nd, 3rd and 4th March next.)

The exploration of a new territory, the development of a new mining camp or of an entire district, is often a question of food supply, as witness the present situation in the Klondike region. It is believed, therefore, that the subject of this paper is not out of place in the programme of a meeting of a mining institute.

Foods may be classified in various ways. For our purpose we may group them under five classes, viz.: Carbohydrates, fats, albuminoids, mineral or saline, and acidulous.

Carbohydrates are represented by starch and sugar, and fatty foods by butter and other fats; these are required to produce heat and force.

As examples of albuminoids or nitrogenous foods, we may take the lean of meat or the gluten of flour. These albuminoids are required to build up the muscular tissue of the body.

Then, next, the saline or mineral foods are required to supply the mineral matter found in various parts of the body, e.g., phosphate and carbonate of lime, the principal ingredients in the bones, potash salts for blood and other fluids of the body, common salt for gastric juice.

The acidulous foods are found in fruits and vegetables. Whilst they may not contribute to any permanent tissue, they are indispensable, for without them we know that long continued health is not to be expected.

All five classes are required to keep the body in a healthy condition, although one or other of them may be omitted for a considerable time, and all five are required in certain proportions.

According to the report of Commissary General of Subsistence of the United States army for 1896, the desired amount of elementary food constituents for a man engaged in very hard work is as follows:

Albuminoids, 6.2-6.5 ozs.; fats, 4.5 ozs., and carbohydrates, 17 ozs., there being sufficient salts and acids associated with the classes named.

When we come to examine various foods with which we are familiar, we find that usually two or more of our classes are associated. The solid matter of the potato is almost entirely starch, but in flour we have starch, albuminoids and salts associated. In beef we have salts and albuminoids associated. In fruit, such as grapes, we have tartaric acid and sugar.

Let us look now at the approximate composition of some common articles of food, as set forth in the subjoined table:

Name of Food.	Water	Albuminoids.	Carbohydrates.	Fat.	Salts.	Acids.
Lean Beef	80.	19.			1.	
Potatoes	75.	2.	22.	2.5	.7	
Turnips	91.	1.2	7.2		.6	
Apples	85.		12.98			1.04
Milk	87.	3.	4.	3.5	.36	
Beans	12.5	30.	48.	2.	3.5	
Peas	14.	23.	53.	2.	2.65	
Flour	15.	11.	70.	2.	1.7	
Oatmeal	15.	12.	64.	5.6	3.	

On glancing at this table we are at once struck with the large per centage of water in all except the cereals and the leguminous products, i.e., flour, oats, peas and beans. These cereals and leguminous seeds represent, as it were, naturally concentrated foods, for whilst it is possible to drive off a portion of the water they contain, yet unless under very special conditions it is not possible to prevent the reabsorption of water from the air.

Of the foods named in this group, flour is generally recognized as the staff of life. One great difficulty in connection with flour, in so far as the prospector is concerned, is the skill required to make bread, oatmeal, peas and beans require much less culinary skill. It is greatly to be regretted that larger use is not made of peas and beans by prospectors and others who require a concentrated and nourishing food. It will be noted that peas and beans contain nearly twice as much albuminoid or nitrogenous matter as flour. They are easily cooked by long boiling into a soft pulp, which, when flavoured with a little extract of beef, makes a most nutritious and satisfying food.

In this connection, I would like to call attention to a preparation of peas, which is but slightly known in this country, although it is a well known article of food in Scotland. It is known as peas brose meal. It is steam-cooked before being put on the market, and all that is required to make a very toothsome dish is the meal and boiling water.

Finally, let me say that a well known medical authority has stated that life may be sustained for a very long period upon such foods alone as beans and peas.

Leaving the cereals and leguminous products, we find that in the other foods mentioned in our table from three fourths to nine-tenths of the whole is water. See what this means. When a miner carries a bag of potatoes weighing fifty pounds he is carrying only twelve pounds of solids and thirty-eight pounds of water; of the latter he has in all probability an abundance at his door.

Can this water be in part or wholly removed, and leave the solids unimpaired? The answer is that whilst for various reasons it is not in some cases easy to remove the whole, it is possible to remove a very large portion, and leave the solids in such a condition that when water is again added we may have the food practically in its original natural condition; and moreover it is to be noted that when the water is withdrawn we not only have the food concentrated, but it is also brought into a condition in which it will "keep" for a long period of time, and will not readily spoil as the ordinary vegetable will.

No doubt the great majority of the members of this Institute are familiar with various foods that have been concentrated by removal of a portion of the water they originally contained. Here, for instance, is condensed milk, which instead of containing 87½ per cent. of water now contains only 26 to 28 per cent., cane sugar, of course, being added.

Then again, we have the well-known Bovril, fluid beef, etc., which are the virtues of beef in highly concentrated form.

Again, in compressed corn beef we find 52½ per cent. of water against 80 per cent. in the fresh beef.

The process of concentration by removal of water has recently been applied to potatoes, turnips, and other vegetables. From 100 lbs. of ordinary potatoes 15 lbs. of this concentrated article is obtained. In the case of turnips 8 to 10 lbs. represent 100 lbs. of ordinary turnips; the loss, peelings and water. In some other vegetables the results are higher, 15 or 16 lbs. to 100. It is thus evident that two or three pounds of these concentrated vegetables, which are imperishable whilst kept dry, represent a week's supply for a man.

But of late the idea of food concentration has been carried still further. Not only are various articles of food concentrated by the removal of water by methods that leave the flavour and nutritive value of the foods unimpaired, but various articles of food are blended into ideally perfect foods, the carbohydrates, fats and albuminoids being properly proportioned and put up in packages, each containing a day's rations. These combinations are packed in tins, hermetically sealed, so that the contained foods will keep indefinitely. As an example of the keeping qualities of these foods, I may state that I have seen a

package that Nansen took with him on his celebrated voyage in the "Fram," and which on his return he handed over to the makers of the food, in as good condition as when it was first sent out.

I lay before you the so-called cartridges, each containing one day's rations for a man under hard work. These, as offered by a firm of food specialists in this city, are of two kinds, distinguished by their colours as blue and red. The blue contains nitrogenous matter in the form of beef, and as carbohydrates we have potatoes together with fat. The red cartridge contains beef and bacon, and instead of potatoes we have peas. It is recommended that these two be used alternately so as to produce variety.

The contents of these cartridges are almost entirely freed from water, and all that is required in the way of preparation is that they be heated for a short time with water, or indeed, in cases of emergency, they may be eaten without cooking, and will be found palatable and nourishing.

Another style of package contains, in addition to the contents already described, a second compartment, in which is a cocoa preparation, so that by a simple addition of hot water both solid food and beverage, nourishing and palatable, are easily prepared.

These packages weigh only 10 to 12 oz. gross, and contain sufficient food for a day.

These preparations have been extensively used by the British government in connection with recent military expeditions, *e.g.*, Ashanti and Benin, and by explorers, such as Wellman, Andre and Nansen, with most satisfactory results, and our own government uses for the mounted police somewhat similar preparations put up by another firm.

It is hoped that this brief paper may tend to minister, to some extent at least, to the comfort of the hard-wrought prospectors, to whom the mining community owes so much, by pointing out the direction whence comfort may be obtained in the matter of concentrated foods.

The Chemistry of Foundry Practice.

By ERNST A. SJOSTÉDT, M.E., MONTREAL.

(Paper to be discussed at the Montreal meetings of the Federated Canadian Mining Institute, 2nd, 3rd and 4th March next.)

Compared with the chemistry of the blast furnace process (in which the ores are deprived of their oxygen, and the reduced metal combines with such elements as carbon, silicon, manganese, etc.) and the different processes of iron and steel making (whereby the said foreign ingredients are oxidized and eliminated to a more or less complete degree), the chemical changes taking place in the cupola, where the metal is merely remelted, are quite simple. Nevertheless, these changes, small though they be, are sometimes of great practical importance, and as the physical qualities of the castings, such as strength, hardness, elasticity, etc., are very largely dependent on the chemical composition of the metal, it is evident that the adoption of chemical researches in connection with the foundry practice are well deserving of a most careful attention. The importance and necessity to the blast furnace manager and the steel maker of applying chemistry in their daily practice has long been recognized, but it is quite recently that the services of the chemist have been called upon to help solving the many puzzling problems which the foundryman constantly encounters. However, his legitimate place and position is already well established at the larger foundries in the United States and in Europe, besides at such works where a specialty is aimed at, such as car wheels and malleable castings; and the smaller foundries are slowly following their example.

In the hopes of arousing some interest in this important subject in this country, and especially among the members of this Association,

the following notes and facts are hereby presented as a nucleus for discussion—founded as they are on the best authorities, and in all essential parts having been found correct and a most valuable help to the writer, in connection with his labors and investigations as chemist at different iron and steel works. Even at the risk of appearing pedantic the writer has aimed at making this treatise as elementary as possible, in order to interest those least familiar with the subject, and must therefore ask of the well informed members their kind forbearance.

As we all know, absolutely pure iron does not exist as a commercial product, for what we are working and dealing with is not a single substance, but an alloy, composed of a number of elements in different proportions, the total sum of which, however, seldom exceeds five to ten per cent. Among these elements, carbon is an essential constituent and one that plays a most important role in determining the physical character of the iron. In fact its influence on the iron is so great that its presence in smaller or greater amounts is responsible for the three well known classes, with so distinctly different characteristics, in which iron has been divided, namely wrought iron, steel, and pig iron—pig iron containing about 2.5 to 5.0 per cent. of carbon, steel from .4 to 2.5 per cent., and wrought iron from about .03 to .35 per cent.; and their characteristics are so familiar to us all that it is here only necessary to recall their different melting points, which for pig iron is from 1,800° F to 2,200° F, steel about 2,650° F, and wrought iron about 2,880° F. Again, we must carefully keep in mind that carbon, in pig iron, occurs in two conditions which are distinct in their physical and chemical relations, namely as graphite and as combined carbon. If present as graphite (*i. e.* simply mechanically mixed with the iron) the pig has a gray, soft fracture, but when it is in chemical union with the iron the fracture is white and hard, with metallic luster. In molten pig iron all the carbon is present in its combined form, and it all depends on the time and conditions allowed during cooling which state—graphitic or combined—it will assume in the casting. The slower the cooling is taking place the better opportunity the carbon will have to crystallize (forming graphite) and the grayer the iron becomes, whereas if made to cool suddenly (as when poured against a chill block) the carbon is not given this opportunity, and consequently it remains in its combined state, and the iron becomes hard and white—always provided no other strong agent is present that will break this rule, and of which we will speak presently. The carbon, *per se*, as long as it remains combined in the pig iron, increases the absolute tensile strength of the iron, but when separating as graphite it makes the iron weaker; it also increases the hardness, but decreases the elasticity and the melting point of the iron (*i. e.* white pig iron is somewhat easier to melt than gray). The following analyses of combined and graphitic carbon in a certain coke iron will give a clear idea of the influence which the different modifications of the carbon exert on the fracture of the pig:—

No. 1 Foundry pig.....	3.80 p.c. graphite, and.....	.10 p.c. combined carbon
No. 2 Foundry pig.....	3.78 p.c. graphite, and.....	.25 p.c. combined carbon
No. 3 Foundry pig.....	3.60 p.c. graphite, and.....	.39 p.c. combined carbon
Gray forge.....	3.00 p.c. graphite, and.....	.70 p.c. combined carbon
Mottled.....	1.50 p.c. graphite, and.....	1.70 p.c. combined carbon
White.....	.10 p.c. graphite, and.....	3.10 p.c. combined carbon

Among the other elements usually present in the pig iron, and the one next to carbon in importance, as regards its effect on the iron, we must place the silicon. Silicon, namely, exerts a controlling influence on the chilling properties of the iron, owing to its tendency of separating the carbon as graphite. Its percentage in the pig iron is generally in proportion to the temperature at which it has been manufactured—thus a coke iron is higher in silicon than a charcoal pig—and varies from a few tenths of one per cent. (as in Swedish charcoal pig) to 1.5 and 2.0 per cent. (in iron usually suited for machine castings,) and runs as high as 2.5 to 3.5 per cent. in good soft coke iron,

and the "silvery iron" contains about 4.0 to 5.0 per cent. Silicon alloys with iron in greater proportions than carbon (ferro-silicon containing 30 to 50 per cent.) and decreases the absorption of carbon—hence coke iron is generally lower in total carbon than charcoal pig, and iron with 2 per cent. silicon and no manganese has seldom more than 3.8 per cent. carbon. It increases the fluidity and fusibility of the iron and lowers its melting point, retaining its heat for a longer time, and thus lessening the formation of blowholes, and decreases the shrinkage (in proportion to the amount of graphite that has separated). Added to "pure cast iron" it has been found to improve the strength of the iron up to 2.5 per cent, above which amount, however, it makes the iron weaker. From the above properties of the silicon it is easy to see why it is that pig iron which contains a high percentage of silicon acts and is used as a "softener," and that by melting various portions of such iron with hard iron all the different grades can be obtained, from close to very open grained soft iron—in remelting, pig iron loses about .25 per cent. of silicon, which should not be lost sight of.

