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SEVENTEENTH YEAR OF PUBLICATION

The CANADIAN MINING REVIEW

Established 1882

Vol. XVIII—No. vi. OTTAWA, JUNE 30th, 1899. Vol. XVIII--No. vi.

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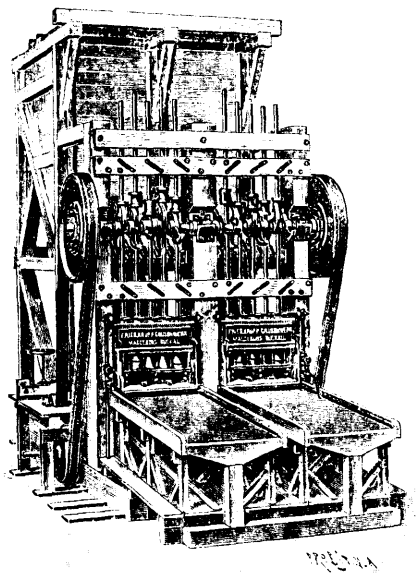

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. . . . 1899 . . .

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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.

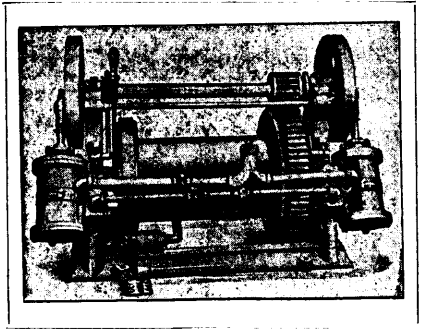
The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou 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.

Copies of the Mining Law and any information can be had on application to

THE HON. C. E. CHURCH,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.



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DUNCAN MINES, Nelson, B.C.
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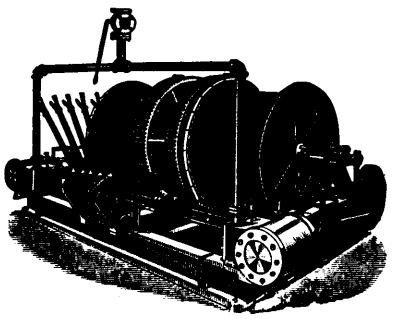

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The Canadian Mining Review

Established 1882

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

OFFICES {Slater Building, Ottawa; Windsor Hotel, Montreal.

VOL. XVIII., No. 6. JUNE, 1899. VOL. XVIII., No. 6.

The Proposal to Establish a Canadian Mint.

Regarding the proposal to establish a Mint in Canada there are several points of practical importance which should be borne in mind, and which, we think, make it clear that the time has not come for the establishment of a Mint in this country. We are beginning to be an important mining country, and we are likely to produce a large quantity of gold along with silver, lead, copper, nickel, iron, coal and other minerals. Our interest in regard to the gold cannot be different from our interest in regard to any of the other minerals mentioned. It is a product which we must sell in order that the miners and others depending upon mining operations may live, and that the profit of such operations may be secured, and our interest must be to sell it in the best market in the world. The best buyers for many years past have been Great Britain, the United States, France, Germany, Russia and Austria. The competition between these nations for the gold has been largely due to the necessity for keeping an adequate gold reserve in support of their banking and currency systems, and to some of these nations the securing of gold has been of vital importance because of the disturbance in their currencies. But apart from this fact, the best buyers of gold must be these prominent nations of the world, because, being the wealthiest, they require the largest quantity, both for the arts and for reserve purposes. It cannot, therefore, in the nature of things be true that Canada can afford to enter into competition with these great nations as a purchaser of gold, and if it cannot pay as good, or better, prices the gold will, of course, continue to be exported.

An attempt has been made to draw an analogy between Australia and Canada, but this will not bear the light of investigation. Australia is able to coin gold because the mints are branches of the Royal Mint in England, and the coin made is a sovereign similar in appearance to the British sovereign, which the Bank of England is willing to take without discount. Unless the proposal in Canada takes the form of a branch of the Royal Mint for the purpose of making Canadian sovereigns there is no analogy. That we should make Canadian sovereigns would be an absurditity, because everybody must recognise that they must immediately be shipped to England, while it would undoubtedly be cheaper to export the gold in a raw state instead of manufacturing it into coin.

The use of gold as an actual currency in circulation has been demonstrated to be a backward instead of a forward condition of affairs. We do not mean by this to advocate a paper currency, but we do mean to assert that a paper currency, *always redeemable in gold*, is the most forward condition of currency for any country. Stanley Jevons has shown that a sovereign becomes so light from circulation as to become legally uncurrent in eighteen years, and in 1883 it was ascertained that the average loss in worn sovereigns amounted to about three pence per sovereign, or about 1¼%, and that half of the whole quantity of sovereigns in circulation in Great Britain were light. Anyone who will read the history of Great Britain's difficulty in maintaining the gold currency in a satisfactory condition as to weight will realise what a foolish thing it would be for Canada to enter into such a system. As a matter of fact, no one pretends that we desire a gold currency, but people do not realize very clearly that gold coin is mainly valuable nowadays for the purpose of international settlements. When we cannot pay our foreign debts by the export of products, or the sale of securities, we may have to ship gold, and conversely when balances are due us from abroad we may import gold. The two places of international settlement in which we are interested are London and New York, and the gold coin most suitable for international pnrposes in Canada are British sovereigns and United States eagles and double eagles, and these coins, by a very wise provision, have been made legal tender in Canada.

The gold stock held in Canada by the Government, the banks, and the people is very small, because, measured by our finances, we are not a very large country as yet. If we were to coin Canadian gold to replace this to the fullest extent possible, 15 or $20,000,000 would be the measure of our requirements, and when this was done a mint would have no further reason for existence in Canada. If, however, we established the free coinage of gold, and the Mint price was higher than could be obtained by exporting the raw gold, the Mint would, after the first year or so, turn out gold with a Canadian stamp upon it, which, not being required at home, would have to be exported to either New York or London. In New York it would in any event have to be remelted, and someone in this country, probably the merchants and manufacturers who buy exchange, would have to bear the loss occasioned by the raw gold having been manufactured into money and remelted into bars. If it went to London the same thing would take place if the denominations of our gold coins were in dollars, as they undoubtedly would have to be.

Canada at Paris.

The exhibition of Canadian minerals in Paris in 1900 will occupy part of the British Colonial building, which is to be erected in the garden of the Trocadero palace, in the immediate vicinity of the British Indian building. The space allotted to the mineral exhibit is somewhat less tha.. 2,500 square feet, after deducting the necessary passage ways.

At Chicago, the several provinces had space accorded to them separately. Some objection was taken to this method of installation at the time, on the ground that, when appearing in a foreign country, Canada could make a much more striking and creditable aggregate display than it was possible to make by means of a group of provincial exhibits, differing in plan and in which the same class of exhibits was several times repeated. Quite apart from arguments based on this fact, however, it became apparent at an early date in the course of the arrangements for the forthcoming Exhibition, that the space available would not admit of any such provincial sub-division. It was then decided to make an aggregate display of the minerals of Canada, in which each class of ores or products will be grouped together. In this way the coals, gold-bearing quartz, copper ores, etc., of all parts of the Dominion will be readily studied and compared together by visitors interested in these particular materials. It is, further, obvious that the specimens displayed should in all cases be the best of their kind, thoroughly representative and at the same time not of undue size; working mines being assigned room for larger specimens than that accorded to mere "prospects" or undeveloped properties. It was decided, in fact, that the display as a whole must be of a concentrated character, while at the same time fully representative of the important mineral deposits.

It has also been determined that the Canadian representation in this class shall be a thoroughly practical and economic one. In most previous exhibitions palaeontological and lithological collections have been given considerable space, but, in the present case, while the importance of the strictly scientific aspects of the subject are not denied and while Canada has achieved a very prominent place in such lines, it is obvious that the economic minerals must be given the right of way.

In view of the above-mentioned considerations, the Canadian Commission for the exhibition determined to enlist, as far as possible, the Mining Bureaus of the several Provinces in the collection of specimens and data, all of which would be sent to the Director of the Geological Survey of Canada for final classification, cataloguing and expedition. The Provincial Mining Bureaus are now lending their assistance to the carrying out of this project and there is every reason to believe that excellent results will be obtained.

The Geological Survey will, it is understood, prepare a general explanatory Catalogue of the Canadian minerals, in which the name of the exhibitor or owner of the deposit will in each case appear. This should constitute a good practical index to the economic minerals of Canada, of some permanent value.

In addition to the ordinary entry form for the exhibition, a special form has been printed by the Director of the Geological Survey for mineral exhibits, in which the following indications are given in regard to the character of specimens desired, conditions of shipment, etc.

"Because of the restricted space available for Canadian exhibits at the forthcoming exhibition in Paris, single mineral specimens should not exceed one foot in greatest diameter. Many specimens may advantageously be made much smaller in size, but in the case of ores, etc, where an exhibit is composed of a number of fragments, enough of these should generally be sent to fill a box from 6 inches to 1 foot cube.

In regard to specimens larger than those above indicated, which it may in some cases be desirable to exhibit, special application should be made.

The collection of mineral substances, to be made as far as possible through local agency in the several Provinces, will be taken over, catalogued and combined in a general collection for the Dominion by the Geological Survey of Canada, but the names and addresses of exhibitors or owners of properties will in all cases appear in the catalogue with the specimens.

In the case of exhibits of this class, when accepted at the place of origin, ordinary freight charges will be paid to Ottawa, and if approved for exhibition, all charges of transportation thence to Paris and of installation and supervision at Paris.

The right is, however, reserved to reject duplicate specimens or any other material judged to be unsuitable for exhibition.

If it should be desired, in particular instances, to exhibit groups of products or series of specimens in special show-cases or fittings supplied at the expense of the exhibitor, it may be possible to accord the necessary space for this. In such instances notice should be given immediately, when the ordinary forms of application for space and other information will be furnished.

It will greatly facilitate the compilation of a catalogue of the Canadian minerals, if full details are sent in with the several specimens, in regard to prices, markets, uses, analyses or tests, etc. Such notes should be entered in the column headed 'Remarks,' or when necessary sent on separate sheets attached to this form."

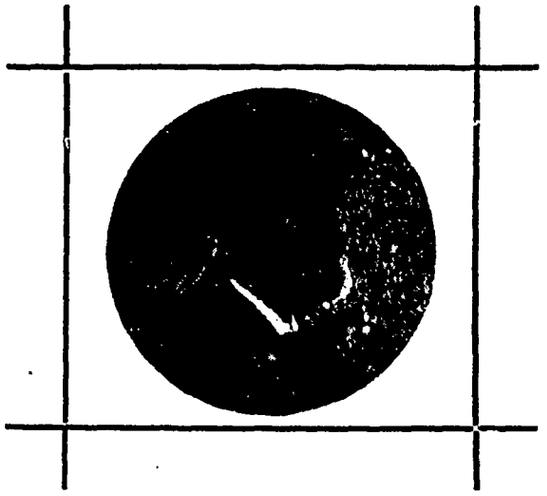
The Late George Whitfield McCarthy.

We regret to learn of the death at Springhill, N.S., on June 7th, of Mr. George Whitfield McCarthy, prospector to the Cumberland Railway and Coal Company, who for some years past has been intimately connected with the development of the Cumberland coalfields.

Mr. McCarthy was born in 1853, at the Joggins, where his father, a schoolmaster from the north of Ireland, settled and brought up a large family. At an early age, young McCarthy, having to earn his own living, went to work in the mines, and when the construction of the railway from Moncton to Truro opened up the Springhill district, he was employed by Mr. John Anderson in his explorations for coal and afterwards by Mr. Scott Barlow of the Geological Survey in a general exploration and survey of this important coalfield, which he made between the years 1871 and 1878. Mr. Barlow often bore testimony to his strength and skill as a woodsman and explorer.

He was married on Christmas, 1879, to Miss Jane Mills, who with a son and daughter survive him. In the following March he left Nova Scotia for Pennsylvania, where by his industry and thrift he was in a fair way to realize his ambition to accumulate enough money to buy a farm in his native land. In the summer of 1881, however, he sustained in the coal mines an injury from which he never entirely recovered.

His tastes and training had led him, both at home and in Pennsylvania, to spend his spare time in the study of the geological structure of the coal measures, which he turned to advantage on his return to Nova Scotia in 1883. He leased and worked areas on the northern side of the coal basin. In 1888 he was engaged by the Cumberland Railway and Coal Company to sink the Aberdeen slope, and from that time until his death he was almost continuously employed by that company, his worth and knowledge being especially recognized by the present manager, Mr J. R. Cowans.



In 1892 and 1897, he accompanied Mr. Hugh Fletcher of the Geological Survey to point out features of interest in the coalfield and indicate beds of coal, conglomerate, limestone, sandstone, which he had observed and traced with great success and which his keen observation and retentive memory enabled him to weave into a clear conception of the geological structure of the coal basin. In 1898 he "traced, by means of bore-holes and trial-pits, the lowest seams worked at Springhill mines to a distance of more than two miles and a half beyond the point to which they were proved by Mr. Scott Barlow and Mr. John Anderson"—work of great value as indicating the persistence of the coal-seams and consequent permanence of the mines.

