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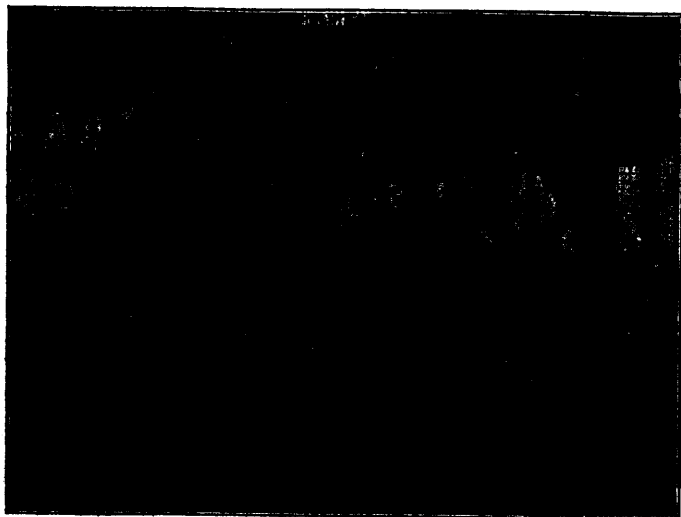
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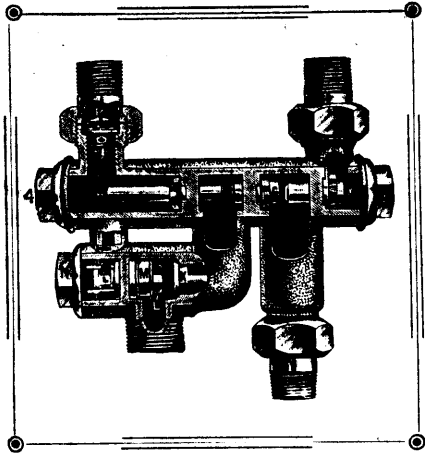
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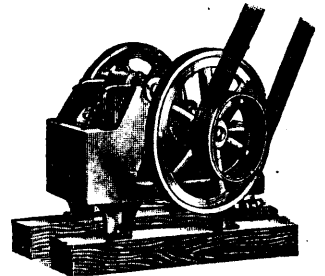
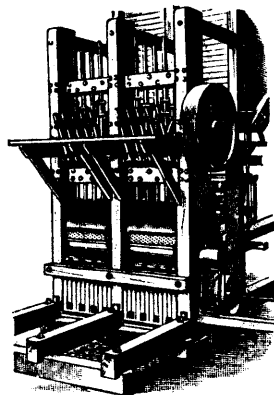
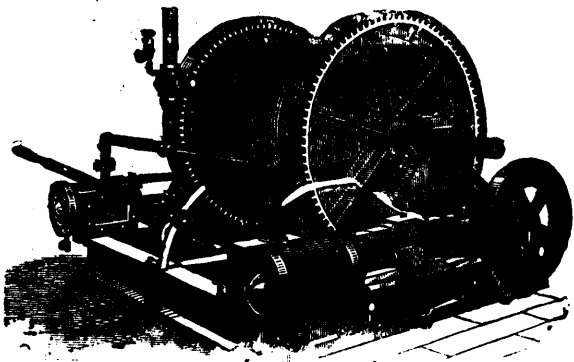
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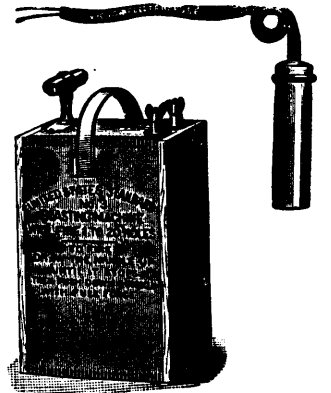
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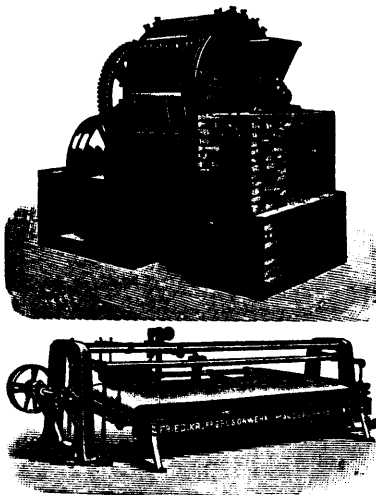
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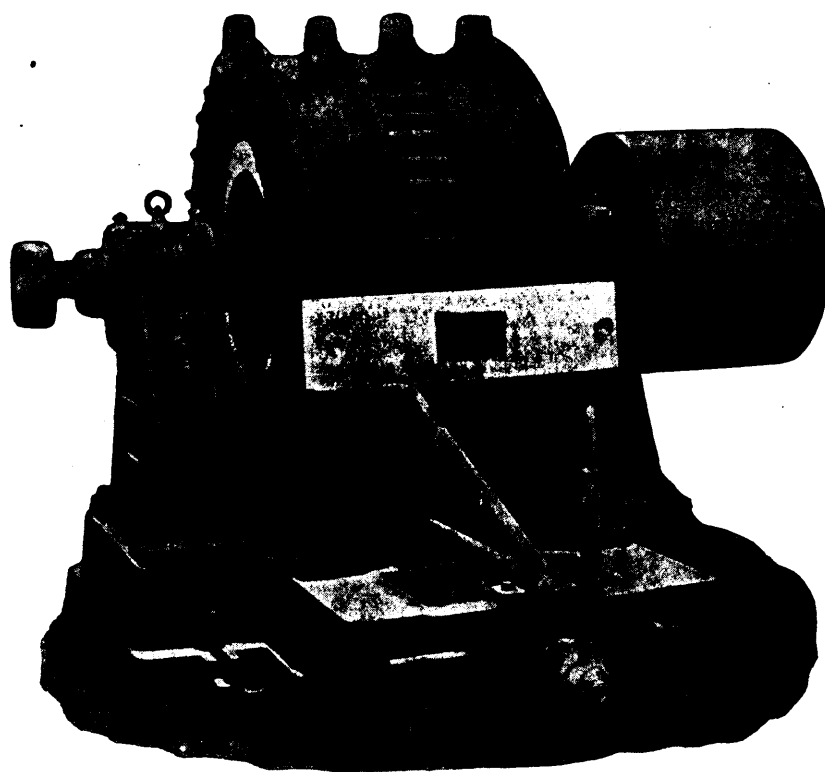
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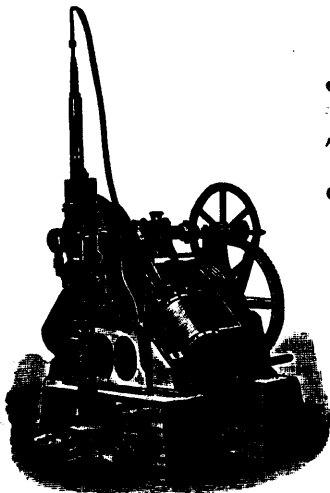


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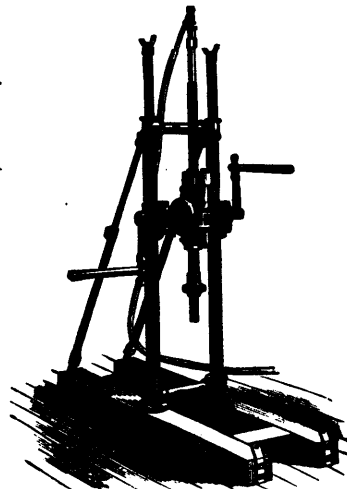
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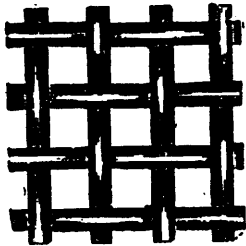
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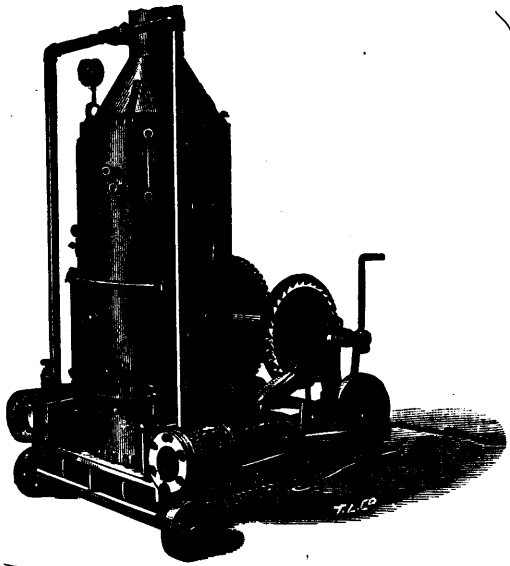
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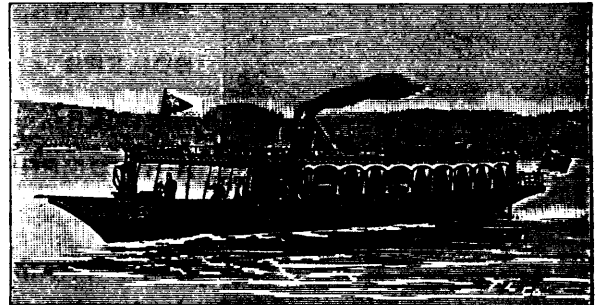
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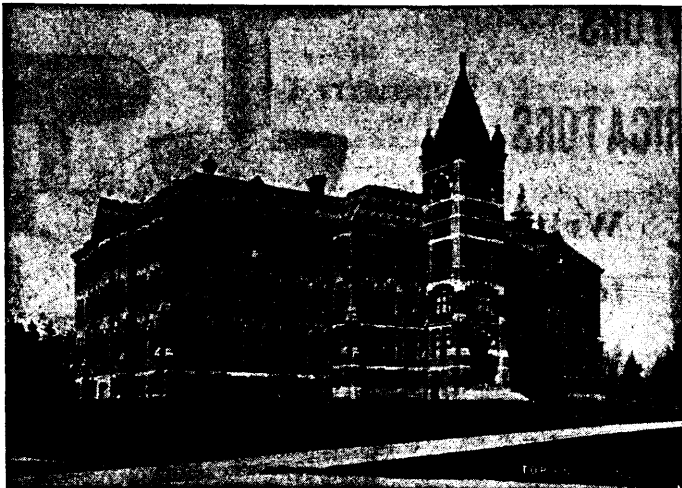
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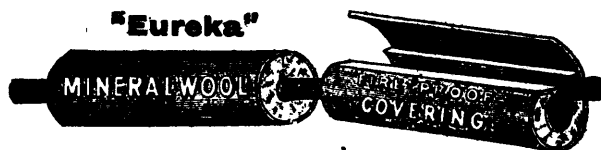
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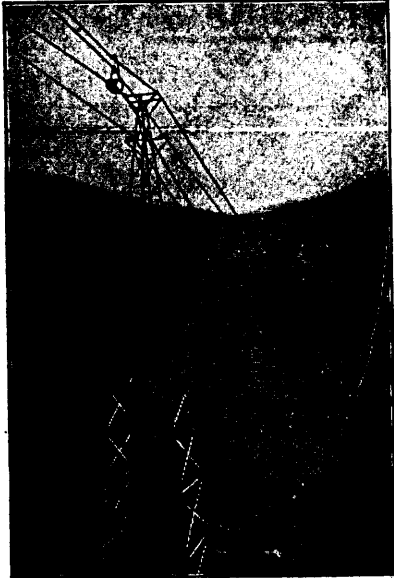
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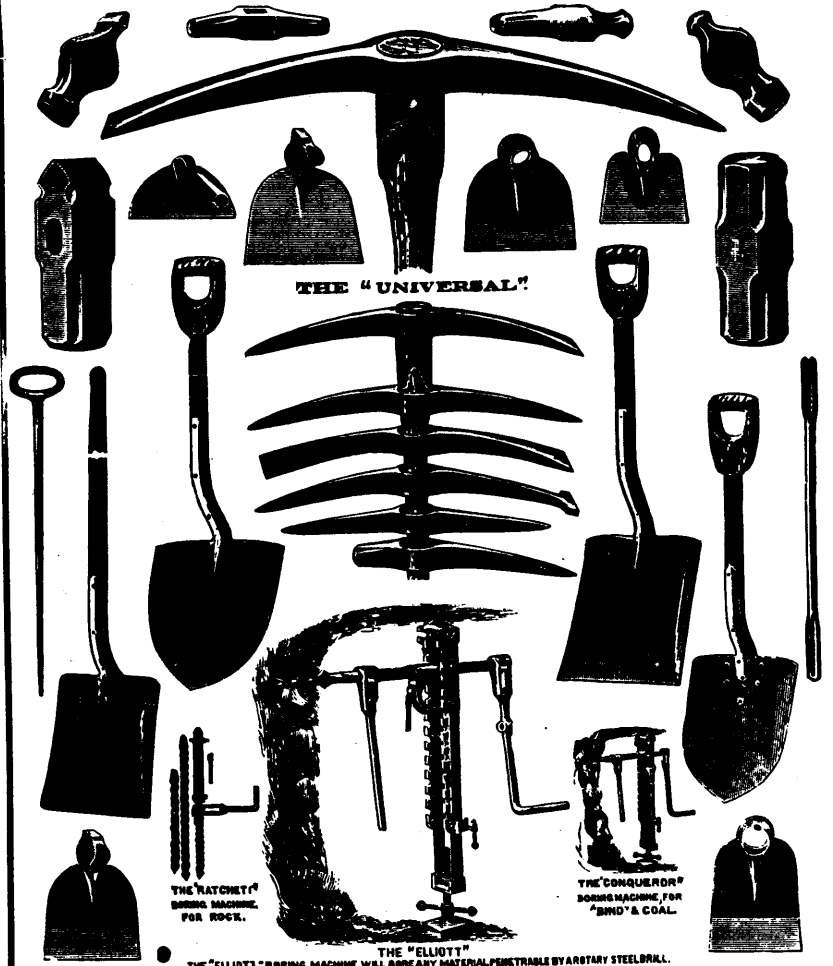
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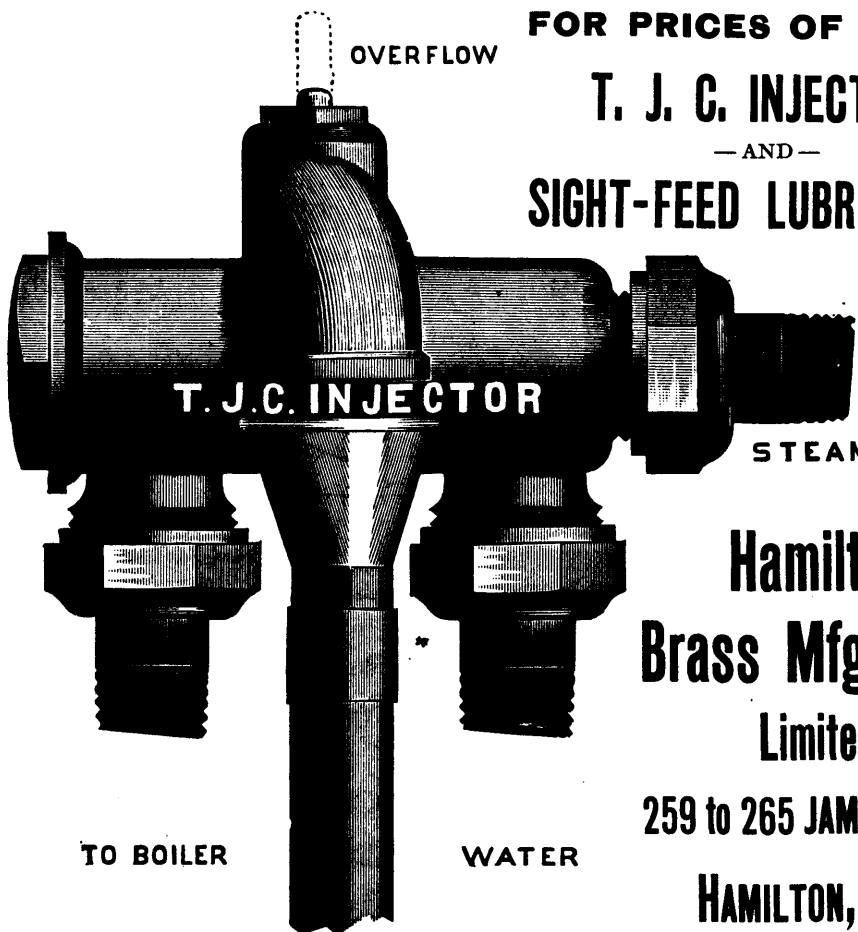
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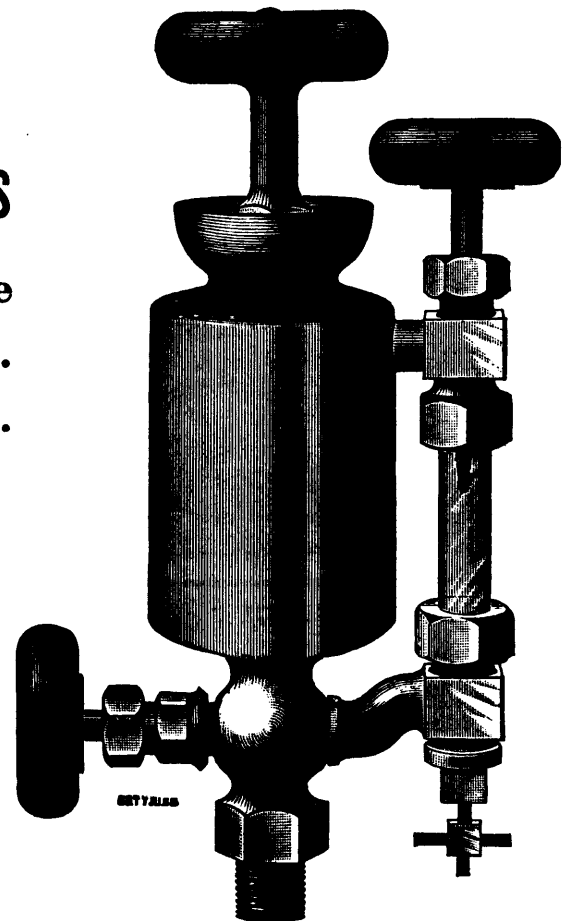
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4—Prospectors' Course.

The School offers to Mine Foremen, Assayers, Prospectors and Mining Men generally, Special Courses of Instruction beginning January 4th, 1898, and continuing eight weeks.

5—Extramural Classes for Prospectors and Mining Men.

Lecturers are sent to Mining Centres to conduct Classes in Elementary Chemistry, Mineralogy and Geology as applied to the discovery and winning of valuable minerals.

The School is provided with well equipped Laboratories for the study of Chemical Analysis, Assaying, Blowpiping, Mineralogy, Petrography and Drawing. In the Mining Laboratory the operations of Crushing, Amalgamating, Concentrating, Chlorinating, Cyaniding, etc., can be studied on a large scale.

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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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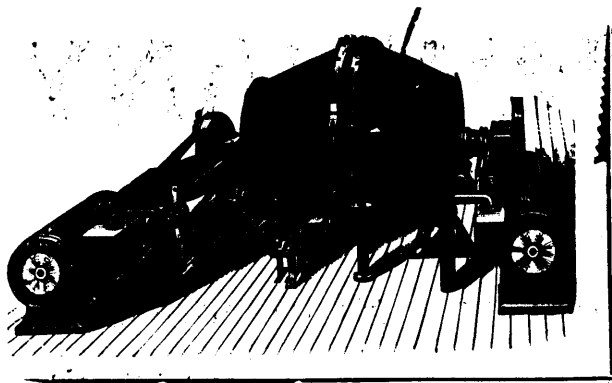
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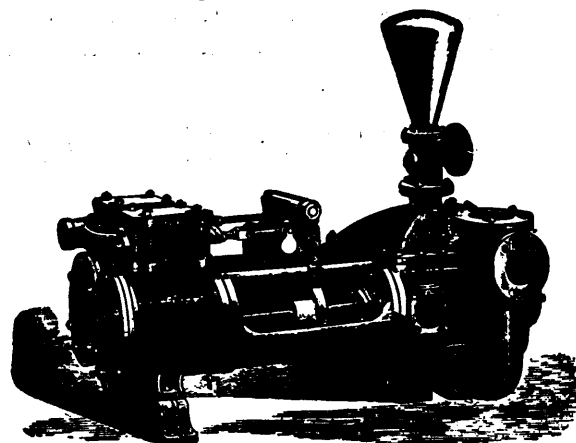


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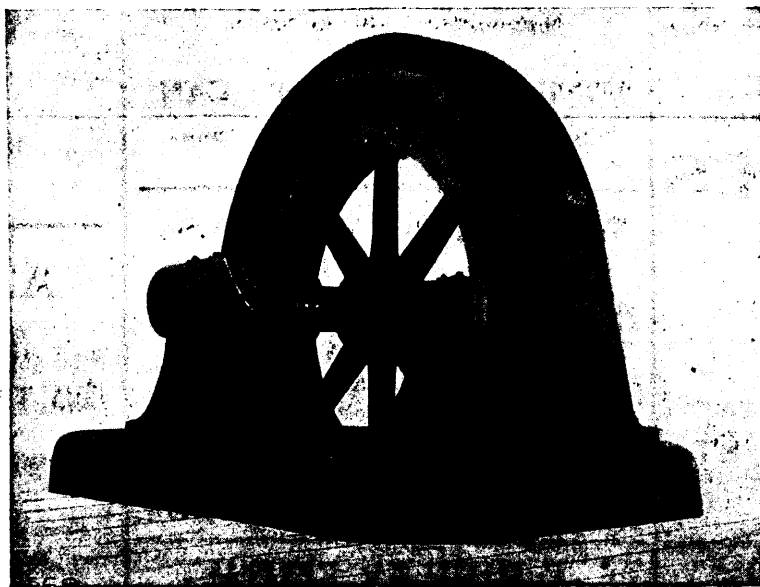
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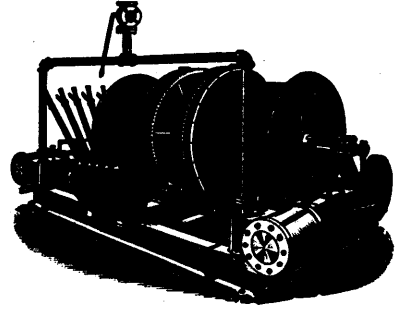
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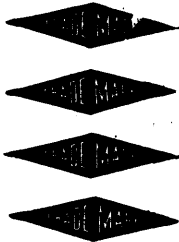
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VOL. XVI., No. 10.

OCTOBER, 1897.

VOI. XVI., No. 10.

The Ontario Mines Act.

A general mining law may be based upon the principle of the government's ownership of mines and minerals, whether upon private or public lands, and it may provide for the sale or lease of mineral rights, under stipulations as to the active proceedings of the purchasers or lessees, or without such stipulations. Or, on the other hand, it may be based on the government ownership of public lands only, and may provide for the sale or lease of surface rights or mining rights, or both together. In the latter case, if it deals with mines upon private lands at all, it must do so by way of police regulations, to secure the safety of workmen or protect adjacent property, or enforce pecuniary responsibility.

It is impossible to compare intelligently the mining codes of different countries without bearing in mind this fundamental distinction. Thus, the United States mining law applies only to mines upon a certain portion of the public domain, and has in view nothing more than the title to mineral lands within that area. It is silent as to private lands, and leaves all police regulation to the local legislatures. It is not based on the principle of the sovereign right to the metals in the soil. That right belongs, so far as all the older States are concerned, to the States severally, and not to the Federal government, and it is doubtful whether the Federal government has ever claimed or exercised it in the territory acquired since the formation of the Union. Its mining law has been simply a statement of the conditions upon which its own mineral lands might be explored, exploited, and acquired. That law has been proved bad in almost every particular. Yet we must confess that it has had one tremendous result, which perhaps a better system would not have reached, or would only have reached much more slowly. It has developed with unparalleled rapidity the resources of a vast empire, and has increased the wealth and power of the United States to a degree far beyond what they would be at this time, if more careful legislation had left less individual freedom, or conferred less extravagant governmental bounty. Its one glaring defect, the absurdity and indefiniteness of the title it conveys to purchasers of mineral land, has probably inflicted great loss through litigation upon the mining industry; yet, if we leave that evil out of sight, the "apex-title" has undoubtedly promoted prospecting, and hastened development. On the other hand, the earlier United States law, which gave preference to the discoverer, rather than the apex-owner, was equally stimulating in these respects, though intolerable in others. A great opportunity was lost when the present system was substituted. The preference of the discoverer should have been retained, and the rights of the occupant or owner should have been defined; but the

anomalous extra-lateral privileges attached to the apex should not have been incorporated into law.