Another disturber of the equilibrium in a pig iron is sulphur. Contrary to silicon, sulphur present prevents the formation of graphite, and consequently it has a tendency of producing a white hard casting; it also makes the iron sluggish and full of blowholes, causes red shortness and increases the shrinkage. Besides, being generally irregularly distributed in the iron, sulphur tends to make an uneven, unreliable casting. For these several reasons sulphur has well been called "the foundryman's bane," and (owing also to the hindrance it offers to annealing) it should especially be avoided in malleable castings, also in iron intended for car wheels. Sulphur has a great affinity for iron, combining with it at a low temperature and in any proportion up to about 53 per cent.; and as its evil effects are perceptible already at a fractional part of one per cent., it must be a matter of great importance for the foundryman to keep track of this element. As a general thing it is rarely found in a soft open foundry pig—for its presence to any high degree would make the iron more or less close grained or white—and this great enemy therefore is not always shunned as much as it deserves; but its presence in the coke, and sometimes also in the limestone, is certain to bring it in the iron, and thus it happens that a good iron often has been condemned when the fuel and the flux alone were to blame. Good Connelsville coke contains seldom over .6 per cent. sulphur, but at many a foundry 1. per cent. of sulphur in the coke is not unusual; and if a basic flux and a high temperature be not resorted to in the cupola the iron, in remelting, will increase .2 to .5 per cent. in sulphur, which is sufficient to spoil it for most purposes,—if the silicon be not present in sufficient quantity to neutralize its effect.

The powerful influence of sulphur in changing the character and fracture of the pig iron has more than once been forcibly brought to the personal experience of the writer, and an extreme case was met with several years ago at Kathadin Iron Works, Maine, with iron made from a bog ore that contained from 1. to 3. per cent. of sulphur and which at the time was only imperfectly roasted. Analyses of several samples of all grades of this pig iron—from open gray to white and spongy—revealed the presence of sufficient silicon which under ordinary circumstances would have made them all gray and soft, but the varying amounts of high sulphur present were here the determining agent, as we see from the following table:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.	No. 12.	
Silicon.....	3.09	3.16	2.35	3.55	2.06	2.74	2.70	2.22	1.30	3.89	3.05	2.73	1.26
Sulphur.....	.03	.13	.18	.39	.10	.20	.34	.62	.18	.60	.46	.65	.43

Here, thus, we have a white iron with nearly 4. per cent. silicon, which but for the .6 per cent. sulphur present would have shown an open soft gray fracture.

An element we often hear about, and which when present even in the smallest quantity in steel is much dreaded, is phosphorous. In foundry pig, however, a certain small amount is not only permissible but highly desirable, as it lowers the melting point of the iron and makes it fluid, thus causing it to retain its heat longer and making it suitable for producing small castings of a delicate pattern. Pig iron with less than .2 per cent. phosphorous is apt to shrink.

But when it is present to over .75 per cent. the iron becomes brittle—this in proportion to an increased percentage of carbon present,—and strong castings should not contain over .5 per cent. of phosphorous. It unites readily with iron to about 26 per cent., but practically the pig iron in the market contains from a trace to 1.5 per cent. Phosphorous is not eliminated in the cupola smelting, and its presence should therefore be kept run of.

Manganese is also an element to be taken in consideration in foundry practice, for so many iron ores contain this metal, and a certain amount enters the iron during the blast furnace process, while part combines with the lime and the sulphur and is removed with the slag. Its most striking property is to make the iron "chill," *i.e.* prevents formation of graphitic carbon. But this chill does not make a durable wearing surface, as it is more crystalline than hard, and readily crumbles under the impact of rapid shocks (to which *e.g.* a car wheel is subjected). Its presence up to 1 per cent. however is not considered detrimental, but a high percentage of manganese makes the casting brittle and white—provided the silicon is not exceptionally high, in which case (as in some Scotch foundry pig of good repute, which carry 2 to 3 per cent. of manganese), the graphite is separated, and a gray iron obtained. Iron alloys with manganese in all proportions, and when the amount of manganese runs between 20 and 80 per cent. the product is called ferro-manganese, and when containing from 5 to 20 per cent. it is termed "spiegel" iron. Manganese raises the point of saturation for carbon, *i.e.* permits of a high total carbon. Iron without any manganese rarely contains over 4.5 per cent., but ferro manganese often from 5 to 7 per cent. of carbon (nearly all of which is in the combined state). Owing to its affinity to sulphur it acts as a "purifier," even more so than lime, in the cupola, removing oxides of iron and silicon from the molten iron, and thus helps to prevent blowholes.

A metal which during the last decade has come in great favor as an admixture to iron and steel is aluminum.

The credit of first calling attention to the influence of aluminum on iron castings belongs to a Swedish inventor who introduced the so-called "mitis" castings—a mixture of wrought iron and aluminum. The principal effect this metal has upon cast iron is that it lowers the melting point of the alloy, consequently increases its fluidity and makes it run quick and sharp, besides giving the gases an opportunity of escaping from the molten iron—hence its reputed quality of preventing blowholes. Like silicon, aluminum tends to make a gray iron, and lessens the tendency to chill (*i.e.* favors the formation of graphite), and if allowed to take the place of silicon it will make a stronger and softer casting than if silicon were the agent; but added to an iron already high in silicon it makes it weaker. An addition of aluminum, therefore, is beneficial only to a low silicon pig. If added in sufficient quantities (2 per cent. and more) aluminum, for the same reason as silicon, prevents shrinkage.

Other elements, such as titanium, arsenic, copper, nickel, chromium, etc., also exert their influence on the character of the iron, but they rarely occur in sufficient quantities to require looking for.

From what already has been said, it follows that carbon is a necessary but passive component in the pig iron, made to change in amount and in form by the presence of other elements. Thus sulphur and aluminum, and to a lesser degree silicon, cause it to release, while manganese enables it to hold more carbon in solution, silicon and aluminum tend to change the carbon into graphite, while sulphur, manganese and phosphorous do not cause carbon to leave its combined state. Sulphur, manganese and combined carbon increase the tendency to shrinkage, while silicon and phosphorous help to counteract this evil,—and the more of the effective element the iron contains the more is its action facilitated or retarded, as the case may be.

According to the state in which the carbon is present in the pig iron its grading is determined; but as we have also seen how largely the proportional amounts of graphite and combined carbon are dependent on the many foreign elements present, and to a great extent also on the conditions under which the metal has been allowed to cool, it will at once be evident how uncertain and unsatisfactory it must be to try to judge the quality of the iron simply from the fracture it presents. On the other hand it is not claimed that the physical properties of an iron are wholly dependent on a certain chemical composition—for there are several possible and proper compositions for an

iron intended for any certain purpose,—each of which depends for its physical success on the manner of working the iron, as the fuel, blast, temperature, etc., and on the relative proportions of one element to another, as well as on the actual amount of each present—but before we institute chemical investigations we do not gain a true knowledge of what causes these different physical qualities in the iron, nor is it otherwise possible to ascertain the true composition of the pig iron or the cupola charge. In trying to remedy any evil, the first step to be taken, after all, is just in this direction of discovering its cause, after which a restorative generally can be found. For in forming his deductions, the chemist's mode of procedure is singularly simple, reasonable and practical: as a result of years of scientific experience, theory and actual practice, it is known that certain impurities in the material produce certain characteristic effects on its physical behavior; and these impurities may be eliminated, retained or forced into combinations with others, according to fixed laws and conditions to which they are subject. "There are foundries that can get along without chemical service, but they are very few who could not obtain practical benefit from a use of the knowledge now obtainable upon this question."

Mechanical Loader for Wire Ropeways and Tramways.

We illustrate one of the latest patents of Mr. A. S. Halldie, of San Francisco, California, which is a device for loading the carriers of wire trams and ropeways.

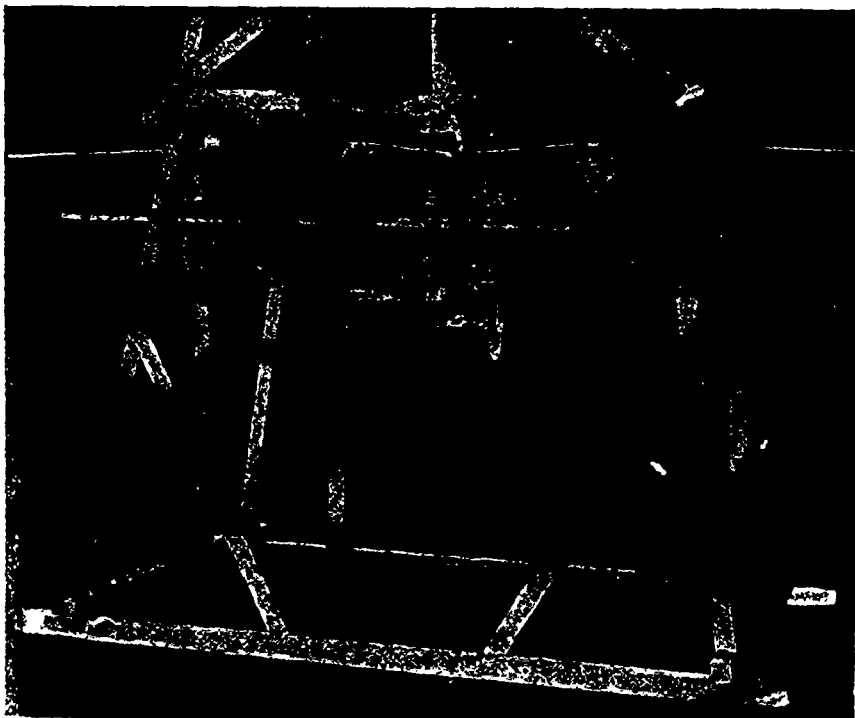
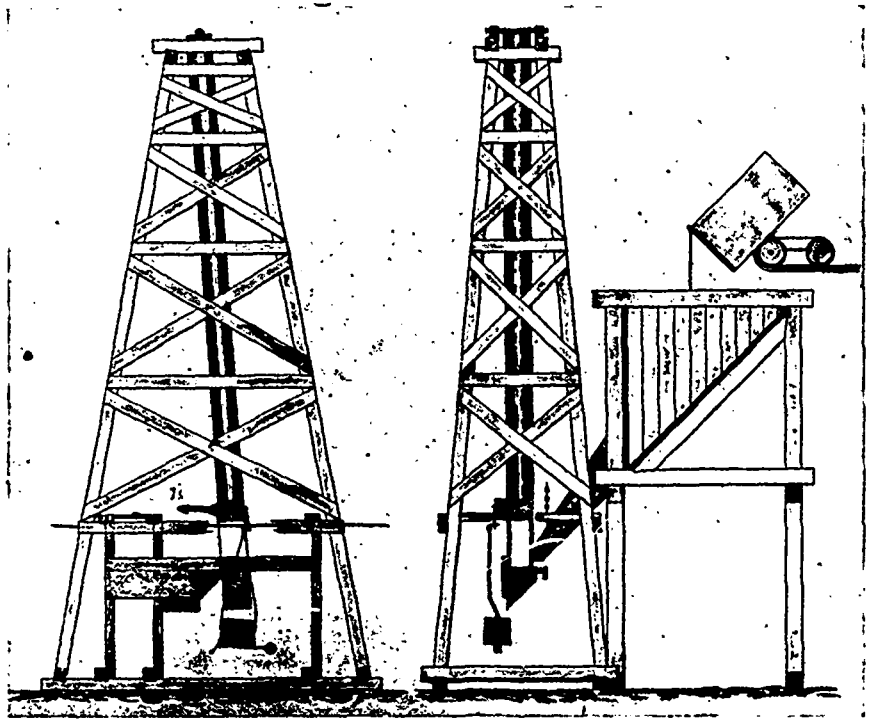
Fig. 1 is a side view of the loader showing the ore bin, the chute, the pendulum with the loading box at its lower end, and the ore carrier.

Fig. 2 is a front view of the same, showing the pendulum and the loading box swung out from its resting place having discharged its contents into the carrier.

Fig. 3 is an enlarged view of the lower part of Fig. 2, in which the essential parts are shown more in detail.

The apparatus is exceedingly simple and efficient, and with the aid of one man can easily load 300 tons in 12 hours. There is nothing to get out of order and very little wear out. It is placed in front of the ore bin and receives the ore from the chute, whence it is discharged into a loader box at the foot of the pendulum.

The device consists substantially of a pendulum swinging on trunnions about 16 feet above level of the moving cable. The pendulum is made from No. 16 sheet iron tubing, 12 inches in diameter. At the lower end is attached a loading box which contains, when loaded, enough ore to fill one carrier of the



ropeway. The loader box has two sides, a back and a sloping bottom; the front of the box is open. With an open front the ore dumped in would, of course, slide out immediately, but while the box is being loaded it is held between a guide and a fixed partition or bulkhead. The ore is thus held in a stationary position by a hooked latch, which forms part of a tripping device consisting of a lever working on a fulcrum, and will be held there until the latch is released from its keeper.

The releasing of the loading box is done by the clip on the moving ropeway cable to which the ore carrier is suspended, and which, as it moves along, strikes the end of the lever and raises the latch. This releases the loading box. At the time the loading box is released the ore carrier is immediately under the nose of the loading box ready to receive the contents of the box. The clip on the moving cable pushes the pendulum along in the direction of the travel of the cable and out from the partition, and thus opens up the front of the loader box and lets the contents pour into the carrier. Both the loader box and ore carrier move together at the same speed for a sufficient distance to allow the ore to be discharged from the loader box into the ore carrier. The swing of the pendulum raises it sufficiently high to clear the rope clip and the pendulum with its loader box swings back in between the guide and the bulkhead ready to receive another load of ore from the ore bin.

The loader is manufactured by the California Wire Works, whose office is at 330 Market Street, San Francisco, California.

B. C. Association of Mining Engineers.

IMPORTANT AMENDMENTS TO THE MINES ACT RECOMMENDED.

Annual Meeting at Vancouver.

The annual general meetings of the members of the British Columbia Association of Mining Engineers were opened in the Hotel Badminton on the evening of Wednesday, 18th ulto. There was a good attendance. In the absence of the President, Mr. S. M. Robins, of the New Vancouver Coal Co., Mr. William Blakemore, M.E. (General Manager of the Crow's Nest Coal Co.), was called to the chair.