In appearance Mr. McCarthy was tall and straight, of dark complexion, spare and active, with bright, beaming eyes A "silent great soul; he was one of those who cannot but be in earnest; whom Nature herself has appointed to be sincere."

Our engraving is from a photo of a group kindly sent us by Mr. Cowans. We have had some difficulty in enlarging it and the reproduction is not as good as we should have liked.

EN PASSANT.

The mineral production of Canada increased from $28,661,430 in 1897 to close upon $40,000,000 in 1898. This substantial rate of progress will be maintained for many years.

The value of mineral products estimated by Provinces may be summarized in round figures as follows:—

British Columbia (Gold, Silver, Lead, Copper, Coal and Coke)	$10,906,861
North-West Territories, including Yukon and Manitoba (Gold, Coal, etc.	10,000,000
Nova Scotia and New Brunswick (Coal, Coke, Iron and Steel, Gold, Gypsum, Manganese and Building Materials	8,000,000
Ontario (Nickel, Petroleum and Natural Gas, Iron and Steel, Gold, Silver, Lead, Mica)	6,000,000
Quebec (Asbestos, Copper, Pyrites, Slate, Chromite, Iron and Steel, Mica, Felspar, Graphite, etc.)	3,000,000

The gold production distributed by Provinces may be stated to have been as follows:—

British Columbia	$2,844,563
N. W. Territories and Yukon	8,100,000
Nova Scotia	600,000
Ontario	271,906
Quebec	6,500
Total gold production of Canada in 1898	$11,822,969

The largest and most important of our mineral industries is the production of coal in the Provinces of Nova Scotia, British Columbia, Manitoba and North-West Territories. This industry represents a larger invested capital, it employs more labor, and distributes more money in wages, machinery, supplies and freights than any other mineral industry in Canada.

The mining and transportation of coal involves the expenditure of more money for labor than does any other product in the Dominion. Eight tenths of the cost of coal laid down in any of the great centres of consumption is for labor. The mining of a ton of coal and its delivery to the consumer involves among other things:—

1. Employment in timbering the mine as the levels are advanced and pumping water as the mines deepen—a serious expense—and this timbering furnishes a ready cash market to farmers for an otherwise unmarketable article.
2. Cutting the coal.
3. Hauling it to the surface.
4. Handling it at the pit's mouth.
5. Railroading it to the shipping pier and loading on vessels and steamers.
6. Trimming cargo.
7. The transportation and consequent pilotage and harbor expenditure.
8. Discharging at the terminus and perhaps trans-shipment of storage.
9. Delivery to consumers.

The transportation of the coal involves the expenditure of almost as much money as the original cost of the product, and gives employment to a great number of men on the shipping piers, the railroads, the vessels, the points of discharging, etc. Of Nova Scotia's total product of 2,300,000 tons, 1,500,000 tons are water borne, giving constant employment to a fleet of steamers and sailing crafts, while 500,000 tons are carried over the railways. The expenditure for freights aggregates at least $2,000,000, not to speak of the hundreds of thousands of dollars paid for storage, and delivery to the consumer.

The most extensive mining operations carried on in Canada are those of the Dominion Coal Co., Limited., operating the Caledonia, Reserve, International, Old Bridgeport, Dominion No. 1, and other collieries in Cape Breton. The capital of this large enterprise is $18,000,000. It employed in 1898 about 1,500 miners, and raised 1,135,182 tons coal.

The largest and most important metalliferous mining and smelting enterprise in Canada is located at Copper Cliff, Sudbury, Ontario, where the Canadian Copper Company employs close upon 1,000 men, and has four smelters in active operation. It is reported that this company has recently acquired a remarkably promising new mineral territory on the Montreal River, about 75 miles N.E. of its present works. The company has been prospecting the ground, and is said to be now negotiating for the erection of a mining and smelting plant.

The deepest vertical shaft in Canada is sunk at the Albion Colliery of the Acadia Coal Co., at Stellarton, Nova Scotia. Present depth over 900 feet.

The deepest workings in any Canadian metal mine are to be found at the pyrites mine operated by the Eustis Mining Co., at Eustis, Que., where the main shaft, on the incline, is now down to a depth of 2,500 feet.

The longest working slope in Canada is at the Drummond Colliery of the Intercolonial Coal Company at Westville, Nova Scotia. Present length over 5,000 feet.

—

The most extensive underground workings in Canada are those of the General Mining Association, Limited, in Cape Breton, where they extend several miles underneath the sea.

—

There are at present in blast in Canada two (coke) blast furnaces' one in Nova Scotia and one in Ontario, and three charcoal furnaces two in Quebec and one in Ontario. A large furnace and steel plant will be erected this year in Cape Breton by the Dominion Iron and Steel Co., while another is under construction for the Canada Iron Furnace Co. at Midland, Ont.

—

Some idea of the remarkable methods pursued by English company promotors may be gathered from the published accounts of the meetings of the creditors and shareholders of the British Columbian Exploitation and Gold Estates, Limited, held recently in London.

This company was registered in July, 1896, with a capital of £7, the promoter being Mr. John Sheridan, who was assisted by Mr. E. H. Seddon and Mr. Cottam. The objects of the company were of an extremely wide character. The prospectus stated that the company was formed to explore, purchase, and carry on the business of mining, mine owners, and mine prospectors, generally, but more particularly in the colony of British Columbia and the adjacent territories under British influence and control. In August, 1897, the nominal capital was increased to £200,000, and under an agreement then entered into a Mr. G. W. Jones, who was stated to be Mr. Sheridan's nominee, was to pay the expenses up to and including allotment, and to receive 2 per cent. on the amount of the nominal capital. The first prospectus, which was issued in August, 1897, contained the following headnote: "A pioneer parent company.—A company with 10 proved claims.—Seventy-three further claims under consideration.—Great gold finds in British Columbia.—Rush of diggers.—Sixty-eight prospectors with more than a million dollars in gold dust and nuggets.—Next season's estimated yield $50,000,000.—Rich finds daily." A reference was also made to 10 mining claims situate near the China Creek, in the Alberni district, British Columbia. The Official Receiver was informed that Mr. William Shaw, who was a clerk in the employ of Mr. Sheridan, obtained an option in July, 1897, to purchase the claims for £3,000, and 7,500 shares in a company to be formed. Under a subsequent agreement, Mr. Shaw assigned his interest in the option to the company for £12,000 in cash and £28,000 in shares; but, owing to the fact that the prospectus only brought in applications for 1,499 shares, the company never acquired the claims, although the directors went to allotment on that small subscription. It became necessary for the company to acquire some property, and in October, 1897, it acquired a lease of the dredging rights for three miles of the Quesnelle River, Cariboo, British Columbia, the purchase price being £75,000 in shares. It was interesting to study the history of that lease. In the first place, it was granted by the Gold Commissioner of Cariboo to a Mr. Reichenbach for twenty years, at an annual rent of $150 and a royalty of 50 cents for every ounce of gold obtained; but both rent and royalty were subsequently reduced. Mr. Reichenbach assigned the lease to Mr. Frank Spencer for $1 and other valuable considerations, and in October, 1897, the latter assigned his interest in it to Mr. William Shaw for £30,000 in cash or shares. Mr. Shaw next assigned the lease to the company for £75,000, and 45,000 shares were duly allotted to him, the other 30,000 being allotted to Mr. Spencer. The issue of a second prospectus in October, 1897, brought in applications for only 24 shares, which were duly allotted. In order to provide working funds, the company entered into an agreement with Mr. Henry Mockford, who took over a portion of the company's rights, and undertook to pay them 30 per cent. on the net profits. Nothing, however, had yet been done on the property, and it was impossible for the Official Receiver to express any opinion upon the value of the lease. The only other asset of the company was £96 representing unpaid calls, and, apart from a sum of £3,105 due to Mr. Jones, the liabilities only amounted to £310. In conclusion, the Chairman stated that the official Receiver would probably consider it his duty to apply to the court for a public inquiry into the affairs of the company.

—

The deplorable explosion this month at the Caledonia Colliery of the Dominion Coal Company, whereby eleven lives were lost, is the fifth serious accident in the history of coal mining in Nova Scotia, and the eighth since 1873 in the Dominion. The following shows these accidents chronologically with the number of lives lost:—

1873—Drummond Colliery, Westville, N.S.. .	73	lives lost.
1880—Albion Colliery, Stellarton, N.S.	44	"
1884—No. 4 Pit, Wellington Colliery, Wellington, B.C.	23	"
1885—McBean Seam, Acadia Colliery, Westville, N.S.....	13	"
1887—No. 1 Pit, Nanaimo Colliery, Nanaimo, B. C.	142	"
1888—No. 5 Pit, Wellington Colliery, Nanaimo, B. C.....	60	"
1891—Cumberland Ry. & Coal Co., Springhill, N. S.....	125	"
1899—Caledonia Colliery, Glace Bay, C. B...	11	"

—

Mr. Frederick J. Pope, a graduate of Queen's University, Kingston, and University Fellow in Chemistry at Columbia University, New York, has given the results of special researches in the composition of Magnetic Iron Ores of Eastern Ontario, in an interesting essay which will no doubt meet with considerable attention. Mr. Pope's investigation shows that in the titaniferous magnetites vanadic and titanic oxides follow a ratio approximating 1·28, and that nickel and cobalt are also universal constituents, the nickel invariably greatly in excess of the cobalt, but apparently with no relation. The greatest financial successes in the world have rewarded the persons who obtained possession of improved economic processes for making iron and steel. Perhaps no less signal reward awaits the inventor who will overcome the economic difficulties in the reduction of titaniferous magnetites, of which Canada has an enormous supply. By calling attention to the valuable contents of these ores, Mr. Pope's essay may be the forerunner of a discovery so much to be desired.

—

What is Asbestos? Here is what a recent text-book *New Elementary Geology*, has to say about it:—

"It is a property formed of very fine fibrous-grained timber, which grew during the antedeluvian period."

Erudition such as this deserves a medal.

—

The Barker Bros. mine in the Lower Manitou, Ont., is reported sold for $250,000.

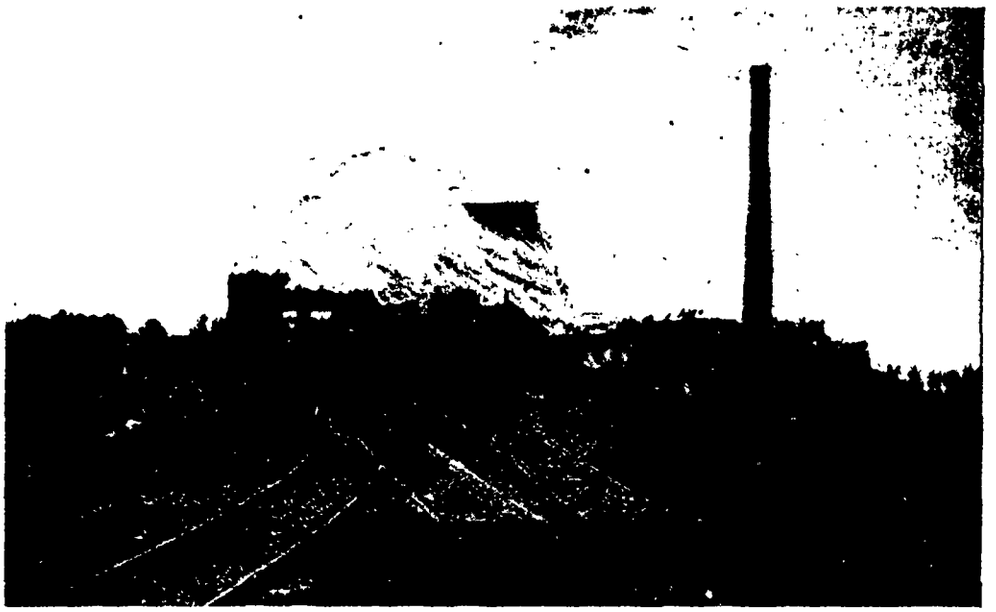
—

At the last session of the Nova Scotia Legislature an Act was passed to encourage the manufacture of iron and steel within that Province. It provides:—

1. The Governor-in-Council may, by order, refund one-half the royalty paid on coal used within the Province of Nova Scotia in the

EXPLOSION AT THE CALEDONIA COLLIERY, CAPE BRETON, N.S.

THOS. J. JOHNSTONE,
Underground Manager Caledonia Colliery
(Reported killed in explosion.)



CALEDONIA COLLIERY, CAPE BRETON
Photo taken after explosion.