The Ontario Mining Act, as framed in 1892, seems to me to embody a very judicious attempt to continue the encouragement of exploration and mining with the retention of sovereign control and supervision. It is the Queen who grants and regulates the rights and privileges of mining, and who exacts royalty and enforces police conditions.

The first salient feature of this code is the fact that it deals with mineral rights in "square locations" only, that is, as bounded by vertical planes drawn through surface boundaries. Canadians may be devoutly thankful for this. It delivers them at a stroke from the curse of conflicting titles dependent upon geological conditions.

The second striking feature is the sweeping abolition, in section 3, of all royalties, taxes or duties upon ores or minerals required by any government patents issued prior to May, 1891, (with a single class of exceptions, namely, the lands patented under the "Free Grants and Homesteads Act" of 1887). I must confess myself unable to understand the grounds of this provision. It must apply to a considerable number of tracts sold before 1891; and it seems to put the owner of these tracts on a special footing of privilege. There is doubtless some good reason for this distinction, which, however, in the absence of such a reason, would be a bad thing, as partaking of the nature of unequal legislation, and as marring the simple uniformity which every code should exhibit as far as possible.

A third feature which seems noteworthy and admirable, is the latitude of discretion given to the representatives of the Queen as to numerous details of administration. Thus the royalty on silver, nickel or nickel and copper, is fixed at 3 per cent. of their real value at the mine's mouth. On iron-ore, it is fixed at "not exceeding two per cent.;" and on "all other ores," it is to be at such a figure, not exceeding three per cent., as shall be from time to time, imposed by Order-in-Council. In many other particulars, which every reader of the statute will discover for himself, the power of the Lieut.-Governor is adequate, without further legislation to fix conditions, determine facts, settle disputes and execute substantial justice.

The discoverer of a new mine is exempted, upon certain reasonable conditions, from all payment of royalty for the term of fifteen years. There is, however, a somewhat severe definition of *newness* in this connection. The new mine, in order to deserve this exemption, must be "at least three miles from the nearest known mine or discovery on the same vein or lode, or, if it be on a vein or lode "theretofore unknown or undiscovered," it must be "at a distance of one mile from any other known or discovered mine, lode or vein." This provision is open to several objections:

1. It introduces the term "vein" or "lode" into a statute which would be much better without it. Looking back at the introductory "Interpretation clauses" of the Act, I find, as I expected to find, that the learned gentlemen who drew the statute have not undertaken to define these terms. I do not blame them for that. Very likely they made the attempt and gave up in despair. Very likely their definition would have made the matter worse. But clearly, if they fail to state what a vein or lode is, they should not make a provision of the law depend upon it.

2. The difference between three miles from the nearest mine on the same lode, and one mile from any mine not on the same lode is impracticable. A man discovers a new mine, two miles away from its nearest neighbour. Who is going to decide whether it is on the same vein or not? Very few veins can be clearly traced as far as that. Above all, in the very nature of the case, no such clear tracing is likely to have been made prior to the discovery here supposed. If it had been so made, then there would have been already many "mines" in this sense between the two points named. In fact, the statute says "*mine or discovery*." Now there cannot be a tracing of a lode without "discoveries" of it at short intervals, to say the least. It follows that the discoverer, in the case supposed, whose discovery is separated from the nearest one by two miles, cannot possibly know at that time whether the two are on the same vein or not, and therefore, he cannot tell whether he can claim exemption from royalty or not. This introduces one of the worst evils known to mining law—the evil from which we have suffered so much in the United States—namely, the dependence of a miner's rights upon conditions to be developed after their inception. I might enlarge upon this point; but I forbear, because the provision is not of capital importance. I fancy that its defects will go far to make it simply inoperative, which is not a fatal disaster.

3. The vagueness of the term "known" is another objection. To whom must the nearest mine be known, and how? A similar vagueness in the United States Revised Statutes has opened the door to much bold oral testimony and hairsplitting ingenuity of advocates. The only safe rule is that knowledge of this sort, affecting the rights of innocent adventurers, must be of record. The existence of a mine must be known to all men by its registry upon the proper books of the Government. Failing such a record, it must be held unknown. But our courts have not always taken this common-sense view; and legislatures should be all the more careful to make their statutes clear in such respects.

On the whole, I think it fair to say that if it be deemed desirable (as I think it unquestionably is) to reward a discoverer with special privileges, two miles from the nearest recorded mine, no matter on what "vein," would be a sufficient distance to ordain as a condition.

Passing by the amount of royalty, which does not seem to be excessive (provided the discretion of the Lieut.-Governor-in-Council be wisely exercised), I note with much satisfaction that mining claims are made large enough to permit proper development and justify the investment of capital. This is indeed an essential feature of the "square location" system. It is because we, in the United States, if we should substitute that system for our "apex-rights, would have to enlarge our surface locations, that we encounter so much opposition in every attempt at this reform. The short-sighted fear of prospectors least a few owners should get all the land has hitherto dominated many of our mining communities. Yet we have no trouble on that score in all our older States, where the "law of the apex" never existed, and where by far the greater part of our mining is done.

With regard to the tenure of locations, the conditions of leases, and the relations between surface owners and the holders of mineral

rights, I do not feel competent to criticize in detail the provisions of this Act. They seem to be sound in principle; and they will doubtless receive such further amendment in details as local experience may suggest. As a general proposition, everything that simplifies and unifies the application of a mining law is good, and everything which complicates it, multiplies vexatious requirements or inflicts upon the mining industry unnecessary hardness, is objectionable. Mining, it must not be forgotten, is not in the main an exceptionally profitable business. It cannot stand "squeezing" for revenue. On the average, people make a living by it. Sometimes they win fortunes; often they lose fortunes; always they must risk fortunes, large or small, before the ultimate result is known. They need to be encouraged by liberal legislation, though they have no claim of right to be exempt from the normal burdens of the community. Such changes as shall hereafter be made in the Ontario Mines Act will be made, I trust, in this spirit. And I trust, also, that the excellent features I have taken the liberty of pointing out will not be sacrificed, either to paternal authority on the one hand, or socialistic clamour on the other. A free industry, in responsible hands, will be better for the Province than either the extreme of too much control or that of utterly unregulated license.

R. W. RAYMOND.

British Columbia Smelting Development.

There are at present operated in British Columbia two smelters only, each also doing a little refining. One of these, the noted smelter at Nelson, belongs to an English company, the "Hall Mines, Limited"; the other at Trail near Rossland, is owned by the British Columbia Smelting and Refining Company, an offshoot of the Montana Ore Purchasing Company, of Butte, Montana. The Hall Mine's smelter, though doing a general custom business, is mainly intended for and increasingly devoted to the treatment of the vast silver-lead deposits of the Silver King Group and other rich properties of the Hall Mines Company, in and about Nelson. Somewhat heavy freight and other charges on the other hand largely confine the operations of the Trail smelter to the ores of the Rossland district, of which ores moreover, when the mines of the neighbourhood attain aught approaching their full capacity, the Trail smelter can—however much enlarged it be—treat but a moderate proportion.

A third West Kootenay smelter, at Pilot Bay, near Ainsworth, has for some time been closed down, but will probably—as reconstruction is now proceeding—be reopened shortly and then again, become capable of treating a very modest quota of the silver-lead ores of South Kootenay.

Other smelter buildings there are of small capacities at Revelstoke and Golden, but for divers reasons, there seems to be little likelihood of the realisation of the limited opportunities which they could, if fully equipped and worked, supply.

Difficulty and cost of getting coke, suitable fluxes, have hitherto temporarily prevented the erection and working of smelters at other central points within the Province, and as a result, very large and increasing quantities of Kootenay ore have been and are being sent to smelters at Everett, Tacoma, San Francisco, Omaha, Jennings, and other towns in the United States. A small quantity of ore from the Coast and from Vancouver Island and the Isles of the Gulf of Georgia, is being similarly sent to American smelters, and some of the same ore is also being shipped by sea to far distant Swansea, in South Wales.

Now however, coke from the collieries that are about to be opened in the Crows Nest Valley, so too coke from the Dunsmuir collieries in Vancouver Island, are becoming, or about to become available for

smelter purposes in the Kootenays and the Coast, whilst fluxing materials are being made more readily accessible by improved railroad and steamship facilities. It has thus become evident that there are highly profitable opportunities for a large development of home smelting, as also for a modest further development of refining in the Kootenays, and for a beginning of both operations on the Coast.

These opportunities now seem likely to be met at an early date, to such an extent as should, by cheapening and otherwise conveniencing, greatly aid precious metal and copper and lead production in British Columbia, and at the same time lessen considerably the present export of ore for smelting to various points in the United States.

As regards West Kootenay and a large portion of East Kootenay also, it is reported on excellent authority, that capable financiers and business men connected with the the Canadian Pacific Railway Company, are planning to establish a smelter on a large scale at some point, very probably in or near Robson, within South Kootenay. They are stated to be also prepared, if further occasion arise, to cater similarly—"nearer home"—for the special wants of the Slocan district of West Kootenay. The project has about it every element essential to complete success, if once inaugurated on the right lines. The leading men of the Canadian Pacific Railway can easily command all the capital and technical skill that is required, whilst the railroad with which they are associated, can to mutual advantage supply all necessary transport facilities, as also fuel from the coal claims which it now has at command in the Crows Nest Valley. Hence there is every reason to expect early establishment, under the Canadian Pacific Railway auspices, of a large ore smelter or smelters in South Kootenay, which will, when once opened, doubtless be worked to their fullest capacity and in very truth "for all that they are worth."

Hence, without any export duty on ores, against the imposition of which, many strong objections can in this present be raised on behalf of a precious metal mining industry, that is yet in an early stage of development. There is good reason to hope for large and successful further home competition in the Kootenays with the American smelters, and as a result of this, a considerable development of a lucrative metal working industry that will employ many and increasing workers.

Meanwhile, English capital purposes to establish on Burrard Inlet, hard by Vancouver, a large smelter, capable alike of treating copper-gold and lead-silver ores. The projectors also declare their intention to establish, in conjunction with the smelter, a small refinery, which will, to a total smelter capacity of at least 300 tons a day, add refining facilities for 20 or 25 tons of matte.

This Vancouver project will, by the expected early consummation of the Kootenay smelter proposal of the men of the C.P.R., be deprived of some up country ore, which its promoters first hoped to draw to their works with the co-operation of the great railroad. They expect, nevertheless, with good reason, to make a success of the undertaking, for which there will still remain available the smelting ores of the coast, of Vancouver island, of the Gulf isles, and of certain promising places, yet to be developed, in the Yale and Lillooet districts of the mainland.

The syndicate which will control this intended effort is being organized in London by Mr. J. H. Rothschild, (not, however, one of the great family of this name), and he and his Canadian associates have secured the sympathy and practical support of Vancouver as a city, provided, as seems fairly assured, the tax-paying property owners endorse the conditional agreement now made between their City Council and the Rothschild syndicate. The latter agree, in return for the taking by the City of stock in the smelter undertaking to the equivalent of \$65,000, to form a company in London, England, organized on joint stock lines, and under the English laws. The company is to have

an authorized capital of £250,000, and to expend on a smelter of 300 tons daily capacity, erected on Burrard Inlet, Vancouver's harbor, a sum of at least \$500,000. The promoters of the syndicate are, in proof of competency and good faith, to make an early deposit with the City Treasurer of \$6,500, or 10 per cent. of the proposed holding of the city in their undertaking. Such stockholding is, it may be noted, authorized by Vancouver's charter of incorporation, if and when duly approved by citizens' vote, in the case of an industry located in the city or within five miles of it. The smelter will almost certainly be erected without the city limits, there being no convenient and cheaply available site otherwise available, whilst risk of damage and consequent litigation in respect of possible noxious fumes may be minimized by the placing of the smelter a few miles beyond Vancouver's boundary, at a point on the harbor (of which there are several) where are now few inhabitants, and little or no cultivation. The Rothschild syndicate proposes to work the smelter by a force, novel in Canada as regards its application to this special industry, namely, electricity. This will be derived from an abundant water power that is available on Seymour creek, North Vancouver, at a point opposite the city. Considerable time will be taken in preparation for so large a work, and one intended, moreover, to be operated by somewhat novel means, but if the citizens of Vancouver endorse the project by their vote next December, the promoters declare that construction shall be well advanced by June 1st next at latest. They will have behind them the advice and supervision in their effort of Messrs. Bewicke, Moreing & Co., the eminent mining and metal working engineers of London, England, and it is generally believed that with civic participation in the enterprise, little or no difficulty will be found in organizing the necessary strongly capitalized English company. It is true that the actual money stake of Vancouver in the enterprise would be small by comparison with the total capital, but the participation of the city in the undertaking should assure British investors that all that a strong and growing municipality can do to aid, to its own and their joint profit, an important local industry, will certainly be found at the command of the directorate.

The movement is, in its way, as significant as the proposed action of the C.P.R. capitalists up country, and in one respect bolder, since it is certain that at present there is from the shipping mines of the coast and island districts nothing like an available daily supply of even a third of the 300 tons required by the proposed smelter. But some of the copper-gold, silver and silver-lead deposits in Texada island, on Thurlow island, up Phillip's Arm and Frederick's Arm, in the Harrison lake, on Jervis inlet, and in and about Alberni, Vancouver island and other districts conveniently near Vancouver appear to be so richly promising, that ere the smelter is built and well at work there should be neither doubt nor difficulty in regard to the obtaining of an adequate ore supply. Shipments of coast and island smelting ore may, and probably will, multiply ten-fold in less than a twelve-month, since the shipping mines of the region are at present few, and only in the earliest stage of development. Many another claim will, moreover, be developed and become a speedy shipper, so soon as smelter facilities shall have been made available at a point on Vancouver's famous harbor, most easily and cheaply accessible by water. And as coal, coke, iron and lime supplies lie near at hand on Vancouver island and Texada island respectively, there will not be the least difficulty in supplying the necessary fuel and fluxes, whilst the resulting matte and bullion can easily and quickly be shipped from such a port as Vancouver to the big purchasing centres of the world.

Under these circumstances, it is not saying too much to assert that the smelter movements above noted will, if satisfactorily accomplished, prove of the utmost importance to British Columbia, whilst having the further satisfactory result as regards Canada in general, of greatly extending within its borders a most profitable metallurgic industry, that will assuredly in due course bring many another in its train.

EN PASSANT.

Although the next meetings of the Federated Canadian Mining Institute do not take place until February, the arrangement of the Syllabus of proceedings is making very satisfactory progress. The following subjects are announced:—

Henry S. Poole, M.A., A.R.S.M., Stellarton, on "the Mineralogy of the Carboniferous"; Mr. F. T. Snyder, (Ottawa Gold Milling and Mining Company) Keetwatin, Ont., on "Some Modern Forms of Milling Machinery"; Mr. Spencer Miller, Assoc. Am. Soc. C. E., New York, on "Cableways as applied to Open Pit Mining" (illustrated by line light views); Mr. John B. Hobson, M.E., Quesnelle Forks, B. C., on "The Milling of Cemented Gravels"; Prof. A. B. Willmott, Toronto, on "The Michipicoton Gold Region." H. H. Pringle, (Regina (Canada) Gold Mine), Rat Portage, "On a comparison between the Tremaine Steam Stamp and the Modern Gravity Mill." Papers will also be contributed by Mr. J. Burley Smith, M.E., Rat Portage, Ont.; Mr. Milton L. Hersey, B.A. Sc., Montreal; Mr. R. H. Jones, F.S.A., London, England; Mr. A. H. Holdich, A.R.S.M., Nelson, B. C.; Mr. E. A. Sjostedt, M.E., Montreal; Mr. Wm. Blakemore, M.E., Glace Bay, C. B.; Mr. J. Bawden, Kingston, Ont.; Mr. John Hardman, S. B., Montreal, Que.; Howard West, A.R.S.M., New Denver, B. C.; John Birkinbine, M.E., Philadelphia; and others.

In order to facilitate discussion, intending contributors are requested to forward M. S. S. of their papers to the Secretary before the end of the year, so that printed copies may be in the hands of the members in advance of the meetings which, as last year, will open in Montreal, on the first Wednesday in February.

The second volume of the Journal of the Institute, is now in press, and will be distributed to members next month.

The Appraiser of the United States Government at Boston, U.S.A., rules, that Rough Split Mica, edges knife trimmed, will be admitted as "Unmanufactured Mica," at the rate of 6 c. per lb. and 20 per cent *ad valorem*. The ruling of the General Appraiser has been asked for.

Mr. William Blakemore, M.E., Glace Bay, C. B., who has been acting as consulting engineer for the British Columbia Coal, Petroleum and Mineral Company, has returned from an inspection of the Company's valuable coal properties in the Crow's Nest Pass, British Columbia. The areas comprise 11,169 acres of coal lands near Martin Creek, and also, near Morissey Creek, East Kootenay. On the easternmost property, near Martin Creek, there are fifteen seams, four of which are a very fine cannel coal. In the westernmost property of 7,200 acres, a distance of 12 miles from the former property, there are 12 superposed seams of coal cropping out on the side of the mountain, varying from 2 to 30 feet in thickness. These seams being adjacent to the line of the Crow's Nest Railway are to be opened up immediately.

Mr. E. A. Sjostedt, M.E., who has been identified for many years with the iron industry of Nova Scotia, has opened a metallurgical laboratory in Montreal.

The report of the Nova Scotia Steel Company for 1896-97, shows that there has been a loss of 4,687 dollars on the year's operations. This unsatisfactory result is attributed to low prices and the tariff changes. It is noted as unfortunate that provision was made for the payment of the increased bounties on steel, ingots, &c., only from the date of the passing of the Tariff Act, and not from the date of its

introduction—between which dates there was an interval of more than two months. The report goes on to say, that \$5,000 worth of the company's bonds were sold during the year, and that the wages of all the workmen, and the salaries of all the officials have been reduced.

Some interesting statistics have been issued by the Dortmund Mining Bureau regarding the accidents with winding ropes that occurred at the collieries of the district last year, says the London *Mining Journal*. Out of the 270 ropes discarded, five, or 1.85 per cent., broke suddenly while in use. Out of the 5,405 ropes laid on one side during a period of 25 years, from 1872 to 1896, 254, or 4.70 per cent., broke suddenly while in use. Of the above, breakages occurred in the case of 43 out of 736 flat cast-steel wire ropes, 19 out of the 147 flat iron wire ropes, 7 out of 97 flat manilla fiber ropes, 80 out of 3,536 round cast-steel wire ropes, and 105 out of 881 round iron wire ropes, while not one of the eight hemp ropes gave way. In 1872 the percentage of wire ropes breaking was 19.30, while in 1896 it was reduced to 1.85.

"The Klondyke rushers, who think more about carrying gold than carrying food, are sure to be in trouble a little later on. They have the winter to face, and will be selling claims for messes of pottage, as a certain gentleman did in days gone by to an exploiting younger brother. Pioneers, by some unfairly devised arrangement, seldom make their fortune. They spy out the land, and, as often as not, lose their money and their lives in so doing, while the company agents in the back-ground, who carry the messes of pottage, or the instruments of foreclosure, get for a few shillings in the pound properties which are afterwards floated in London at a few pounds to the shilling. So says *Money*. Our London contemporary, in this matter, has a level head.

The decision of the Supreme Court in the case of R. T. Daniel vs. The Gold Hill Mining Company, sets aside the sale of the mine made in June, 1896, to the brother of the president of the company, and is interesting in that it presents a case wherein a citizen of the State of Washington, owning stock in a company organized under the laws of his own State, appealed to the courts of British Columbia for redress and received it. In brief, R. T. Daniel interested several Spokane gentlemen in the organization of the company. Through misrepresentations Daniel was induced to dispose of a number of shares of stock which took from him the control of the property. Work amounting to nearly \$8,000 had been done, and because of an indebtedness of \$400 the property was sold by those in control to the brother of the president of the company, thereby freezing out Daniel and his friends. This was possible because, like all other companies so incorporated, its board of trustees had power to sell the entire property without consulting or securing the consent of the stockholders. The history of the ups and downs of this property is familiar. It is on Sheep creek, in the Rossland camp, adjoining the Jumbo. Its workings have produced several good showings and a shipment of surface ore to the Tacoma smelter brought \$20 per ton in gold. In the summer of 1895 R. T. Daniel, of Spokane, took hold of the property and organized a company and disposed of the treasury stock for upwards of \$5,000 to operate it. Welch, the original owner, retained a half interest, but afterwards sold a quarter to Michael Doneen of Spokane. Then, as the testimony showed, Doneen and his friends set about to secure enough of the treasury stock to gain control, and for that purpose made up a purse of \$2,000, and sent one Fred. Davidson, to purchase some stock from Daniel, and then proceeded to operate the mine to suit themselves. Under Daniel's control a 410 foot tunnel, two shafts and some drift and crosscut work were done, but he was soon

displaced in the management by Welch. New directors were elected and the majority of Daniel's friends were removed and succeeded by Doneen's followers. With but \$600 in the treasury, a contract for \$1,000 worth of work was let, resulting in a debt of \$400. Daniel was called upon to pay the pro rata assessment for himself and friends, but told the directors it would simply mean the loss of additional money, as well as what he had already put in. At the next regular meeting, without any notice to the stockholders, the property was sold to E. J. Doneen, a brother of the president, for \$1,250. Daniel was advised of the proceeding, and instead of taking the case to the Washington courts, as it was supposed he would do, he went to the courts of British Columbia with the result above indicated.

The preliminary report of Prof. Willmott on the Michipicoton gold region issued by the Ontario Bureau of Mines is a very timely production, and will serve to clear away the exaggerated statements respecting the value of the district, which have been published by sensation-mongers in the Toronto daily press. Prof. Willmott says:

"The metal most likely to be found in large amounts in this district is gold, though discoveries of nickel, iron, copper and silver have also been reported. Almost nothing is yet known definitely as to the occurrence of any of these. Gold has been found at a number of places in visible particles, and in all cases simply chipped from the surface. At no place in the division has a pit been sunk to a depth of over ten feet, and in all the recent prospecting for gold not more than a single shot has been put in at any one point. What little prospecting has been done has been almost entirely confined to Lake Wawa and the canoe route north to Missanabie. Even here few men have gone more than three miles inland. At the most, a strip six miles wide by forty long has been examined, and this in the most superficial manner, for several reasons. Many of the prospectors who have recently turned their attention to the field are utterly unfitted for the task. Fully three-fourths of those I met did not know how to pan, and could not tell when they had quartz of value. Many did not know quartz from granite, and still more were mistaking pyrites and mica for gold. Moreover, these men were not used to bush life, and many were afraid to go out of sight of their canoes. Even for experienced woodsmen this region is a hard one to prospect. The cliffs are so steep, and in some regions the rocks are so completely enshrouded in moss, that it takes days to prospect a very small area. From all that I can learn from prospectors, from the number of finds of free gold, from the quantity of quartz pebbles in the lower parts of the streams, and from the great resemblance of the country rocks to the Lake of the Woods region, I think there is every reason to believe that the division will well repay careful prospecting, and that in a few years gold mining will here be established on as profitable a basis as in other parts of Ontario."

Prof. Willmott, who, by the way, is Professor of Natural Science at McMaster University, is also to be congratulated on the publication of his handy little book, "*The Mineral Wealth of Canada*," a summary of our mineral resources, which cannot fail to be of service as a guide, not only to students of economic geology, for whom it has been designed, but to all who take an interest in this subject.

Regulations respecting the bounty on steel ingots, on puddled bars and pig iron, have recently been prepared by the Customs Department. On steel ingots, if made in Canada, and if the product of material of which 50 per cent. by weight is pig iron made in Canada, the bounty is \$3 per ton. It became payable after June 28, and is to hold for five years. On puddled bars, the product of Cana-

dian pig, the bounty is \$3. On pig iron made of purely Canadian ore it is \$3; on pig iron made of ore which is not all Canadian the bounty is \$2. The regulations are for the purpose of assuring the Government against fraudulent claims.