Mr. W. BLAKEMORE, in opening the proceedings, referred to the good work that had been accomplished in Eastern Canada by the provincial mining organizations and by the Federated Canadian Mining Institute, of which the B. C. Association was the latest and a most welcome addition. Much benefit had been derived from these organizations by the various mining companies and by Canadian mining engineers, in combatting obnoxious legislation, and by the interchange of knowledge and ideas respecting their professional work. As his Worship the Mayor and Mr. Williams, M.L.A., leader of the opposition, had favored them with their company, he would call upon these gentlemen for a few remarks.

Mayor GARDEN, who followed, extended a very hearty welcome to the Association on behalf of the corporation and citizens, and briefly referred to the importance of such an organization of engineers in furthering the interests of mining, which had become one of the most important industries of this Province and of the Dominion.

Mr. A. WILLIAMS, M.L.A.—I did not expect to be called upon tonight to address you, and took shelter back here till the discussion was under way. As far as mining is concerned, I have had very little experience in it except what I have acquired in buying mining stock at 2½c. to 3c. a share (laughter), and of that I have had quite enough. Mr. Garden has said he is not a mining engineer. If an engineer present will do his work on the claim as well as Mr. Garden lays it out after it is discovered, he will be a credit to his profession. I have seen him with his coat off going up hill in a way that I should not like to follow. I also tender you a welcome here. I think that the success of your association is synonymous with the mining interests in British Columbia. I expect to get a very great deal of information here with you. I know of no body of men who can give a better impress to the mining laws, or better assist the Government in framing their policy in this industry. Many members of legislative bodies know very little of the requirements of the mining engineer, and they are therefore placed at a very great disadvantage. The success of mining depends materially upon the experience and information of the mining engineer. I shall listen with much interest to the discussions here in order that I may obtain some assistance in dealing with any mining legislation that may come up at the forthcoming legislature. I thank you, gentlemen, for the pleasure and the honor conferred in calling upon me. (Applause.)

THE POSSIBILITIES FOR SMELTING IN B.C.

Mr. B. T. A. BELL, Secretary of the Federated Institute, having briefly reviewed the history and operation of mining organization in Eastern Canada, presented a paper by Mr. R. A. Hedley, manager of the Hall Mines smelter, at Nelson, on the "Possibilities for Smelting in British Columbia" (reproduced elsewhere in this number.)

Mr. W. J. WATERMAN suggested that as the paper contained a number of points worthy of consideration, it would, perhaps, be well if the discussion upon it were deferred.

Mr. BLAKEMORE—Just one word: Mr. Hedley gives his opinion as an expert that the Rossland ores can be certainly smelted by the pyritic process at the very low cost of less than \$3 a ton. There are many properties in that and the Boundary Creek districts which contain vast beds of low-grade ore which may become profitable mines with a cheap smelting rate. Another point is the question of coke. He estimates the cost at \$12 a ton, and bases his smelting cost on this. I might say we hope to supply coke from the Crow's Nest area at a very much lower rate—how much lower I would not like to say. But I hope this will help to realize this \$2.95 rate that Mr. Hedley speaks of.

MINING LAW AND ITS BEARING ON THE DEVELOPMENT OF MINES AND MINING DISTRICTS.

A paper on this subject (reproduced in our January issue) was presented by Mr. F. C. Loring, M.E., Spokane.

Mr. G. F. MONCKTON—The laws of this Province are fairly good, but might be made better by certain alterations, which the writer thinks should be on the following lines:—

(1) The free miner's license should be abolished. There is no business or trade which entails the same hardships as the prospector must undergo. It is often said by those who have no real knowledge of the matter that the prospector's gains are ultimately so great that he ought to pay five dollars a year for the privilege of risking his life on snowslides and in crossing mountain torrents, but how many prospectors ever make even a living. Probably five per cent. do very well, twenty-five per cent. make enough to live upon, and the rest are always on the borderland of starvation. By their discoveries, from which most of them reap little or no benefit, the riches of this country are being rapidly brought to light, and it would seem fairer that they should be subsidized rather than taxed for their work. As to the working miner, there are no doubt many of this class to whom the payment of this fee is a trifle, as they have steady work, but many of them cannot find employment in mines all the year round, especially if they live in the districts where the mines are but little developed. If a man is to be taxed because he works, let those engaged in all trades and employments be taxed alike. There are some who say that the farmer is engaged in working for the benefit of the

community, and the miner, who is only producing gold, "the root of all evil," is not assisting the race; but what shall be said of the miners who produce other metals? In these days of electricity and steam, are not copper and iron as necessary to our civilization as many farm products? Even if the free miner's license were not abolished, there is one reform which should be made in the system. At present, if a man who has no license discovers mineral in place, he must obtain a license before he can stake a claim. This has several times resulted in the loss of the claim to the original discoverer. He should have a period of time, the duration of which should be the same as the period prescribed in the Act, section 19, in which he can take out a license and render valid his location of the ground, although he had no free miner's certificate at the time of the location.

(2) The Provincial Mineralogist has called attention to the fact that too many claims are taken out by one man, and that the assessment work is not properly done on them. He has, I believe, suggested that the assessment work should be done within three months. Although this is a step in the right direction, I think that the time is too short, and would suggest six months instead. I have done a good deal of prospecting myself, and know that if this period were made three months, it might bear hardly on the prospector. Prospecting parties are often fitted out for trips of three months, and it might be a difficult matter to obtain the capital required to do the assessment within the time, as this often entails a long journey back to the point of starting, and there might be delays owing to the absence of members of the syndicate. In many districts great inconvenience is often caused by the difficulty of finding the boundaries of claims previously staked. Much of this would be avoided if corner posts were inserted when the assessment work was being done. I would like here to point out the annoyance caused to prospectors by the prevalent habit of staking claims which are never recorded. This is a great evil, but there are difficulties in the way of checking it which seem to be almost insuperable. It would be useless to enact that the locator should record his abandonment of all claims which he had staked by a notice on or the destruction of the stakes, as this would cause him considerable trouble, and the imposition of a fine for neglecting to do this would be inoperative, as but few prospectors have any money.

(3) There should be an official charged with the duty of inspecting the assessment work done on claims. Much of this work which is recorded is never really done, and that which is done probably represents only one-third of the value for which it is recorded. The writer knows several instances where three or four shots have been recorded as a hundred dollars' worth of work, and has seen one remarkable fraud. In this case the record stated that a tunnel was driven 10 feet. The facts are that the locator built a few sets of timber in the position which they would occupy in a drift, against the face of a steep bank, covered them with brushwood and then shovelled down earth from above on to this artificial tunnel. He then ornamented the face of the drift with a few pieces of quartz, spending probably two days over the whole work. I am not proposing that the inspector should be required to visit all claims, or even all districts, but that he should make flying visits without warning, and the danger of having the fraud unmasked and thereby losing one's claim would soon deter claim owners from doing dishonest work.

(4) Buildings for use in connection with the development of a mine should be counted as improvements in obtaining a crown grant.

(5) The present area of claims is too great. It would be better to return to the old size of 1,500 feet by 600 feet, the greater length being as parallel to the strike of the vein as the locator could make it.

(6) There should be an inspector of metalliferous mines who should have certain powers with regard to workings carried on in an unsafe way.

(7) As rock often slides in large masses, it might deceive the prospector into believing that he had found mineral in place, and the expenditure of a very large sum might be required to prove this. There should be a clause in the Act to prevent a mistake of this kind invalidating a claim, if the locator could show that he had good reason for believing he had rock in place.

(8) Section 25 and section 35 of the Mineral Act should be abrogated. These allow the holding of claims by paying a sum of money instead of doing the same amount of assessment work. If a claim is worth holding, the owner should be compelled to develop it. If it is not worth holding, he should not be allowed to obtain fifty acres for purposes other than mining under the Mining Act. The country needs development, and anything that aims at the locking up of land without development is a hindrance to its progress.

Mr. MCCARTNEY—There is one matter I object to in the mining laws as at present framed: that is the matter of having to make out papers before a Justice of the Peace. I have been through the upper districts of British Columbia, where, after staking a claim, it was necessary to go 100 miles to have the papers made out ready for recording. I think there should be some law passed by which, where some four or five persons have taken up claims, they could arrange the papers without seeking a Justice of the Peace. We staked claims in the Upper Lillooet and had to go down to Pemberton Meadows at a cost of \$50 only to find that the Justice of the Peace had gone down to Port Douglas on Harrison Lake. I think when a man stakes a claim and has witnesses to prove his staking, that his affidavits should complete the preparations for recording.

Major VAUGHAN—These matters of mining laws I hope you will take up and thoroughly discuss before the close of this session. I have been interested in mining for the past fifteen years. I am also a land surveyor. I think considerable alteration could be made in some of our laws to advantage. There is, first, the question of miner's licenses, then the area and shape of the claim, especially that of fractions. In surveying a number of contiguous claims, we find that in this rough country it is almost impossible for the ordinary man to run straight lines in first staking, and when the surveyor lays out the claim there is often a little miserable fraction between several of them, and it is possible that an outsider may jump in and stake and cause trouble and expense. I think the end lines should be surveyed at right angles, and where the fraction, if any, does not increase the size of the claim beyond the requirements of law it should form a part of the claim itself. This would save the cost of surveying the fraction, which may be charged for at the rate of a full claim, and would avoid much trouble and litigation. Again, my contention is that the No. 1 post should govern the whole location and define the boundaries of it. The law reads that no claim shall be more

than 1,500 feet. Where fractures are often but a few hundred or even a few tens of feet in one direction, I think they may be an exception to the 1,500 feet rule in another. They are seldom of much value except to holders of adjoining claims. I hope you will give this some consideration.

Capt. C. N. BLACK—Gentlemen, I would like to say a few words in regard to the Mineral, Water and Placer Acts, especially the latter. These are continually changing and, as it now is, to keep posted, a prospector should carry a full library around. I think it would be a good idea to have the Acts codified and printed in a handy, convenient form, with map and other information for prospectors and mining men.

I have been placer mining all summer up north and was not aware of a change made in the water rates until I picked up a magazine a few days ago in which the changes were referred to. I think if the laws were codified it would simplify matters a great deal.

Mr. W. J. WATERMAN—I also would be glad to have the Placer Act taken up and discussed. In an article published some months ago the question was taken up, and it was thought unfair to allow the prospector 50 acres for \$2.50 recording fee and \$100 worth of work for five years, while the holder of a placer claim pays \$50 a year rent, and must do \$600 worth of work. I mentioned this to the Minister of Mines, who remarked that it would tend to the using of a large capital in placer and hydraulic mining, but I do not see why it should take capitalists to work placer claims any more than the mineral claims. The two seem to me to be at present unequal. As to the amount of assessment work, I think the work should be continuous as far as practicable. There are some situations where the snow lies most of the year. I also think the claim should be surveyed before being recorded, and that the surveyor should be the one to state the amount of work done on the claim as assessment work. I do not think any prospector would grumble at these changes, although miners do grumble for having to pay a license to work in the mines. Mr. Loring says 1,500 feet square is too large. I agree with him; I think the old claim of 1,500 by 600 feet is better. A locator discovering and staking his claim does so on one vein, and even in case it should lie very flat if he has staked on his vein he will have a large area of ground from the apex. I do not see why the original staker, having found one vein and staking upon it, should preclude another prospector staking another vein within his boundaries of which he had no idea existed. I think also that the prospector should put the direction line on both stakes. I find the direction on the No. 1 post, but if I happen first to strike post No. 2, it does not give me the direction, and unless well blazed will take time and trouble to find in many places.

I am sorry Mr. Carlyle, Provincial Mineralogist, is not here. In a recent discussion he made the remark that he hoped soon to see the mining laws in such a shape that they would accomplish all that was expected of them in the opening up of the country. We are all, directly or indirectly, interested in mines, looking from the standpoint of the capitalist, surveyor, prospector, miner, or even the trader. We ought all to take advantage of the mistakes of others and not commit the same ourselves.

Mr. BLACK remarked that the amount charged for placer ground is \$1,000. Also that objection could be raised to the staking of mineral claims throwing 1,500 feet to the right or left by staking along a water course or natural roadway and not staking over the lead, and that the length should be determined in some way before placing No. 2 post.

W. H. GALLAGHER—I have had a good deal of experience in prospecting and some little experience in mining, and have read the papers carefully. It has been suggested that the four corners of the claims ought to be staked. That used to be the law some years ago in this Province. I think the ordinary prospector could not stake in that way and that it would cause endless trouble. I agree with our Secretary that the lines are too often insufficiently blazed. I also think that post No. 2 should contain a full description of the claim the same as on No. 1. A few changes, I think, would perfect what is already admitted to be a good system of staking. A prospector should blaze his location along the line of his lead, and not along a water-course or base of a mountain for convenience. Where this is not done the matter ought to be called to the attention of the Minister of Mines. The greater part of this immense Province is yet untouched by the prospector. Especially in our northern districts this is true. The prospector must start out early in the spring, with three or more months' provisions with him, on his long journey and undergo many hardships; instead of restrictions being placed upon him, one would almost conclude that the Government ought to recompense him. We have large areas of 50 or more miles in width, lying back from travelled routes that have never yet been prospected. Here it may be a prospector locates his claim late in summer. We all know that the prospector is not always, or indeed often, a miner, and I think it would be an injustice to compel him to do assessment work before filing his notice. I have known good prospectors who could not write their location notices. It is not reasonable to expect such men to run the four lines to the boundaries to their claims. Again, the prospector is not a millionaire or capitalist; if he takes out his miner's license, pays his grub stake for the summer, his recording fees, and does \$100 worth of work on his claim in a year, he has done well. As to holding more than one claim, I think you will find in almost every instance that this is not done by the prospector himself, but by men backed with capital, and they are held in such a way that they are hard to get at at the present time. I would make a distinction between the original locator and a subsequent holder. I am also in favor of continuous working of claims, taking into consideration attendant circumstances. There are very few places in this Province where it could not be carried out. In a few years the country will be better opened up and supplies can be had at a distance from the present stores; then we hope to find the prospectors all over British Columbia working under less difficulties. In regard to the lease of \$50 for placer claims, I think the Government should apply a royalty on the output in its place. The Government is now collecting for rent over 300 miles on the Fraser, Thompson and Quesnelle rivers. I object to the granting of miner's licenses to the Chinese; most of the gold taken out by them is sent to China instead of being put in circulation in Canada. I might say I have always found the Government reasonable, and I am confident if any issue is placed squarely before them they will do what is right in the matter.