CALEDONIA COLLIERY, CAPE BRETON
Photo showing siphon at work near a dam by which the company is flooding the workings. A 6-inch pipe runs from water to a 12-inch borehole under the derrick which taps the mine in the vicinity of the fire.

making of iron and steel, to any company now carrying on the business of making iron and steel, or to any company that may be organized and have begun operatious within twelve months from the first day of August next, and also shall have within two years from said date erected within the Province of Nova Scotia, plant, buildings, furnaces, machinery, and appliances, at a cost of not less than $3,000,000, for the manufacture of steel or iron, or both.

2. The said refund of royalty shall not be for a longer period than eight years to any company now formed, or hereafter to be formed, and the period of rebate shall run from the date of said Order-in-Council.

3. The Governor in-Council may also by order pass any regulation necessary for ascertaining the amount of coal consumed by any company referred to in this Act and the rebate to which it may be entitled thereon, and for the proper carrying out of the provisions of this Act.

4. Any coal on which royalty has been refunded under this Act shall not be counted as part of the minimum output of coal required of the Dominion Coal Company, Limited, under any statute of the province, or any lease from the Crown, or any agreement with the Commissioner of Public Works and Mines, or with the Crown, for or on behalf of the Province of Nova Scotia.

5. There shall be no refund of royalty on coal used in the making of iron and steel under the provisions of this Act unless and until a new company is organized and qualified under the provisions of Section 1 hereof to receive such refund.

—

British Columbia miners in several camps have walked out, refusing to stand the cut in wages which followed the introduction of the eight-hour law. Thus far no trouble is reported. There is no objection on the part of the miners to the eight-hour shift, but they demand the same pay for eight hours that they have previously received for ten.

—

A question frequently asked is, "How cheaply can a mine be worked?" There are so many factors entering into the economy of mine equipment, development and management that no arbitrary answer can be given this question. "An important consideration," says the *Mining and Scientific Press*, "is the width of the vein. Another question of almost equal importance is the character of the rock, whether hard or soft, easily supported or requiring close and immediate filling. Still another consideration of great importance is the manner of recovering the ore bodies, whether by means of tunnels or through shafts. The quantity of water, cost of timber, cost of labor and supplies, distance from mine to mill, kind of motive power and its cost—all of these are important considerations which have a direct bearing on the cost of mining. The beneficiation of the ore is a distinct branch, and a large number of conditions have to be considered. Here the hardness of the ore has a direct effect on crushing capacity, but large capacity per stamp is not always productive of the best results. The fineness of the gold or its association with other minerals determines in a large measure the capacity of the mill. A free milling quartz can be milled more cheaply than one which is only partly free and requires concentration or other subsequent treatment. Some ores cannot be successfully milled at all, or at least milling cannot successfully compete with smelting.

"To obtain the best results at the lowest cost is the object throughout, and to accomplish this result requires a careful consideration of equipment and methods of mining to be pursued. The ore, having been brought to the surface with as little handling as possible, should reach the mill as quickly as possible, and when dumped on the grizzlies it should pass automatically downward by gravity from one operation to another, until the pulp passes to waste down the gulch, having been relieved of all the precious metal it is economy to extract. Under favorable circumstances mines have been operated in California at less than 50 cents per ton, this covering all cost of mining, milling, etc., but in these operations the ore bodies were extensive and were mined in the open cuts; the tonnage per stamp was large, the rock an ideal free milling material, and the power employed free water.

—

All of the large and successful mining enterprises in the country were small concerns in the beginning of their history. A mine must be made, and it requires usually a vast amount of money, much time and planning to bring about the desired result; but no amount of money or scheming will make a mine where the values do not exist in the ground. Some great mines require much less money and less time than others to achieve greatness, and in some instances the promoters of mining schemes attempt to "thrust greatness upon" the mines they are endeavoring to sell.

—

A very rich strike is reported in the deep workings of the North Brookfield Mining Co., Queen's County, Nova Scotia.

—

The whole question of colliery explosion is once more before an International Committee, which will deal with the problems in the broadest manner. There have been many inquiries with limited scope. They have done useful work, but they have not grasped the problems in their totality. That is what the committee, established at Brussels last year, hopes to do. A committee had been decided upon to study gravitation and pendulum problems, and the influence of the shape of the earth on such matters. It seemed necessary to bring in the micro-seismic disturbances, which admittedly have an influence on the discharge of methane, etc., from coal, whilst earthquake waves, felt down below in the pits, have not always affected the gasses. All connection between earthquakes and danger threatening in gassy mines had been denied on the ground of such negative records. The committee does not contemplate any very novel steps. When the balance of the last decade's progress will be drawn some time hence, it will probably be found that posterity will be less impressed with inventions and discoveries which had caused a temporary stir and brought fame and wealth or disappointment to a few individuals, than with the development of methods of long-continued systematic study, which alone can help us to understand the inter-relations of phenomena. For what we may call the scientific purposes first mentioned, observations were planned at Brussels, Ghent, and Liége. Three further classes of stations are now proposed. Observations are to be taken in all the colliery centres with comparatively inexpensive apparatus. Four stations are to be fitted out on a superior plan along the Belgian coal basin; and, finally, there is to be one central station. The observations are to concern geological, physical, chemical, meteorological, and physiological conditions. The work will not be accomplished in the course of a year or two. Anybody interested in it may help in a modest way by sending his annual subscription of one dollar (minimum) to the Secretary of the Société Belge de Géologie, Brussels. This subscription would entitle the member to receive certain reports.

—

It is evident from the tone of numerous letters received that the present activity in mining has resulted in the flotation of some mining schemes, the character of which should be investigated, at least, by intending purchasers of stock. It is not at all uncommon to receive

inquiry concerning this, that, or the other concern, the whereabouts of whose property can only be ascertained, if at all, with the greatest difficulty, and yet the prospectus of these concerns are most elaborate. One common feature of these wildcats is the coupling of the name of the property they are trying to boost with that of well known producers, the language of the prospectus leading the would-be investor to believe that they either join or are in the immediate vicinity of valuable mines, when, in fact, they may be many miles distant. Old mines with unenviable records are promoted under new names; the names of successful and valuable mining properties are applied, with slight variation, to new ones having little or no merit, actual or prospective, for the purpose of leading the public to believe that when purchasing stock in these concerns they are buying into a rich and going property. These and many other forms of deception are practiced to catch the careless investor. The simple fact of being in the same county, the same neighborhood, or even immediately adjoining a rich mine, gives no actual value to any other mine unless such mine has a valuable deposit of ore within its own ground, except for purely speculative purposes, but the idea is general that the "chances for striking it" are better in the neighborhood of a rich mine, when really there is much doubt about it; but the unscrupulous promoter makes the most of it. When it can be reasonably shown that a known and valuable chute of ore in a claim passes beyond its end line into the adjoining property, then such mine, owing to its fortunate position, undoubtedly has a certain value.

There are meritorious new concerns in the market where there is a good chance to win by the economical development and operation of a promising prospect, but there are many others which have nothing to recommend them, the market price of the stock of which would indicate an actual cash valuation of many thousands of dollars. The reaction which always follows the bursting of these gilded bubbles has a bad effect on the industry of legitimate mining. Men have the legal right to associate themselves privately, or as corporate bodies, for the purpose of equipping, developing and operating mines, but the law does not give any one the right to make the grossest misstatements concerning their property when the purpose of these misstatements is to deceive.

—

Messrs. George G. Blackwell, Sons & Co., Liverpool, the well known purchasers of minerals, ores, and metals, write us respecting Molybdenite, a mineral which is found in many localities in the Ottawa Valley The following excerpts from their letter will be of interest to owners of such deposits :--

"Owing to a new article that we manufacture from this mineral, we have opened up a consumption for the same, and could certainly take almost any reasonable quantity from Canada, providing the quality was good and free from silica and gangue. For a good quality we would pay now £40 per ton c.i.f. Liverpool or London, and as before stated, we can take quantities at this figure. We think it would be better for those who have good deposits to make a selection and send us a couple of tons for trial, so that we could thoroughly try the quality as we do not care to absolutely rely upon very small post samples.

—

Members of the Canadian Mining Institute who purpose visiting British Columbia in September, in connection with the meetings to be held at Nelson and Rossland, are requested to send in their names to the secretary without delay. So far the indications point to a good representation from the East. It is not unlikely that, in response to the invitation from the coast members, a party will also visit Vancouver and other points in that neighbourhood.

Mining in British Columbia.

The annual report of the Minister of Mines for British Columbia for 1898 has been issued somewhat later this year than usual, and our copy having been received too late to permit the extended notice which we usually accord to this interesting official document, we are only able in this issue to briefly refer to some of the figures which it presents. The total value of the mineral products of British Columbia during the year is somewhat disappointing, only reaching $10,906,861, as compared with $10,455,268 in 1897. Increased production, however, is to be noted in gold—both placer and lode; also in copper; while the output of coal has broken all previous records. There has been, however, a considerable shrinkage in the value of silver and lead produced, the figures of the former metal having dropped from $3,272,836 in 1897 to $2,375,841, and the latter from $1,390,517 to $1,077,581.

Mr. Robertson explains the situation by saying: "The reason for this decrease seems to be the unusually low price of silver during the latter part of 1897 and the beginning of 1898, together with the uncertainty as to the future price of the metal. For the time being this paralyzed many existing ventures and prevented new ones being started to work properties of this nature The drop in price coming, as it did, shortly after a rise in the duty on lead imported into the United States, then our only market, deterred many of our mines from starting work this season. When the price of silver increased again, in the latter half of this year, it was then too late to begin operations for this season. Again, the certainty of the completion this year of the Canadian Pacific Railway's branch through the Crow's Nest Pass, bringing with it cheaper fuel and transportation, and so enabling our native smelters to compete for ores, has induced many large producers to confine their attention to development and blocking out of their ore-bodies, holding back shipments until such time as the new conditions should have taken effect, and higher net values might be obtained for the products of the mines. Decrease from this cause is a healthy sign, and next year should show a very materially increased output of this class of ore." The following summary statement shows the production of various minerals during the last two years :—

	Customary Measure.	1897.		1898.	
		Quantity.	Value.	Quantity.	Value.
Gold, placer	Ounces	25,676	$ 513,520	32,167	$ 643,346
" lode	"	106,141	2,122,820	110,061	2,201,217
Silver	"	5,472,971	3,272,836	4,292,401	2,375,841
Copper	Pounds	5,325,180	266,258	7,271,678	874,781
Lead	"	38,841,135	1,390,517	31,693,559	1 077,581
Coal	Tons, 2,240 lbs.	882,854	2,648,562	1,135,865	3,407,595
Coke	" "	17,832	89,155	35,000	175,000
Other materials			151,600		151,500
			$10,455,268		$10,906,861

Mr. W. F. Robertson, Ba. Sc., who succeeded Mr. W. A Carlyle last year in the position of Provincial Mineralogist, is to be congratulated on the excellent arrangement of this publication, which may well serve as a model for some of our other Provincial Governments to follow.

We cannot do better than give in his own words his summary of the progress made by the various industries during the period under review :—

Gold.—While the output of placer gold has not regained the importance it held 20 years ago, still there is a material increase over last year--and, as a matter of fact, over any of the last ten years --showing that the gold is still unexhausted, though occurring under conditions rendering it only available by large operations. The placer miner has largely given way to the hydraulic plant.

The increase this year seems to be pretty well all along the line, each district showing a decided gain.

The production of free milling gold is surprisingly small, when one takes into consideration the amount of rich placer found in the country. Attention is being gradually drawn to this class of mining, and stamp mills are going up in several localities. The increased production of Camp McKinney and Fairview, in Yale District, and the returns from the Fern mine, in Nelson Division of West Kootenay, indicate pro-

babilities for the future. Something less than 200 tons of such ore has been milled at Alberni, on Vancouver Island, and fair results are reported as having been obtained.

So far, all the free milling properties have found it necessary to use some form of concentration, for the collection of gold not existing in a free state, which concentrates have usually been sent to the smelters for treatment.

The first working Cyanide plant in British Columbia has been erected, and is situated on Philipps' Arm, 120 miles up the coast from Vancouver, in connection with the "Doratha Morton" mine—a full description of which appears in this report.

The plant has only been in operation for a couple of months, but has already produced satisfactory results, which, it is hoped, may continue, as the continued success of this, the pioneer of its class in the province, will be looked forward to with much interest, as indicating what may be expected from the large low grade gold-bearing quartz veins occurring along the coast line.

The ores of the Rossland Camp may be more appropriately classed as gold ores than as copper ores, inasmuch as the values of the former metal are proportionately much greater. The output of Trail Creek Division is almost entirely from ores of this character—sulphides of copper and iron carrying gold and silver.

These ores are being treated by smelting at Northport, Wash., the Trail Smelter, or at the Hall Mines Smelter, Nelson. The copper acts as a collector for the gold and silver, a matte being produced—the greater part of which is brought forward to refined copper, cast into anodes, and sent to some electrolitic refinery, for the separation of the gold and silver.