A remarkable bed of pure white clay has been discovered some twenty miles north of Christina lake, on McCrae creek, in British Columbia. The deposit is quite extensive, running for 1,300 feet on the surface, and it is known to have a depth of over twelve feet. Assays made by the Pratt-Fairfowl Co., of Northport, and E. B. Van Osdel, of Spokane, Wash., show it to be extraordinarily rich alumina, running from 31.2 to 43 per cent., which would be equivalent to \$165 to \$185 per ton of pure aluminum. The locators, Messrs. Latta, Teale and others, are now in communication with some of the aluminum works in the east to have its commercial value fully determined.

Prominent in our illustrated supplement this month we give a number of excellent photogravures showing the pyrites mines and works of the Cape Copper Company at Tilt Cove, Newfoundland. The property is operated under a 99 years lease from the Tilt Cove Copper Co. Limited. The West mine was opened in 1864 and worked until 1877, when operations were suspended until 1895, when mining was resumed. At last reports the prospects of success were regarded as favorable. At the East mine an adit chamber 300 ft. x 200 ft. was first opened out; then a shaft was sunk from the adit chamber to a depth of 20 fm., open out chambers at 10 fm. and 16 fm. The output last year amounting to 70,000 tons of 3½ per cent. ore—cupreous iron pyrites. The shipments average about 14,000 tons per month during navigation. A smelting plant at the mine is not at present in blast.

We are indebted for the excellent series of photos from which our engravings have been made to Mr. Williams, the Superintendent at Tilt Cove. The photos of the Lanark mine and works at Laurie have been kindly furnished by courtesy of Mr. J. M. Turnbull, B.A. Sc., Mining Engineer, while those of the Cheticamp gold districts are from our Halifax correspondent, Mr. F. H. Mason, F.C.S.

Our next supplement will be entirely taken up with a large number of photos of the managers, underground managers and other officials prominently identified with the production of coal in the Dominion.

In striking contrast to the columns of verbiage appearing in the Toronto press respecting the alleged new gold field of Michipicoten, the following from the Fort William *Journal* has the right ring about it, and is worthy of reproduction: "Canada has reached the effervescent stage. The golden sunbeams of prosperity are now creeping over her horizon. She is, of all the countries of the world, the most promising. Nature has been kind to her, and has, it appears, not only endowed her with marvellous agricultural fertility, but with vast mineral wealth as well. Her wondrous pregnancy has burst upon the world's eyes of a sudden. It takes a strong-headed man to stand prosperity, and it takes a firmly-governed country to stand a rapid influx of population, and the revelation of a thousand gold mines within its borders. But let us not lie about our luck! Lying is bad, in the first place, because it is a wrong against conscience. In the second place, because we are sure to be found out. Sooner or later the Nemesis of Truth will be on our track, and we will be caught in the act. Strangers whose optics are healthy and clear will see through our pretensions if there are no real nuggets behind them. The prevailing Michipicoten

"boom" bids fair to throw a cloud over the mining business in this whole western country if the "boom" has no excuse for its title. The dishonesty of a few adventurers is liable to hurt the best interests of prospectors in neighboring districts whose claims are attracting the attention of investors. The sooner the real status of Michipicoten, as a mining country, is universally known, the better for the western gold fields."

The City Council of Vancouver has made an essential condition of its taking stock in the proposed smelter in Burrard Inlet, the exclusion of Japanese as well as Chinese labour from employment at the works. Otherwise the aid proposed would be vetoed by the civic voters, whose ratification of it is needed. Most of them are almost as adverse to Japanese labour immigration as to Chinese, the "little brown man" having already largely ousted the white worker from important departments of employment in the river fisheries, canneries and lumber mills of British Columbia. There are now nearly 2,000 Japanese labourers in British Columbia, where five years ago there were not a hundred. They live on humble fare and accept lower wages even than Italian; are very clannish and form squalid little colonies.

Diluvial—A New Form of Asbestos.

(A paper by Robert H. Jones, F. S. A., Mineralogist and Asbestos Specialist, read before the Asbestos Club, Black Lake, on the 28th October, 1897.)

Almost immediately on my arrival at Black Lake to pay a friendly visit I was reminded by your worthy president, Captain Evans, that on his writing to inform me of the honour you had done me, in electing me an honorary member of your club, he had been careful to add that, on my next visit to Canada, the members of the Club would look forward to the pleasure of hearing an address from me.

Now, however highly one may appreciate the distinction of becoming one of your members, I am bound to say, that the quasi obligation so attached to it, is not a little disconcerting. Because, here you are in the very headquarters of the asbestos industry, thoroughly imbued with every detail of the subject, your whole lives being spent in and about it and all your thoughts and energies entirely devoted to it; so that when I came to consider the matter, I felt that, as a mere outsider, there was absolutely nothing I could say about asbestos, which could be of the slightest interest to you. If, therefore, you will allow me, I will endeavour to illustrate my position by saying a few words on another and a different subject.

I have, as many of you are aware, spent considerable time in the Island of Newfoundland, engaged in prospecting for minerals, with an especial view to the discovery of asbestos, which I had abundant geological reasons for believing I should find on the west coast of the Island, with many other magnesian and attendant minerals, which are found in such profusion in the richly endowed Province of Quebec.

As you are, no doubt, perfectly aware, that little known part of the world, Newfoundland, is like that which Pontoppidan calls "the lapidous kingdom of Norway," a land almost entirely composed of the primeval rocks, which, it is superfluous to say, are wonderfully rich in all the economic minerals. The inhabitants of the Island, however, are of a somewhat torpid nature, and care very little for these things, their undivided attention being given up to fish. In this, their very existence seems to be bound up, and it appears singularly strange to us, though it emphasises in a very striking manner their peculiar dominant ideas, that with them there is but one fish in the ocean they consider worthy to be called by that name. Cod is the king, and cod alone among all the multitudinous denizens of the deep, is thought worthy

to be called by that honoured name. Of salmon, trout, and species of the finny tribe, there is great profusion, but none of these are ever called fish. Salmon is simply salmon, as trout is trout, but these are never dignified by the name of fish.

It occasionally happens that when you sit down to dinner, your host will ask:

"Will you take salmon or fish?"

Now, this, droll as it may sound to English ears, means simply that, though there is on the board magnificent salmon, probably the most delicious in the world, there is fish, that is cod, also, for those who prefer it, which most Newfoundlanders do. In this matter, I was once assured by a Newfoundlander, that cod is the only article of food that a man can partake of at every meal in the year, without growing tired of it; but that on the contrary, his appetite for it, will be just as keen for its enjoyment on the last day of the year as on the first. Cod, he said, never fails; whereas such a denizen of the ocean as turbot, which is accounted so delicious a fish in England, is with flat fish generally, actually despised, and scarcely believed to be fit for human food. And so firmly rooted is this idea in the mind of the fishermen, that if by any chance, a turbot is brought up in his net, he at once throws it away as useless, taking, however, good care to kill it first, possibly out of revenge for the trouble it had given him in causing him to drag it up to the surface in the place of a cod. One morning, when when strolling down the far famed Water street, I caught sight of some strange looking fish gibbeted on a board against the door of a store, with some inscription over its head, which curiosity naturally led me to go and see. Not readily knowing what the thing was, I read the inscription which was to the following effect: "A Rare Fish! A Turbot!" which all passers by were requested to see, and to try cured for breakfast as a delicacy. Now I suppose the rarity consisted in the novel sight of one of these fish got up for food, for if any one desired to catch one he might catch thousands in a day, and my not at once seeing what the creature was arose from the fact that it was dressed, salted and cured like a cod.

I once asked a man what was the reason of this universal prejudice against a fish, which was really a costly one in England.

"Prejudice," replied he indignantly, "we have no prejudice, but who do you think would eat turbot, if he could get cod?"

Cod, indeed, is the Newfoundlander's *summum bonum*. He lives by it, feeds on it, thinks and dreams on it, almost worships it, if he swore, which he seldom does by the way, would most certainly swear by it.

Now, you will readily understand that if in the place of the words "cod" and "Newfoundland," we were to use the words "Asbestos" and "Black Lake," how little short of madness it would appear for a mere outsider like myself to go to Newfoundland to lecture on cod, or to Black Lake, to read a paper on Asbestos.

In London, for various reasons, it is altogether different. For one thing, in that metropolis, there is a far wider, if an exclusive, class, as well as a much greater number of scientific men of leisure, who are always ready to devote a good deal of time and attention to subjects of special scientific interest, and examine into and demonstrate their practical worth and utility, and by so doing actually promote the very object of the discoverers of new and little known things. It was entirely with this object in view that on my arrival home, after my late visit to Canada, I obtained permission from the Council of the Society of Arts to read a paper before the Fellows of that Society on the subject of *Asbestos and Asbestic*, in which I gave an account of the important discovery by Mr. Boas at Danville, of the latter new form of the mineral, which has since exercised so vast an influence on the chief industry of this part of the province. The object I desired to attain

was successful to a much greater degree than I had believed to be possible. The reading was attentively listened to, and the subject matter of it very fully discussed by the numerous scientific men present, among whom were a large number of the leading asbestos manufacturers and experts, electricians, well known architects and contractors for large works, with several officers of rank and experience in the Fire and Salvage Departments, and many others personally interested in asbestos and its uses. A most remarkable interest was taken in the subject, due entirely to the novelty of the fact laid before the meeting, though personally I am very proud to say that, at the next meeting of the Council of the Society, they conferred upon me the distinguished honour of awarding me the Society's silver medal, in recognition of my services in bringing the matter before them. The paper was also reported verbatim in the Society's journal, which has a very large circulation all over the world, and some gentlemen who are especially interested in asbestos afterwards obtained permission to re-print the paper, which they have since circulated to the number of several thousands of copies among all interested, or likely to be interested, in the asbestos industry.

Since the first discovery of this invaluable mineral, its rise and progress have been unexampled, and many very surprising changes have taken place, and are even at this moment in progress, which must materially affect your interests, and notwithstanding anything that may now be seen, will most certainly tend to advance them in the immediate future.

Since the early days of Thetford, many new and remarkable varieties of the mineral have been brought forward, sometimes under very unusual auspices, but none of these have so far been able to touch the time honoured fibre of Thetford.

The discovery of asbestic, which has startled the whole asbestos world, has, at the same time, greatly advanced the scope of the business, and shown in a very practical way some of the almost universal capabilities for usefulness of asbestos. At this moment it has almost paralyzed the business, but this you will presently recognize as a temporary result only of the great change. Still greater changes are in progress, and you will find that, as a better knowledge of the actual scientific facts gains ground, new ideas and superior methods of work will be generally taken advantage of, and I am assured that the expansion of the industry will be great in proportion as these things become better known. You may rely upon it, that the industry will before long become more flourishing than ever. No great change in any line of business ever occurs without, at the outset, inflicting personal hardships upon some one. Personally, I am actively engaged in studying the new features, and hope shortly to have the honour of introducing some of them to your notice, and by this means to assist in the good work of substantially and permanently advancing the progress of this now temporarily depreciated industry.

Now, in introducing an absolutely new fibre to your notice, I wish first of all to say a word or two on color, which is a most important matter for your consideration, and very naturally we look first to that of the fountain head, that is, the time honoured rock and fibre of Thetford. That is generally of a dark bottle green colour, and although the more siliceous rocks of Coleraine and Black Lake may not appear to be materially different, they are so to a very appreciable degree. Then at East Broughton, where the Frazer mine was formerly productive of a superior class of mineral, the rock becomes of a light yellowish green, which gradually changes again to a nearly white, streaked or tinged with saffron. Then if we turn to the Laurentian fibre of the Ottawa Valley, the nonmagnetic variety, we find it to be of a singularly light, nacreous golden, or pale amber tint, because entirely free from any taint of iron or alumina. This is the variety

formerly worked by Mr. Cirkell at Tempelton, and the same rock is found in enormous deposits in South Australia, many samples of which are now in London, showing the fibre to be of over three inches in length. Then, if we look at some of the foreign asbestiform rocks, we find them to be materially different in almost every essential particular; many of them are harsh, and some of them, notably those of Servia and Hungary, as unpleasant to handle as mineral wool or spun glass. Some of the many Australian fibres also are very curious. One, in particular, is of that remarkable bluish, eucalyptus green, so representative of the foliage and verdure of that country. Then, turn again to Africa, that land of gold, diamonds and ivory, concerning which Aristotle, in the olden time, declared "she had always something new to show," and we shall find that she still maintains her old time reputation. She has ever something new to show, even in asbestos, for on the banks of the Great Orange River, in Grigualand West, she exhibits mountain masses of asbestos, in the form of crucidolite, of a deep, almost Prussian blue colour, and of wonderful tenacity, but which is far more like wool than any of the beautiful silky fibres of Canada. This, like all the blue fibres, has so much of the magnesian element replaced by ferrous oxide, that its surprising tenacity is far beyond any of the fibres of Italy or Canada.

Now, I want to speak of another blue fibre, altogether unlike the last named, or indeed anything hitherto seen, which a year or two ago was sent from the Republic of Bolivia, in South America.

This curious fibre was entirely different from the blue of the asbestos (properly crucidolite) from the Cape, in that, instead of being woolly it was of a marvellous hair-like silkiness, in every respect lighter and finer than anything from Canada, and very nearly translucent. Yet notwithstanding its evident superabundance of metallic oxide, which is shown by its colour, it was well reported on by the manufacturers who gave it a trial, but unfortunately from the day of its first introduction to the present time nothing more has been heard of it, which may possibly be on account of the political troubles, which are of such frequent occurrence in this and some other of the South American Republics.

Then, at the precise moment, when we were regretting the loss of this Bolivian fibre, comes something very similar, almost identical in colour, though hardly of so silky a texture as that from Bolivia. It is of considerable length, of great tenacity, and much of it extremely beautiful. The most surprising feature, however, is a statement made respecting it, by one of the professors of the Imperial School of Mines in Vienna, who has examined it, that unlike the Italian asbestos or the Canadian crucidolite, it is unconnected, so far as at present known, with any form of tremolite, hornblende, serpentine, or indeed any other rock. He declares it to be a product of diluvial mud, simply washed up in a possibly volcanic torrent of the same. This astounding statement is to us perfectly incomprehensible, and when I send you a sample of it you will see for yourselves, and agree with me, that the whole thing is simply a matter of wonderment. The exhibited specimens have usually been very scrupulously cleansed from any trace of the mud or clay in which they are found, and I experienced some difficulty in obtaining a sample of the fibre in its crude state, just as it left the bowels of the earth. Of course until I saw this I was unable to obtain any definite appreciation of it. In its original state it has the precise appearance of lumps of indurated clay of a somewhat plastic nature, but never having visited the locality I have no means of knowing whether the mountains on which it occurs are volcanic, or whether the surface mud, even approximately, represents the "till" or "boulder clay," which forms such notable deposits in parts of the British Isles, as to constitute the main evidence upon which Geikie based his theories respecting the existence and influence of the Great

Ice Age. When a sample of this indurated clay or mud is taken from the earth and broken apart with the hands, a bunch of exquisite hair-like fibre is disclosed in the interior of the lump, of remarkable fineness, softness and delicacy, which, if only the colour be ignored, can be likened to nothing but a tress of some lovely woman's hair. In all probability, on more scientific examination, it will prove to be not asbestos at all, but, as I presume to think, on the insufficient evidence obtainable, some fibrous form of glaucophane, or some similar mineral.

The excavation into the deposit of mud or clay has been carried down as far as twenty or thirty feet, but, up to the present the Imperial Geologists leave us entirely in the dark as to its actual origin, or the real nature of the rock from which it must have been derived. We have no evidence to go for, except what we can derive from the geological professor's suppositious statement that it is simply a product of diluvial mud. No rock of any kind has yet been met with, but the owner states that on one occasion he picked up a great stone, to which long fibres were attached, yet no one else appears to have seen this stone, which, if the statement were true might materially assist in this important investigation. From his description of it, I take it, that it must have been some form of conglomerate, but of the precise nature of which, at present we know nothing.

All that the authorities can suggest, is that the fibre occurs as a secondary deposit only, but if that be the case, where and of what nature is the primary deposit? Concerning this, they suggest nothing, although this is the very thing most important for us to know. It is very clear that the work of excavation must be further proceeded with, until the subjacent stratum is disclosed. This new discovery has been very fully, though insufficiently, reported on by the Geological Professor of the Imperial School of Mines at Vienna, but pending further enquiry, it is only under his auspices that this curious fibre is introduced to the notice of the British public.

Another very remarkable point connected with this curious fibre is disclosed by its analysis. This was made by the Experimental Professor of the same Institute, who gives the proportion of metallic oxides, chiefly ferrous, as remarkably large, the quantity of magnesia proportionately small, while the water of composition is absolutely nil, which must certainly point to some misconception on the part of the analyst. Yet in spite of the above, one of the largest and most experienced asbestos dealers in London, avers, after due investigation, that he can readily sell any quantity of it that may be forthcoming, while a well known manufacturer states that, the fibre has exceptional spinning and weaving capabilities and further that it will fetch as much as £18 per ton in the London market.

A company or syndicate has now been formed to investigate its origin and formation, as well as to promote its use, and of this great things are expected, though at present they are little more than matters of speculation. The fibre comes from the district of of Alilovci, in the Austrian Province of Bosnia, of which place and its mineral resources we shall no doubt hear more.

Now, in conclusion, allow me to say one word to yourselves respecting the Club of which you are the proprietors. This, I find, notwithstanding its unusual facilities for usefulness, is really only the nucleus of a club, a club only in name. I should like it to be, what it may be easily made, a club in actual fact, of great practical utility. To carry out this idea, let me suggest that you set apart some small portion of this room, which is admirably suited for the purpose, for starting the commencement of a valuable and complete Museum of Asbestos and the asbestiform minerals, their products and manufactures. Specimens of the former should be obtained from all parts of the world, which with a little attention should grow until the Club, its

Museum, and Register becomes universally known and regarded, when very many of those who are now somewhat indifferent, will gladly become members and be desirous of partaking of the grand advantages it will offer. In doing this, every one of you can assist by contributing good samples of your own produce, than which the world can produce nothing finer. With each specimen must be sent the name of the locality and the mine which produces it, with a short record of its origin, ownership and especially its chemical analysis, and the name of the analyser, all to be entered in a Book to be kept by the Secretary, so as to show its special capabilities, and as new features come forward showing its advance in public estimation and the causes thereof. For my part, I shall be most happy to contribute good specimens of many new and foreign fibres from my private cabinet, with such particulars concerning them as I may be able to obtain. For this last, I have special facilities, as on account of the nature of my business, there are none such which are not first sent to me for advice and assistance in regard to working them. And I shall always have great pleasure in sending you good samples of new and uncommon fibres, so that with a little attention you may accomplish the object I wish you to attain, the founding of a Museum such as will greatly redound to your credit and be to Black Lake, a thing of great interest, not to yourselves alone, but to scientific men generally as well as to travellers from all parts of world.

Some Boiler Tests at Drummond Colliery.

By CHAS. FERGIE, Westville, N.S.

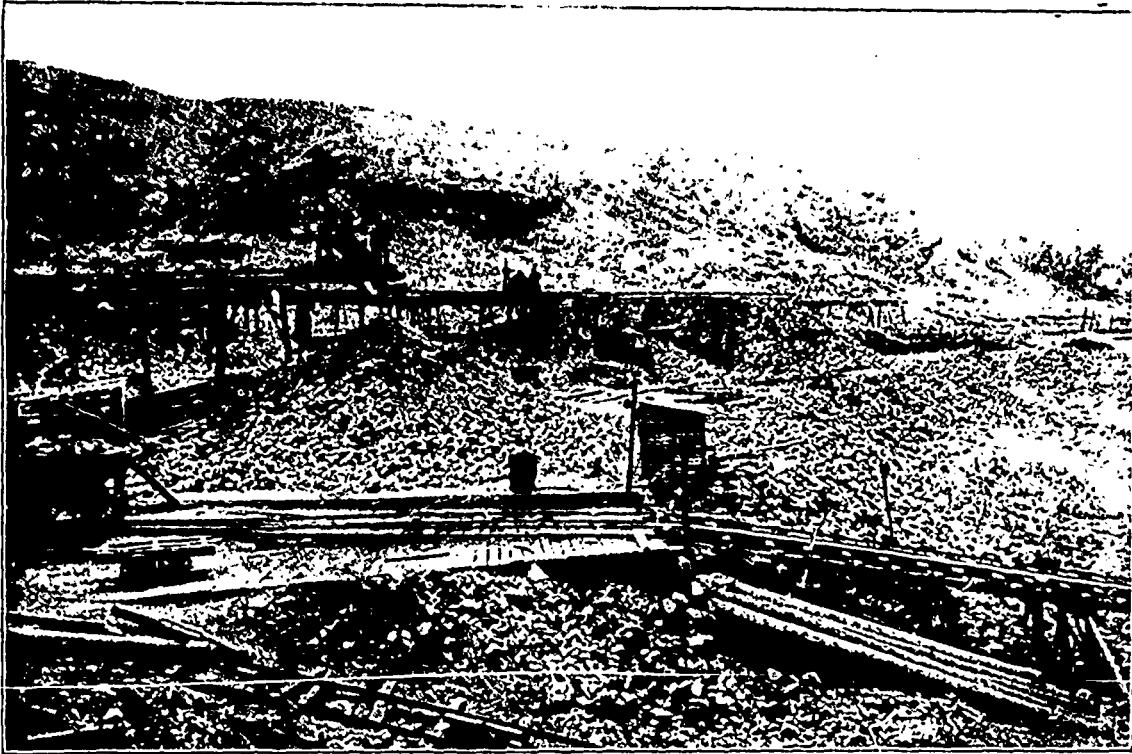
In bringing before the notice of this Society some recent boiler tests made at the Drummond Colliery with water tube boilers of different design, it is not with a view of criticising one or other boiler, but simply to show what is actually being accomplished in every day practice, and to promote discussion thereon; also with a hope that other members may be induced to take up so important a matter, and that by giving their practical experiences with the different boilers at their works, some useful information and comparisons may be elicited which will be of value to mine managers, whether of a coal or gold mine.

The boilers tested were two Stirlings and one Heine. The Stirling boilers have been in use some three years, the Heine boiler five years. Both Stirling and Heine boilers give entire satisfaction, and no trouble has been experienced with either since their erection. They are both quick steamers, will burn almost any class of fuel and supply dry steam. There has been no renewal of tubes in either make of boilers, and there have been no leaky tubes. Repairs to both the Stirling and Heine boilers have been very slight, the Heine having the advantage in that it has no fire box arch to contend with.

The actual cost of erection of the boilers was as below:—

ITEMS OF COST.	Stirling Boiler, 300 H.P.	Heine Boiler, 200 H.P.
Makers' Invoice.....	\$3450.00	\$2600.00
Smoke stack and breeching....	554.00	212.18
Duty on boiler.....	1035.00	
Freight on boiler.....	238.66	
Exchange.....	4.40	
	\$5282.06	\$2812.18
Labor erecting.....	925.05	275.20
Stores erecting.....	1196.02	340.62
	\$2121.07	\$615.82
Total cost.....	\$7403.13	\$3428.00

When comparing the rating of the two different makes of boiler it must be remembered that with the Stirling Co. one H.P. equals 30 lbs. of water evaporated per hour from 100 deg. F., at 70 lbs. pressure.