A resolution was passed that before the session closed a committee of seven, of which five shall form a quorum, should be appointed to consider and deal with the question of mining laws.

The CHAIRMAN—From what I have seen in travelling through British Columbia, especially in the Kootenay districts, I am very much impressed with the vast—almost limitless—resources of your Province. Lately I have been impressed with something more than this. I was in London, England, about four weeks ago on business; one of the items was a matter of mining. I mentioned the matter to two of the leading firms in London, and I suppose you will hardly believe me when I say that neither of these firms had ever heard of Rossland or the Kootenay, and had a very vague idea of British Columbia. They were not small concerns, but had a paid-up capital of millions, and were handling gold properties in all parts of the world. To say I was surprised is mild—you could have knocked me down with a feather.

You should consider in what way you can best bring the real character of the mines and mineral deposits of British Columbia before the people whom you want to interest. It is not necessary to recapitulate the means often adopted, nor to tell you of the injury done to this, as to other Provinces, by ill-advised representation of us. There is much capital lying in banks practically drawing no interest, and the owners see but little chance of remunerative investment. Now, we should see what could be done to have some of it invested in our legitimate enterprises in British Columbia. To this end the Federated Institute is working. Mr. Bell has told you that our reports and papers are circulated among the leading mining societies of the States and in Europe. More stock will be taken in them than in all the advertising of a continent. Therefore it is really to your interest that the papers be written by competent, experienced and practical men. There should be no exaggerated reports, but the truth should be made known. There is no reason why we should hide anything—the truth is good enough.

The papers by Mr. Holdich, "Odd Notes on Mining and Smelting," by Mr. West on "Mining Machinery in the Slocan," and by Mr. J. C. Gwillim on "Notes on Some West Kootenay Ore Bodies" (all reproduced in last number), were then presented, after which a hearty vote of thanks was tendered to the Chairman, and the meeting adjourned.

ELECTION OF OFFICERS.

The members re-assembled at eleven o'clock on Thursday morning in the Hotel Badminton. The meeting proceeded to elect officers for the ensuing year, as follows:—

Past Presidents:

Mr. R. C. CAMPBELL JOHNSTONE, M.E., Slocan City, B.C.
Mr. S. M. ROBINS (New Vancouver Coal Co.), Nanaimo.

President:

Mr. W. A. CARLYLE, M.E. (British America Corporation), Victoria.

Vice-Presidents:

Mr. FRANK C. LORING, M.E. (Josie Gold Mining Co.), Rossland, B.C.
Mr. JOHN B. HOBSON, M.E. (Cariboo Hydraulic Mining Co.), Quesnelle, B.C.
Mr. R. A. HEDLEY, Hall Mines, Limited, Nelson, B.C.
Mr. WM. BLAKEMORE (Crow's Nest Coal Co.), Macleod, N.W.T.

Secretary:

Mr. HOWARD WEST, A.R.S.M., New Denver, B.C.

Treasurer:

Col. T. H. TRACEY, C.E., Vancouver, B.C.

Council:

A. H. HOLDICH, Nelson.	H. PERRY LEAKE, Revelstoke.
A. BUCKE, Kaslo.	W. J. R. COWELL, Victoria.
W. J. WATERMAN, Vancouver.	Major VAUGHAN, Vancouver.
J. D. SWORD, Rossland.	G. F. MONCTON, Vancouver.
A. J. COLQUHOUN, Vancouver.	

A vote of thanks to the retiring officers, and particularly to Mr. G. F. Moncton, who had organized the Association and carried on its operations as Secretary most efficiently, was adopted unanimously.

Mr. B. T. A. BELL said, before the meeting closed, he desired to submit a resolution which he was confident would receive the sympathy of every member of the Association. They were all aware of the painfully sudden death of the late Chief Magistrate of Vancouver, Mayor Templeman, and as a mark of respect he would move that the afternoon session stand adjourned until eight o'clock, and that the members attend the funeral in a body. The motion being carried unanimously the meeting adjourned.

EVENING SESSION.

The evening session at the Hotel Badminton was well attended, Mr. Blakemore again occupying the chair. The following were then elected delegates to the Federated Canadian Mining Institute for the ensuing year:—Messrs. W. Macgregor (New Vancouver Coal Co.), Nanaimo; Mr. G. F. Moncton, F.G.S., Vancouver; and Mr. John B. Hobson, M.E. (Cariboo Hydraulic Mining Co.), Quesnelle Forks.

NEW MEMBERS.

The following were then elected to membership:—

W. Perry Leake, M.E., Revelstoke.	W. Pellew-Harvey, Vancouver.
Capt. C. N. Black, Omenica.	Major Vaughan, "
W. J. Watson, Vancouver.	H. P. Walton, "
H. G. Mitchell, "	W. H. Gallagher, "
J. O. Norbom, "	B. T. A. Bell, Ottawa.
W. Blakemore, Macleod.	J. L. Parker, Rossland.
W. E. D. Dowlin.	

ASSOCIATE MEMBERS.

Mr. F. S. Taggart, Vancouver, B.C.
Mr. J. H. Sirett, "
Mr. T. H. Hardiman, "
Mr. Mortimer Lamb, Victoria.

HONORARY MEMBER.

Dr. A. R. C. Selwyn, C.M.G., Vancouver (late Director of the Geological Survey of Canada).

COMMITTEE ON LEGISLATION.

The following were elected a committee to consider amendments to the mining laws of the Province, and to frame any necessary alterations and make any representations they may think proper to the Government:— Messrs. A. Williams M.L.A.; A. J. Colquhoun (convener); W. H. Gallagher, F. C. Young, Major Vaughan, Col. Tracey, and W. Blakemore—five to form a quorum.

A paper was then presented on "Practical Cyanidation of Tailings and Ores," by Mr. A. S. Edgecombe (which we hope to reproduce in a future issue).

It having been decided to hold the next meeting of the Association either at Nelson or Rossland, at the option of the Council, the meeting adjourned.

The Mineral Products Co.

NEW YORK SYNDICATE ESTABLISHES FERRO-MANGANESE WORKS AT HILLSBORO, NEW BRUNSWICK.

In connection with the views, reproduced elsewhere, of the manganese property and plant now operated at Hillsboro, New Brunswick, by the Mineral Products Company, the following particulars of this important new enterprise will be of interest to our readers:—

The company is incorporated under the laws of the State of New York. Hon. F. C. Sayles, of Pawtucket, R.I., is president; F. C. Sayles, jr., of Providence, R.I., treasurer; Dr. Edwin F. Ward, of New York, secretary; Russell P. Hoyt, of New York, general manager; N. M. Langdon, of New York, superintendent of works.

The company began operations in Dawson Settlement six months ago, and have spent about \$50,000 in purchase of land, clearing it up and erecting their plant. They have had about forty men employed until lately, when they were laid off to await the beginning of operations in the works themselves, which will start now in a very short time, and be run night and day, employing thirty hands or more, and treating probably a hundred tons of ore per day.

The company own 400 acres of land, on 17 of which the ore is found under a thin coating of soil or vegetable matter, and extending to a depth of 5 to 30 feet of the ore, which can be got out by merely shovelling it into the cars. The deposit lies on a hillside, with a slightly higher elevation behind it and a deep gully running along its base. The place was covered with a

thick growth of bush. Seventeen acres of this has been cleared and the stumps taken out and drained. The ore lies in a bed of varying thickness all over it.

This bog ore in its natural state contains about fifty per cent. of water, and this of course must be got out. When that is done the result is a powder, black in color and about as fine as flour.

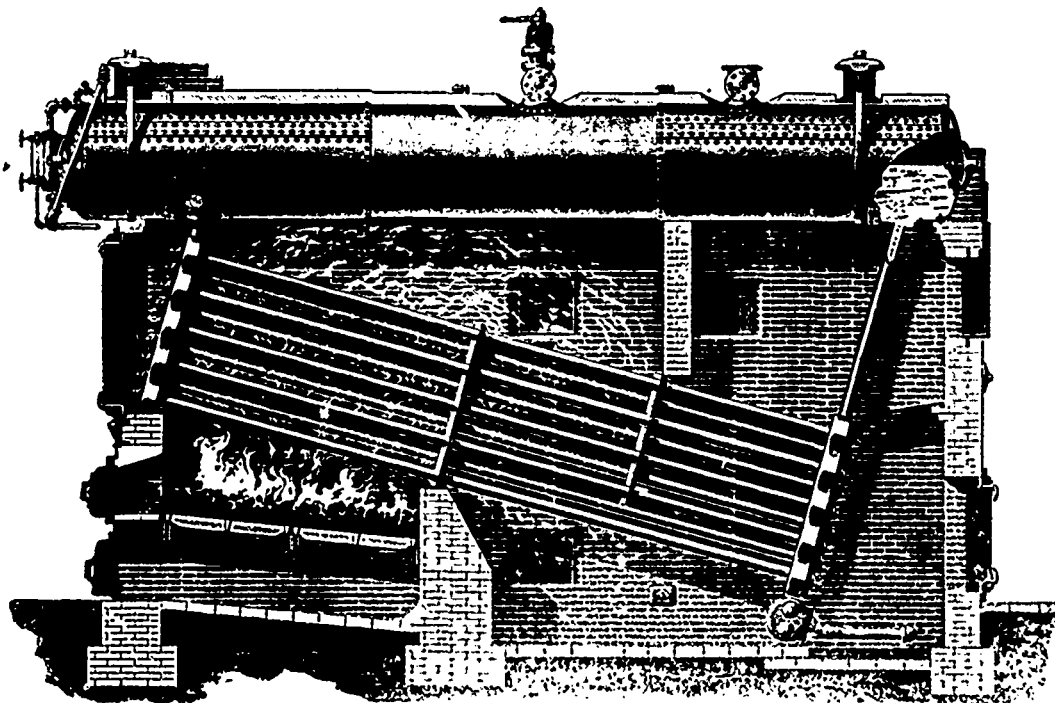
The company have erected their plant at the foot of the hill that forms the ore bed, the lower side of the structure being on a level with the bed of the gully, where a branch railway comes right up to the back door. The building is 52 x 72 feet, with 30-foot posts on the upper side, and extending 16 feet lower on the side next the railway, being thus erected on the shoulder of the hill. The building is equipped with heavy machinery, specially made for the work. There is an 80 horse power engine and 50 horse power boiler. The "drier" is a brick chamber, 10 x 44 feet and 30 feet high, in which there is a revolving cylinder of half inch iron, five feet in diameter and 28 feet long. The process through which the ore must pass is a very interesting one. It goes in as rough ore, looking to the unpractised eye not very unlike any other blackish colored fine earth, and it comes out in the form of a hard, black, cylindrical brick, three inches in diameter and two and a half inches long.

The process is not easy to understand without being seen, and even then of course the secret of the process by which the dried powder is cemented together remains a mystery, known only to the company who control it. The ore is brought in little tram cars from the ore bed, a distance of only 600 to 1,000 feet, and running into the building, is dumped on a platform on a level with the feed-hopper of the revolving drier already spoken of. It is shovelled into this hopper, and the revolving drier, which is kept heated by wood or coal fires, carries it to the back end of the brick chamber, where it drops into a spiral conveyor, which carries it out of the chamber to the boot of a bucket elevator, by which it is elevated to the top of the building, some thirty odd feet, where it passes through a revolving screen. The fine ore sifts through the screen into what is called the dry ore bin. The coarser part, which will not sift through, goes on and out of the farther end of the revolving screen, and is carried from thence down into a grinder, which grinds it up fine, and it is then carried back again to the boot of the elevator and up again to the revolving screen, through which this time it sifts without difficulty into the dry ore bins.

But this is not all. Above the brick drier is a dust chamber with a V shaped bottom, provided with a spiral conveyor. Any fine ore passing off from the drier along with the steam or gases, settles in the bottom of the dust chamber, and is carried out by the spiral conveyor and passes to the boot of the elevator and up to the revolving screen and into the dry ore bin. Thus every bit of the ore is saved. The steam and gases pass away through two smoke stacks rising from the dust chamber above the drier.

The ore from the dry ore bin is drawn into a mixer, where it is mixed with a suitable "binder," the purpose of which is to cement the powder

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together. The mixed material is then carried up to a sufficient height to pass in at the top of the briquetting machine, a very complicated piece of mechanism, from the bottom of which the ore comes out in the hard cylindrical bricks or briquettes already described. These briquettes are carried to a pocket on the level of the railway, with capacity to store 250 tons, and from here the ore is shipped on cars to be taken to the company's blast furnace at Bridgeville, N.S.

The company would have erected a blast furnace at Hillsboro, but there was some difficulty in getting a site, and they leased the furnace at Bridgeville, N.S., which, along with a fine belt of hardwood, happened to be on the market. The briquettes will be taken by rail to Bridgeville, converted into ferro-manganese, and from there can be shipped to steel works in any part of the world.