Platinum.—Platinum has been found in the black sands obtained in placer washing, both in the Similkameen and Omineca Divisions. From the former some 100 ounces have been sold this year. It is only recently that attention has been drawn to the existence of platinum in these sands, quantities for years having been thrown away, prospectors not being aware of its value.

To facilitate the detection of platinum, this Department is prepared to test qualitatively, free of charge, samples of such sands sent in from any part of the province.

Silver-Lead.—Here these two metals go together, their source being chiefly argentiferous galena, and mined principally in Ainsworth and Slocan Divisions of West Kootenay. While they still hold the place of premier importance in our year's production, the output has this year considerably diminished, for the reasons previously given.

For the two divisions mentioned, the grade of shipping ores seems to have been maintained, as may be calculated from the statistics, and averaged, on over 32,000 tons of ore, 97 ounces of silver to the ton and 47 p.c. lead.

The galenas of East Kootenay are not so high grade in silver, the North Star holding its own this year with about 50 ounces of silver and 50 p.c. lead.

Developments of galena properties in East Kootenay, lead to the expectation of shipments next year from the Moyie Mines and from the Sullivan.

Discoveries of galena in quantity have also been made in Windermere Division of East Kootenay, but remain to be proven by further development.

Few "dry ores" of silver have as yet been developed, though a few such exist in West Kootenay.

The Hall Mines, of Nelson, a silver-copper proposition, carrying about 15 to 20 ounces of silver to the ton and 2 to 2½ p.c. copper, have smelted over 45,000 tons of ore of this class this past year.

Copper.—Classing the ores of Rossland as gold, and of Nelson as silver-copper ores rather than as copper ores, has removed from the list of copper mines the properties which are really our greatest copper producers, a very unfashionable thing to do in these days when anything branded "copper stock" is so eagerly sought for.

Except as noted above, we have no large copper producers in the country as yet. A few hundred tons of fair copper ore have been shipped from Van Anda, on Texada Island, and a smaller quantity from mines of Vancouver Island, but more as trial than regular shipments.

There are, however, a large number of promising copper prospects in the Fort Steele, and also in the Windermere and Donald Divisions of East Kootenay. Vancouver Island has also shown up a few prospects which may soon become producers, notably the "Lenora," on Mount Sicker, and certain properties on the west coast.

With copper anywhere near its present market value, a large number of copper producers will probably spring up this coming year.

Coal.—This past year has been the banner year in our collieries, the yearly output of the Vancouver Island collieries alone being 1,126,531 tons—about 100,000 tons more than was produced in any one year heretofore, and to this must be added some 9,334 tons from Crow's Nest—which has only just entered the field as a producer—bringing the grand total for the year up to 1,135,865 tons.

Coke.—Vancouver Island has produced in the neighbourhood of 35,000 tons of coke, the exact figures not being available, and of this amount some 3,167 tons have been exported, the remainder going chiefly to the Kootenays.

The Crow's Nest Collieries have just begun shipping, having before the close of the year shipped some 361 tons of a very superior quality of coke.

Coal Production in 1898.

The output of coal in the Dominion for the last calendar year shows an increase over previous year, the figures, as tabulated below, from returns furnished by the various collieries, showing an output of 3,714,217 as against 3,528,133 tons in 1897. It is noteworthy, that British Columbia contributed 1,127,869 tons, as against 798,458 tons in 1897. The present year will show a large increase all round on these figures.

PROVINCE OF NOVA SCOTIA.

		TONS.	
Dominion Coal Co.,	Cape Breton	1,135,182	
General Mining Assn.,	do	272,279	
Cape Breton Colliery	do	12,647	
Broad Cove Coal Co.,	do	5,022	
North Sydney M. & T. Co.	do	7,186	
Mabou Coal,	do	325	
Acadia Coal Co.,	Pictou County	203,613	
Intercolonial Coal Co.,	do	210,191	
Cumberland R. & Coal Co.,	Cumberland Co.	322,542	
Canada Coals & Ry. Co.,	do	67,616	
Scotia Colliery,	do	485	
Add not included above		10,000	
Total Nova Scotia			2,247,088

MANITOBA AND N. W. TERRITORIES.

	TONS.	
Alberta Railway and Coal Co., Lethbridge	168,260	
H. W. McNeill Co., Anthracite	23,000	
do Canmore	121,000	
Roche-Percee Colliery, Estevan, Man	10,000	
Sundry Miners Estimated	10,000	
		332,260

BRITISH COLUMBIA.

	TONS.	
New Vancouver Coal M. & Land Co.	520,222	
R. Dunsmuir & Sons	315,738	
Union Colliery Co. of B.C.	236,395	
do Alexandria Colliery	45,560	
		1,117,915
Crow's Nest Pass Coal Co.		9,334
And New Brunswick Estimated		7,800
Total Tons		3,714,217

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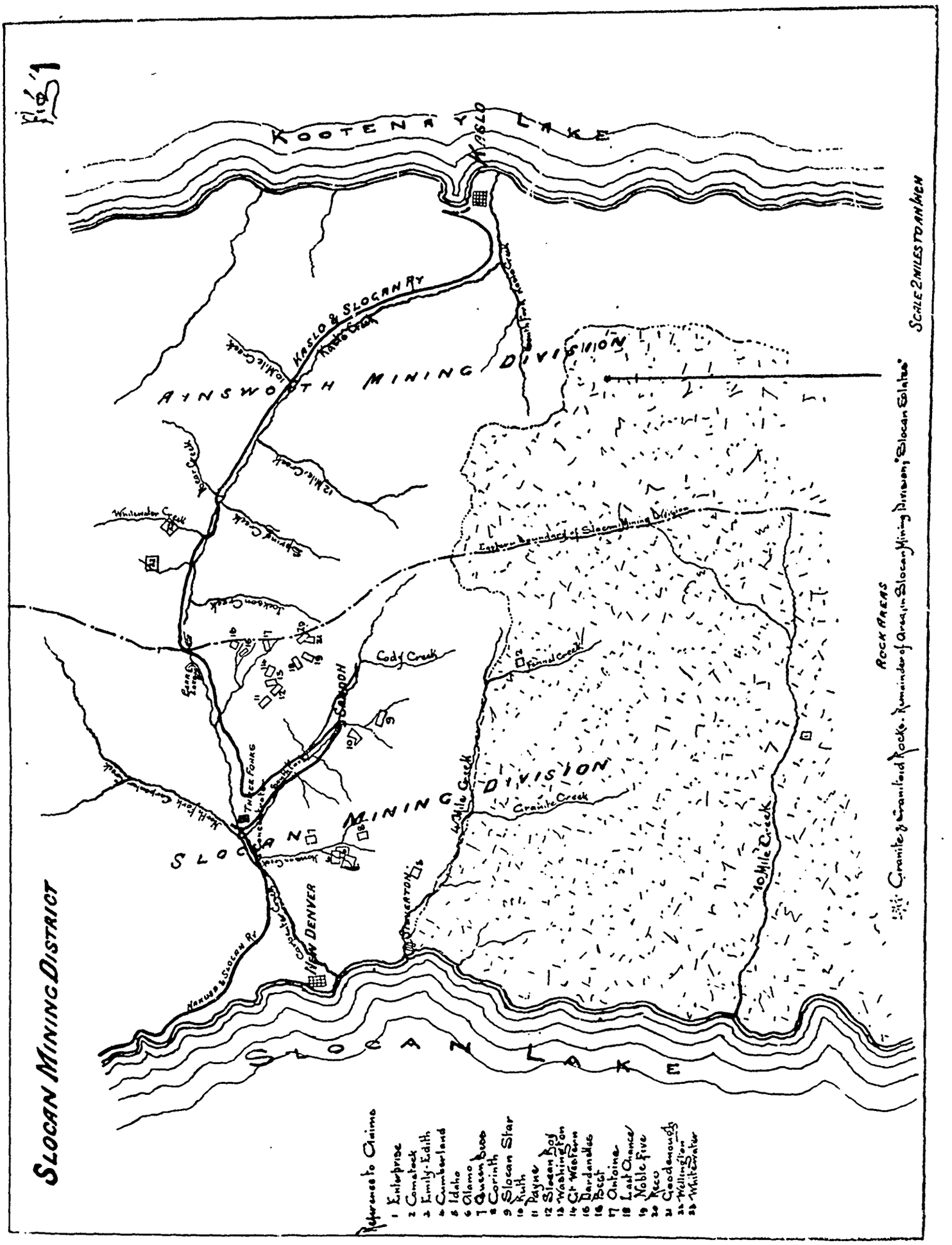


Fig 1
SLOCAN MINING DISTRICT
KOOTENAY LAKE
KASLO
SLOCAN LAKE
NEW DENVER
SLOCAN
KASLO & SLOCAN RY
KASLO & SLOCAN RY
AINSWORTH MINING DIVISION
SLOCAN MINING DIVISION
Kaslo Creek
Woodbury Creek
Whitewater Creek
Springer Creek
Lemon Creek
Cody Creek
Three Forks
Granite Creek
10 Mile Creek
12 Mile Creek
4 Mile Creek
Carpenter Creek
Eastern boundary of Slocan Mining Division
SCALE 2 MILES TO AN INCH
ROCK AREAS
Granite & Crawford Rocks. Remainder of Area in Slocan Mining Division, Slocan Lakes
References to Claims
1 Enterprise
2 Comstock
3 Emily Edith
4 Cumberland
5 Idaho
6 Alamo
7 Queen Bess
8 Corinth
9 Slocan Star
10 Ruth
11 Payne
12 Sloan Boy
13 Washington
14 Ct Western
15 Bardonald
16 Bell
17 Antoine
18 Last Chance
19 Noble Five
20 Reco
21 Goodenough
22 Wellington
23 White Water

The Silver-Lead Deposits of the Slocan, British Columbia.

By J. D. KENDALL, M.Inst. MM.*

INTRODUCTION.

British Columbia will in all probability in the near future become one of the most important producers of silver-lead ore in the world, if indeed it will not occupy the first position. It is not that the deposits are large; rather they may be said to be numreous and the ore high grade. The district known as the Slocan contains most of these mines hitherto opened up in the province, and therefore gives a fair idea of B.C. silver-lead mines.

The first mineral locations were made in the Slocan, in September, 1891; so that as a mining district it is in its infancy. When in conjunction with this we remember the great difficulties in transportation that had to be overcome by the pioneers of the mining industry, we are surprised that the output of ore is so great, rather than it is not greater.

A few of the earliest claims of importance appearing on the records may here be named. The first is the Payne, located on the 9th September, 1891. Others were located soon after, as shown below.

Name of Claim.	Recorded.
Payne	22nd September, 1891.
Noble Five	5th October, 1891.
Last Chance	5th October, 1891.
Slocan Boy	5th October, 1891.
Slocan Star	15th October, 1891.
Washington	17th October, 1891.
Idaho	4th July, 1892.
Ruth	8th July, 1892.
Alamo	5th August, 1892.

On each of these claims shipping mines have been opened up and most of them are to-day on the list of shippers.

The first shipment of Slocan ore was from the Whitewater Mine, in July, 1892. It had to be "packed" on horseback through the forest, a distance of 17 miles, to Kaslo, at a cost of about $40 per ton. Then it was taken by boat and rail to United States smelters, at a further cost of about $20 per ton. Ore was packed in a similar way from the Best and Dardanelles a few weeks later, and from the Idaho and Mountain Chief mines during the winter of 1892-3. The cost from the two last named mines was $45 per ton to Kaslo, and from other mines at somewhat similar rates.

How near the surface the ore occurred and with what little preliminary work it was reached, outside the difficulties of transportation, may be judged from the fact that a quantity of ore was shipped in 1892, in most cases, however, only a sample. The following figures are from the Report of the Minister of Mines for 1892:—

Name of Mine.	Ore Shipped. Tons.
Whitewater	8
Freddy Lee	over 400
Blue Bird	100
Dardanelles	10
Best	15
Idaho	15
Wellington	10
Noble Five	not stated

The first railway built into the Slocan was the Nakusp and Slocan, commenced July, 1893, and opened for traffic as far as Three Forks (32.9 miles) in 1894. This was followed in 1895, by the Kaslo and Slocan (31.8 miles long.) In the same year the Naksup and Slocan was extended from Three Forks to Sandon, a distance of about 4 miles. These lines placed the Slocan in communication with the Canadian Pacific, Northern Pacific, and Great Northern Railway systems and reduced the cost of transportation $20 per ton.

Location and Extent of District.—The Slocan Mining District is in West Kootenay, on the eastern side of Slocan Lake. It is about 12 miles across in an east and west direction and about 18 miles long from north to south. Part of it, on the east, is really in the Ainsworth Mining Division, but there is no natural line separating the Ainsworth from the Slocan Mining Division. It is merely an arbitrary line for record purposes.

Physical Geography and Geology.—The entire area is mountainous, ranging in altitude from about 1,800 to about 7,500 feet. The mountains are not only high, but steep. Usually they are very uniform in outline, a result of the slight variation in the hardness of the rock ont of which they have been formed, over a great part of the area.