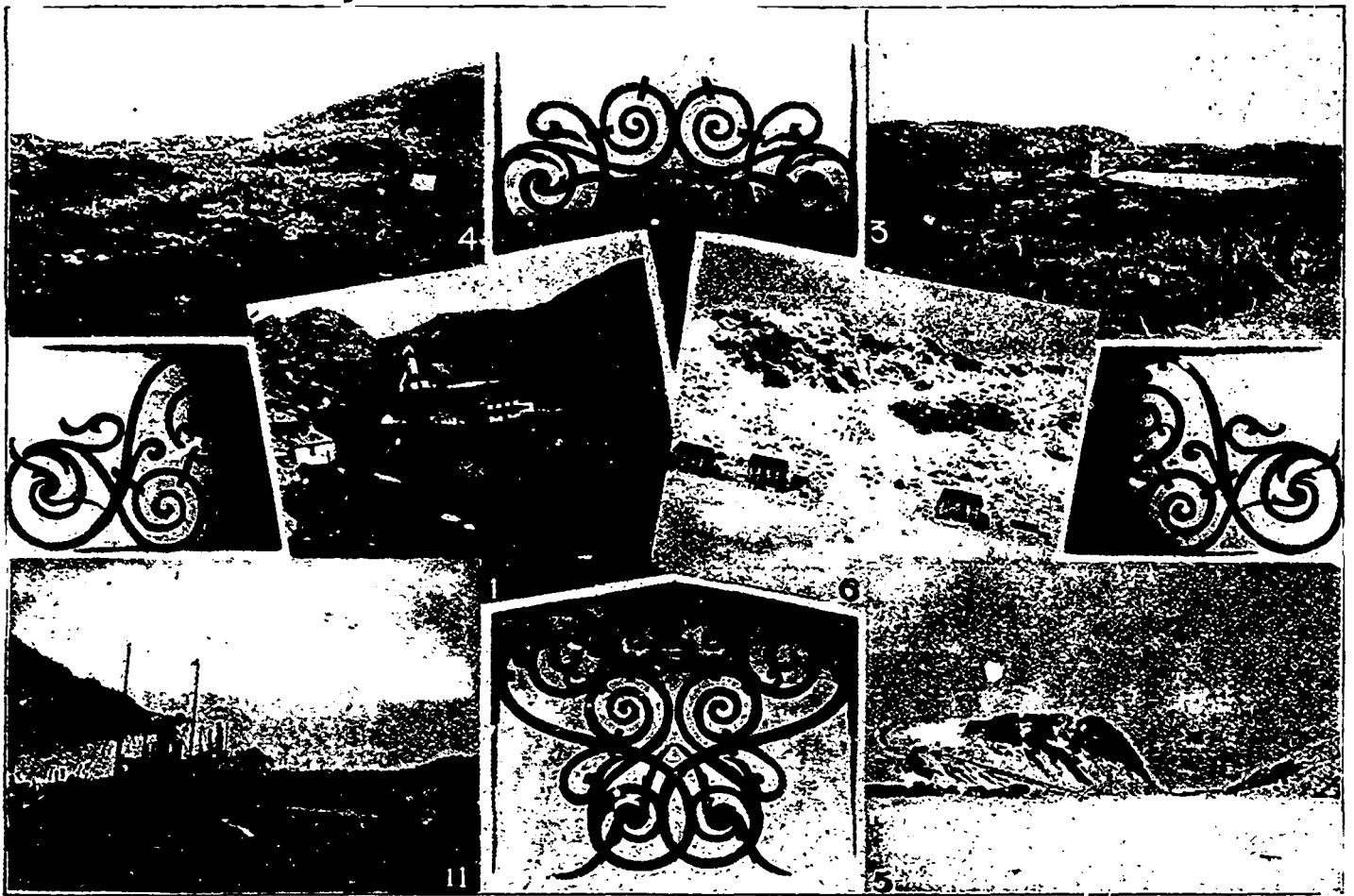


Cape Copper Co., Tilt Cove, Newfoundland. East Mine Ore Floors.



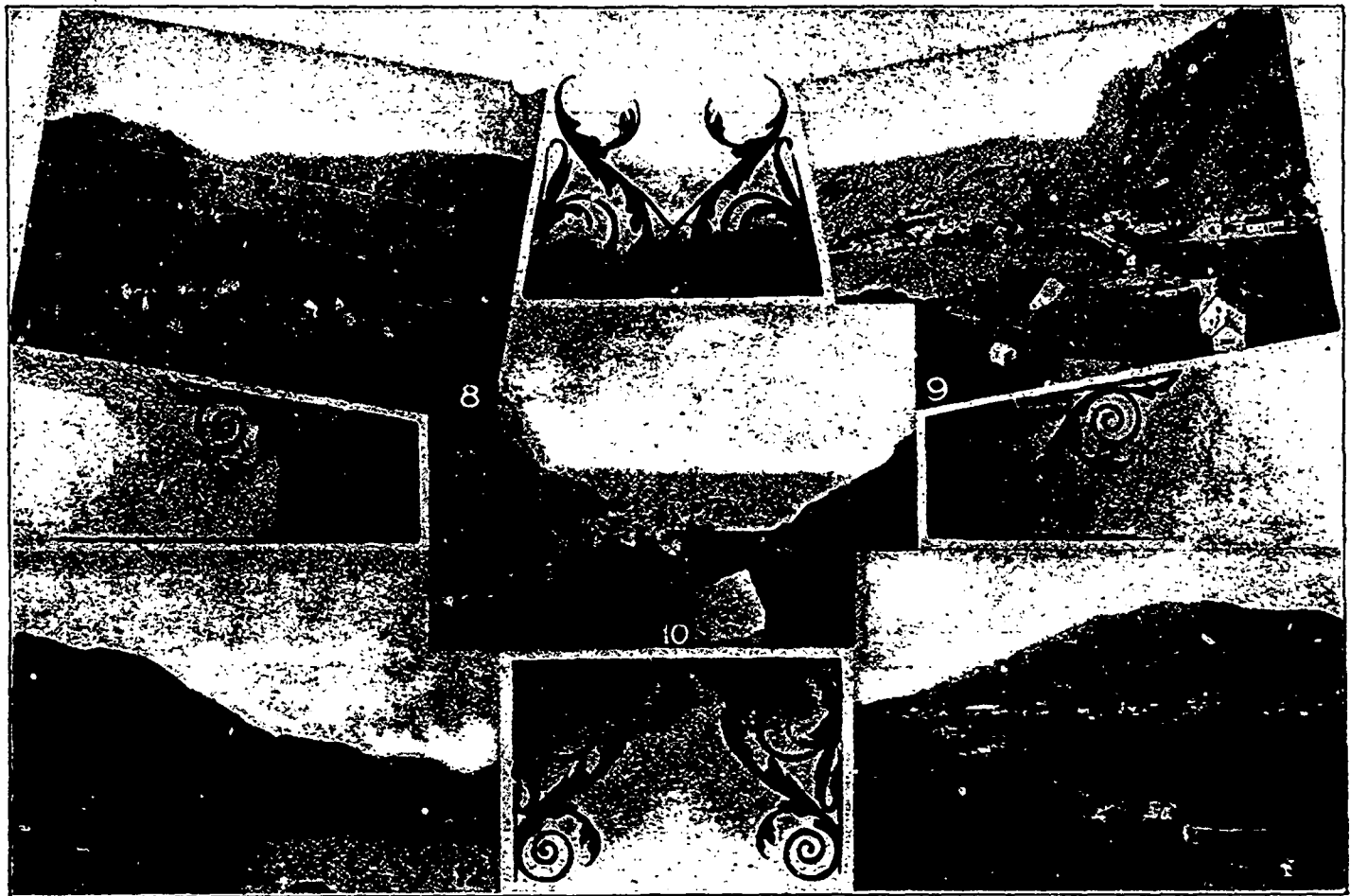
Cape Copper Co., Tilt Cove, Newfoundland. Public Tea given on Jubilee Day.

CAPE COPPER CO., TILT COVE, NEWFOUNDLAND.



- 1—Looking towards East Mine from the Pond.
- 2—East Mine Pumping Station.
- 3—Showing surface over East Mine.
- 4—View showing entrance of Cove from head of Pond.
- 5—View showing head of Winsor Pond.
- 6—S.S. "Para" loading ore.
- 7—East Mine Pumping Station.

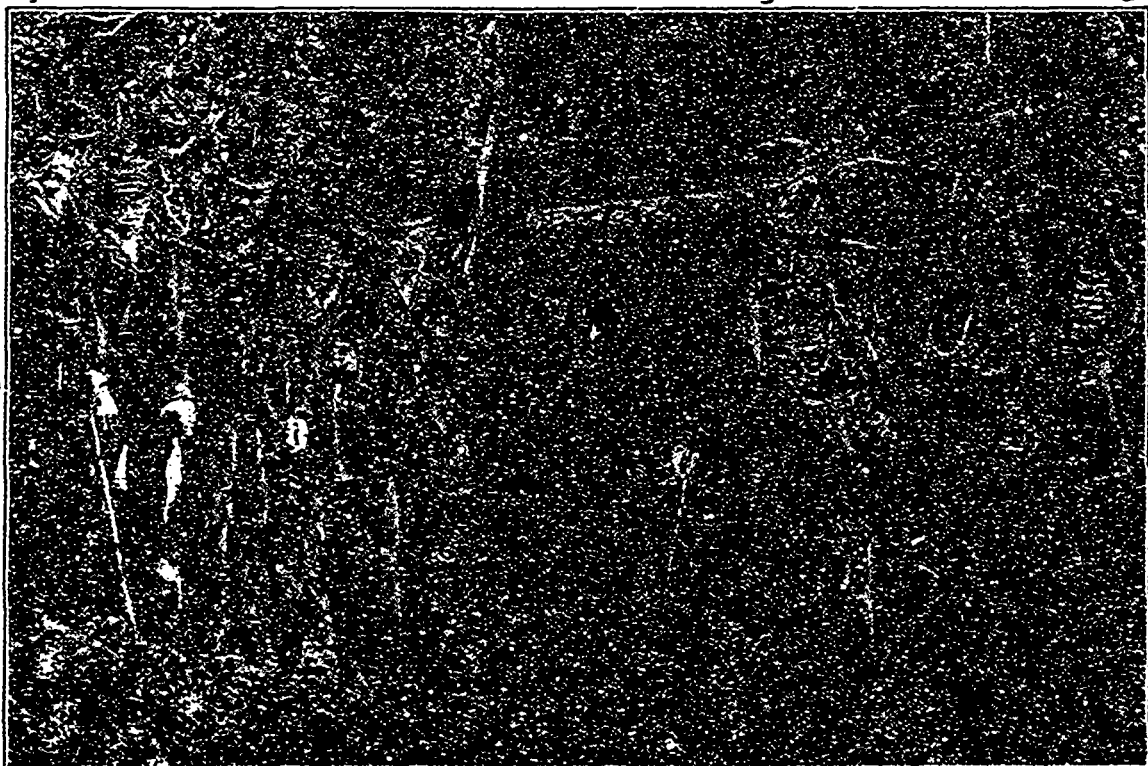
CAPE COPPER CO., TILT COVE, NEWFOUNDLAND.



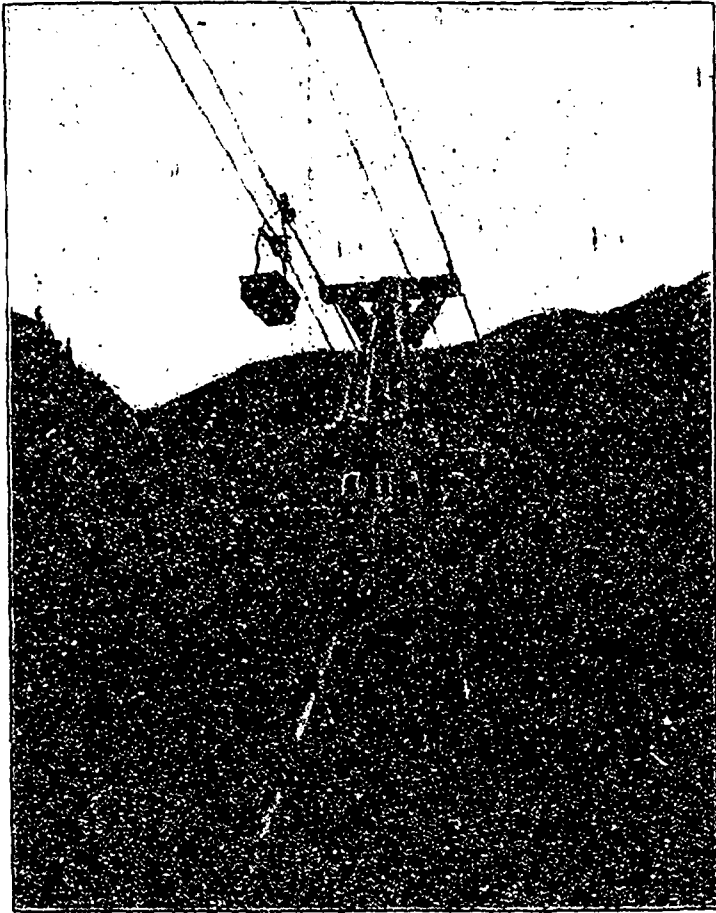
- 7—View from East Side Incline. West Mine in centre. Offices, stores, etc., to the left.
8—View from East Side Incline, North end of Pond, showing miners' houses, etc.
9—View from West Mine Bluff, towards East Side Incline.
10—West Mine Bluff, showing Cove and Wharfs.
12—Cove from outer point. S.S. "Annandale" loading.



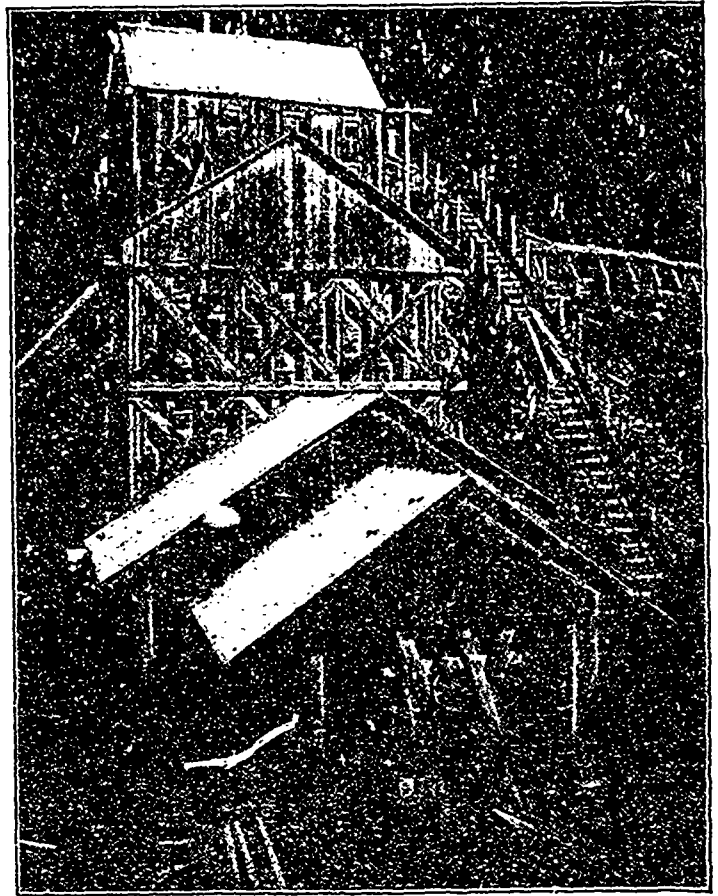
Cape Copper Co., Tilt Cove, Newfoundland. Long Pond Trial Mine. Some of the Miners.



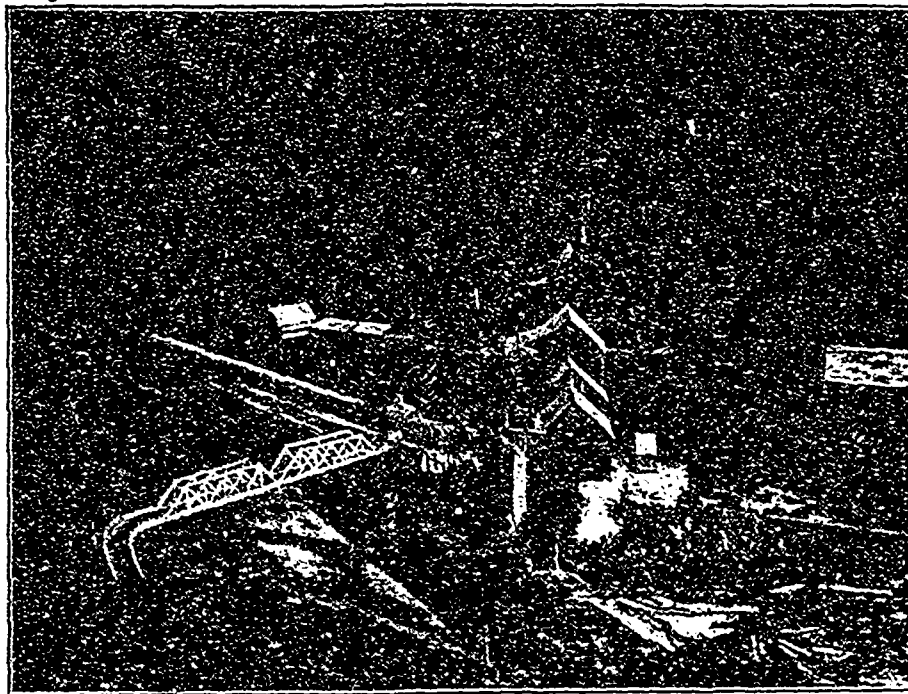
Cape Copper Co., Tilt Cove, Newfoundland. Group of Company's Officers at Long Pond Trial Mine.



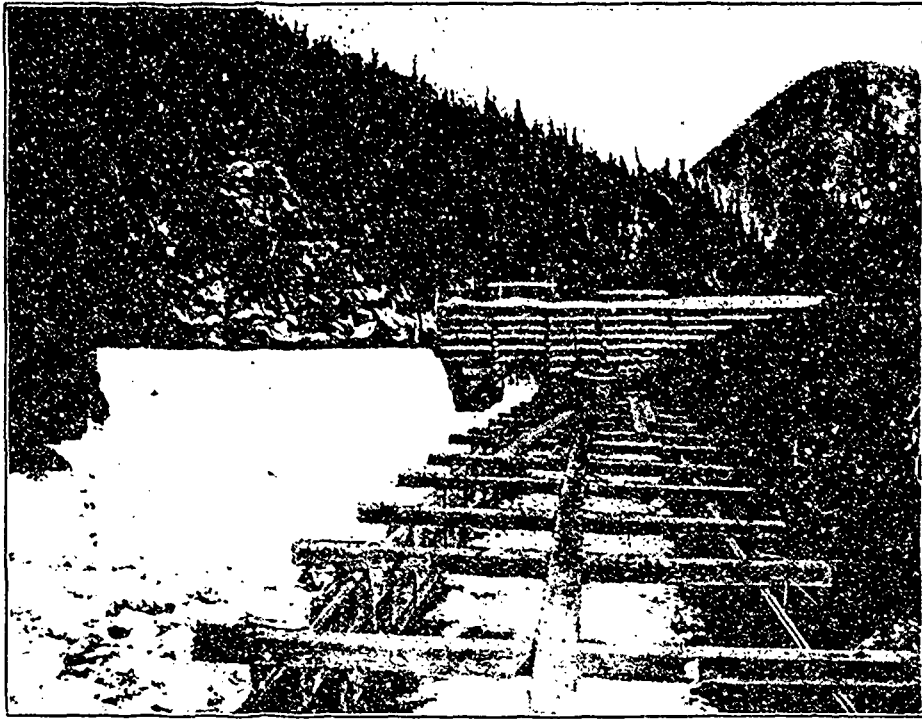
500-ft. Standard (Otto) Tramway at Lanark Mine, Laurie, B.C.



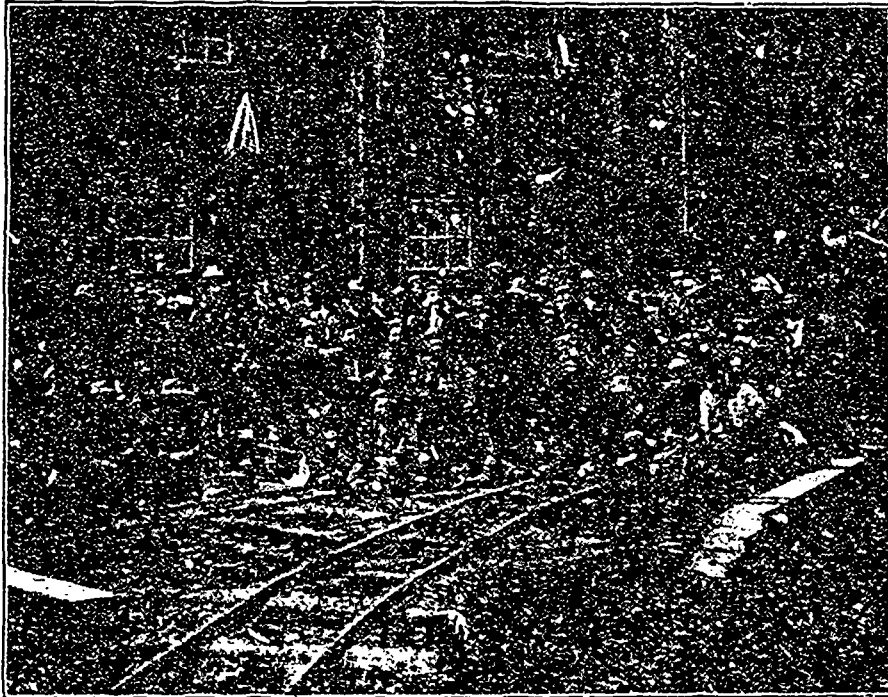
Ore Bunkers and Tramway Loading Station with Bunk-house in background, Lanark Mine, Laurie, B.C.



View of Concentrator, Flume and Bridge. at Laurie, B.C., from a photo taken from Bucket on Tramway.



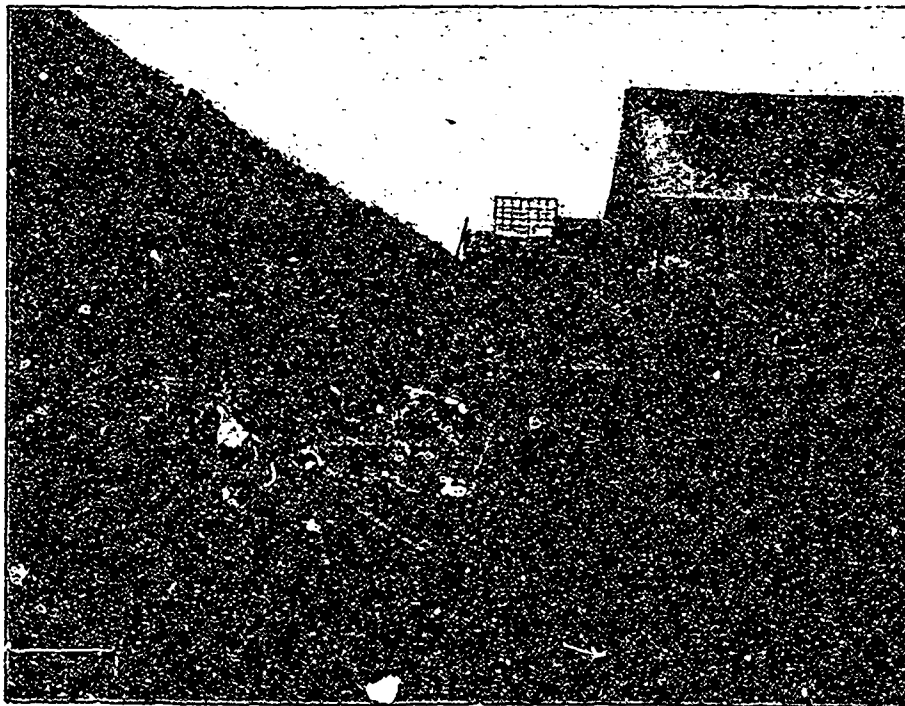
Lanark Mine. Dam on River Illecillewaet and Head of Flume.



Group of Miners at Lanark Mine of the Jilloet, Fraser River and Cariboo Gold Fields, Limited, at Laurie, B.C.