The company have had the property examined and reported on by seven of the best experts in the United States and Canada, and the ore analyzed by ten of the principal steel makers and prominent chemists of the United States; and the result shows that the ore deposit is a valuable one. The analysis is as follows:—

	Per cent.
Metallic manganese.....	48.24
Metallic iron.....	5.70
Sulphur.....	0.096
Phosphorus.....	traces
Silica.....	1.83

This analysis was made on the dried mineral at 212 deg. Fahr. The value of the ore is shown by the very slight proportion of phosphorus and sulphur. No process has yet been discovered that will eliminate phosphorus. When an ore contains more than 0.10 per cent. of phosphorus or more than 12 per cent. of silica, the price is scaled down in proportion to every unit above these figures. The Albert county ore is thus a very valuable one if it can be successfully prepared for the blast furnace.

The ore is covered by a few inches of vegetable matter. A cubic yard of the ore weighs 1,000 lbs.

Besides erecting their plant the company have built a branch line of railway from the works one and a half miles to Stony Creek on the S. & H. Railway. The latter connects with the I. C. R. at Salisbury, eleven miles away, over which the ore is taken to Bridgeville and which connects the works with the Grand Trunk system and practically with the railway systems of the continent. It is only five and a half miles from the works to Hillsboro, where, at a wharf which the company proposes to construct, vessels of 1,000 tons can lie, and thus they will have direct water communication with Boston, New York, Philadelphia and other American ports, and also with Europe

by vessels which come there to load lumber. The vessel rate of freight of U.S. ports is \$1.50, and to British ports about the same.

When the works are in full operation, running night and day, they will employ about thirty men, and expect to ship about fifty tons of briquettes per day to the blast furnaces. Mr. Langdon, the superintendent of works, has had long experience in manganese working in New York State, and his inventive skill has been utilized in adapting the briquetting machine to its present purpose. There has been some difficulty in getting this new machinery properly adjusted and the "binder" effectively mixed with the ore. Machinery practically does it all, from the time the ore goes into the hopper of the revolving drier until the briquettes come out. The building is equipped with an elevator connecting the floor where the briquetting machine stands with the storage room beside the railway.

The market value of ferro-manganese to-day is \$16.50 per ton. Two tons of the bog ore will make one ton of ferro-manganese, which is the only material that will successfully purify steel. It is imported by steel works from South Africa, Spain, Cuba, Mexico and Japan, and is not therefore found in quantity in any country, the bog ore so far as known only in New Brunswick. In Canada the returns show that only twelve tons were produced in 1896.

MINING NOTES.

British Columbia.

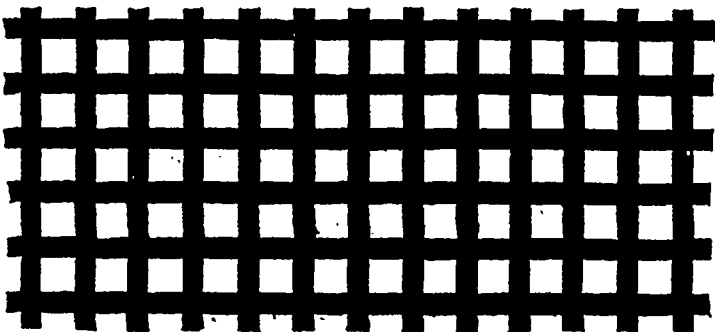
NELSON DISTRICT.

All indications point the same way as far as British Columbia is concerned, for though the Klondyke may entice a good many from comparative comfort to desolation and misery, yet very few of those interested in the wide Kootenay district will care about missing the bone for the sake of the shadow. And this rush to the newly found gold fields will not do any damage at all to the coast cities of British Columbia, as from all accounts even sleepy Victoria has waked at last and begun to bestir herself to attract some of the trade that is certain to be produced this spring.

It certainly seems odd that some of the United States newspapers still persist in telling their readers that Spokane, Wash., is the best place to outfit; possibly it is due to ignorance of geography on the part of the writers, but the statement cannot be excused on that ground, as all who do outfit in the States will find to their cost when they begin their long journey through Canada towards the frozen north.

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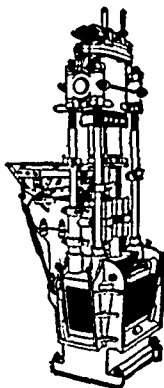
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CHICAGO, ILL.

Turning again to British Columbia, and to West Kootenay in particular, it is very cheering to note the advance that has been made during the past year. The C.P.R. have built a branch road from the Nelson and Robson line into the Slocan, terminating at present at the south end of Slocan Lake and affording another route from Nelson to Revelstoke by the lake and the lately constructed Nakusp and Slocan Railway. This line, short as it appears, is most valuable in opening up the district and enabling claim owners to ship consignments of their ore to the Nelson smelter at a reasonable rate. Already advantage has been taken of the assistance so provided, and small parcels of ore are now being constantly received and treated at Nelson.

The Hall Mines, Limited, have declared and paid a 10 per cent. dividend on their ordinary stock, as was promised by the directors, and there are rumors of another equally good at a not far distant period, which hope, if fulfilled, should raise the value of the shares considerably. The smelter has proved one thing conclusively: that is, that ore of no more than \$14.00 a ton can be treated at a profit under certain conditions. But it will not do to go away with the idea that all \$14.00 ore can be profitably smelted; it depends chiefly on the composition of the gangue, which in the case of the Silver King ore is almost self-fluxing, a little limestone being all that is added as a rule to form a fusible slag.

The smelting plant proper at the Hall Mines now consists of two water jacket furnaces, capable of smelting respectively 120 and 250 tons of ore daily in addition to fuel and fluxes; also two large calciners or roasting furnaces in which to prepare certain ore and matte for further treatment, and two reverberatory furnaces for converting the matte into copper. In addition to this, there is the large and well equipped sampling department, and all the usual plant for electric lighting.

I am not aware that the city of Nelson was ever asked to bonus the erection of a smelter here, and on the face of it such an application made to any city savors somewhat of "unlimited gull."

It is reported also that attention has been turned towards the rich iron deposits in British Columbia, and that a strong company is in the course of formation to develop these deposits and convert the ore into metal. Such a company ought to be very successful financially, and though the operations will not affect West Kootenay particularly, it will be all for the great and permanent benefit of British Columbia.

At Ainsworth much more work has been done during the past few months than for some time before, and as the mines are more developed it seems the ore improves in many instances. Take the Tariff mine for example, where the ore is now 3½ feet wide at the 300 feet level, while at the surface the vein was but 18 inches. Nor has the ore decreased in value, as the owners claim it now runs about 50 ounces silver per ton with 75 per cent. lead, and naturally regard it as a very valuable property. The Lucky Jim is also doing very well and shipping nearly 100 tons daily.

On Toad Mountain, work will be continued all through the winter on the Delight group, from which very good assays have been made, and also

the Morning and Evening claims. This latter group has been sending ore to the Nelson smelter pretty steadily, as also has the Athabasca, the California, and one or two more. Toad Mountain will be very much heard from next season, and while the Silver King naturally is by far the biggest mine yet, there are many of the others that will probably surpass it in the value of their ore; they are but small now, but the indications are surprisingly good.

The Fern mine (on Hall Creek) has had another clean-up, and the results are considered very satisfactory, the yield being nearly \$10,000 in bullion, besides some \$3,500 in concentrates and ore shipped, from some 1,250 tons of ore treated. A cyanide plant is expected to be in operation shortly, and with additional stamps there should be a greatly increased yield. The ore bodies are still continuous and assay well, so that this mine certainly ought to be all right.

On '49 Creek (near Nelson) the Referendum group is having a 10-stamp battery erected to treat the ore, which the manager says is increasing and improving the more it is developed. Another very promising prospect is the King, which is said to carry much "grey copper" (that convenient name for anything that *isn't* copper) and gold also, but hardly enough work has been done yet to enable one to speak confidently.

The Northern Light group on the same creek is more developed, and is showing up very well indeed, many samples showing free gold.

Going south from Nelson, we must mention the Ymir district, referred to last month. Some surprisingly rich strikes have been made lately, especially on the Summit mine, from which ore assaying as high as \$2,500 in gold is reported. No need of Klondyke after that, surely!

The Independence mine—same district—reports ore assaying \$76 in gold and 7 oz. silver, which is not too bad; whilst the Dundee group is still showing up well and development work is being steadily performed; the ore carries lead, gold and silver, and is valued from \$50 to \$100 per ton. A first rate find of free gold is reported from Porcupine Creek (in the neighborhood), and specimens brought down unquestionably bore out the statement; and as the Ymir mine itself is working in a vein 25 feet wide, of which 12 feet is shipping ore, it is plain that this particular district has a great future before it.

During the month of December there was a greater value in ore matte and bullion passed through the port of Nelson than ever before, the total value for that month being recorded at \$337,000; October ran a close second with \$335,000; and the total value for the whole preceeding twelve months (including some \$720,000 sent through Revelstoke) is about \$8,400,000, which is a highly creditable showing. What we shall be able to say about these matters and figures next year must be a matter of conjecture to a great extent, but if the value is not more than doubled it will surprise a good many who have good grounds for thinking that will be the case.

A. H. H.

Nelson, B. C., Feb. 16, 1898.

CALEDONIAN IRON WORKS

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NEW DENVER.

The outlook is quiet in the Slocan as compared with last year, notwithstanding the fact that the production advances in an ever-increasing ratio. This may be attributed to several causes, the most noticeable being that last winter there was a tendency to emulate Rossland on a small scale by booming matters. The country has lost very little by the removal of certain individuals of the inflammable type to what they evidently deem more inviting quarters, namely, the Klondyke, and while we look to a partial diversion of capital originally intended for Kootenay, to the land which is popularly considered in the light of a panacea for all ills that flesh is heir to, yet the fact that a large surplus is bound to be available for investment in British Columbia after the first rush is over, forms a considerable item in our calculations, and we look for corresponding activity later on.

Various adverse comments and reports have been current for some time now regarding the Slocan Star; the expense recently incurred by the management in increasing the capacity and efficiency of the concentrator would, however appear to give the lie to these rumors and should suffice to allay all suspicions. The outside world may rest assured that the famous Star has as yet barely passed the initial stages and there is at the present time an enormous reserve of ore to draw upon. An uninterrupted continuation of clean, high-grade ore is a little too much to expect of any mine; there is bound to come a time sooner or later when a less valuable concentrating product will constitute the bulk of the output. Such ore is the acknowledged backbone of the mining industry the world over, and is not likely to prove an exception in the Slocan.

There is nothing small about the Reco! Another hundred thousand dollar (\$100,000) dividend was declared last week, making the total to date \$287,000.

Negotiations are pending for the sale of the Whitewater to an English syndicate. This property is known as one of the largest producers and most prosperous mines in the Slocan. The daily output approximates to 40 tons, and substantial dividends are being declared with gratifying regularity.

The unbounded success of the sampler at Kaslo appears to have stimulated further efforts in the same direction. At Rosebery, four miles above New Denver on Slocan Lake, the ground is now being cleared preparatory to the erection of works similar to those at the place above mentioned. The advantages which will accrue to prospectors and mine owners in a small way are so manifestly obvious that there is no need to dwell on them here.

The Queen Bess, transferred by bond to a London syndicate, bids fair to uphold the name and fame of this district across the water. On a recent visit to the mine I was fortunate enough to behold over six feet of sparkling galena in one of the cross-cuts.

The Fidelity continues to look well, showing a foot of galena in its lowest workings. It makes periodical shipments to the Nelson smelter, the average value obtained being in the neighborhood of three thousand dollars per carload. This property, you will remember, was discovered by the merest accident—like many others in this district—an uprooted tree, serving to reveal the clean ore. If I may venture the opinion, I would say that the hill on which this claim is situated is destined to become of immense service to New Denver when thoroughly exploited. On the other side of it are located many of the finest mines we possess, including, amongst others, the Slocan Star, Ruth, Alamo, Idaho, Queen Bess, Alpha and Mountain Chief—a formidable array indeed. Unfortunately for the prospector, the western slope is overlaid with several feet of surface soil and debris, which renders it very difficult to locate the veins. The iniquitous mining laws moreover permit of the whole mountain-side being covered with stakes and a minimum (in most cases next door to none at all) of work done to prove the productiveness of the ground. The success which has so far deservedly attended legitimate development gives promise of great things in the future.

Times are quiet around the lake, but not more so than is usual at this season. Among the many shippers in a small way may be mentioned the Comstock, Vancouver, Fidelity, Silver Nugget, Two Friends, Republic, Chapleau, Alberta, Howard Fraction, and Cameronian. The Enterprise, on Ten Mile, is exceeding all expectations. Forty men find constant employment, and a contract has been let to haul 500 tons of ore a month to the lake where it will remain until the spring. To date over 1,100 tons have been shipped to the smelter.

This is said to be the age of female advancement, and judging by the inroads they are making into territory formerly held sacred to the so-called lords of creation, the remark cannot be said to be without justification. One might with reason, however, expect that the profession of a "mining engineer" offered the minimum of scope for the display of female talent and learning, but it may be that in this as in other matters we are mistaken. Certain it is that news comes from the Boundary country of the visit of one who is described as a female mining expert. It is very evident that we shall have to look seriously to our laurels and not trust to physical obstacles and difficulties of transportation to shield us from competition as in the past.

HOWARD WEST.