The solid geology is relatively simple, the greater part of the area being occupied by dark agillities or clay slates occasionally interbedded with calcareous quartzite and dark coloured limestone. Traversing these rocks are numerous igneous dykes and intrusive sheets, some of great thickness. Many of them are closely associated with the ore deposits, as will be seen hereafter. A number of these igneous intrusions may be seen in the neighbourhood of Three Forks, along the line of the Canadian Pacific Railway. In a cutting on that railway, just below Three Forks, the section shown in Fig. 2 is exposed, and about half a mile west, on the way to the Alamo Concentrator, commonly called "The Concentrator," a dyke, about 150 yards wide, croses the railway. Many others may be seen in the same locality and elsewhere in the district.

FIG. 2.—Section in railway cutting at Three Forks.

A, argillite; B, felspar porphyry.
Scale 50 ft. to an inch.

The aqueous rocks are known to geoligists as the Slocan slates. They seem to occupy about the same geologic horizon as the upper part of Adam's Lake Series, which has been provisionally classed by the Dominion Geological Survey, as Silurian or Cambro-silurian. The beds are, as a rule, highly tilted and severely faulted. Most of the faults are ordinary, but some are reversed. Both kinds are met with in the mines and some of them frequently stagger the so-called practical miner who, unfortunately, is very often only a practical rock breaker, and absolutely innocent of any knowledge of geological structure.

The remainder of the area is occupied by granites and granitoid rocks.

Climate and Forests.—The climate of the Slocan is very good. There is, however, an almost entire lack of precise information regarding it. Generally it may be said that the snow "comes to stay" on the higher altitudes in October, and throughout the district in November. It disappears from the lower levels at the end of March or beginning of April, and from the mountain tops, except where drifted, about the end of June. A little rain falls in the autumn and spring, but the summer ere long, dry and bright. The following table shows the depth of snowfall at the Idaho Mines (altitude 6,100 feet) during the winter of 1897-98:—

		Snowfall. Inches.	Days on which Snow fell.
1897.	September	3	1
	October	12	2
	November	95	22
	December	56	13
1898.	January	55.5	15
	February	104.5	19
	March	44	8
	April	25.5	9
	May	24	7
		419.5	96

At the Corinth Mine, not more than a mile from the Idaho, and at an altitude of about 6,200 feet, the following figures were recorded during the same winter. First snow 12th October, 1897. Between that date and the 22nd of April, 1898, 394 inches of snow fell. The record was not regularly kept afterwards, but on the 14th and 22nd of May 2 and 3 inches respectively fell.

* Paper read before the Institution of Mining and Metallurgy, May, 1899.

No exact figures can be given with respect to rainfall or temperature, but it may be stated that unmelted ice is frequently seen in July and August in the lowest or drainage levels of mines near the mountain tops. It may also be stated in a general way that in summer the thermometer sometimes rises to 90° in the shade, with cool nights, whilst in winter the mercury may often be seen in the neighbourhood of zero, and occasionally 20° or more below.

Before the advent of the prospector the Slocan was thickly covered with firs and pines, except on the higher mountain tops. Since then large areas have been partly or wholly burned, but many of the trees within those areas, although killed by fire, still stand and are quite good for mining purposes. The firs are more useful to the miner than the pine. The principal species of the former are:—

Pseudotsuga Douglasii	Douglas fir or red fir.
Tsuga mertensiana	Hemlock.
Thuya gigantea	Cedar.
Larix occidentalis	Tamarack.
Abies subalpina	Balsam.

The balsam ranges in altitude from about 3,0[illegible] to about 7,000 feet, the cedar up to about 5,500, the Hemlock and Douglas fir to about 3,500 and 4,000 respectively

Transportation.—The mines are connected with one or other of the railway systems serving the district by either rawhide trails, wagon roads, aerial or other tramways.

Rawhiding is extensively practised in the Slocan, the conditions being highly favourable for it, the steep mountain sides and the thick mantle of snow by which the ground is covered throughout the long winter making it possible to form a trail for use in this way at a cost little exceeding that necessary to remove the underbrush and the few large trees that cannot be avoided along the selected route. In rawhiding, the ore is first sacked—each sack containing 100 to 150 lb. of ore according to the tenor reached in dressing, then wrapt in raw cowhides—15 sacks being an ordinary load—and drawn by horses over the snow. A horse takes only one hide at a time, but one driver may be in charge of any number of horses up to four, the number depending upon the character of the trail. This system of haulage can only be followed in winter when a good covering of snow is on the ground.

In some cases wagon roads are built to the mines. Then the haulage is done by sleighs in winter, and by four-wheeled wagons in summer, the load (depending mainly upon the grade) ranging from 4 to 8 tons. These roads cannot be used for about four or five weeks in the spring—when the snow is melting—because part of them are then only fit for "runners," and part for wheels. As the melting snow disappears at the foot of the hills, runners are impossible, and wheels cannot be used until the snow has gone entirely from the higher ends of the roads. The usual time that elapses after the ground is bare in the lower valleys, until the snow disappears at an altitude of about 6,000 feet is four or five weeks, and during this time haulage by this system has to be suspended, to the higher mines.

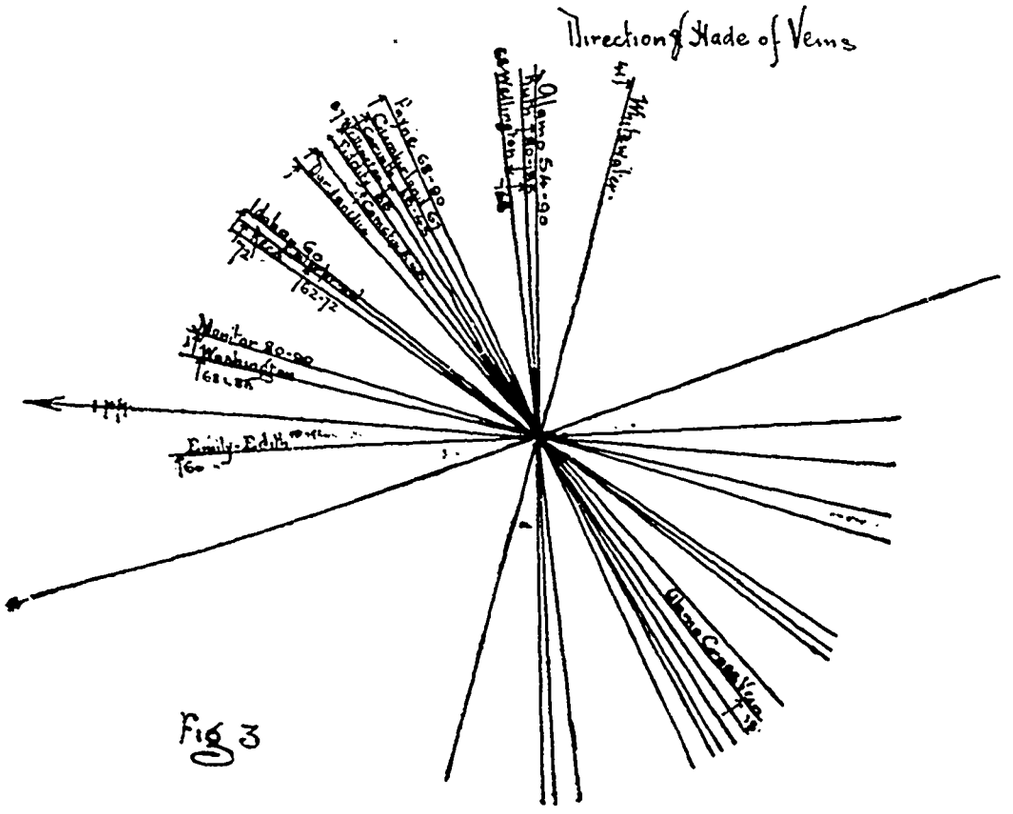
Some of the mines are provided with rail, others with rope, tramways—in all cases self-acting. Both these forms of tramway, if properly arranged, are capable of continuous working throughout the year, and are therefore superior to either rawhiding, wagon, or sleigh haulage, where the output is large enough to justify the extra cost of making them.

The longest wagon road yet made is about 8 miles, the longest tramway about 1¼ miles.

Form of the Ore Deposits.—Most of the deposits hitherto worked are at considerable altitudes, for the simple reason that the rocks are more exposed there than at lower levels, and consequently the prospector has been more successful. The following table shows approximately the level at which some of the more important mines occur, disregarding the range of altitude in the several properties:—

Mine.	Feet above sea.
Payne	7,200
Idaho	6,700
Alamo	6,700
Reco	6,200
Whitewater	5,000
Slocan Star	5,000
Ruth	4,700

Nearly all the deposits known in the Slocan, and certainly those of greatest importance commercially, have the form of veins, often called, here and elsewhere, "fissure veins" or "true veins," but a few are bed-like in form, that is, occur along the bed-planes of the strata. The two kinds will be considered separately.



Veins.—Most of the deposits in this class, hitherto worked, occur in the argillites or clay-slates, a few only having been worked in the granite area. Whether this preponderance is due to the former rock being more favourable to the formation of ore deposits, or to the greater ease with which they can be opened up after they are found, is not evident. Experience on the granite area is too small for any reliable judgment to be pronounced yet, but the development of the Enterprise Mine or Ten Mile Creek, has shown conclusively that it is possible for good mines to occur in that area.

The *direction* or *strike* and the *hade* or *underlie* of some of the veins is shown in Fig. 3, which gives the information in a form that admits of ready reference and comparison. One fact is rendered very evident by this drawing—there is no particular direction for these veins, as is often assumed, although it must be admitted they seem more frequently to have an easterly and westerly bearing or strike than any other. The statement sometimes made that what is called a "true fissure vein" must have an inclination or underlie of at least 60°, is also seen to be erroneous, for all the veins included in Fig. 3 are of that class, yet some of them occur at lower angles than 45° even. As in other areas, the veins here, considered singly, are not constant either in direction or hade; the lines in Fig 3 represent only the average direction, so far as at present known. The changes in direction are fairly well illustrated by the horizontal section of the Payne vein in Fig. 4, and the variations that occur in hade are suggested by the cross-section of the Alamo vein in Fig. 5. Some of the variations in the different veins are more precisely indicated on Fig. 3, the numbers thereon showing the inclination in degrees, of the respective veins, from a horizontal plane. Where two sets of figures are given, they indicate the range of variation in hade. All the veins named in Fig. 3, except the Comstock and Enterprise, are in the argillites and their associated rocks. The two last mentioned veins are in mica-syenite and granite respectively.

The greatest proved *length* of any one vein in the argillites is only a little over a quarter of a mile, and only about a third of a mile in the granitoid rocks. This statement will doubtless be disputed by those whose powerful imagination can supply the facts which observation fails to find, but it is true nevertheless. How much longer they may here-

Fig. 5.—Cross section of a vein. (Alamo Mine.)

Scale 200 ft. to an inch.

after prove to be we cannot tell. What has been said, however, may be taken as a protest against the too common practice of *assuming* the existence of veins in areas that are covered by drift or otherwise, and in consequence of which the solid rocks cannot be seen. Inferences as to continuity in such cases can only be drawn with safety when the observed facts, on opposite sides of the concealed area, are in complete accordance.

The *width* of veins is likewise very variable. In the argillites the same vein may, in parts, be only a few inches wide, whilst in other parts it may be over 30 ft. The veins in the granite are less variable than those in the argillites, and are seldom wider than 48 in., although, like those in the latter rocks, they occur of all widths below the maximum, the tendency being, in both classes of rock, for the veins to form a connected succession of truncated lenses.