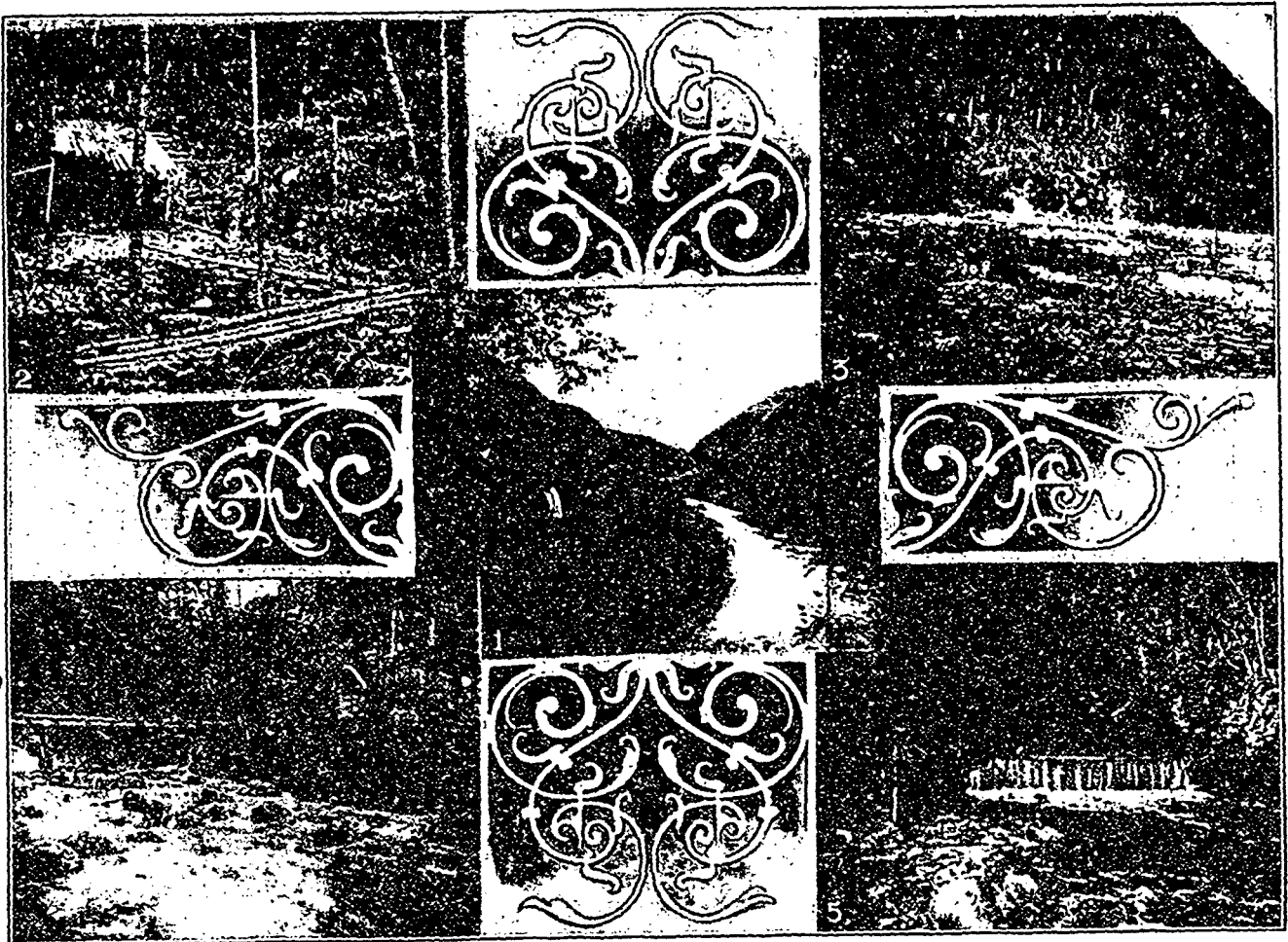


Laurie, B.C. View showing Concentrator on right.



Concentrator at Lanark Mine, Laurie, B.C.

NEW ALLUVIAL DIGGINGS IN NOVA SCOTIA.



- No. 1—The Cheticamp River, from Chipman's cabin.
No. 2—Opening to main slope, Cheticamp Silver-lead Mine.
No. 3—Alluvial washing grounds below Chipman's cabin.
No. 4—Ore house and bridge connecting with Cheticamp Silver-lead Mine.
No. 5—Chipman's Dam for alluvial washings, Cheticamp River, Cape Breton.

The Heine Co. calculate one H.P. equals 30 lbs. of water evaporated per hour from 212 deg. F. at 70 lbs. pressure.

For comparisons of the cost per H.P. of the two boilers we will assume the Stirling system of rating, and it is seen that the Stirling comes out \$20.70 per H.P. developed as against \$14.85 per H.P. developed by the Heine.

As it is the writer's intention to make further tests he will for the present make no further comments, but will supplement this paper at an early date.

TEST OF STIRLING BOILER AT DRUMMOND COLLIERY,
WESTVILLE, N.S.

DATE OF TRIAL, MAY 10TH, 1897.	
Duration of trial.....	Hours..... 8
Flat grate furnace.....	Sq. ft..... 78
Total grate surface.....	Sq. ft..... 3,300
Total heating surface.....	Sq. ft..... 2
Number of boilers in use.....	2
AVERAGE PRESSURES.	
Steam pressure in boiler by gauge per square inch.....	Lbs..... 110
Force of draught.....	In..... 0.5
AVERAGE TEMPERATURES.	
Of external air.....	Deg..... 47
Of fire room.....	Deg..... 71
Of feed water before entering boiler.....	Deg..... 151
FUEL.	
Class of coal—Bituminous, Round, Main Seam.	
Moist coal consumed.....	Lbs..... 11,913
Moisture in coal.....	Per cent..... 1.27
Dry coal consumed.....	Lbs..... 11,761
Total dry refuse.....	Lbs..... 1,434
Total dry refuse.....	Per cent..... 12.19
Total combustible.....	Lbs..... 10,327
Dry coal consumed per hour.....	Lbs..... 1,470
Combustible consumed per hour.....	Lbs..... 1,290.87
BRITISH THERMAL UNITS.	
Number of heat units in a pound of dry coal by analysis.....	B. T. U..... 13,402
Total heat units absorbed by boiler.....	B. T. U..... 95,263,190
Heat units imparted to boiler per pound of dry coal.....	B. T. U..... 8,099
Heat units imparted to boiler per pound of combustible.....	B. T. U..... 9,224
Factor of evaporation for boiler.....	1.106
EFFICIENCIES.	
Efficiency of boiler based upon dry coal.....	Per cent..... 60.4
Efficiency of boiler based upon combustible.....	Per cent..... 68.82
WATER.—Water actually evaporated.....	
	Lbs..... 89,232
EVAPORATIVE PERFORMANCE.	
Water actually evaporated per pound dry coal.....	Lbs..... 7.58
Equivalent per pound of dry coal from and at 212 deg. F.....	Lbs..... 8.38
Water actually evaporated per pound of combustible.....	Lbs..... 8.64
Equivalent per pound of combustible from and at 212 deg. F.....	Lbs..... 9.55
COMMERCIAL HORSE POWER.	
On basis of 34½ lb. of water from and at 212 deg. F., to steam of 70 lbs. gauge pressure, per hour by boiler.....	H. P..... 357.61
Horse power, builders' rating.....	H. P..... 300
Per cent developed, above rating.....	Per cent..... 19.2
RATE OF COMBUSTION PER HOUR.	
Dry coal actually burned per square foot of grate surface.....	Lbs..... 18.84
Dry coal burned per square foot of water heating surface.....	Lbs..... 0.44
RATE OF EVAPORATION PER HOUR.	
Water evaporated per square foot of water heating surface per hour from and at 212 deg. F.....	Lbs..... 3.73
Water evaporated per square foot of grate surface per hour from and at 212 deg. F.....	Lbs..... 158.15

ANALYSIS OF COAL.

Moisture lost at 110 deg. C.....	Per cent.....	1.76
Volatile matter.....	Per cent.....	22.34
Fixed carbon.....	Per cent.....	68.70
Ash.....	Per cent.....	7.20
SULPHUR.....	Per cent.....	0.84
EVAPORATIVE POWER, one pound of coal on complete combustion will evaporate 13.86 lbs. of water.		

TEST OF HEINE BOILER AT DRUMMOND COLLIERY,
WESTVILLE, N.S.

DATE OF TRIAL, JUNE 15TH, 1897.	
Duration of trial.....	Hours..... 8
Flat grate furnace.....	Sq. ft..... 37.68
Total grate surface.....	Sq. ft..... 1,150
Total heating surface.....	Sq. ft..... 1
Number of boilers in use.....	1
AVERAGE PRESSURE.	
Steam pressure in boiler, by gauge, per square inch.....	Lbs..... 75
Force of draught.....	In..... 0.4
AVERAGE TEMPERATURES.	
Of external air.....	Deg..... 53
Of fire room.....	Deg..... 73.5
Of feed water before entering boiler.....	Deg..... 108
FUEL.	
Class of coal—Bituminous, Round, Main Seam.	
Moist coal consumed.....	Lbs..... 7,836
Moisture in coal.....	Per cent..... 1.27
Dry coal consumed.....	Lbs..... 7,736
Total dry refuse.....	Lbs..... 905
Total dry refuse.....	Per cent..... 11.7
Total combustible.....	Lbs..... 6,831
Dry coal consumed per hour.....	Lbs..... 667
Combustible consumed per hour.....	Lbs..... 854
BRITISH THERMAL UNITS.	
Number of heat units in a pound of dry coal by analysis.....	B. T. U..... 13,402
Total heat units absorbed by boiler.....	B. T. U..... 61,567,756
Heat units imparted to boiler per pound of dry coal.....	B. T. U..... 7,958
Heat units imparted to boiler per pound of combustible.....	B. T. U..... 9,012
Factor of evaporation for boiler.....	1.079
EFFICIENCIES.	
Efficiency of boiler based upon dry coal.....	Per cent..... 59.37
Efficiency of boiler based upon combustible.....	Per cent..... 67.24
WATER.	
Water actually evaporated.....	Lbs..... 59,021
EVAPORATIVE PERFORMANCE.	
Water actually evaporated per pound dry coal.....	Lbs..... 7.62
Equivalent per pound of dry coal from and at 212 deg. F.....	Lbs..... 8.22
Water actually evaporated per pound of combustible.....	Lbs..... 8.64
Equivalent per pound of combustible from and at 212 deg. F.....	Lbs..... 9.32
COMMERCIAL HORSE POWER.	
On basis of 30 lbs. of water from and at 212 deg. F., to steam of 70 lbs. gauge pressure per hour by boiler.....	H. P..... 265.34
Horse power, builders' rating.....	H. P..... 200
Per cent. developed above rating.....	Per cent..... 32.67
RATE OF COMBUSTION PER HOUR.	
Dry coal actually burned per square foot of grate surface.....	Lbs..... 25.66
Dry coal burned per square foot of water heating surface.....	Lbs..... 0.66
RATE OF EVAPORATION PER HOUR.	
Water evaporated per square foot of water heating surface per hour from and at 212 deg. F.....	Lbs..... 5.48
Water evaporated per square foot of grate surface per hour from and at 212 deg. F.....	Lbs..... 211.24

ANALYSIS OF COAL.		
Moisture lost at 110 deg. C.....	Per cent..	1.76
Volatile matter.....	Per cent..	22.34
Fixed carbon.....	Per cent..	68.70
Ash.....	Per cent..	7.20
SULPHUR.....	Per cent..	0.84
EVAPORATIVE POWER, one pound of coal on complete combustion will evaporate 13.86 lbs. of water.		

Patent Fuel and its Manufacture.

By CHAS. ARCHIBALD, Halifax.

Before entering upon the subject I have chosen for my paper, Patent Fuel and its Manufacture, I shall briefly refer to the changes that have taken place in the preparation of both anthracite and bituminous coals for the market.

The evolution of the anthracite coal breaker, revolutionized the coal trade in Pennsylvania. Previous to its introduction, the coal was shipped and sold as it came from the mine, and was broken up with hammers and screened by the consumer. The expense of breaking up the coal, and the great loss in fine coal which could not be used, led to the invention of suitable machinery, and the breaker was the result.

Innumerable devices were used, and improvement after improvement was made, until perfection has almost been reached in the modern breaker.

The great improvement in machinery for handling the coal and the introduction of improved forms of grates and furnaces has diminished the waste immensely, and enables the consumer to profitably use coal that was formerly consigned to the dirt dump.

It was not very long since chestnut was the smallest size of saleable coal, and all below that went to the culm dump, and improved machinery, grates and furnaces have added to the market list, pea, buckwheat and rice.

The machinery and appliances for handling bituminous coal, does not require to be so complicated, or expensive, as that used in the anthracite region.

Instead of requiring a breaker to break the coal, we require arrangements to prevent the coal from being broken, and to-day the profit of the colliery very materially depends upon how the coal is handled.

Many years have not elapsed, since there were only two kinds of coal known at the coal mines of Nova Scotia, round and slack; the former passed over a screen, while the latter passed through longitudinal screen bars three quarters of an inch apart. All coal, except coal for gas purposes, had to be more carefully screened, and the coal mined at the colliery I managed, and also at other collieries in Cape Breton, was riddled in the mine by the miners and the slack or culm was left in the rooms, thus thousands of tons of good fuel have been inevitably lost. Later when the reduced duty on culm in the United States, and the erection of sugar refineries and other manufactories increased the demands for small coal and run of the mine coal, the practice of mining in Cape Breton was changed, and all the coal mined was raised to the surface, which was a decided advantage to the miner as well as an improvement to the mine, for every miner knows that the danger of gob fires from slack coal remaining in the rooms is always to be dreaded. The accumulation of slack on the surface for many years caused a slaughter of this coal in price, which sometimes ranged as low as thirty cents per ton, and some mine owners turned their attention to the screening of the slack and thus making nut coal. This making of nut coal has been for a long time carried on profitably

at the Pictou collieries, but in Cape Breton it was not so successful; the coal in the Cape Breton seams made so much fine that when the nut was taken out considerably more than fifty per cent of unsalable coal was left.

To utilize the unsaleable duff was what induced me to start the first, and I think the only patent fuel plant, now in the Dominion of Canada.

Owing to several circumstances, but principally to the inconvenience of handling the fuel after it was made, I did not work the plant to any great extent, but my faith in the enterprise has never weakened, and I feel sure that in the near future patent fuel will be manufactured in large quantities in Cape Breton for shipment to southern ports as well as for home consumption. Great Britain exports a large quantity, in Cardiff alone about forty thousand tons is shipped per month. The great advantage of shipping patent fuel on long voyages to southern ports is that there is no danger of spontaneous combustion in the vessel, it does not slack or deteriorate like ordinary bituminous coal, it can be transported more easily and with less loss, and above all there is no danger of its taking fire when banked out.

I fear that I have wearied you in arriving at what I started out to do, viz: to give a very brief account of how patent fuel is manufactured, and the probable cost of making it. The plant I erected was Yeadon & Co's, Leeds, England.

The plant was capable of making five tons of fuel per hour, or fifty tons per day; this quantity was manufactured by one briquette machine, and the engine was calculated to run two briquette machines, so that by adding another machine I could at any time double the output.

In the manufacture of patent fuel various substances have been experimented on to cement the fine coal, but fire clay and pitch have been the most suitable. Clay made good looking and fairly durable briquettes, but the percentage of non-combustible matter in the briquettes condemned them, and pitch is now universally used.

The most necessary thing then in the manufacture of patent fuel is to obtain pitch of the right consistency, and more important still is to procure it at a reasonable price. The pitch is much harder than roofing pitch, and must be sufficiently brittle to pass through a disintegrating mill, by which process it is reduced to the size of common gunpowder.

When I commenced the manufacture of fuel in 1885, the only places on this side of the Atlantic where I could purchase suitable pitch were New York and Philadelphia. Glasgow, Scotland, supplies the greater part of the pitch used in England for the manufacture of patent fuel, and it can be purchased there now cheaper than in America.

Many experiments have been made in the use of the ordinary coal tar or pitch in liquid form for making patent fuel, and for aught I know some have been successful. When in London a few years ago, I had several interviews with an engineer of some prominence who formed a large company for this purpose; at that time there were some difficulties unsurmounted, but I never learned if he was ultimately successful.

The plant consisted of a coal elevator, a rotary screen for making nut coal, a pitch breaker, disintegrating mill, fine coal hopper and pitch hopper and automatic feed, an elevator to the super-heater, pug-mill and briquette machine; all this machinery was put in motion by a system of belting driven by a single geared engine 14 x 24 inches.

The manner of manufacture was as follows:—The ordinary slack that had passed through screens, constructed by placing longitudinal screen bars, one half inch apart, was dumped into a bin at the bottom of the coal elevator; the coal was elevated and emptied into the

rotary screen; thence the nut passed into a car, and the fine or duff was conveyed by a chute to the fine coal hopper and feed with the pitch to the second elevator. The pitch after passing through the breaker was fed, to the disintegrating mill by a small boy, and after passing through the disintegrating mill was fed by the same boy to the pitch hopper. The automatic feed was so arranged that the percentage of pitch (about six per cent. of the coal used), was mixed with the coal and elevated to the super-heater, where it was carried along slowly by a screw feed and dropped by a chute into the pug-mill.

A super-heater is a cylinder heated by steam conducted from the boilers, which is super-heated by passing the steam through a furnace constructed for the purpose.

The steam is heated up to 300 degrees or more, Fahrenheit, and the coal and pitch passing slowly through the heater is dropped into the pug-mill in a plastic condition.

The pitch and coal is fed automatically from the pug mill or mixer to a revolving wheel containing the dies or moulds, and in revolving is subjected to a pressure of two tons, and then forced out of the dies by a plunger—a perfectly pressed briquette.

The briquettes I made were 9 x 6 x 4½ inches, and weighed when made eleven pounds.

They are made in different shapes, like cannon balls, square, rectangular, and some for open fires are made in rings so that they will burn more freely.

Briquettes require a strong blast or draft, and are more lasting than ordinary coal. The rectangular shaped briquette such as I made, burned well in an open grate, but should be put on a good bright fire. They make most economical fuel in winter, and one briquette will last during a night, and gives out a good heat.

To run a patent fuel plant of fifty tons capacity per day, the number of men and boys required are: one capable men to look after the engine, belting and machinery generally, one man to look after the coal elevator and pitch breaker, one man to attend the nut screen and look after the cars, one boy to run the disintegrating mill, one boy to carry the broken pitch to the disintegrating mill, and two to remove the briquettes from the plunger slide and place them on cars or stack them. When not shipping, I used a carrying chain run by a belt to remove the briquettes from the machine to a shed, where an extra boy is required to stack them.

Under ordinary circumstances twenty cents per ton should pay the labor of making the fuel.

The percentage of pitch varies from five to seven per cent. and valuing the pitch at eight dollars per ton, the cost for pitch would be about fifty cents per ton of fuel.

I have written this paper rather hurriedly and regret that I have no illustrations or plans of the Yeadon Patent Fuel plant, but I shall not feel disappointed if this brief and incomplete paper may induce more owners and managers to look into the manufacture of patent fuel seriously, as I feel sure that in the future it will be an important and profitable industry in this province.

The Alluvium of the Yukon Country.

By WALTER C. CHAMBERLAIN, M.E.

Many are the opinions advanced for the solution of the cause of the rich placers of Alaska and the Klondyke, etc., and I hardly think any definite geological explanation will suffice to satisfy the numerous opinions. Much will no doubt be formed from this time on, because the dissolution of rock, which has set free the gold in Alaska, has had so many different conditions to contend with than had the placers of California.

Regarding the origin: The deposits no doubt follow the same line of subterranean pressure, or axis of volcanic activity, which brought our California ledges to the surface, but the climatic conditions were opposite to a marked degree, notwithstanding the fact that glacial action may have covered the whole Pacific slope during one of its long periods when subsidence and uplifts were of frequent occurrence.

When one looks deep into the matter it furnishes a vast field for study and investigation. Intense heat, cold and glacial action combined with volcanic activity, are all present, and confront the writer with their influence upon that section of the country. The depth, which is considerably less than is encountered elsewhere, can be accounted for by the severity of the Arctic winters, which penetrates and freezes the gravel and earth to such a depth that the surface is only affected to a small degree by the thawing process during a few months of summer, owing to the dense vegetation and moisture of this moss laden country holding and absorbing the heat derived from the sun's rays. Therefore gold, following by gravity to the limit of the thawed out earth, rests necessarily in places near at hand.

Touching upon the dissolution of gold-bearing lodes: The Yukon country is favored in preference to many other localities, insomuch that moisture, heat and finally intense cold in a country where there is such a large watershed to saturate all class of lithological matter, the energy exerted by expansion and contraction coupled with the above agencies would be a potent destroyer of rocks that were unprotected and rendered friable through the absence of volcanic constituents, had these same virgin lodes of the north been enveloped in a garb of rhyolite, and finally covered with a heavy mantle of basalt, such as are encountered in many places in the Sierra Nevadas, things might have been different. Fortunately the andesitic flows have not reached far enough over to have effected the alluvial deposits, confining their actions, as I understand, more toward the coast, otherwise the easy and accessible treasures recently exhumed from the valley of the Yukon would have remained sealed in the womb of mother earth for ages to come. In this respect the Klondyke mecca (with the exception of climate) is a boon for poor man or miner, simply because it has been anybody's gold, requiring no knowledge only that of working a rocker or sluice box. As to the real source of the placers, regardless of all expert testimony the geological features of the country will have to be thoroughly studied before anything can be finally accepted, which as yet I will venture to say: there are many thousands of square miles in the North-West Territory and Alaska which never have been visited by a human being, geologist or miner.

MINING NOTES.

Ontario.

Messrs. Emilius Jarvis & Co., report under date, 1st October:—"The discoveries in the Michipicoten district mentioned in last month's report, whilst they prove to be not very extensive, show that the gold region extends from the Manitoba boundaries to the extreme eastern end of Lake Superior. The government under the power of the new Mining Act, which provides for the setting apart by an order-in-council of a tract of country within the limits of which district owners of a miner's right may proceed to stake out areas of 22½ acres, to be known as miner's claims, have established this district as a "Mining Division." This is a step in the right direction, and does away with the cumbersome survey procedure and the freehold crown-grant which has enabled capitalists to blanket so much of the Algoma country. The Division embraces about 5,000 square miles. Following up this action the Government despatched a survey party under Prof. A. B. Willmot to thoroughly examine the district. The vein formation as far as prospected is almost entirely lenticular. The rich finds advertised should be accepted with some hesitation, as the large majority of the prospectors are innocent of mining experience. Our private report of the district is unsatisfactory, the deposits being very low grade. It is, however, not likely that enough will be known of the district this year for a full opinion to be formed. The reported placer finds in the district prove to be of very limited extent, of no great value, and very widely separated.

Near Tache, about 140 miles west of Port Arthur, some good discoveries are reported, reefs running from 20 to 50 feet in width carrying much visible gold, and alluvial deposits extending for some miles. In the Shebandowan district some rich and large reefs are reported as discovered; whilst in the vicinity of Round Lake development work has exposed a remarkably rich copper deposit, the extent and width of which is going to be tested with the diamond drill.

Progress with the construction of the Rainy River Railway is delayed owing to modifications in the route necessitated by the difficulty of grading along the proposed survey.

Prices for leading companies closed for the month:

Saw Bill, \$2.25—\$2.50. Hawk Bay, 35c.—50c. Empress, 5c.—10c.
Foley, \$1.75—\$2.00. Princess, 25c.—30c. Hammond Reef, 25c.—35c.

Locations on prospector's hands are, in the case of out of the way positions, offering freely, but those well chosen along the Contact are changing hands at higher figures.

Locations with satisfactory opening developments have been bonded at good figures and are more in demand than at any time during the year, whilst actual sales are recorded as high as \$25,000.

The Mikado returned \$16,000 for 16 days clean up, and a second run of 10 days gave \$10,000. A test run of two 50 ton lots of ore from a location adjacent to the Mikado, owned by the Ontario Limited Co., has been put through this company's mill, and the results are said to have been highly satisfactory. These crushings were taken from No. 4 and No. 6 veins, the former being 15 feet and the latter 7 feet wide, the average assays being \$12 and \$18 per ton respectively. A trial shipment from Gaynor Island, results of which are not yet known, has been sent to the Reduction Works at Rat Portage. The Regina returns, which are not published, are, it is understood, sustaining their average. The 5 stamp mill on the Olive put through a preliminary trial crushing of 10 tons, which yielded \$1,500. It is not, however, claimed that the average of the reef will run as high as this.