BOUNDARY CREEK

An unusual number of properties are being worked at the present time. The drilling plant on the British Columbia is now at work, and before the snow leaves, the shaft will have attained a very satisfactory depth. Patsy Clark's bond on the Snowshoe was allowed to drop, but was immediately taken up by R. W. McFarlane, acting for an English company, for \$55,000. English money is being much more largely invested. A deal of very considerable importance has been made by English capitalists for the properties of

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the Republic Mining Co. These include the oldest locations in the district, on which about 700 feet of tunnelling and shafting have been done. They are the most important free milling group in the vicinity, and are in close proximity to Boundary Falls. The bond is for one year.

Another recent English investment is the Golconda group, which is bonded the British Columbia Development Co. for \$35,000. The ore is mis-pickle to quartz, carrying good gold values.

The machinery which was ordered October 1st by the Brandon & Golden Crown Co. has only just arrived, and has been refused by that company, as the shippers did not fulfil their contract as to place, and consequently date, of delivery. Freight for this district is nearly all handled at Marcus.

One of the largest transfers recorded is that of all Farrel & Migeon's (of Perrot smelting fame) interests in the district. About 15 claims are included, among them some of the best copper and gold properties here. The consideration was \$100,000 of which 25 per cent. was paid. The transfer was made to D. D. Mann & Mackenzie, of Toronto.

Fairview is an active camp. Excavations are now being made for a 20-stamp mill to be placed on the Okanagan River for the Dandy group, which is owned by the Fairview Co.

The first clean-up at the Tin Horn was not as satisfactory as was expected, but as they have plenty of ore and the property can no doubt be made to pay when they get on an economical basis.

The ores of Fairview camp are all free milling, and it will not take long for the sure to be made or marred.

GEO. A. GUESS.

Nova Scotia.

We are pleased to hear that our old friend, Mr. John Anderson, has made a rich strike at East Chezzetcook, and has bonded the property to an English syndicate.

We understand that the Nova Scotia Steel Company has bonded a big site at Louisburg, in contemplation of starting a pig iron and steel works, where Gape Breton and Newfoundland coal will be used.

The People's Light and Heat Co. have torn down the Slocum ovens, and are replacing them by Simmet Solway ovens.

The New Egerton Mining Co. propose putting in a water power plant to work their new mill. The ground has been surveyed for this purpose.

The Withrow mine, at South Uniacke, has been showing wonderfully consistent returns, and has averaged about 120 ounces per month since last April, while the ore averages over an ounce per ton. The company are working a lead running parallel to the famous "Golden Lode" vein.

The case before the Commissioner of Mines of the Cheticamp Gold Mining Co. and Oland has been decided in favour of the former Co., and we hope to see active work re-started on the galena lead in the near future.

The Caribou Gold Mining Co. produced during December 61 oz. from 102 tons of ore. We hear that this company propose putting in concentrators.

The concentrators at the Central Rawdon mine are producing a good concentrate, which is being shipped to the States and smelted.

W. H. Cashens mill at Lipsigate returned 125 oz. 10 dwt. from 196 tons of ore.

The Hurricane Point Gold Mining Co. is pumping out the Palgrave mine, with a view to restarting operations there.

J. W. Baker returned 78 oz. of gold from 11 tons from his mine at Chester Basin for the month of November.

The Cow Bay Mining Co. have let their mine on tribute for 12 months.

Dr. Cogswell is getting out some good ore from his mine at West Chezzetcook.

A trial run of 3 tons of ore from the Thompson Bros. mine at Cow Bay gave 16 oz. of gold.

A find of gold is reported at Geizers Hill, about three miles from Halifax. It is stated that a trial run of one ton gave six pennyweights, eight grains.

Quebec.

The mineral exports from the port of Ottawa during the year 1897, from returns furnished to the REVIEW, show:

Mica	\$100,000
Graphite	1,274
Phosphate	450
Felspar	4,492
Galena	1,800
Asbestos	210

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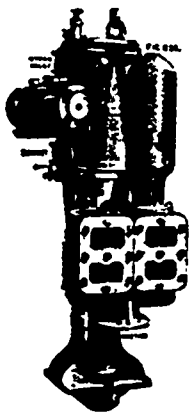


Fig. 620—"Griff"
Sinking Pump.

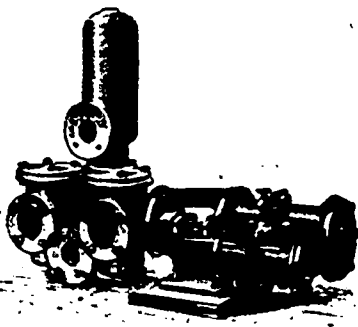


Fig. 598—"Cornish"
Steam Pump
for Boiler Feeding, etc.

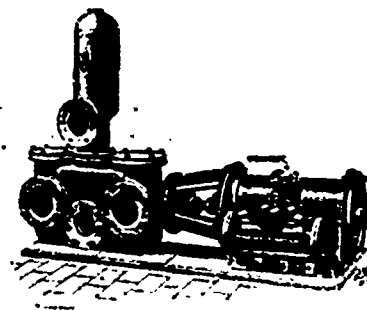


Fig. 600—"Cornish"
Steam Pump
for General Purposes.



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

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About 50,000 tons of asbestos and asbestic were mined by the Asbestos and Asbestic Co., Ltd., at Danville, Que., in 1897.

The slope of the Eustis pyrites mine, at Eustis, is now down 2,300 feet. 130 persons are employed, all the ore being shipped to the United States. The deposit at this depth shows a thickness of 20 to 25 feet.

During the year the same company employed a small force on the Hepburn mine. Three shafts, each down 100, 60 and 45 feet, have been sunk in a nice ore deposit sometimes carrying from 6 to 14 per cent. copper.

The Albert pyrites mine of the Nichols Chemical Co. is now opened to a depth of 2,000 feet, and shaft No. 4, 700 feet. About 150 persons are employed mining and in the reduction and acid works.

At Templeton the Blackburn mine has a force of 40 men mining mica. A large quantity of high-grade phosphate is also being cobbled for the European market.

The new Rockland Slate Company continues to operate their extensive pits on much the same lines as former years, the annual output being about 10,000 to 15,000 squares for roofing purposes. The mill product includes slates for billiard tables, flag stones, school slates, water tubs, etc. About 120 persons are employed.

Rumors are afloat of an important asbestos combination at Thetford, Que., but no particulars are available at this writing.

The Sills Mica Company of Chicago has opened a factory at Ottawa.

In his Report for the year 1896-97, Mr. Obalski, Inspector of Mines, calls attention to the interpretation of the Mines Act in so far as the rights of the Crown relates to the Beauce gold areas. He says:—"The right to mines of gold and silver belongs to the Crown throughout the whole province and extends to all lands which have not been conceded for that purpose (Art. 1426). In Beauce, there are only the seigniory of Rigaud-Vaudreuil and some lots on the different rivers which have been so alienated, that is to say, that the right to the greater part of this territory still belongs to the Crown. When the land has been sold, or upon the other seigniories, whatever may be the dates of the patents, the actual proprietors or the censitaires have the first privilege to purchase or to lease these mines, but they may be expropriated if they refuse to exercise their rights.

There are in Beauce a certain number of lots of land which were formerly worked under the license system, but the mines have not been thereby alienated, and the so-called reserves made by persons selling their lands have no value as against the Crown. For example: A. occupied a lot which he sold to B., who in turn sold it to C. If the mining right, at the time of the original patent, belonged to the Crown, the reserve of the gold or silver or of the right of preemption, made by C. or B., has no value, any more than the pretended rights of the companies which worked these lots under license, and to-day the Crown alone owns the right to the gold and silver and C. alone has the right to purchase, unless he has disseised himself of that right, in favor, for example, of X., and in this case, even if C. sold to D., the Crown would only consider D. as holding the right of preemption and not X."

Ontario.

At the Foley, the north shaft, which is now 315 feet deep, will be extended indefinitely. The vein here is 3 feet wide and well up in gold. At the 300-foot level drifting is being done in a vein which, at 125 feet from the shaft, has developed to 6 feet wide. This large body of ore is the continuation of an immense shute or zone that extends from the surface downward and appears to be widening longitudinally, or upon the strike of the vein, as greater depth is reached. In the spring, No. 5 shaft will be driven deeper upon its vein and a crosscut made into three other veins laying parallel to it.

The following returns of the mineral shipments over the Quebec Central during the year 1897 have been kindly furnished by courtesy of the Passenger Department of that railway:

SHIPPING POINT.	LIME.	BRICK.	FLAG STONE.	ASBESTOS	CHROME ORE.	COPPER ORE.	GRANITE.
Coleraine .....	.....	.....	.....	.....	28,480	.....	1,026,000
Ascot .....	.....	17,852,900	.....	.....	.....	.....	1,026,000
Dudswell Jet	10,157,400	.....	2,144,000	.....	8,832	40,100	.....
Dudswell .....	.....	.....	.....	.....	5,150,225	.....	.....
Garthby .....	.....	.....	.....	.....	.....	.....	.....
Black Lake .....	.....	.....	.....	1,020,425	.....	.....	.....
Thetford Mines .....	.....	.....	.....	16,110,635	.....	.....	.....
Broughton .....	.....	.....	.....	.....	.....	.....	.....
Lake Weedon	30,000	.....	.....	.....	.....	.....	.....
Tring Jet	60,000	.....	.....	.....	.....	.....	.....
St. Joseph	2,000	.....	.....	.....	.....	.....	.....
St. Samuel
Lbs.	10,249,400	17,852,900	2,144,000	17,130,160	5,187,537	40,100	1,026,000



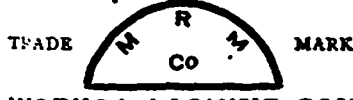
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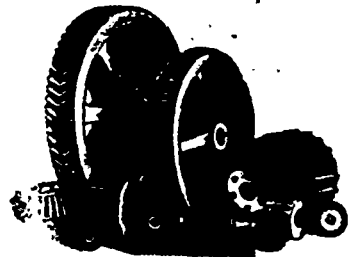
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Also a new shaft will be sunk upon another vein running between the above-mentioned shifts. The shaft upon the Lucky Joe vein will not be extended further. The new air compressor, located at the mill, is running satisfactorily, and the mill is running night and day.

Latest official advices from the manager of the Mikado reports the result of the last clean-up, 20 day's milling, to be 463 ounces of gold from 714 tons rock milled. It is safe to say that if the Mikado keeps up its excellent record it will easily head the list of Ontario's bullion producers in 1898.

The manager of the Hammond Gold Reef Mining Co. writes:—"I am pleased to say that the 'Reef' has so far made a very creditable showing. We have crushed 1,000 tons, or to be accurate, 978 tons, resulting in \$4.00 per ton from the plates, while the concentrates will give an average of another \$1.00 per ton, and it has been decided now to put on a large equipment, developing the water power, which engineers say is a splendid one, and generating electric power. We have been able to mine and place ore on the stock pile at 31 cents per ton, owing to the fact that we simply have to quarry it out. We feel convinced that with 50 stamps or upwards, driven by water power, we can mine and mill for very close to \$1.00 per ton.

The gold output for Ontario for the year 1897, it is estimated, will be close upon, but under, \$200,000. In this estimate, however, we omit the important operations of the Canadian Gold Fields, Limited, and other companies working in Hastings county, of whose returns no information has been obtainable. The output for this year should show a steady increase.

In our next issue we hope to reproduce another batch of photos illustrating the progress being made in mining and milling equipment in this province.

At the Olive mine, shaft A. is down 118 feet to a vein 3 feet wide at bottom. The east drift is 86 feet long, and here again the vein has reached the same width. In the west drift, which is 42 feet long, the vein has not widened. In the main the vein has strengthened remarkably and the ore throughout the mine has become more uniform in value. The stamp mill is running night and day, and for the first few days in December a clean-up showed an average of 10 ounces of gold per day. While this result was a lower average than the fall run, yet it showed approximately an average of \$40 per ton free milling gold, which is excellent considering that a large percentage of the country rock was stamped with the quartz. Mr. Preston reports that an air compressor with a capacity of 6 or 8 machine drills will be added to the mining plant as soon as possible.

At the property of the Ontario Limited, No. 4 shaft is now down 50 feet and No. 1 has reached a depth of 30 feet.

The Dodge Pulley Co., of Toronto, have recently issued a very complete work in the form of a 270-page book or catalogue on the transmission of Power, and their special lines which they manufacture exclusively for the Canadian trade. The Dodge Pulley is well known and needs no trumpeting, unless it might be to say that its construction was being from time to time improved upon as opportunity presented itself. It is not only their wood pulley, however, that the Dodge Co. are calling attention to, as their new catalogue now most completely sets forth a full line of most improved and up-to-date sundries, such as hangers, shafting, flange couplings, grim death couplings, safety collars, self-oiling bearings of all kinds, floor stands, mule pulleys, tighteneas, friction clutch pulleys, clutch coupling, leather belting, chain and sprocket wheels, elevator sundries, etc.—in fact a full line of power transmission machinery is now manufactured by the Dodge Co. at Toronto. The new catalogue contains standard lists on all lines, including iron belt pulleys and iron grooved pulleys for rope driving. It is certainly a most complete and handsomely gotten up edition and should be found useful to all mechanical men and managers of and buyers of machinery, and is mailed free with division sheet on application.