In some cases veins, or parts of veins, occur on one side or other of a dislocation or fault, the plane of which forms either the hanging- or the foot wall of the vein, according to the side of the ore on which the fault exists. In such cases, the side of the vein adjoining the fault is fairly regular, and the variations in the width of the vein arise from irregularities in the opposite wall, as shown in drawings I and II, Fig. 6. Or a vein may occur in part, or wholly, between two faults, as in drawing III, Fig. 6, the planes of the faults, in such cases, forming the hanging wall and the foot wall respectively. The width of the vein is

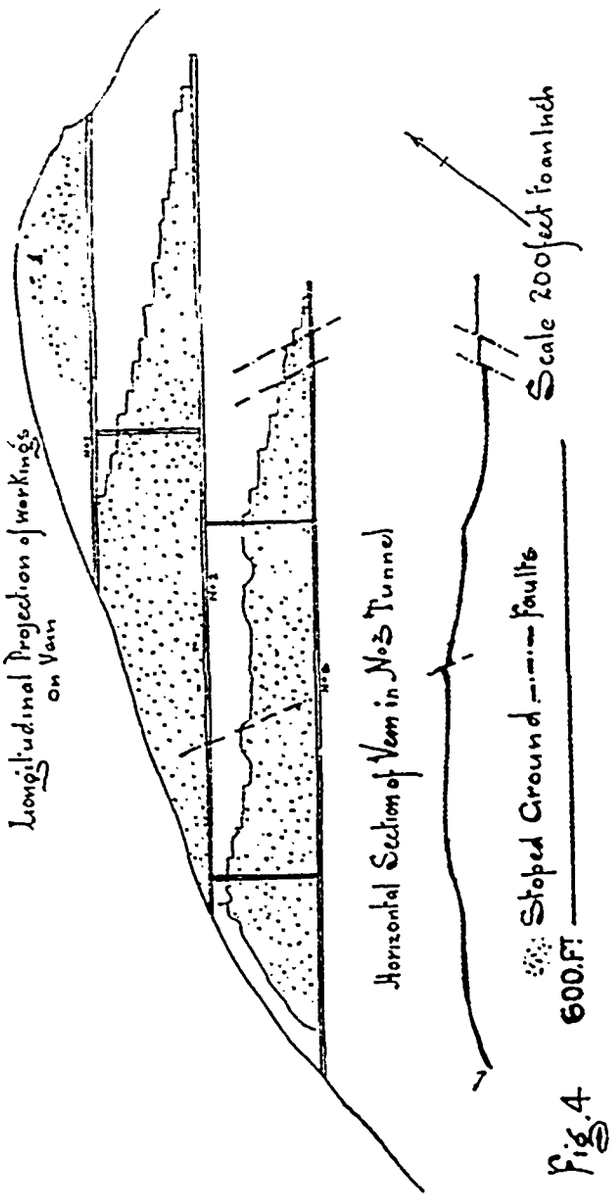
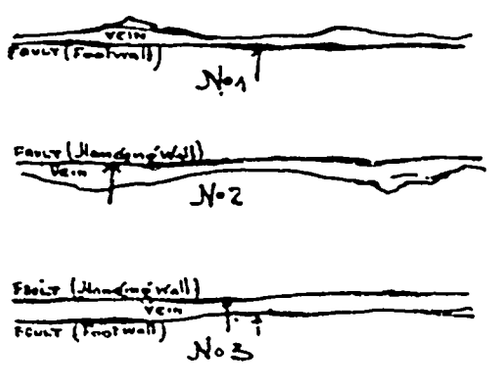


Fig. 4.

Fig. 6.



then much more regular than when the ore follows the line of a single fault, as in I and II, Fig. 6.

The greatest *depth* that has been reached on any vein is about 450 feet, but the bottom of the ore-chute has not been reached, so that the question of depth is entirely unsolved.

Veins usually occur singly, but in a few cases two, having different directions, are found together, crossing one another occasionally, and most probably always, but this cannot in every case be tested by observation, as one of the veins (which apparently cross) is often, if not always, dislocated and shifted by the other. Three instances of this kind are given in Fig. 7. It has just been stated that some veins, or parts of veins, occur along the line of single faults. Other veins, or other parts of the same vein, occur between two faults, and it may now be affirmed that, perhaps, every vein is on the line of one or more faults or dislocations of the strata. This is clearly shown by the severe abrasion of the walls so frequently observable, the broken-up condition of the country rock occurring between the walls, which usually forms such a large proportion of the gangue in every vein, and by the different dip of the strata on opposite sides of the vein. In some cases there is only one fault, in others two or more occur quite close together. The movement along these various fault-planes has often been in quite different directions. It is not unusual, for example, to find the striæ on one of these planes running thus //////, whilst a few inches behind, on a parallel plane, they have a direction at right angles so, \\\\\\ These striæ are of great significance in the dynamics of faulting. In some places they are horizontal, or nearly so. In others they have the same hade as the fault plane on which they occur, whilst occasionally, as just stated, they have intermediate directions. The abrasion has in some instances—where the nature of the rock was suitable—produced the highly polished surfaces known as " Slickensides."

In addition to the faults just named, every vein, perhaps, has been intersected crosswise by one or more faults. These may be divided generally into two groups, one having a direction more or less parallel to the vein, the other group more or less at right angles to it. Examples of the former are given, in vertical section, and of the latter in horizontal section, by Fig. 8. Nos. 2 and 3 are ordinary faults, Nos. 1 and 4 reversed faults. In each of these cases, except No. 1, Schmidt's rule, for finding the shifted part of a vein, holds good. No. 1 is quite an exceptional kind of fault, only two or three examples having come under the writer's notice in the Scocan. When confronted by a fault of this description, it is necessary to be on the outlook for any indication of drag, such as is shown at A in Fig. 9, although that is an ordinary fault; or it may be possible to obtain a clue to the shift like that given in Fig. 10, which is a cross-section of a drift in the Ruth Mine, showing two of these reversed faults. The section, however, indicates the true nature of the lower one only. Fig. 11 shows two of these reversed faults in longitudinal projection. The effect of any of these faults is to shift the veins they intersect, either to one side or the other, and for variable distances. A case in which the shift is large is shown in Fig. 12, which is a plan of No. 3 tunnel in the Enterprise Mine. The vein, as will be seen from the drawing, is intersected by four cross faults close together. The net amount of shift or heave is about 100 ft. In other mines, like the Payne for example, the shift of the vein by these cross faults is very little, as may be seen on reference to Fig. 4. The *amount* of shift on any vein is very variable. The *direction* of shift, on the contrary, is very frequently, in fact generally, the same, on the same vein; but there are exceptions, as in the Payne Mine for example. Some of the faults which cross that vein shift it to the north-west, others to the south-east, as may be seen on reference to the horizontal section in Fig. 4. An instance of a vein being frequently shifted in the same direction is given in Fig. 13.

FIG 7.

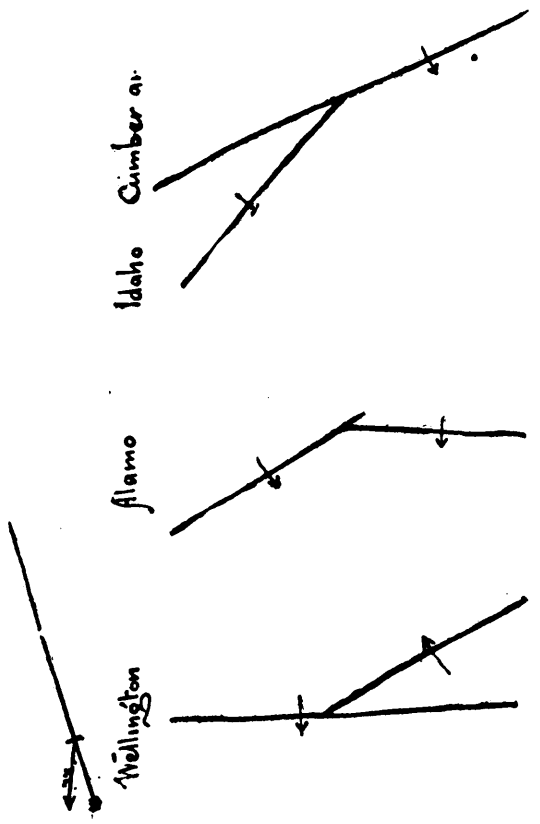


FIG. 8.—Effects of cross-faulting.
In vertical section.

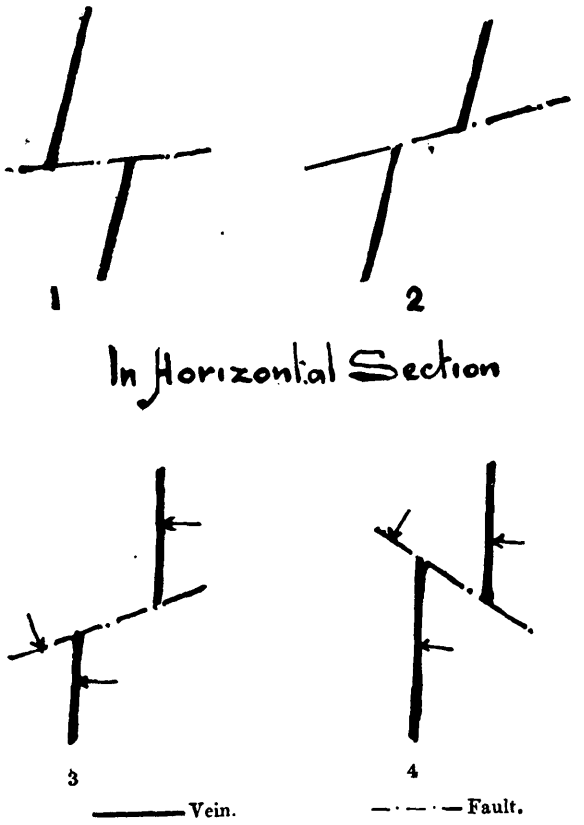
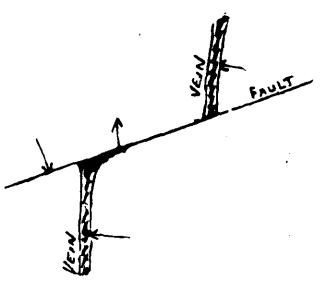


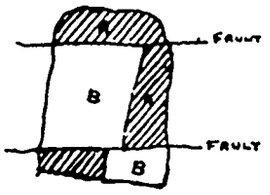
FIG. 9.—Dislocated vein. (Enterprise Mine.)



Scale 8 ft. to an inch.

In the neighbourhood of most veins occurring in the argillites, dykes and intrusive sheets of felspar porphyry are found. These, in some cases, cross the line of the vein; in others they are approximately parallel to it. A case of the latter kind is given in Fig. 14, which is a cross-section of the Slocan Boy vein. The workings in that mine have been carried to a depth of 200 ft., and, so far as they have yet gone, the porphyry either forms the hanging wall of the vein, or is separated from it by only a few feet of argillite. When the dykes or intrusive sheets cross the course of a vein they almost invariably furnish additional evidence of the faulting that has taken place along the line of the vein, for they seldom, if ever, intersect the vein but are intersected by it, and shifted as shown in Fig. 15. Further evidence that the faults coinciding with the veins have had one or more movements since the intrusion of the igneous dykes and sheets is supplied by Figs.

Fig. 10.—Reversed faults as seen in tunnel face. (Ruth Mine.)



A, argillite; B, vein.
Scale 8 feet to an inch.

16, 17 and 18, fragments of igneous rocks having, in each case, been torn from the main body and dragged through the crumpled, crushed, and kneaded argillites.

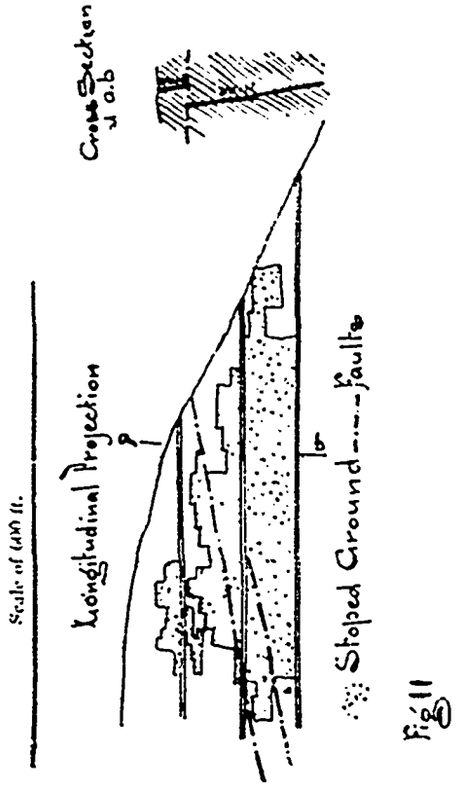
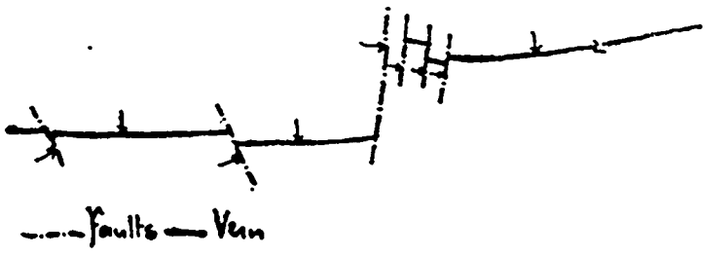
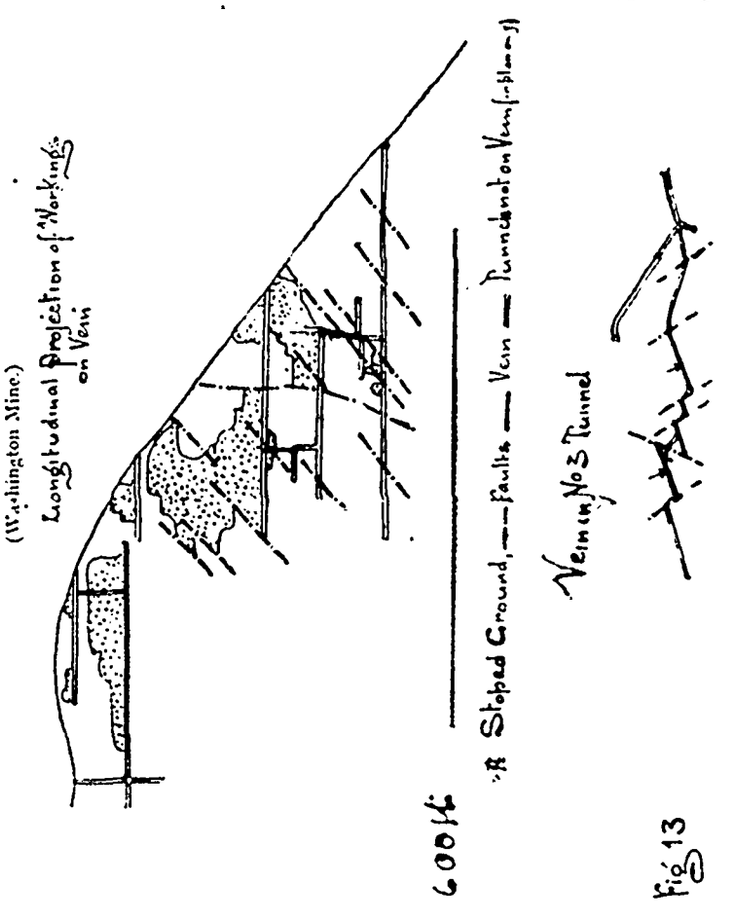


Fig. 12.—Horizontal section of vein in No. 3 Tunnel. (Enterprise Mine.)