The Yum Yum, which is in the immediate vicinity of the Mikado, has opened up so satisfactorily that it is the intention of the company to place the necessary plant and machinery in position this winter. Work on the supposed extension of the Sultana reef in Bald Indian Bay has been commenced. This is a lake location and it is proposed to sink on the reef by means of steel caisson. At the 125 feet level of the Mikado they have struck a body equalling in richness the original crushings. The Hiawatha below the 50 feet level, where the reef has widened to 4 feet, is showing a marked increase in value, assays running from \$18 50 to over \$300. The development on vein No. 2 gives promise that this will be equal in value to No. 1. This property has, it is reported, just been sold at a good figure. This property, with the Wampum, Kabaskonge, Hammond Reef, Saw Bill, and Golden Fissure, all lie in the contact area extending from the Saw Bill to the Seine river, and it is worthy of remark that every property along this line has improved markedly on opening up, and some of the best showings in the district have been discovered on the locations intermediate to the above mines. There are an increasing number of these locations being taken under option. The Saw Bill, after the usual preliminary starts and adjustments, is now mining regularly, and the results of the first clean up are expected October 15th. The shaft on the Neepawa is now down over 80 feet and as the purchase of the property has been completed and the cash paid, it is doubtless giving satisfaction. The Black Sturgeon Company is in difficulties. The property had not been paid for, and as the transaction could not be completed this property was decided back to the owner, who immediately resold the location at \$5,000 advance. The mill on the Crystal Mining Company's property in the Wahnapitae district is working well, crushings running from \$12 to \$18, at which figure large dividends can be earned. The Ontario Government Gold Concessions Company, who took over the Engledue grant, are reported to have made some valuable finds upon their Lake of the Woods concession which runs down to the Mikado property. The Sultana's old stamp plant is being re-placed by a 30 stamp mill with 6 true vanners, a 150 H. P. Corless engine, with a complete equipment of boiler, compressors, and hoisting plant. This will be a Canadian equipment by the Jenckes Machine Company, of Sherbrooke, P.Q. The Hawk Bay Reef, which we reported in July as narrowing, has pinched. The fissure is strong and clearly defined, but in both shafts quartz have given out. On the Foley the foundations for the new 12 drill compressor plant are finished, the boiler setting nearly completed, and the pipes connected to No. 5 shaft. The north shaft was down to 284 feet 3 inches on the 18th September, and was going down at the rate of 18 inches a day. At this depth the vein was 52 inches between the walls.

During the month letters patent have issued incorporating the following companies:

The Yellow Jacket Gold Mining Company of Seine River, Limited, Capital \$90,000 in \$1 shares.

The A. D2. Gold Mining Company of Ontario, Limited, Capital \$500,000 in \$1 shares.

The Gold Creek Mines and Exploration Company of Ontario, Limited, Capital \$500,000 in \$1 shares.

The Mine Centre Development Company, Limited, Capital \$50,000 in \$1 shares.

The Railroaders Gold Mining Company of Ontario, Limited, Capital \$50,000 in \$1 shares.

The manager of the Regina in a cable to head office, under date of 7th inst., states:—"For the month of September 300 tons crushed; mill return, 61 ozs.; cyanide, 94 ozs. There is a great improvement in the 5th level; south vein is fully 8 feet wide, averaging 10 dwts. per ton."

From received advices from the mine operated by the Ontario, Limited, near Rat Portage, it would appear from the work already done at the Mikado that there need be no fear as regards the result of full development work on the property of Ontario, Limited. The impression is gaining ground here, that Ontario, Limited, is one of the finest undeveloped property in the Lake of the Woods region.

The shipments of Canadian crude and refined oil reduced to crude equivalent, over the lines of the Michigan Central and Grand Trunk Railways for the month ending September 30th, 1897, are as follows:

Michigan Central Railway.		
Crude.	Refined.	C. Equivalent.
Bbl.	Bbl.	Bbl.
3,970	11,627	40,694
Grand Trunk Railway.		
14,075	22,495	78,632
18,045	34,122	119,326

"The rich strike made by the Mikado Mine," says the *Financial Bulletin*, "has drawn public attention to the shares, which are now being freely dealt in at between £3 and £3 5s. South American General Developments also a good market at about 5s. 6d. It will be remembered that, in consideration of the latter company's large holding in Mikado shares, we have recommended the purchase of the shares since they were quoted at about 3s. 6d. The boom in Canadian mines is surely on the way, and the above shares can safely be bought for a further rise, as also may Ontario, Limited, at about 2s. 6d., and Gold Explorers of Canada at 22s."

With respect to the reduction works of the Ottawa Gold Milling and Mining Company now rapidly nearing completion at Keewatin, Lake of the Woods, Ontario, the following has been issued by the company:—

The plant has been designed entirely as a "custom mill" having no mines of its own and so prepared to treat all comers alike. In its construction has been utilized a careful study of the requirements of the ores of Western Ontario. To meet these and the commercial desirability of low treatment charges, special machinery has been largely introduced, built from drawings furnished by this company. This follows along the line of old, well established processes, but is exceptionally heavy and efficient.

For the receipt of ore from the waters of the Lake of the Woods, a fleet of barges has been constructed which will be placed at the service of the public. For the receipt of ores by rail, the works are connected with the main line of the Canadian Pacific Railway by a side track, leading into the works. Automatic unloading facilities have been arranged for both lake and rail shipments.

The ore as it enters the plant goes directly into the sampling department where it is crushed to the size of corn and run through an automatic machine sampler, which takes out eighteen hundred samples each hour as the ore stream runs through.

Directly it is sampled the ore is weighed in hopper bins, This allows the moisture percentage, arrived at by testing the sample, to be applied to the gross weight of the ore and the actual weight of the shipment can be obtained. As all the charges for barging, sampling and milling are based on the dry weight, this represents a saving of the charges on ten tons in each hundred, over a plant where the charges are based on the wet weight of the ores, as very few ores carry less than ten per cent. of moisture and many of them more. In addition it raises the grade of the ore an equal amount, as determined by the bullion obtained, for the given amount of bullion has to be distributed over so much less ore.

From the sampler the ore goes to one compartment of the two thousand ton storage bins, to await an opportunity to run it through the mill to the best advantage, both to owner and miller.

From the sample obtained, the actual gold contents of the ore is ascertained by assay and in the laboratory, the best method of treatment is worked out and how much can be saved is determined.

This is done for each lot no matter how small, and gives the mine owner information regarding his property that should prove of the greatest value.

If the ore owner wishes it, the company will purchase the ore from him on the results of the sample, giving him a check for its entire value less the accrued charges. In this way, if desired, a shipment can be realized on within two days of its arrival. Half of the sample from the sampling machine is turned over to the owner of the ore, so that it may be used for any desired checks. The work in the mill is based on the results of the work in the company's laboratory on the other half of the sample.

This requires the maintenance of a chemical laboratory and assay office of unusual accuracy. It has been decided to open this also for custom work in all lines of assaying and analysis. While the charges will be no higher than usual for this kind of work, this laboratory will be prepared to make "high accuracy determinations" a specialty.

This entire plant will be ready for the receipt of ore about the middle of October, and you are cordially invited to inspect its appliances and methods. Any information about charges for barging, sampling, milling, and assaying can be obtained by inquiry to the company at its office at Keewatin. It is trusted that such information will bring out the advantage of handling ore in a large, highly equipped and manned custom plant rather than run the risk of building a small property mill, whose economic operation, prohibits the employment of the same grade of skilled help. It is the belief of this company, that the additional saving of a few percents. on the value of the ore, due to closer technical testing at each point in the process, will more than offset the carrying charges from mine to mill, while the use of water power at Keewatin, as contrasted with the expense of operating and keeping in repair a steam plant, together with the low cost per ton due to large capacity, will enable this company to maintain a scale of milling charges considerably below the actual cost of doing the same work at the mine.

Horace V. Winchell, State Geologist for Minnesota, contributes to the *Engineering and Mining Journal* under date of 23rd October an article on

the Gold Fields of the Rainy River which will be read with considerable interest. Mr. Winche's conclusions are so sound and timely that we may be excused for reproducing them in full. He says:—

"It was extremely unfortunate for the Rainy Lake district that it was located so far from any other gold mining region, and was therefore first visited, explored and developed by novices. The prospector of the West has had a training peculiarly adapting him to his occupation, but the prospectors, mine and mill superintendents, as well as the majority of the so-called 'experts' of this region, were mainly men who never saw the inside of a mine or a stamp-mill and had never sampled a quartz vein before they attempted to operate them here. There are notable exceptions, of course, but they are only exceptions, and are mostly late arrivals. The usual number of fakirs has also made an appearance here, but they have not done one-quarter the damage that has resulted from incompetence.

The situation at present is something as follows: Thousands of acres of land surveyed and purchased for mining purposes, much of which is not worth one cent for gold mining, not possessing even a quartz outcrop. And yet in many instances stock companies have been organized and money paid in for the purpose of developing these absolutely worthless locations. I have seen shafts and pits sunk in black jasper, in flinty argillite, in pure granite, in quartzite and in ordinary green schists, none of which would show a color in a pan or assay half a dollar a ton. Worse even than this has been the construction of modern stamp mills to treat such 'ores.'

Hardly a property in the region that is now equipped with a mill had been developed sufficiently to tell whether a mill was needed or could be worked profitably before it was ordered and erected. Out of six stamp mills that were built before this summer only one was located where it ought to be. In some cases the mill actually could not be operated for lack of water, while in other instances lack of ore or difficulty in transporting it from the mine to the mill resulted in a premature shutting down.

In some instances the fault lies with the hare-brained 'expert.' In others the expert was all right, but the mine owners or the superintendent 'knew better' and changed the plans. In most cases, however, there was no expert whatever; the grocer, lumberman, capitalist or corporation owner knowing all about such matters himself just by absorption and having put up his mill just where and when he took a notion. Two of these six mills have run part of the time during the present season. The others will require moving before they can be made useful. Meanwhile other companies are preparing to build mills or to install some new sort of experimental plant to treat their ores.

If the district survives the epidemic of costly mistakes through which it is passing it is indeed a good one. At present it is suffering severely and is not in as good repute as it was a year ago. Several other mistakes, and some of them colossal ones, have yet to be discovered and rectified before a healthy growth can set in. Much injury has been done to the district by the inflated boom articles that have been prepared by interested parties or newspapers reporters and published in the daily and weekly press. Nor are the members of the mining profession entirely blameless. The writer has seen reports by mining men of more or less repute making the most astonishing claims and statements. One property is said to be 'the greatest deposit of gold ore on the face of the globe.' Another Eastern expert figured a value of over \$200,000 in sight in certain blocks of ore which produced about one-tenth the estimated amount when mined out. Comment on such work is needless.

That there are veins of sufficient size and value to pay for working in the Rainy Lake region there is no longer any doubt. That any money has been made there yet in actual mining is extremely doubtful. This fact, however, is not due to the low grade of the ore treated nor the difficulty of extracting the gold. With practically free-milling ore and an advantageous location as regards all the items that go to make up the cost of production, with many veins of a width of 4 or 5 ft., and some considerably larger, the cost of treatment should not exceed \$7 per ton, and there are numerous lodes whose ore will average from \$9 to \$12. Operated on a large scale and with better transportation facilities, the cost will be reduced to perhaps \$5 per ton, leaving a handsome profit on \$10 ore.

But I wish here and now to repeat even more emphatically the warning which was contained in the Twenty-third Annual Report of the Minnesota Geological Survey: 'In a new district double precautions should be taken to insure against mistakes, etc.' Unless better system and economy are soon put into practice and properties developed as they should be and are elsewhere, there will not be a mill or a mine in operation on Rainy Lake or Seine River in two years from date."

British Columbia.

WEST KOOTENAY.

The total tonnage of ore and matte for last month amounted to 4,604 tons. Of this 897 tons were matte from Trail and Nelson, the product of those divisions being almost entirely treated in their local smelters, whilst the Slocan ore is mainly treated over the line. The value of this total production for September reached the sum of \$714,225, an increase over any previous month.

Rossland expects the early construction of a C.P.R. branch from Robson to Rossland, by way of the Columbia Valley and China Creek, with a terminus in the hollow immediately south of the main town. The engineers are at work and construction may be carried on at once.

The weekly tonnage of this camp is at present about 1,500 tons, this mainly from the Le Roi, with small amounts from the War Eagle, Centre Star and Iron Mask. It is apparent that several mines are directing their work to blocking out ore bodies to be shipped at a future date, when better smelting facilities or rates can be obtained. Such appears to be the policy of the Centre Star and War Eagle.

The Robson-Trail standard gauge railroad is completed, and has been inspected by H. B. Smith, of Smith, Dean & Co., Rossland. The same company is at present surveying a new town site at the terminus across the Columbia from Robson.

The Exchange mine near Slocan City, and the Velvet, ten miles southwest of Rossland, have lately been visited by Sir Charles Tupper, who is chairman of the New Goldfields of British Columbia, to which company they now belong. The consulting engineer and manager is Capt. James Morrish, late of South Africa and London. A vertical shaft is being sunk on the Velvet with a strong showing of copper pyrites which is believed to run well in both gold and copper.

In the Slocan there is some probability of the C.P.R. extension being built from Three Forks to Whitewater, with a system of tributary tramways which will compete with the present K. & S. Ry.

Machinery being put in the Montezuma concentrator, and the Payne and Lucky Jim gravity three rail tramways are nearly complete.

The Slocan Star is said to have struck a five-foot ore body in their lowest tunnel, No. 5, on which they have been driving all summer. The total depth gained is 750 feet, the lowest yet made in the Slocan.

Around Nelson there is fair activity in mining, and as it is the chief town of the district nearly every mining man spends more or less time in the place. The Fern mine is said to be showing up well, the 10-stamp mill at present running is to be increased by another 10-stamps at once.

The Silver King sends down about 200 tons of crude ore per day, which is of higher grade than formerly. The Athabasca continues to make small shipments, and a sale has been made by Hector McRae and J. Fred. Ritchie of their interest in the Poor-man to Messrs. Needham and Woolfson, of London.

There has been some dispute over the ownership of certain ore bodies claimed by both the Centre Star and Iron Mask, under the old Apex law; they went into each others ground. Surveys of the underground work have been made by Frank Wilkin, P.L.S., but it is probable the matter may be settled without going to court.

Small shipments of a car-load or two are being made from the Arlington, Two Friends, Meteor, Howard Fraction, Chapleau and Evening Star. These ores are above the average value of Slocan ores, and are all found on Springer Creek. This section has been in the bad graces of most investors during the summer, but is working its own salvation out like other Slocan camps have done.

Altogether the outlook is prosperous, claims can be bought for something near their reasonable price, and the increase of shipments is largely over any previous output. The towns are, some of them, in a dull state after the late rapid increase of business and professional men, but as a general thing there is a building up of places which is the result of solid business and merit.

The chronicle of new mining companies is but a small thing in these days. The public at large may feel more confidence in buying stock, than they could a year ago. Good stocks are advancing, and poor ones are so low that they do not look prosperous. However some lean properties are still being systematically puffed up by the papers.

The Enterprise transferred from J. A. Finch and associates to Brunton and Hyman of Colorado, is still inactive, although it is not expected it will long remain so, being a high grade ore body of large extent. Other properties on 10 Mile Creek are not doing much, except under development by the locators.

NELSON.

Already indications point to the not far distant commencement of our long winter season. Snow has begun to fall on the hills, and though it is of course not deep yet, and may even disappear entirely for a week or two, there can be no probability of much more weather in which prospecting can be done.

Looking back at the last season, there is very much to record that is highly satisfactory. Assessments have been well kept up, and many small mines that were prospects only a year ago are now shipping ore in more or less quantity, and thereby assisting to pay expenses; a method that is highly commendable for a small concern practically in its infancy.

The Athabasca group is a case in point. This group has been sending ore in considerable quantities (considerable, that is, for a small mine) to the Hall mines smelter, and what has been treated there has averaged about \$100 per ton, which may be regarded as most satisfactory, the more so as by no means all of the ore that is being extracted is shipped to the smelter, a large amount being retained for treatment in a stamp mill which will probably be erected very shortly to deal with the free milling gold rock.

Work on the "Last Chance" group on Toad mountain will now be very shortly concluded for the season. Full assessment has been done, much ore

taken from the veins and placed on the dumps ready for future shipment, while a good sample has been sent to the Nelson smelter for treatment there, which it is confidently expected will turn out very well. Three tunnels have been driven to tap the various veins on this property (which comprises the Huron, Emily, Last Chance and Copperfield claims) as well as a great deal of cutting on the surface, to expose the vein, and so to trace its course. One of the principal owners arrived recently from England, and expressed much surprise and delight at the appearance of the property and the work done upon it.

A little distance south of Nelson, on one of the creeks flowing into the Salmon river, called Sheep creek—(what a comfort it would be if there were a little more originality shown in naming these innumerable creeks)—a very fine ledge has been discovered, nearly 40 feet in width. This gave no value on the surface, but the owners persevered, and crossed it with a tunnel, and the gratifying result is that the average across the whole ledge gives a value of over \$6 in gold, while a thin paystreak about 6 inches wide yields \$50 in gold, besides silver and copper. Part of this is free milling rock apparently.

The Fern mine, on Toad mountain, is still doing very well, the to-stamp mill being completed and ready for operation. There is a large quantity of ore on the dump, and any quantity more "in sight," the assays on which have all run high, and some extraordinarily so. A new discovery has been made lately in the progress of development, of another vein some forty feet below the main lead, and running parallel to it. The quartz is very similar to that already known, and will probably be free milling; if that is the case, it must greatly increase the value of that already valuable mine, and may easily render an addition to the machinery absolutely necessary.

An extensive group of claims on Toad mountain has just changed hands, the Great Eastern, Great Western, Callispel and Golden Bell having been bought by Mr. G. Neelands. These are all supposed to be free milling propositions, and samples said to have come from them unquestionably show much free gold. The present owner intends to put a force of men on to open up the property as far as can be done in the short season left us, and it will be of great benefit to the district when we can show that not only does the neighborhood produce silver and copper, but also free gold. It is wonderful how the report of a find like this encourages prospectors and claim owners in the vicinity, who have almost lost heart at finding they hold nothing of any consequence, after all their work and expense.

I might here point out the utter lunacy of some men, who will work for months on a ledge, spending all their time and money on it, and never having an assay made to see what they have. It has been the writer's lot frequently, to find a sample "from the shaft 20 ft. in" carrying absolutely nothing but a few specks of iron pyrites; and the men have gone on working for months on it believing it was valuable. Surely a dollar or two expended on an assay occasionally would be money well and wisely spent, and save hundreds from being wasted.

The Hall mines smelter and mine are both doing well, and the new manager, Mr. R. R. Hedley, seems to be quite successful in the way he handles the plant; the new large blast furnace treating 200 to 220 tons of ore daily, in addition to fuel and flux. The long talked of dividend has not been paid yet, no doubt like Christmas, it is "coming," and not a few would be glad to see it come, even before that festive season; it would be welcome, anyhow, whenever it may arrive. It has been deferred too long.

A new telephone line is nearly completed between Nelson and Trail, from which town communication can be had with Spokane, and so by the long distance telephone with Portland. It will be a great convenience to this city to have quicker transfer of orders or business messages to the States, as from the position of Nelson many things can be brought in cheaper from "the other side" than from Eastern Canada, the freight alone being so very considerable.

There seems to be very little fresh news from Ainsworth; shipments are being steadily made from the Black Diamond, Little Phil, and one or two more, but no new discoveries have so far been reported.

It is interesting to note the continued increase in the value of the shipments made through the port of Nelson, the approximate value of the exports so far for this year being no less than six million dollars, to which amount the Trail smelter and the Hall mines smelter have very largely contributed; the former having sent \$100,000 and the latter \$50,000 worth of matte and bullion during the first week of this month. The ore from several of the Slovan mines likewise comes this way and helps to swell the sum total, but in any case it is a very creditable for this district.

Nelson has been favored quite recently with a large party of C.P.R. magnates, all of whom expressed pleasure at seeing such an air of prosperity over the town, whilst those who had not been here for four or five years were astonished at the growth that has taken place. When interviewed about the Crow's Nest R.R. Sir W. Van Horne said he expected in a year it would be open to the head of Kootenay Lake (somewhere near Goat River probably) and as rapidly as possible it would be extended to Nelson, though owing to the heavy work to be done on that section it might take some time. Meanwhile, however, arrangements would be made to connect Nelson with the temporary terminus of the Crow's Nest R.R. by means of "train ferries" or large barges capable of carrying a whole train. It is unnecessary to say that it will give an immense impetus to the trade of the district and to the welfare of Nelson when it is accomplished, and is therefore anxiously hoped for by all classes.

A. H. HOLDICH.

EAST KOOTENAY.

The books in the record office of the Fort Steele mining division reveal an activity in mining and prospecting operations in that district that will surprise even those familiar on the outside with what has been done. The record of transactions in the office during the eight months from January 1st to September 1st of this year, and the revenue that has been collected from the same shows the following:—

	TRANSACTIONS.	REVENUES.
Records of Claims	1504	\$3,750 00
Free Miner's Licenses	1045	5,225 00
Certificates of Work	277	761 75
Conveyances	314	785 00
Documents filed	80	80 00
Paid in lieu of assessment	2	200 00
Total	2233	\$10,741 75

Over 1500 new claims have been recorded in eight months of this year, which is nearly double the number of all previous years combined; the books contained a total of only 776 claims at the beginning of this year. The revenue going into the provincial coffers is well on to \$11,000, a sum that will greatly exceed any other district except West Kootenay. There have been recorded 277 certificates of assessment work done, which at \$100 each means \$27,700 for the eight months. Before the year closes this sum will be doubled, for it is from this date out that these assessments are to be expected to be recorded.

VANCOUVER.

The City Council has, subject to the necessary ratifying vote of property owning civic electors, agreed to take \$65,000 of stock in a smelter company, to be organized in London, England, by Mr. J. H. Rothschild, of that city, with a view to establish and work a smelter on Burrard Inlet, hard by Vancouver. The company is to work by electricity, generated from water power, a smelter of 300 tons daily capacity, costing \$400,000. The undertaking is also to be capitalized in £250,000. The conditional acceptance of this offer implies the rejection of one made by Mr. W. H. Remington, of Salt Lake City, who asked in respect of a proposed two stack smelter, a city bonus of \$100,000, payable \$1.00 a ton on output. Messrs. Bewicke Moreing & Co., of London, England, will, it is understood, be responsible for the mechanical details of the proposed smelter and its plant. Vancouver has for two years been seeking to induce capitalists to establish a local smelter for the treatment of coast and island ores. The promoters of the accepted proposal are confident that they will easily raise the required capital in England, encouraged by civic participation in and approval of their scheme. The ratifying vote of Vancouver money by-law voters will be taken some time in December, and nearly a twelve-month will be required to build, equip and begin work at the proposed smelter. A refinery of 20 or 25 tons capacity will be included in the scheme.

The preliminary run of the stamp mill at the Golden Cache mines, Lillooet, has somewhat disappointed expectations. Predictions were freely made of a result of \$25 a ton. After three days' trial crushing, an average of slightly under \$10 was obtained. The directors explain that the rock treated was largely slate, and in the main "country," and urge that considerably better results will be obtained when the mass of ore-bearing rock begins to be crushed. Absorption of gold by the new plates of the mill doubtless also accounts for some lessening of the first result. The directors are, however, prepared, if the deposits prove to be of low grade, to put in elaborate labor-saving and gold winning plant, worked hydraulically, at a cost of \$35,000. Application is meanwhile being made for a Government grant of the right to take 6,000 miners' inches of water from the adjoining creek. The Golden Cache stamp mill has now closed down for some weeks, pending the building of a dam and the making of tramway and other improvements. A second run will then begin in November, and continue till the end of the month, when the directors expect a better average result. The greatest interest is felt in the working of the Golden Cache mine in Vancouver, it being regarded as a somewhat typical Lillooet free milling gold proposition. Mr. Mark Oldroyd, M.P., of Densbury, England, has nominated as his representative on the Board of Directors, Mr. Wm. Skene, ex-Secretary of the Vancouver Board of Trade, who will carefully participate in deliberations, in respect of which, by stock purchases at large premiums, his principal is interested to the extent of over £70,000 sterling.