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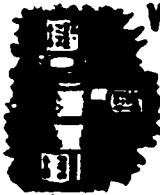
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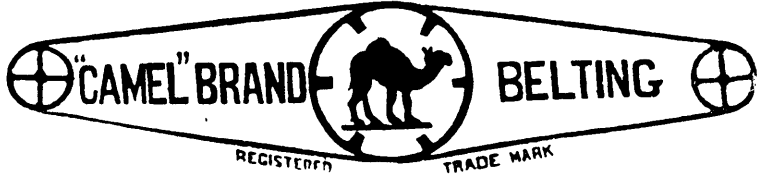
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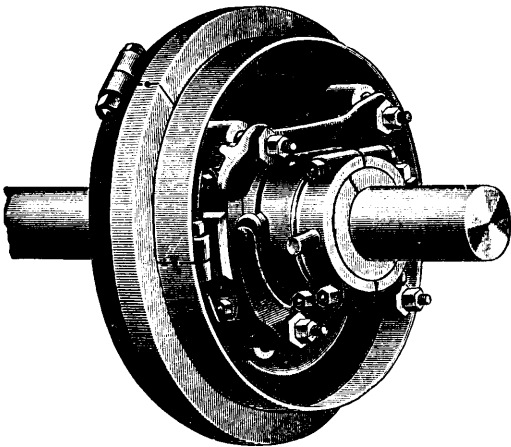
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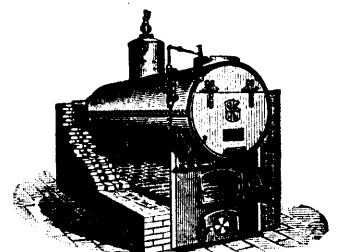
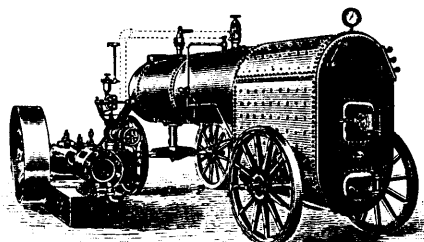
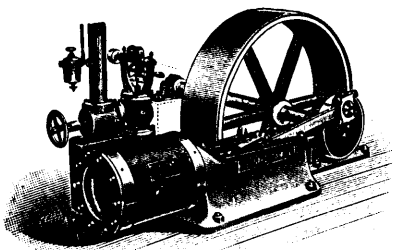
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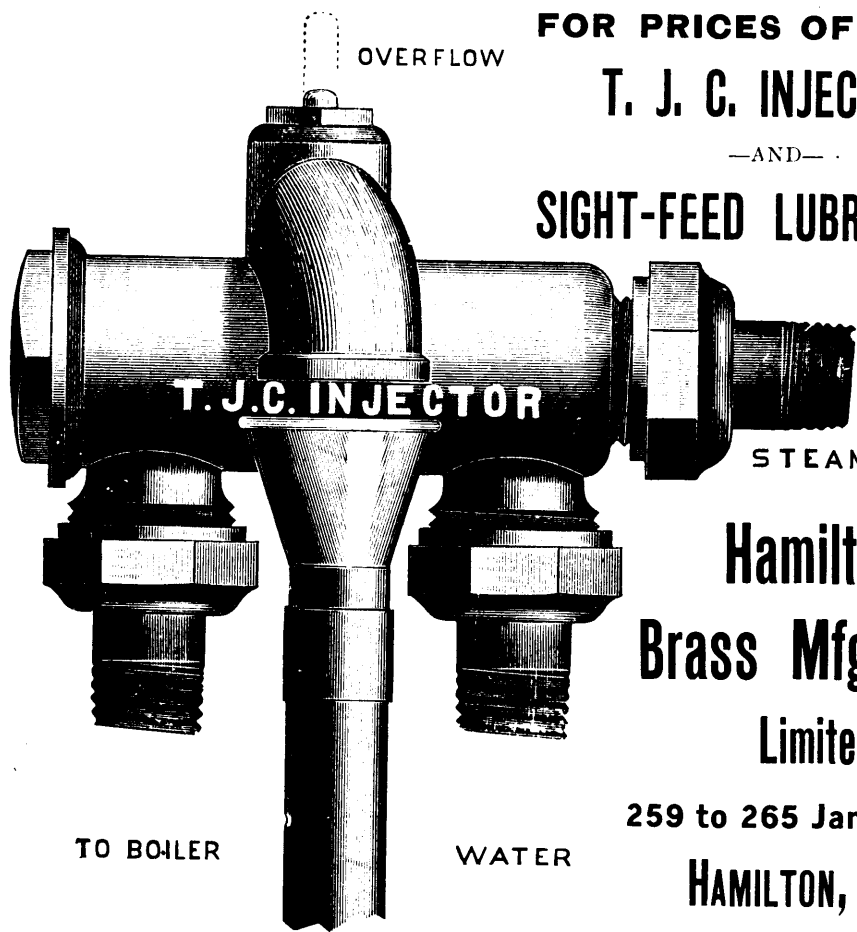


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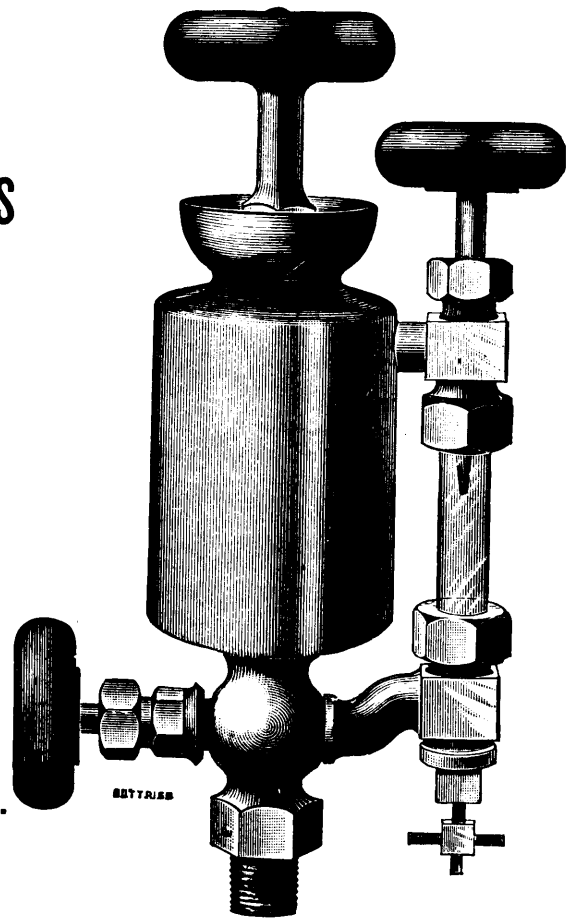


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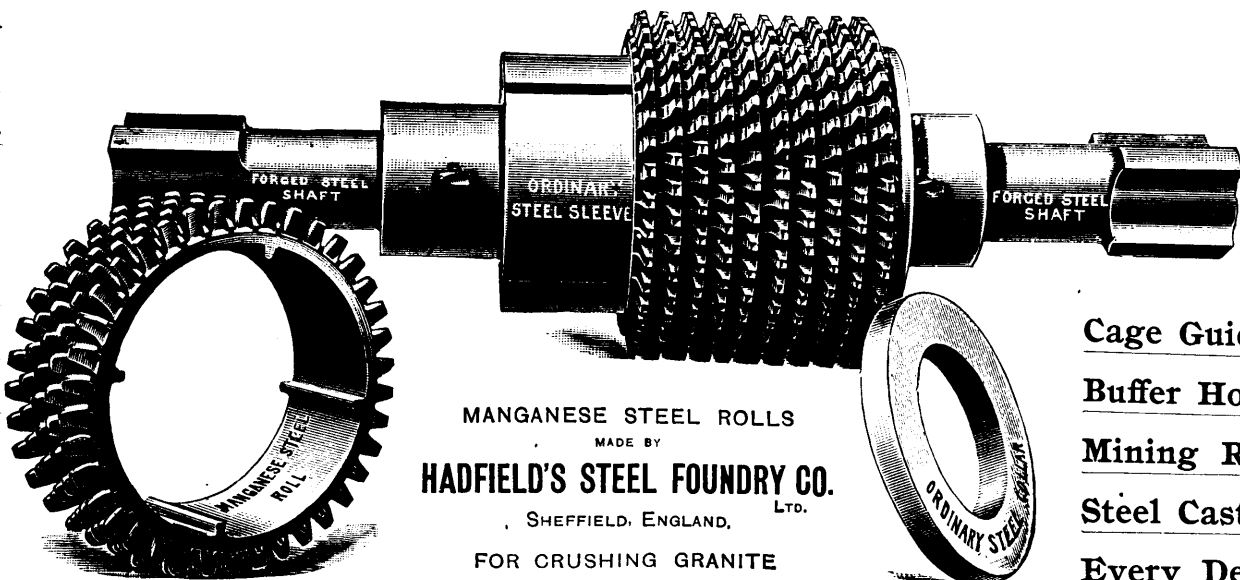


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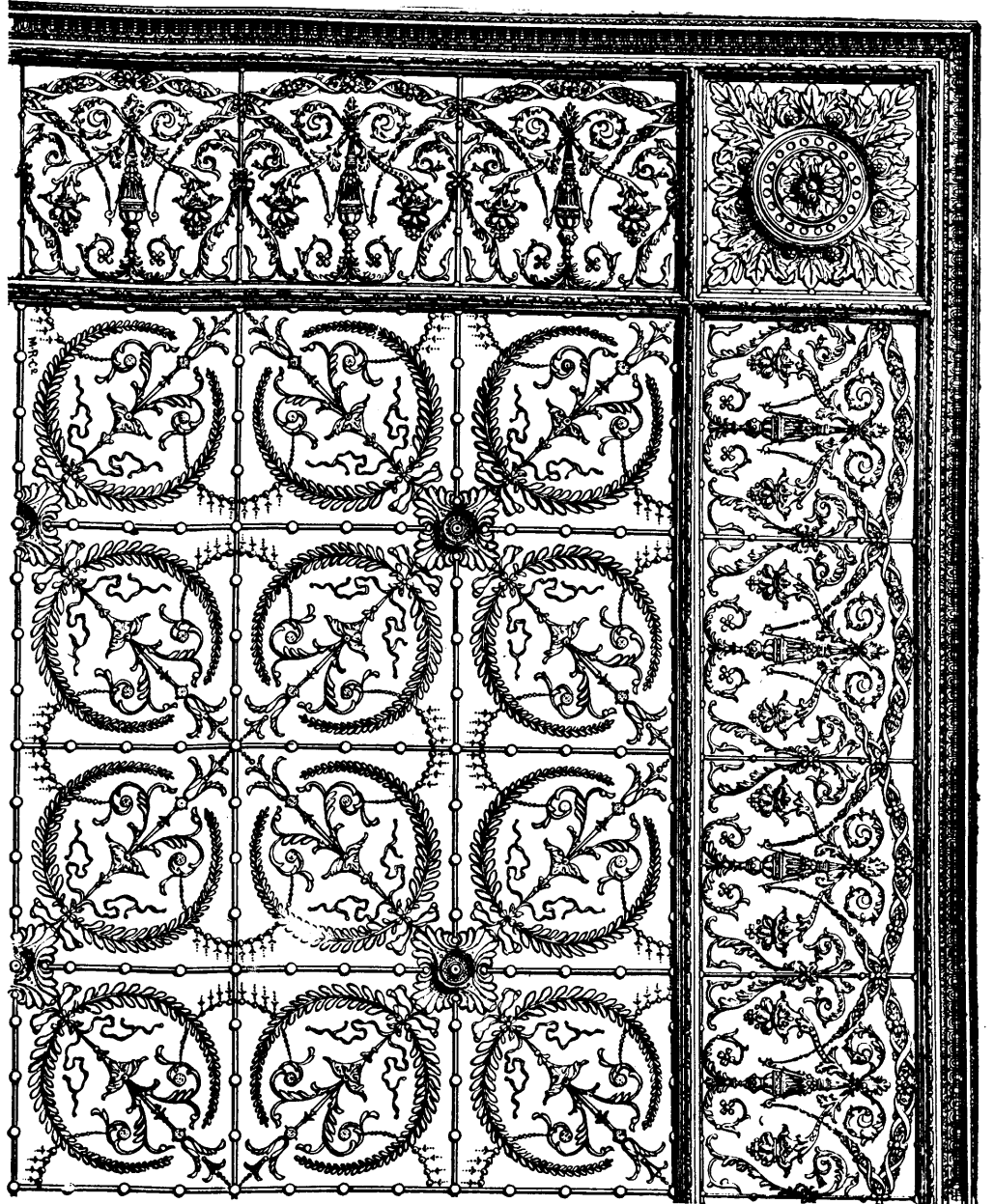
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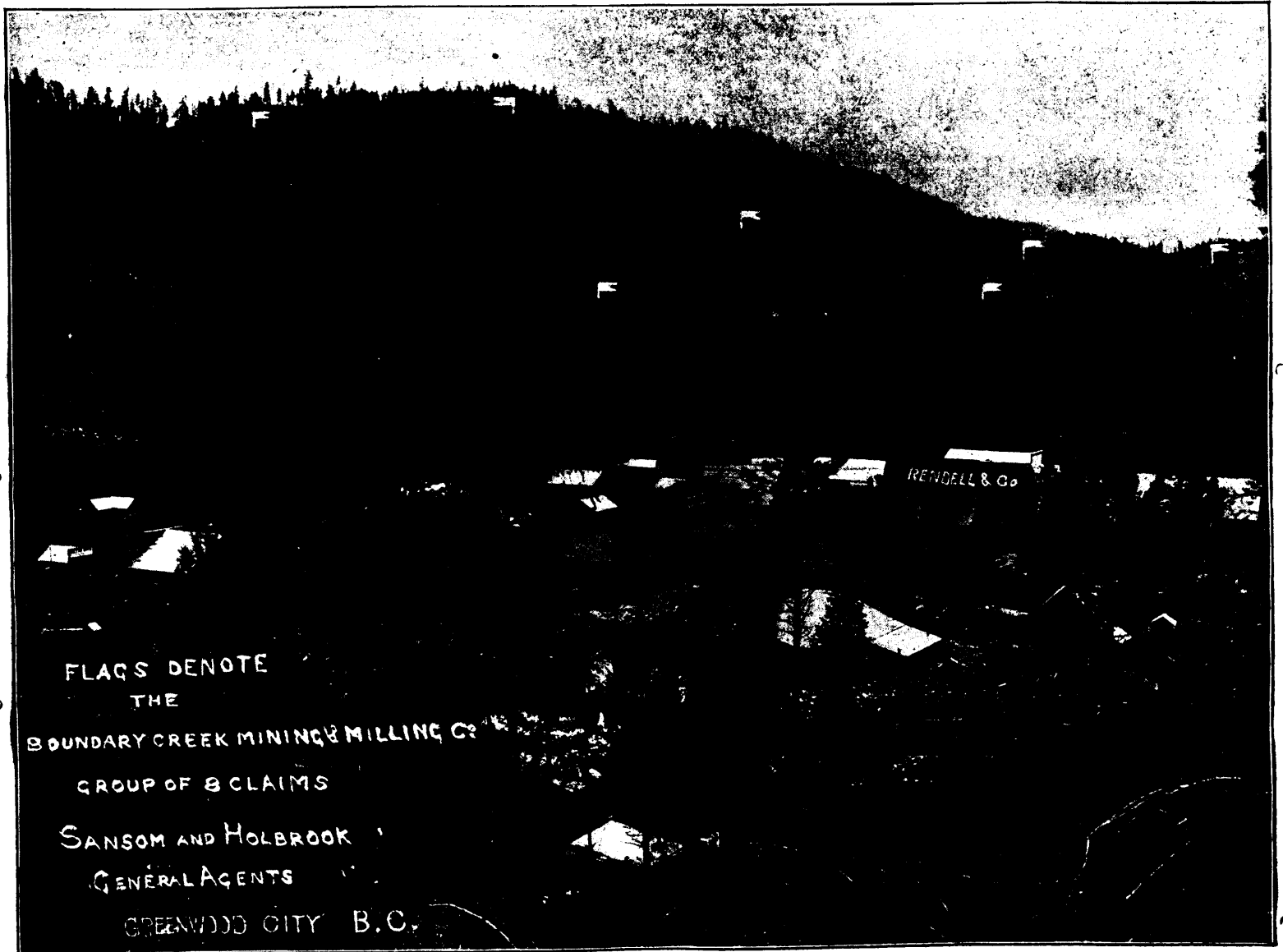
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CLAIMS—The G. A. R., D.A., O. B., S. H. B., J. A. C., FRED D., S. F., C.S. & H., D.H. and BIG LEDGE, constitute the group, which is the most compact and advantageously situated of any under one ownership in Boundary Creek. The proposed Columbia and Western R.R. being surveyed to pass right through Greenwood City and along the base of the hill.