Scale 200 ft. to an inch.



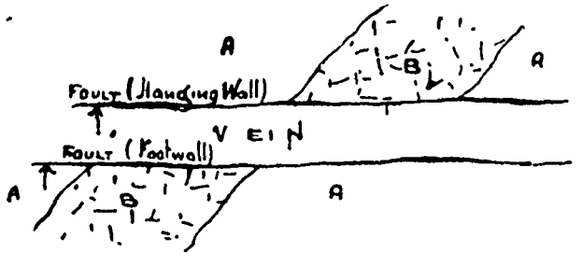
Bed-like Deposits.—Examples of this kind of deposit are few, and they have not been worked to any large extent. Fig. 19 reproduces a section exhibited near the upper end of Spring Creek. The ore occurs in lenses along the bed-joints of the limestone. When the deposit seen in the section, is followed lengthwise in the tunnel, it nips out entirely. A few yards of barren ground occur, and then a lense, somewhat like the last, comes in, but on a different bed-joint. A third lot of ore, practically like the other two, is on a different bed-joint again. The direction of the deposit (or deposits) is N. 76 E. and S. 76 W., and it hades southwards, at angles ranging from 75° to 88°. Cross-cuts have been made in the tunnel to both contacts, but ore was not found there.

Fig. 14.—Vertical section of vein at mouth of upper tunnel. (Slocan Boy Mine.)

A, argillite, thin bedded and crumpled; Aa, thicker bedded; B, felspar porphyry.
Scale 5 ft. to an inch.

Another deposit of this nature has been worked in a small way at the Great Western mine Fig. 20 shows a part of that deposit in horizontal and vertical section. The ore, as will be seen from those drawings, occurs on the contact between argillite and an intrusive sheet of felspar porphyry. In one place it was found extending across the porphyry, between the two contact deposits, as shown in the horizontal

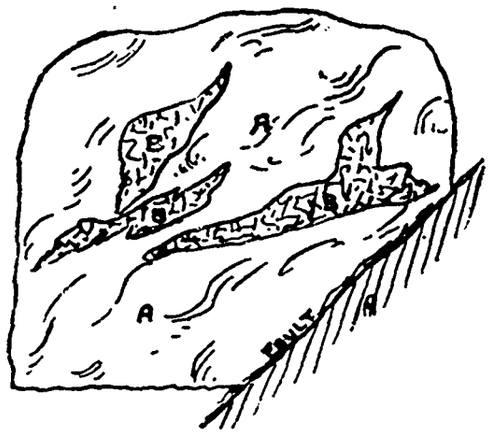
FIG. 15.—Horizontal section. (Alamo Mine.)



A, argillite; B, felspar porphyry.
Scale 10 ft. to an inch.

section, Fig. 20, but in other parts (in either deposit) it does not leave the contact, towards either the porphyry or the argillites, more than 20 m., so far as exposed by the present workings. The direction of the deposit is N. 20 W. and S. 20 E., and it hades eastward at an angle of about 50°.

FIG. 16.—Section in tunnel No. 3, showing occurrence of irregular fragments of eruptive rock in vein. (Alamo Mine.)



A, argillite, crushed and crumpled, and bedding partly obliterated; B, felspar porphyry.
Scale 4 ft. to an inch.

Deposits of this kind may be intersected and shifted by faults exactly like veins, an instance, in support of this statement, being given in Fig. 20.

Inner Nature of the Deposits.—What is commonly known as "vein matter," that is, the non-metallic minerals which make up the whole or a large part of every vein, consists, in great part, of more or less altered country rock with varying proportions of quartz, occasionally some calcite or dolomite, and very rarely felspar. If the country rock be either argillite or granite, or in fact a siliceous rock of any kind, quartz is the predominant xenogenous non-metallic mineral in the vein, calcite appearing then but rarely. On the other hand, if the country rock be calcareous, very little quartz is found among the gangue, but a large

FIG 17.—Irregular fragments of eruptive rock in vein. (Alamo Mine.)

A, argillite; B, argillite, crushed, crumpled, softened, and bedding in great part obliterated; C, felspar porphyry; D, galena
Scale 4 ft. to an inch.

proportion of calcareous matter. The alteration of the country rock included in a vein may be, and often is, of two kinds—mechanical and chemical. The mechanical alteration has mainly resulted from abrasion, the hardened rock having been ground into powder, and, where sufficiently argillaceous, kneaded, with the help of water, into "gutta-percha or soft putty-clay. In some cases the mineralogical constitution of the country rock is such that any amount of grinding and kneading would not produce either of these clays. The abraded material then appears in a less coherent form and more like a fine

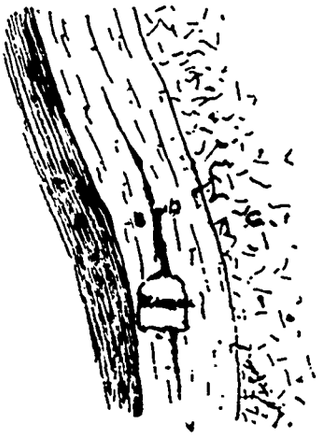
FIG 18.—Vertical section across disturbed part of vein. (Alamo Mine.)

A, argillite, crushed and crumpled, and bedding partly obliterated; B, felspar, porphyry; C, galena and blende.
Scale 8 ft. to an inch.

clayey sand. In either case the pulverized rock usually adjoins one or both walls, if there be two lines of faulting and is known to the miners here as "gouge," elsewhere as selvage or flucan.

The chemical alteration induced in those portions of the country rock which occur within the vein (and often for some distance into the

FIG. 19.—Vertical section. (Carbonate No. 1.)



A, argillite; B, limestone; C, granite; D, galena and limonite.
Scale 20 ft. to an inch.

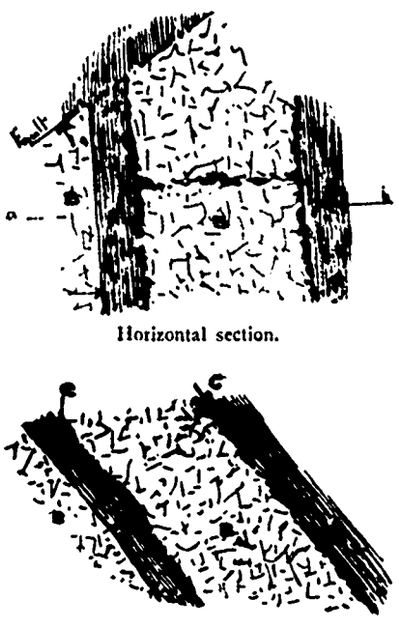
walls) consists in the partial removal of the alkalis and more base constituents. The course of some of these chemical alterations may often be observed, as, for example, in the Comstock Mine on Fennell Creek. There the country rock is a mica-syenite, but, in those portions of it included in the vein, mica is usually absent. Here and there it is possible to find the the faintest trace of the crystals of that mineral, the iron having been removed In such cases if the rock be carefully examined inch by inch towards the unaltered walls, it will be seen that the flakes of mica become gradually more and more distinct, until, in the unaltered rock, they assume their normal appearance.

The quartz which makes up a considerable part of the Slocan veins has often a tendency to occur in bands, more or less parallel to the walls, of varying and irregular widths and frequently interrupted by

the country rock included in the vein. Strings and bunches, along lines of jointing, are also of common occurrence, the ramifying quartz in this way sometimes producing a most complicated network in the rock which forms the greater part of the remaining gangue in the veins.

In addition to the vein matter just described, all veins perhaps contain a larger or smaller proportion of the metallic minerals. Those met with most frequently are galena, blende, and siderate, the first and last being often altered, especially near the surface, into cerussite and limonite respectively. In smaller quantities the following are met with :—(1) Pyrite, (2) tetrahedrite and chalcopyrite, both often altered near the surface into malachite and more rarely into azurite, (3) pyrargyrite and stephanite, (4) metallic silver. The more abundant

Fig. 20. (Great Western Mine.)



Horizontal section.

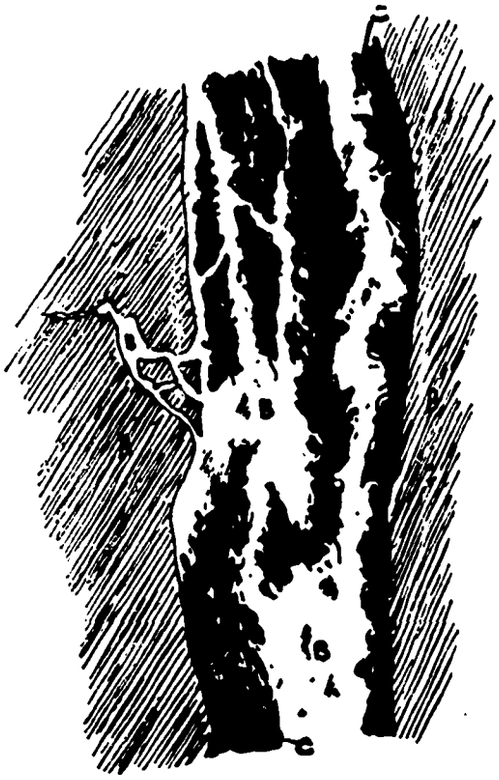
Vertile section on *ab*.

A, argillite; B, felspar porphyry; C, galena, blende, and quartz.
Scale 20 ft. to an inch.

metallic minerals, such as galena, blende, and siderite, usually occur in association with the gangue or vein matter in interrupted and irregular bands more or less parallel to the walls, as shown in Figs. 21, 22, 23, and 24, whilst the rarer minerals—metallic silver excepted—are most commonly scattered in strings, spots, and small bunches through the former. Metallic silver is generally found in thin flakes along the joints of the quartz. The band-like arrangement of the commoner minerals arises in two different ways, either from one or more of them forming a continuous layer, as on the foot wall of the Whitewater Mine, Fig. 24, or like that on the hanging wall of the Alamo vein, Fig 25. Or it may be brought about by their being scattered as spots, strings, and bunches through the gangue in such a way as to form an irregular band like that near the hanging wall in Fig. 24.

The metallic minerals are not distributed in all parts of a vein alike, some portions being entirely barren, whilst others are more or less prolific. The ore-bearing parts may consist merely of a few strings, spots, or blotches of the metallic minerals scattered through the gangue in a disconnected and irregular manner, or the metallic minerals may be concentrated and extensive In the latter case they are usually known as "ore-chutes" or "pay-chutes." The mines of the Slocan are yet too young for much to be said about their pay-chutes. In not a single instance, perhaps, has the full extent of a pay-chute been ascertained either horizontally or vertically. Nor do we know anything yet about the pitch of them. In some cases a projection of the stopes may seem to suggest a pitch, but an acquaintance with the structure of the ground shows that the inclination, of what seems to be the ends of the

Fig. 21.—A horizontal section of vein. (Idaho Mine.)



A, argillite; B, quartz with some argillite; C, galena and a little blend.
Scale 2 in. to a foot.

chute, is due to the existence of cross faults that intersect and shift the vein and are not therefore the natural terminations of the ore-chutes. This is partly explained by the longitudinal projection in Fig. 13. The area of the pay-chutes opened up in two of the more important mines is shown in Figs. 4 and 11. Since these projections were prepared the stopes have been considerably extended. How large the chutes may prove to be eventually, time alone can tell.