The Alpha Bell, Excelsior, and a few other free milling gold mines, hard by the Golden Cache, are meanwhile being advanced in development steadily, with a view to early crushings of ore. This stage will, however, scarcely be reached before early spring, save perhaps in the case of the Alpha Belle, the chief holder of stock in which is Mr. J. Barnet McLaren, of the well known family of Ottawa capitalists.

A considerable aggregate shipment of coast and island sample ores will, ere this issue of the REVIEW appears, be consigned to the Vivian smelters at Swansea, South Wales, by the steamship Tekoa, now loading at Steveston, on the Fraser river. A very fair response is being made to the liberal cash offers of the Swansea capitalists, who should establish very considerable copper connections with the coast and other districts of British Columbia, despite the local competition of the proposed smelter on Burrard Inlet.

Some promising free milling gold deposits are being steadily developed at Fire mountain, near Harrison lake, at points about 100 miles from Vancouver. Much tunnelling has in particular been done on the "Money Spinner," to work the ore on which a stamp mill is being erected that may begin work by mid-December. This is, however, rendered somewhat doubtful by the height of the mine workings, which are far above the snow

line, rendering construction in winter difficult. The owners of the Money Spinner, who are responsible business men of Vancouver, express themselves confidently as to the value of their property, and quote an assay showing \$800 to the ton. They state that free gold is visible wherever shots have been put in on the vein. The assay quoted was doubtless, however, that of a specially good specimen. If as here hoped, the Fire Mountain deposits prove to be profitably productive, a considerable impetus will be given to mining trade in Vancouver and New Westminster.

Comparatively little is at the moment being done on apparently promising copper-gold deposits at Seymour creek, North Vancouver, distant only some ten miles by land and water from the heart of Vancouver city. Expensive tramway and other facilities are required, for which the aid of British capital is being sought, with fair hopes of success.

Extensive development work is being done on some of the best copper-gold and silver claims on Texada island, in the Gulf of Georgia, but some of it too unscientifically, as in the case especially of the Van Anda mine, where experts state that Chinese unskilled workers are hacking out the rich ore deposits in very wasteful fashion. The same experts, however, speak highly of the richness and extent of the Van Anda deposits, and declare that it must, under good management, become a very large shipper.

The purchase of a controlling interest in the Vancouver, Victoria and Eastern Railway and Navigation Company by a syndicate, of which Messrs. Mann & Mackenzie, of Toronto, are leading members, is here regarded as involving another tactical success of the Canadian Pacific Railway, with which these gentlemen have friendly relations, whilst the vendors of the charter rights were in most cases avowed opponents and intending competitors of the great railroad. The purchase probably means, that aided alike by Provincial and Dominion subsidies, the latter to be re-sought at Ottawa next session, in the alternative aided by Provincial assistance, new railroad connections will be established within a twelve-month or so between Pen-ticton, Boundary creek and Robson. South Yale and South Kootenay would thus be connected, whilst from the north the C.P.R. would run a service from its main line, in connection with the Steamship and Okanagan branch. The transfer of railroad charter interests thus implies the early extension of much needed rail facilities to a rich copper-gold country about Boundary creek, now difficult of access. It probably also means a fight for the right of railroad extension in that district between the C.P.R. and Mr. Heinze and the capitalists with him associated, who are anxious to connect the Boundary creek country with their Columbia and western line, which now makes from Robson to Trail, and gives access to the Heinze smelter at the latter point. It is confidently expected that the C.P.R. interest will gain the day in a necessarily unequal encounter.

A further result of the Mann-Mackenzie deal with the Coast-Kootenay promoters, otherwise the Vancouver, Victoria and Eastern Railroad and Navigation Co., is the placing of a much needed new rail route between Vancouver and Rossland, at the virtual control of the Canadian Pacific Railroad. It is now regarded as unlikely that this further connection will be made in the very early future, as the great railroad has, or shortly will have, sufficient Coast-Okanagan and Coast-Kootenay connections for its own purposes. The bargain is consequently most significant, and here in British Columbia closes a short period of provincial platform campaigning for public aid towards a rival road to that of the C.P.R., between Vancouver and South Kootenay.

N. C. SCHOV.

BOUNDARY CREEK.

Of the various railway men—Corbin, Heinze, Canadian Pacific Railway, and McKenzie & Mann who are reputed to be building into Boundary next year, it is altogether likely that one at least will reach here. A railroad will be the greatest incentive to development that the district could have. That one will be built is certain, but an early construction is what is needed. "Too far from transportation," has been too long the epithet applied to this country. By far the larger part of the ores will be treated here, but that they can be treated a railroad is a necessity.

This winter will be one of unusual activity here. Several mining plants have been ordered, and the properties will work continuously all winter. Of these the Ironsides has just started up since the installation of her plant. The plants for the Brandon and Golden Crown and the Winnipeg will be on the ground in a few more days.

A \$6,000 payment, 10 per cent., is due next month on the "B. C." There is no question about its payment, as the property is exceedingly satisfactory. The shaft is now down 60 feet in almost solid copper pyrites. There is no waste ore on the dump.

An example of mill management extraordinary has been given at Fairview, in connection with the much talked of Tin Horn mill. This mill consists of 8 of Joshua Hendy's triple discharge two-stamp batteries; and was placed in position near the Tin Horn tunnel, on a creek in which in the fall of the year there is not enough water for a cayuse. The company have just learned this, and now are undertaking to supply their mill with water from the Okanagan River, nearly 3 miles distant. Several pumping stations will be needed, as the mill is 800 feet above the river.

Mr. E. M. E. Munns has put a number of men at work on the Anaconda Group. Contracts have been let for the putting up of winter quarters for the men. He will employ 12 men on the properties. G.

The Snowshoe claim in Greenwood camp has been bonded by "Patsy" Clark. The bond is for \$50,000, in three equal instalments at the end of six, nine and twelve months. This is one of the old locations of the camp. It was under bond two years ago to Geo. Turner. Some very rich ore was found this fall on the property. Development will be started and carried on continuously.

MISCELLANEOUS.

The Le Roi Mining and Smelting Company lately completed a new hoist on the 500-ft. level. The skip now connects with the bottom of the shaft. Work will shortly be commenced on a three-compartment shaft. This, when completed, will enable the management to double its output. The work of sinking to the 600-ft level is now being pushed, and it will be continued to completion. A fine body of ore, 18 ft. wide, has been encountered near the 600-ft. level.

The Cariboo Mining, Milling and Smelting Company has declared a dividend of two per cent., which will result in the distribution of \$16,000 among the stockholders. The dividend was payable on September 6th, and the transfer books of the company closed from September 4th to September 8th. This is the sixteenth dividend declared by the company, and when paid will make a total of \$173,000 in round numbers which the company has paid its stockholders. Some of the earlier dividends were only one per cent. The mine is reported in a prosperous condition. The new air compressor, which was recently installed, is working in a satisfactory manner, and it is the expectation of the directors that other and larger dividends will follow in the near future.

Mr. I. H. Webber, the representative of the British Columbia Bullion Extracting Company in Rossland, states that the preliminary work for the erection of the reduction works, near the O.K. mine, is to begin immediately. This work is to consist of a railroad siding, 4,000 feet of flume, ore bins and excavation. A large force of men will at once be put to work. Mr. Thomas W. Fisher, of Helena, who has for some time been engaged in making the drawings and plans of the proposed works, is to have charge of the construction. This company intends to give particular attention to the low-grade silicious ores of the camp, which in most cases are closely associated with the heavy sulphide ores. Nearly all ores of this class at present are discarded. The value of the ores to be treated in this way will range from \$5 to \$15 per ton. The Pelatan-Clerici process will be mainly used. The works will not be ready for custom business until the spring of 1898.

It is reported that the new 10-stamp mill at the Fern mine, at Nelson, is running to perfection, exceeding all expectation and saving closely. They are running three tons to the stamp, making 30 tons per day. While they can take 150 tons of ore from the mine daily, they are only taking out about 40 tons. This amount will be doubled as soon as the additional stamps are put in. The foundation for another 10 stamps is completed, and they expect to have them running inside of six weeks, giving them 20 stamps. A permanent force of men is employed at the mine, and as soon as the stamps are increased to 20, twelve more men will be put on permanently. There is enough ore now blocked out in the mine to run the mill for over two years at its fullest capacity. All that is claimed is an average of \$20 per ton, which is higher than the prospectus gave. The mill will treat more ore than was claimed by the prospectus, and running much higher than \$20 per ton.

By a vote that was practically unanimous, the Josie Mining Company decided at a recent meeting of the stockholders to give to Thomas Ricards an option of sixty days on the property. Mr. Ricards was represented at the meeting by Mr. S. L. Lowe, who submitted a proposition to the meeting in writing, offering to incorporate a company under the laws of England with a capital of £250,000. This company, he agrees, shall pay to the Josie Mining Company £10,000 in cash, and place in the treasury £40,000 in cash as the proceeds of the sale of stock at par to that amount. The Josie Company is also to receive £100,000 in fully paid stock. The offer further stated that the details of the transfer would be arranged by Mr. Ricards, with such representatives of the Josie Company as should be authorized to act.

There is great activity in mining in the Fairview district, all the camps being busy, and there is a great deal of money in camp as a consequence. The new 25-stamp mill of the Tin Horn mine will be finished within 30 days if the present plans of the company are carried out. A contract has been let on the Morning Star for the erection of a mill, and work will be begun on it without delay. The Joe Dandy Company has also commenced work on a new claim. The Smuggler mine is running full blast, and it is said that the ore runs remarkably high. The proprietors have rented a 10-stamp mill, which will answer the purpose temporarily. There are now about 300 men working in and about the camp, and there will be 200 more put to work within the next 30 days. The camp is well provided with business houses, and two new hotels are being erected.

Work on the Le Roi Company's smelter at Northport is progressing steadily and rapidly. Several carloads of machinery are already on the ground, and the roasters will be ready to receive ore by November 15th. The company will begin to ship ore to the smelter soon, probably by the last of October.

Nova Scotia.

The output and shipments of the Dominion Coal Co., officially reported to the REVIEW for September, are:—

	OUTPUT.	SHIPMENTS.
	Tons.	Tons.
Gowrie	8,255	6,027
Caledonia	35,109	28,706
International	10,661	10,464
Dominion	33,409	32,250
Old Bridgeport	21,297	20,512
Reserve	40,144	34,576
Victoria	10,915	12,052
Hub	18,818	17,244
Total	178,608	161,831
Large day's output in September		8,346 tons.
shipments		9,746 "

The new strike at the Coxheath copper mine on Oct. 7th is in the south crosscut from No. 1 shaft. At 161 feet from the shaft a strongly defined three-foot vein was encountered, with good foot and hanging walls, dipping south about 20 degrees, with patches of rich yellow and purple ore the entire width of the drift. The strike is about the same as that of 'B' vein in No. 2 shaft, 1100 feet to the west of No. 1, but it is not yet certain that it is the extension of 'B' vein, and as the heading still shows specks of copper ore the crosscut will be driven farther south.

There has been a considerable stir in mining circles over a supposed find of gold at Whycoomagh, C B. The lead is said to be 100 feet wide and is reported to have assayed up to four ounces. We have, however, been unable to find out the name of the assayer, and we are very doubtful as to the results. There are several people just now, both in and out, of this province who pose as experts on minerals and who appear to give results in proportion to fees paid and we would impress upon prospectors and mine owners the necessity of having their assays made by reliable men.

A number of areas have been taken up near McKay Settlement, Hants County, for alluvial gold. This is certainly a move in the right direction. We have little doubt that there are many places in Nova Scotia where, with proper machinery, alluvial deposits might be made to pay. Alluvial gold has also been recently found near the Dartmouth lakes, and we are disposed to think the wonderful and much talked of mercury mine (?) may serve a useful purpose in bringing to light an alluvial gold deposit. In panning for mercury, gold has been found in several of the pans, and sometimes in fairly large pieces.

We are pleased to note that the New Egerton mine at Fifteen Mile Stream is showing good returns again, last month 230 ounces were produced. We understand that the mine is bonded to a well-known Scotch company, and if the deal goes through great things may be looked for.

The returns from the Richardson mine for last month were 203 ozs. from 2,150 tons of rock. This company are still allowing their valuable concentrates to run to waste down the stream and into the lake, or their returns might be nearly double what they are at present.

M. Merchfield, who is tributing on the Stuart-Hardman block of areas at Goldenville, returned 85 ozs. from 174 tons of ore, and the New Glasgow Co. returned 122 ozs. from 305 tons from their property adjoining the Stuart-Hardman block.

Some very fine specimens have been obtained from Renfrew mines lately. These mines are showing considerably better than they have done for a long time.

Things in the western part of the province are looking up. The Owen mine at Millingsgate yielded 88 ounces; Samuel Ferguson mine at Malaga 21 ounces; W. Gilmour's mine 10½ ounces; M. Demone 15 ounces. The Brookfield mine, the staple producer of the district, yielded 340 ounces for the month.

The development on the Galena lead at Chetichamp continues to give its owners satisfaction. The main slope will have reached a depth of 50 feet by the time this issue is published, and if the ore continues of the same high grade as at present, a dressing plant will be erected. Mr. F. H. Mason, of Halifax, who has had considerable experience in the English and Welsh lead mines, is the company's consulting engineer.

Quebec.

The following is from the advance sheets of the Consular Reports of the Bureau of Foreign Commerce at Washington: "The Petroleum Oil Trust Company has for some time extended its operations to a district about 22 miles' distance from Gaspé Basin, near one of the tributaries of the York river, called the Mississippi brook. Several wells have been bored in that neighborhood, with varying results, some have yielded half a barrel, some one barrel, per day. On the 23rd July, well No. 27, in that district, produced a quantity of oil from a depth of 1,400 to 1,500 feet. This is the best known so far in Gaspé. The well flowed several times before it was under

control, and 300 to 400 barrels are said to have been lost. It was pumped this week, and gave at one pumping 1,600 gallons. During the time taken to replace the plug the well filled again and the oil was forcing the plug. I deem it my duty to draw the Department's attention to this well, as the oil is of very good quality and rock beds are nearly flat in its neighborhood whereas in the parts of the country first prospected, the wells were bored into the rock at a sharp angle. The company is having several tanks built around this well, and it is said they intend to bore other wells in the vicinity immediately."

Pyritic Smelting *

By Mr. W. L. AVSTIN, Ph.D., Denver, Col., U.S.A.

INTRODUCTION.

Under pyritic smelting is understood a smelting process which aims to utilise the calorific power of an ore. Pyrite (FeS_2), chalcopyrite (CuFeS_2), pyrrotite (Fe_2S_3), arsenopyrite (FeAsS), blende (ZnS), galena (PbS , &c.), are all ores which have calorific values as metallurgical fuels, and it is with the utilization of this quality in such ores that pyritic smelting has to do.

When a smelting ore contains in itself the fuel necessary for its concentration into a product which can be transported to market at a profit, a common practice is to destroy such natural fuels by calcination, and then smelt, with the help of coke, etc., the oxides thus produced. Why should we burn (roast) an ore which contains in itself a sufficient quantity of potential heat units to smelt it, and then smelt the burnt product itself with the assistance of more or less expensive fuel? Or, even when such an ore is smelted raw, why should we melt it down with coke—as if it were pig-iron for foundry purposes—although we may have dispensed with the preliminary roasting? In either case, such a proceeding must be considered as wasteful and extravagant if it can be shown that a heavy sulphide ore contains in itself a source of heat which, when properly applied, will suffice for maintaining a smelting temperature. When iron pyrites has been raised to a temperature at which its component parts are free to unite with the oxygen of the air, further use is as unnecessary as in the case of coal, which, when it has once been started, is self-sustaining. In the proper apparatus the same is the case with iron pyrites, which statement we see verified in the everyday practice of heap-roasting. In this process, and in the modern pyrites burners used by sulphuric acid manufacturers, the combustibility of the pyrites itself is relied upon to accomplish the end in view, and the carrying out of these processes demonstrates that, once ignited, pyrites will continue to burn till the sulphur is practically all eliminated and the iron is converted into oxide. It only remains to burn the pyrites more rapidly in order to produce a temperature high enough to fuse the whole mass, and this actually takes place unless care is exercised in restricting the amount of air admitted to the kilns.

Pure iron pyrites is a compound of iron and sulphur in the proportion by weight of 46.66 of iron to 53.34 of sulphur, and both of these elements may be burned in air when the proper conditions are provided to effect their combination with oxygen. The combination of iron and sulphur in iron sulphides of whatever class is not a combustible as long as the two elements are united. They must first be dissociated from each other in order to be free to enter into combination with another element; and it is only after such dissociation has been brought about, and the two elements find themselves *in status nascenti*, that their combustion may be effected. To dissociate these elements from each other, a certain amount of mechanical work must be done, and in the pyritic furnace this work is performed by heating the compound up to a certain point, when the elements separate from each other, and if the proper amount of oxygen is then provided they will unite with it. When means have been taken for supplying the proper proportion of air and pyrites in a manner conforming to the conditions under which they can best unite, the smelting will not materially differ, as far as the appearance of the furnace is concerned, from the usual operation with coke or charcoal, only in this case the pyrites supplies both the fuel and flux. That iron pyrites contains in itself the potential heat units requisite for its own smelting may be demonstrated by thermal calculations, or ocular evidence of the fact may be obtained by observing a Manlie's converter in operation. In the so-called bessemerising of copper matte the molten iron sulphide is run into a converter and air is blown through it until practically all the iron is burned off. The combustion of the iron, and incidentally of the sulphur associated with it, sufficing to keep the mass at a high heat and extremely liquid during the operation. If, then, iron pyrites contains in its combustible elements a sufficient quantity of potential heat units to support a smelting operation, then the use of carbonaceous fuel to smelt such ores is sheer waste, provided a suitable apparatus can be obtained for turning this quality to economic advantage. Assuming that such an apparatus is at hand, deposits of this mineral so low in grade as not to permit of profitable treatment by metallurgical processes heretofore in use may be handled economically at the mines themselves. In a well-managed mine the excavation of the ore is controlled by assay, so that its value is known before it is mined, and thereby the cost of taking out worthless material is avoided. Such a preliminary assaying is all that is required where a fire concentrator is used, and there is no reason why the crude ore, just as it is mined, should not be dumped into the hoppers of a fire concentrator, as it is dumped into the rock-breakers of a wet concentration mill.

ORES ADAPTED TO PYRITIC SMELTING.

The first requisite in an ore to fit it for pyritic smelting is that it should contain enough iron combined with sulphur or arsenic to make an easily meltable slag, and to provide for a matte fall sufficient to cover the valuable metals contained in the charge. With regard to fusibility, practice has shown that the best slag for the purpose is a mono-silicate—one in which the oxygen of the silica is equal to that of the bases. To form such a slag requires different amounts of the various bases in common use. For instance, an iron mono-silicate calls for 29.41 per cent. of silica to 70.59 per cent. of ferrous oxide; a similar lime silicate requires 34.88 per cent. silica to 65.12

* From a paper read before the last meeting of the N. of Eng. and Institute of Mining Engineers.

calcium oxide. Substituting magnesia for the lime, we need 42.86 per cent. of silica for 57.14 per cent. of magnesium oxide; and for aluminium 46.68 per cent. of silica to 53.32 per cent. aluminium oxide, and so on. Now, to make a ferrous mono-silicate requires approximately 4 tons of pure pyrites to 1 ton of pure quartz, so we may say that for slagging purposes alone we need an ore mixture containing 80 per cent. of pyrites and 20 per cent. of silica; but that is using up all the iron on the slag, and does not allow for any matte fall. It is a well-established fact in smelting that a complex slag—that is to say, one containing a mixture of various bases—is usually more desirable than one consisting of only one base and silica. Therefore, where it is possible, we aim to make a slag containing several bases. If the ore charge is composed of pyrites and quartz in the ratio of 4 to 1, and we add to it limestone, we can form a lime-iron slag, still preserving our mono-silicate, and then have iron sulphide in excess, which is free to form matte. The addition of lime has another advantage; it lightens the specific gravity of the slag and renders it more easy to separate from the matte. If limestone is not available, the same end may be reached by decreasing the amount of silica or by substituting some other base. When an ore is not of the desired composition—that is, when it does not contain 80 per cent. of iron sulphide—other expedients must be resorted to; but it has been found in practical work that an ore mixture of the composition given will smelt readily without the assistance of carbonaceous fuel in the furnace, and will produce enough matte to effect a saving of 95 per cent. of the valuable metals which it carries. It is seen, therefore, that pyritic smelting finds its limitation in the amount of silica contained in the ore it is desired to treat, and the opinion whether or not a given ore is suitable to the process is one which can be decided by chemical analysis. With practice, however, the operator can often determine by simple inspection whether his ore possesses the desired qualifications, but in cases of doubt a silica determination will set the matter at rest. Often simple panning will give all the information necessary. If a few pounds of the ore are ground up, the pulp weighed, and concentrated in a pan, the weight of the resulting sulphides will allow one to make a pretty close guess at the relative amounts of pyrites and quartz in the material under investigation. All that is necessary to be decided is—does the ore contain enough iron in the form of sulphide or arsenide to flux off the silica, and form a mono-silicate slag? If not, then are there other bases available in the neighborhood to make up the deficiency in iron?

There are various cements which can be utilized for cheaply and firmly binding even the finest concentrates into forms suitable for blast-furnace work. The influence of zinc in pyritic smelting is one of considerable importance. The sulphide of zinc (blende) has nearly the same thermal value as the pyrites. Up to a certain point, any blende contained in the sulphide under treatment assists the operation by its heat-producing qualities, the temperature resulting from the combustion of zinc sulphide being nearly as high as that of proto-sulphide of iron. In practice 14 per cent. of zinc in the charge has shown no deleterious results. The zinc oxide being a base, materially helps out any deficiency in iron, for the zinc is disposed to go into

the slag rather than into the matte. Much of this metal is also carried off in the fumes, and in a properly constructed furnace every opportunity is given to assist its volatilization.

The arsenic, when arsenide of iron is used in the place of sulphide, separates from the iron readily under the influence of a pyritic furnace, and volatilizes, leaving the iron free to unite with oxygen. The results produced from burning arsenide of iron have been almost, if not quite, as good as where iron pyrites was used. The arsenic burns to arsenious acid and goes off in the form of heavy white flakes, which may be caught in suitable dust chambers. The burning of the arsenic yields also its quota of thermal units to the operation.

Any galena present in a pyritic charge is of assistance in producing heat, but the heat is difficult to save.

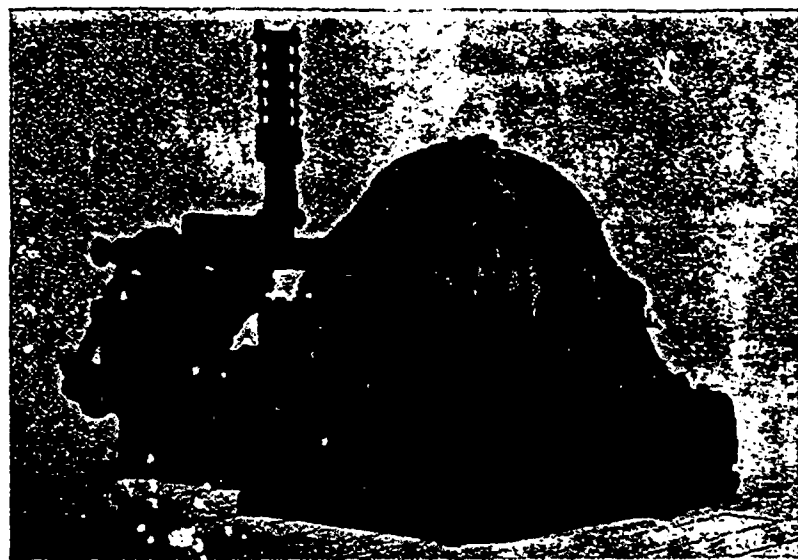
STYLE OF FURNACE.

In the experimental stages of pyritic smelting, circumstances compelled the use of whatever apparatus was at hand. For this reason blast furnaces were employed which had been built originally for other methods of smelting, and it is largely due to this precedent that furnaces intended for pyritic smelting continue to be built on similar lines, without sufficient consideration being given to the peculiar conditions under which they are to be operated. If results carried out in these furnaces do not come up to expectation, it will usually be found to be due to the fact that the experimenters have not a clear insight into the nature of sulphide fuels, and have attempted the impossible.