FLAGS DENOTE
THE
BOUNDARY CREEK MINING & MILLING CO.
GROUP OF 8 CLAIMS
SANSOM AND HOLBROOK
GENERAL AGENTS
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From the above photograph it will be readily seen that, lying as they do on a steep sloping hill, the properties offer unusually good facilities for drainage and rapid and economical development, by main working tunnels driven in from the base of the hill.

The veins lie in the Granite Area—which occupies the upper part of Boundary Creek basin—along the line of contact with the more basic eruptives, and are among the oldest locations in the camp.

A small shipment of 8,653 lbs. was made to the Everett smelter in 1894, yielding per ton, Gold, \$103.15; Silver, 74-7-10 ozs.; Lead, two per cent., and a considerable amount of shipping ore is at present on the dumps of the different claims.

Careful investigation is earnestly invited by the Company, as their properties are being developed with a view to making mines and not to booming stock.

Attention is drawn to the large amount of stock (700,000 shares) put into the Treasury, and to the fact that the properties are all fully paid for.

150,000 Treasury shares fully paid up and non-assessable, have been put on the market at 10 cents, and most of the stock so far sold has been taken up locally. A large proportion of the miners now working are also taking stock in payment. For further particulars address

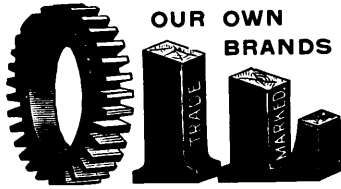
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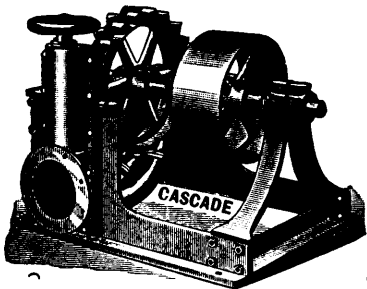
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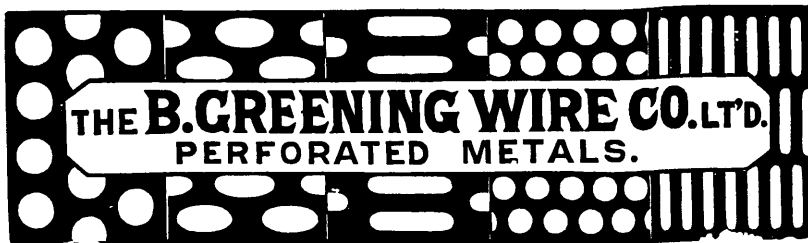
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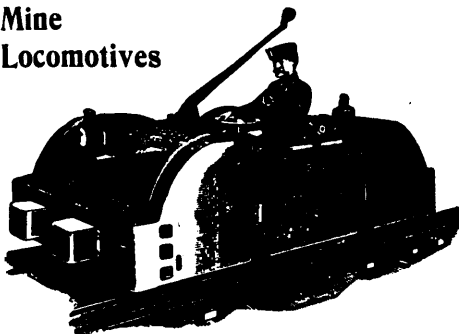
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On Wednesday, Thursday and Friday, 2nd, 3rd, and 4th March, 1898.

SYLLABUS OF PAPERS.

The following among others, will contribute papers for discussion:—

- | | |
|--|---|
| MR. HENRY S. POOLE, M.A., A.R.S.M., General Manager, Acadia Coal Co., Stellarton, N.S. | MR. ROBERT HEDLEY, Metallurgist, Hall Mines Ltd., Nelson, B.C. |
| MR. CHARLES FERGIE, M.E., General Manager, Intercolonial Coal Co., Westville, N.S. | MR. F. T. SNYDER, Ottawa Gold Milling and Mining Co., Keewatin. |
| MR. F. H. MASON, F.C.S., Halifax. | MR. H. H. PRINGLE, M. Inst. of C.E., Regina (Canada) Gold Mine, Rat Portage, Ont. |
| MR. C. A. MEISSMER, General Manager, Londonderry Iron Co., Londonderry, N.S. | MR. J. BURLEY-SMITH, Burley Gold Mining Co., Rat Portage, Ont. |
| MR. JOHN E. HARDMAN, S.B., M.E., Montreal. | MR. R. H. JONES, F.S.A., Mineralogist, London, Eng. |
| MR. GEORGE E. DRUMMOND, Canada Iron Furnace Co., Montreal. | MR. JOHN BIRKINBINE, M.E., Philadelphia, Pa. |
| MR. E. A. SJOSTEDT, Metallurgist, Montreal. | MR. SPENCER MILLAR, Am. Soc. C.E., New York. |
| MR. MILTON HERSEY, Ba.Sc., Montreal. | PROF. A. B. WILMOTT, McMaster University, Toronto. |
| MR. W. A. CARLYLE, M.E., Provincial Metallurgist, to the Government of British Columbia, Vancouver, B.C. | DR. W. L. GOODWIN, School of Mining, Kingston. |
| MR. JOHN B. HOBSON, M.E., General Manager, Cariboo Hydraulic Gold Mining Co., Quesnelle Forks, B.C. | MR. C. F. ANDREWS, Isaac's Harbor, N.S. |
| MR. A. H. HOLDICH, A.R.S.M., Nelson, B.C. | MR. JOHN RUTHERFORD, M.E., Ex-Inspector of Mines for Nova Scotia, Windsor. |
| MR. HOWARD WEST, A.R.S.M., New Denver, B.C. | DR. E. GILPIN, Inspector of Mines for Nova Scotia, Halifax. |
| MR. J. C. GWILLIM, Ba.Sc., M.E., Slocan City, B.C. | MR. C. C. HANSEN, M.E., Rat Portage, Ont. |
| | MR. LIONEL H. SHIRLEY, C. and M.E., Montreal, Que. |
| | MR. J. T. DONALD, M.A., Montreal. |
| | MR. FRANK C. LORING, M.E., Rossland, B.C. |

STUDENTS' SESSION.

A session for the reading and discussion of Papers presented by students of Mining Engineering, in competition for the prizes offered annually by the General Mining Association of the Province of Quebec, will be held on Tuesday Evening, 1st March.

ANNUAL BANQUET.

The Second Annual Dinner of the members of the Federated Institute will be held in the Windsor Hotel, Montreal, on Thursday Evening, 3rd March. His Excellency the Governor-General and other notable persons are expected to be present.

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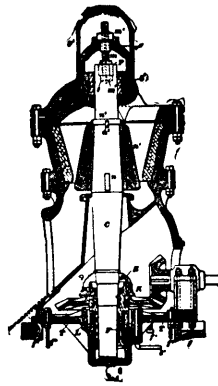
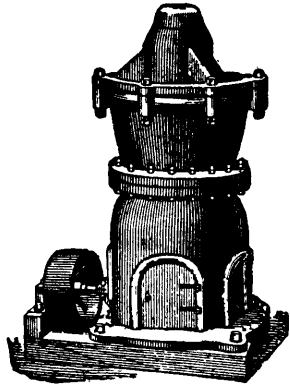
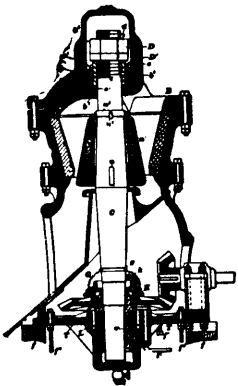
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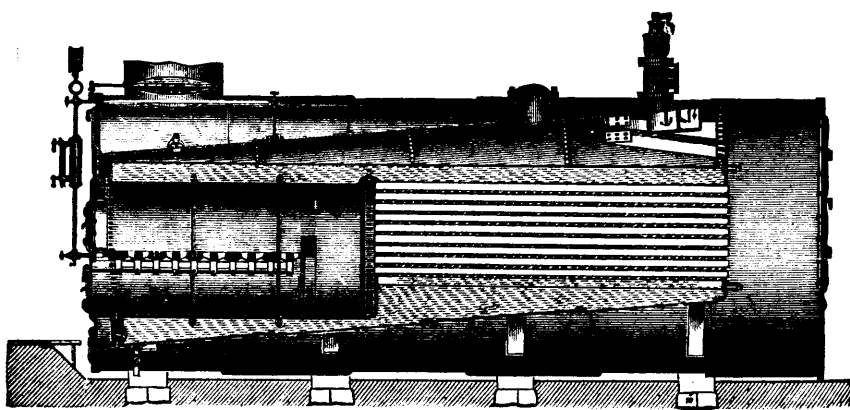
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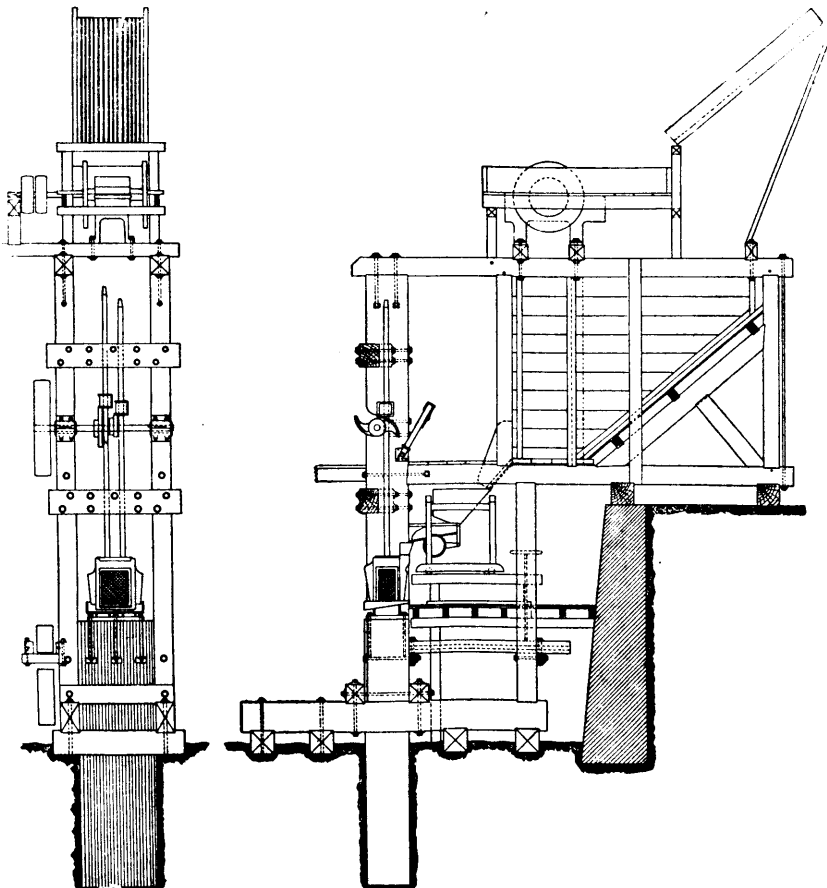
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