That furnaces built on the lines of those intended for lead-ore smelting are not adaptable to pyritic smelting purposes becomes all the more patent when the two classes of fuel used in the respective processes are considered. In the first place, coke is, for all practical purposes, a single element—carbon—and in the furnace it unites directly with the oxygen of the blast; whereas the sulphides are compounds of sulphur with some other element, and this union must first be broken up before the component elements can unite with oxygen. The author then enters in detail into the various changes which occur in the burning of coke and pyrites, and points out their respective differences of behaviour while being acted upon by the action of the blast. To sum up, he continues, we have in coke a solid, consisting of a single element with a large surface exposed, which is retained in position until consumed; in the sulphides, heavy liquids of very limited surface, requiring dissociation of their elements before the oxygen can act upon them, and which rush through the charge in the briefest possible time. It is therefore unreasonable to expect that a furnace designed for burning the former class of fuel will be equally efficacious in the case of the latter. The products of combustion resulting from the two operations is a matter requiring consideration. In the case of coke, these are largely combustible gases, which pass upwards through the charge, carrying heat with them, and in this upward passage act upon the descending minerals. With sulphides, the products of combustion are principally heavy fluids, which drop downwards; the amount of heat carried upwards by the sulphurous acid gas and the nitrogen of the

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air being comparatively small. It is obvious, therefore, that the fusibility of the sulphides precludes the use of high smelting columns. In pyritic smelting, unlike lead smelting, there should be no carbonaceous fuel to burn away, nor oxides to reduce; any action of the ascending gases upon the charge is to be avoided, if possible. What is wanted is to melt the whole as quickly as possible without permitting a preliminary matting together of its component parts.

The best height for a smelting column in pyritic smelting is one which will present a sufficient resistance to the upward tendency of the blast to cause the latter to penetrate to the centre of the charge. This, of course, varies with different sizes of furnaces: a wide furnace requires a deeper charge than a narrow one. In order to be able to regulate the height of the smelting column and keep it stationary, recourse is had to an interior feeding cylinder. This contrivance is so adjusted as to deliver the sulphides at a given point in the furnace shaft, and at the same time protects them from the action of the escaping gases. In this way a constant height of smelting column is maintained, and the sulphides are delivered at a point where smelting takes place without permitting an incipient fusion, the heated gases being directed into other channels prepared for them. In order to make up the deficiency of heat which is absorbed in dissociating the sulphides before their component elements can combine with the oxygen, some auxiliary heat must be supplied; and in the Manlie process the air entering the tuyeres is heated by coming in contact with the molten mass, which has already been brought to a high temperature by the preliminary operation of melting the matte in a cupola before charging into the converter. This hot air then attacks the sulphides, and the burning of the sulphur and slagging off of the iron continues as long as there is any sulphide of iron in the vessel. All experiments, nowever, with low-grade ores, on the converter principle, have resulted in failure. There are various ways of giving the blast the necessary temperature before allowing it to enter the furnace—heating in hot-blast firebrick or pipestone, or in the tuyeres themselves. The first are costly methods, and the author recommends the gasifying of some cheap fuel by burning it in the tuyeres. The amount of heat necessary for the direct heating of the blast is comparatively small, and may be readily computed when the calorific power of the fuel and the volume of the blast are known. Owing to the charge column in a properly constructed pyritic-smelting furnace being of necessity low, and as the heavy globules of molten sulphide drop past the tuyeres very rapidly, the time during which the blast can act upon them is very short, so that it is necessary to use a higher pressure than ordinarily employed in Western blast-furnace practice. Care must be exercised that the volume of the blast is not too large, as if even a slight excess of air is blown into the furnace the cooling effect of the surplus air is very marked. What is wanted is pressure of blast, not volume. When the furnace is properly managed, the oxygen entering the tuyeres should be consumed to the extent that sulphur fumes will distil off from the surface of the charge, and may be collected and further utilized. In order to protect the workmen from the stifling gases given off by a pyritic furnace, and to provide for the regular charging of the ore and fluxes, the top of the furnace should be kept closed and a feeding device provided. Such an apparatus has been designed which is automatic in its action.

CONCENTRATION AND SAVING.

The degree of concentration effected in a pyritic-smelting furnace is in direct ratio to the amount of iron burned; hence, to make a good concentration the mono-sulphide must be retained under the influence of the blast until the desired quantity of iron has been converted into oxide. When no coke is used there is no reason why any desired degree of concentration should not be reached; but to accomplish this two smeltings are necessary.

The percentage of saving effected in pyritic smelting depends upon several factors, prominent among which are (1) the composition of the furnace-charge; (2) the amount of matte fall; and (3) the time given for the separation of the matte from the slag. The amount of matte fall necessary to effect a given saving must be determined experimentally in each instance, for a hard-and-fast rule cannot be laid down which will cover every case.

When experience has been acquired in the operation of a pyritic furnace, and with the necessary amount of matte fall, a saving of from 95 to 98 per cent. of the gold, silver and copper contained in a pyritic ore can, the author asserts, be realized in a properly constructed furnace.

RONTGEN RAYS FOR METALLURGICAL TESTS—The very first comments on the discovery of the Rontgen rays indulged in hopes on the great assistance which the new rays would offer for the examination of metals, the detection of internal flaws, etc. It was soon found that the task was not so easy, and besides scientific investigations of alloys which for that purpose had to be applied in thin laminae, we have heard very little about the practical utilization of the rays in the interest of the metallurgist. With the recent perfected apparatus, however, Radiguet has obtained some very encouraging results, which he has brought before the French Academy. Blisters could distinctly be seen in an aluminum bar 1 1/2 in. thick. The bolt and other parts of a lock, the wheel work of a clock, whose glass plate had been removed on account of its opaqueness, whilst the silver case had been left, could fairly well be distinguished; a key of cast steel showed internal flaws; some coins and medals could be studied, whilst an aluminum medal, whose obverse had been filed away, disappeared completely; an ebonite splinter had likewise vanished. Finally a model of a bed plate casting, whose dimensions are, unfortunately, not stated, gave quite a fair indication of the thickness of the various parts, and a coin of one franc, placed on the top, came out as a black spot.

BLAST FURNACE SAFETY TOP.—A new form of safety top for blast furnaces has been designed by Mr. Foote, for the works of the Illinois Steel Company, the object of which is to lessen the danger attending the sudden formation of explosive gases. This apparatus, of which an illustration is given in the "Iron and Steel Trades' Journal" of October 2nd, seems well calculated to relieve sudden pressure, and permit the explosive gas and flames resulting therefrom to escape, without damage to the furnace or injury to the workmen. Between angular braces are provided several swinging doors, which are arranged at 30° to the perpendicular, and are of iron, very heavy, so that if they are opened from any cause they will immediately fall back into the normally closed position on the cessation of pressure. The operatives on the dumping platform are protected from the flames by the metal floor, so that these pass through the surrounding atmosphere without damage to the men or mechanism. If this apparatus works in the manner expected—and there is no reason why it should not do so—a much needed safeguard will be provided for blast furnaces.



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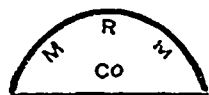
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GERMAN COAL, BRIQUETTES—The coal dust from the Emanuel colliery, in the Ratibor mining district, Germany, has for several years been made up into briquettes in an unwashed condition, but, as might have been expected, the briquettes were found to be largely composed of ash. It was therefore determined to employ washed coal dust, to be dried in a special apparatus. A plate over 10 ft. 9 in. diameter was constructed, and into this the wet coal dust, already mixed with pitch, was delivered by an elevator. The drying was effected by an open fire, the heat and gases from which pass over the revolving plate, and then under it into a flue, which leads the products of combustion to the chimney. This apparatus, designed for turning out 200 tons of briquettes in 24 hours, has given good results. It cannot be said that this is an extraordinary turn out for a German colliery. A much larger output is obtained from some of the briquette making plants at work in this country. It is not usual here to mix the pitch with the coal dust while the latter is in a moist condition, nor can we see what advantage is gained thereby.

REDUCTION OF LEAD ORES.—A new method of smelting galena has been suggested. This consists of first treating the ore in an open hearth blast furnace, and collecting the lead fumes, containing a large percentage of lead sulphide, driven off therefrom, treating the metal-bearing slag of the open hearth furnace and the fume in a stack furnace, in which the temperature at the top is maintained at so low a point as to prevent the oxidation of the lead sulphide fume generated in the furnace, and subsequently collecting the fume, containing a large percentage of lead sulphide, drawn off from the stack furnace, and smelting it in the same furnace, together with the slag from the open hearth furnace. The results obtained from this process are said to have been satisfactory.

VALUES AND COSTS IN THE SLOCAN, B.C.—A Slocan mine manager estimates that a ton of Slocan ore is worth \$50 for silver at 50c., and \$25 for lead at \$2.20, or a total of \$75. The cost of freight and ore treatment is \$20 a ton, leaving a margin of \$55 for mining and putting on cars.

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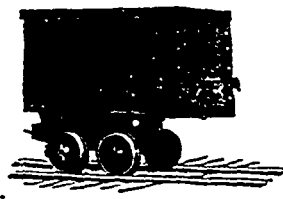
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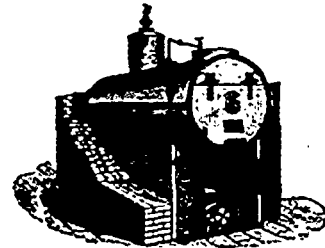
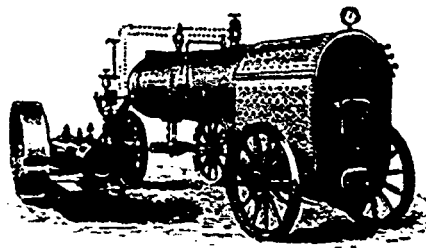
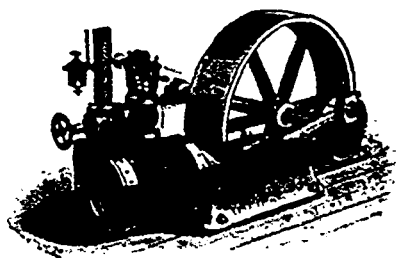
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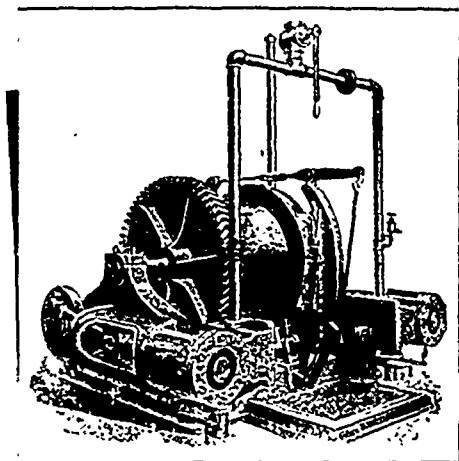
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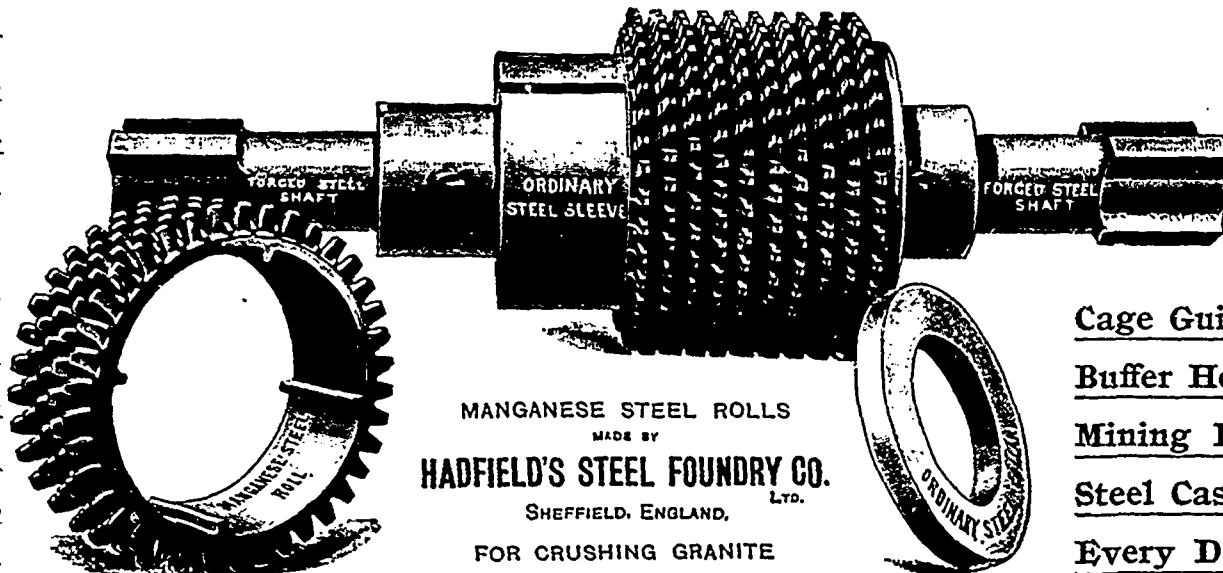
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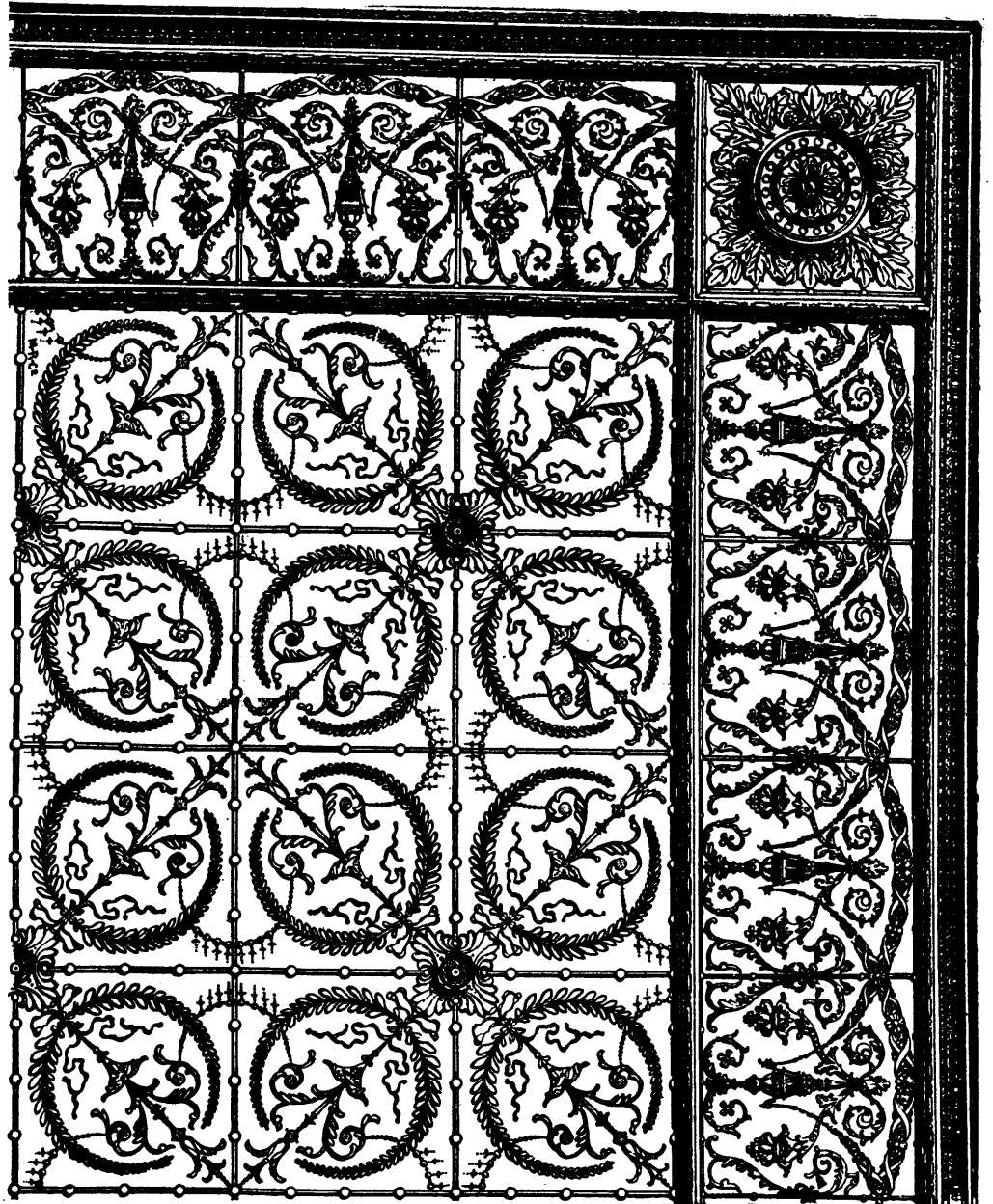
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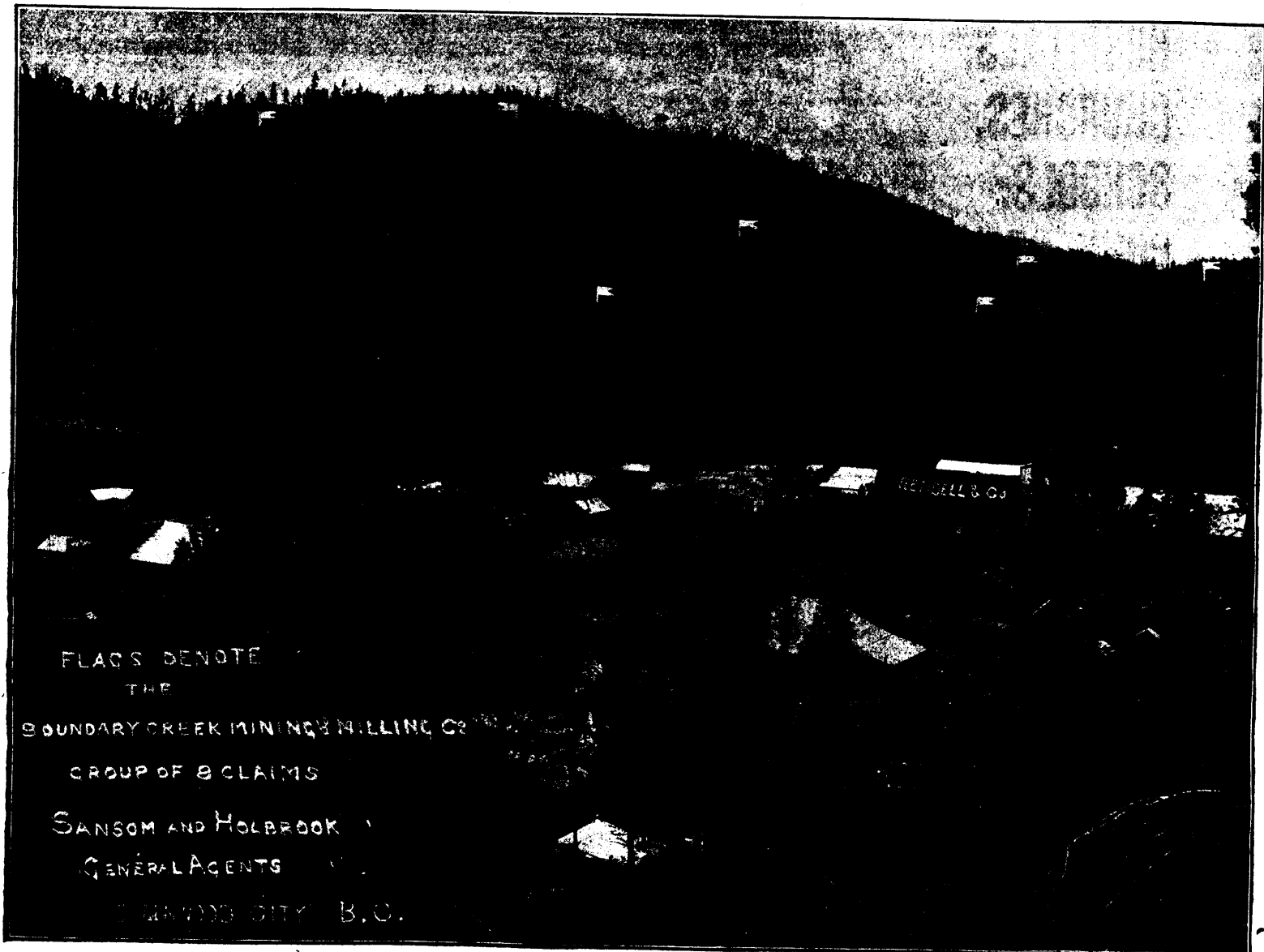
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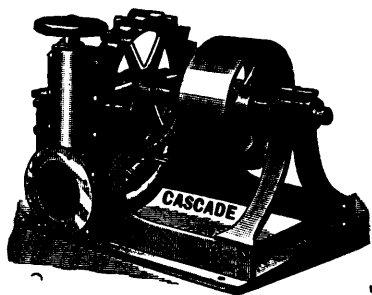
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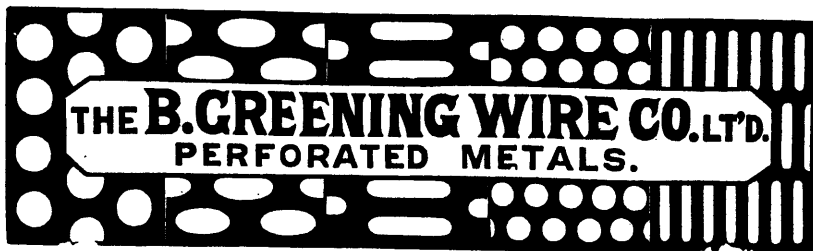
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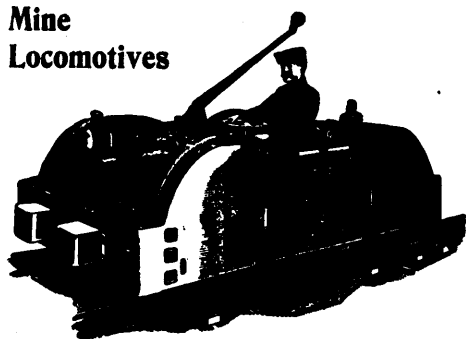
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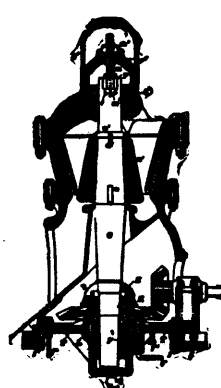
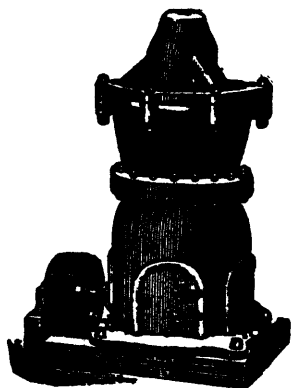
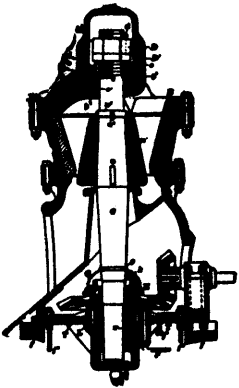
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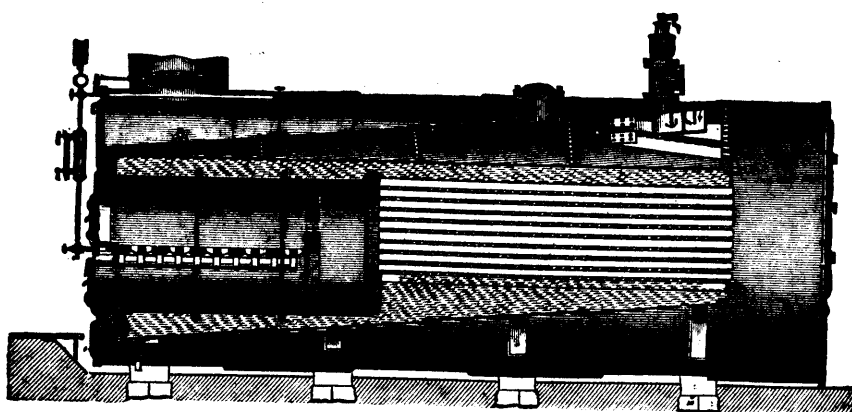
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