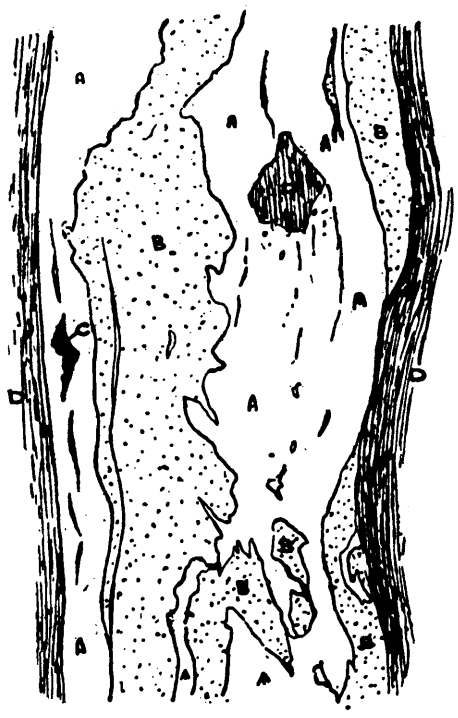
The metallic minerals in the pay-chutes are not often found in any great force throughout the full width of a vein, unless it be narrow. Where wide veins carry ore from wall to wall they usually contain a large proportion of gangue or veinstone In the majority of cases the ore is concentrated, more or less, along one or other or both of the walls. As seen in section, that portion of a vein is commonly spoken of as the "paystreak." It bears no fixed relation, in extent, to the vein as a whole. The vein may be many feet wide, and the paystreak only

Fig. 22.—A vertical section of vein. (Corinth Mine.)

A, argillite; B, galena and limonite; C, calcite and quartz.
Scale 2 ft. to an inch.

a few inches. For example, the Whitewater vein varies in width from 3 to 15 ft., whilst the paysteak on the footwall ranges from 1 to 24 inches only. There is another paystreak near the hanging wall, but, so far as is known, its extent will not exceed, if it equal, that on the foot wall. In the Ruth vein the paystreak has, in one instance at least, occupied five-sixth of the width of the vein when that was 8 ft. across it,

FIG. 23.—Section showing distribution of minerals in vein. (Alamo Mine).

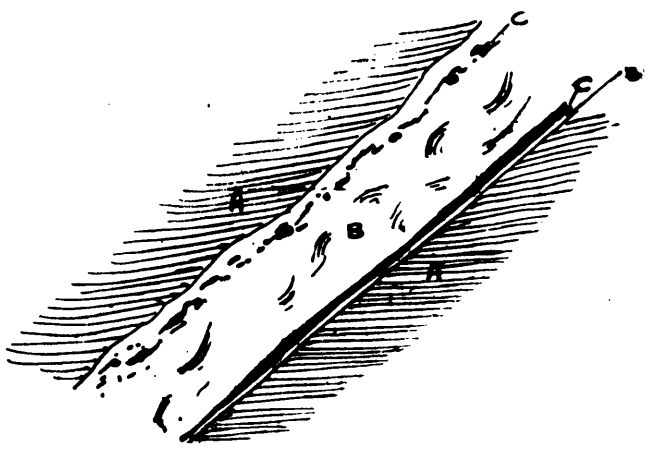


A, quartz (granular); B, blende; C, galena; D, argillite.
Scale half full size.

but that was quite an exceptional occurrence with a vein so wide. In narrow veins the paystreak may extend from wall to wall, as was the case in parts of the Alamo vein. For example, the vein below the horse in Fig. 25 is of this character.

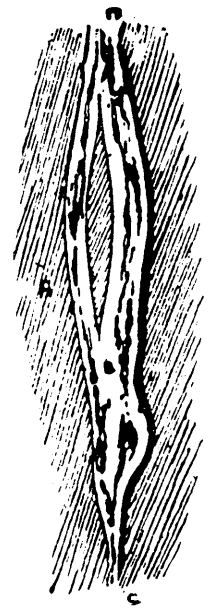
Occasionally the metallic minerals occupy the entire width of a vein to the seclusion of quartz or country rock, except when the latter occurs as "horses." A case of this kind is given in Fig. 26, which is a cross-section of a remarkably well developed part of the Ruth vein. One half of the entire vein—or 4 feet—was argentiferous galena, without a trace of any non-metallic mineral whatever, and a third more was composed of argentiferous galena and siderite combined, in the proportion of one of siderite to two of galena. The remainder (16 in.) of the vein consisted of argillite as a horse, that is to say, it was entirely free of

FIG. 24.—Vertical section of vein. (Whitewater Mine).



A, argillite; B, argillite and quartz, the former crushed, crumpled and softened; C, galena and sphalerite.
Scale 20 feet to an inch.

FIG. 25.—Vertical section showing "horse." (Alamo Mine).

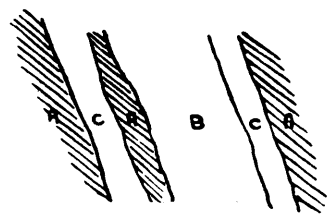


A, argillite; B, argillite (soft), cerusite, and limonite; C, galena.
Scale 8 feet to an Inch.

either metallic minerals or of xenogenous non-metallic minerals. Another section of a vein, composed entirely of metallic minerals and horse, is given in Fig 27, which is a section seen in No. 3 tunnel of the Payne Mine, at about 960 feet in from "day." This curious section contains 10 separate and distinct ribs of ore—composed of about two thirds galena and one-third limonite—having an aggregate width of 50 in., whilst the full width of the vein was 17 feet. Horses often assume the form of an irregular lens—both in vertical and horizontal section—like that shown in Fig. 25.

The average width of the paystreak in one or two important mines may here be given. In the Payne it may be considered as about 8.3 in. over the whole area of the stopes. In the Alamo as 14.3 in. The paystreak on the foot wall of the Whitewater averages about 7 in.

FIG. 26.—Vertical section of vein where unusually large. (Ruth Mine).



A, argillite; B, galena; C, galena with about one-third siderite and limonite.
Scale 8 feet to an inch.

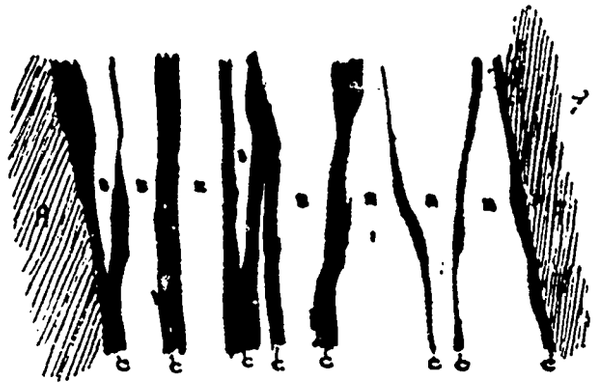
These figures do not, of course, afford a measure of the relative value of these veins over a given area stoped, as that is also influenced by the percentage of metallic minerals they contain To such an extent is this so, that a narrow vein might be much more valuable than one far wider.

When gouge occurs between the ore and its walls they are easily separated in working, but in places, as where there is a fault only on one side of the ore, the latter is separated with difficulty from the wall. The ore is then said to be "frozen" to the wall.

Near the surface the metallic minerals have often undergone considerable alteration, galena being changed into cerussite, siderite into limonite, and copper sulphides into carbonates. Fig. 28 gives a section illustrating some of the effects of these changes. The galena has been partly altered into cerussite, kernels of galena still remaining within the cerussite, as evidence of the change. The lead carbonate is very soft, and absorbs a large amount of moisture. It will be noticed that the vein becomes narrower towards the surface. Is this an accidental oc-

currence, or the effect of a cause operating widely? We know that veins have often a tendency to close together when the walls are unsupported. Whether the soft altered ore which now fills the upper part of this vein can, under all circumstances, give the necessary support is not evident, for the ore may eventually, by slow degrees, be either forced out at the surface or removed by meteoric or other denuding agents. The latter is perhaps, the more probable. In either case the effect would be to produce a narrowing of the vein upwards. It is a matter worthy of consideration whether we have not here a suggestion that will help us to explain a very curious fact, sometimes observed in the Slocan lead veins and in other veins in B.C. and elsewhere. It is not an uncommon observation that a vein which, on the surface shows only iron stains and quartz may, after a few feet of driving, begin to produce galena and other metallic minerals, small at first, but gradually increasing. The Alamo

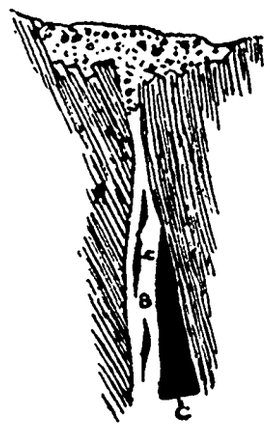
Fig. 27.—Vertical section of vein in No. 3 tunnel, 900 feet from "day." (Payne Mine).



A, argellite; B, argillite, softer than the wall rock A and bed planes mostly obliterated; C, galena with some limonite.
Scale 7 feet to an inch.

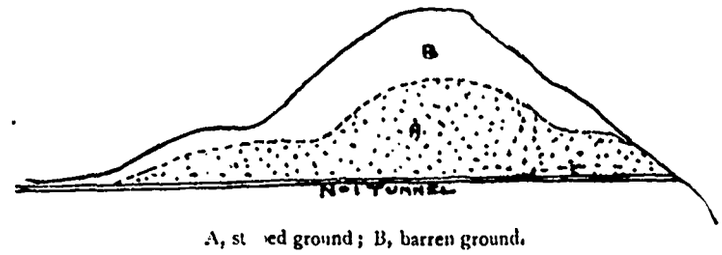
vein will illustrate this point. That vein crosses a "hog's back;" and in stoping above the topmost tunnel the ore was found to nip out entirely some distance short of the surface, and in a line which, although not parallel to the surface, had also the form of a hog's back, as shown in Fig. 29. In view of the facts just recorded, it does not seem improbable that the now barren part of the Alamo vein, adjoining the surface, may have been originally ore-bearing, that the galena was altered and softened as it now is at the Monitor, that the softened ore was removed in the ordinary processes of denudation, and that the walls gradually closed together as the intervening support was removed. This explanation may be applied to other similar occurrences in veins carrying galena, and also to veins carrying other minerals—such as copper ores. It is, therefore, of some interest to the prospector; when rightly understood it may

Fig. 28.—Vertical section of vein at surface. (Monitor Mine).



A, argillite; B, carbonate of lead; C, galena.
Scale 4 feet to an inch.

Fig. 29.—Longitudinal section. (Alamo Mine):



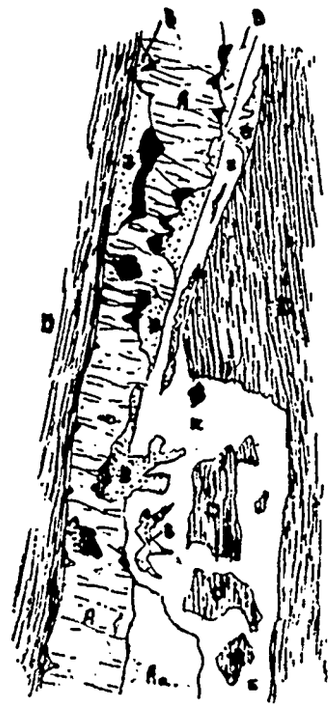
A, st ed ground; B, barren ground.
Scale 200 feet to an inch.

lead to the discovery of ore bodies in places where the surface indications are not very encouraging.

Although, as already stated, there is usually in the veins a more or less banded arrangement of the metallic minerals, yet the duplicate layers and "comb-structure," so freely illustrated in the text books, are very seldom met with. The prominence commonly given in such works to sections illustrating these somewhat rare phenomena, tends to promote an entire misapprehension as to the inner nature of mineral veins, not only in British Columbia but elsewhere. Fig. 30 is a reproduction of the only instance of duplication and comb-structure that the writer has met with in the Slocan, and they are exhibited in only one part of the section—the left side. Blende has been deposited first, irregularly but on each wall, then galena, and lastly quartz, in more or less freely developed crystals.

In some places the metallic minerals follow the lines of jointing in the country rock, branching off from the vein, along both the bed joints

Fig. 30.—A vertical section of contracted part of vein. (Alamo Mine).



A, quartz (combed); A*a*, quartz (granular); B, blende; C, galena; D, argillite. E, bitter spar.
Scale half full size.

and divisional planes, in strings up to an inch or more in thickness. In the Washington Mine it is common to find large strings of galena, without a particle of quartz or other non-metallic mineral in them, running out from the vein into the argillite of the hanging wall. In Figs. 17, 18 and 19 somewhat similar strings of galena are seen to traverse the felspar porphyry. Fig. 31 exhibits a curious occurrence of blende in that rock. At first sight it might be mistaken for a breccia, but closer examination shows that the blende has most probably been deposited in

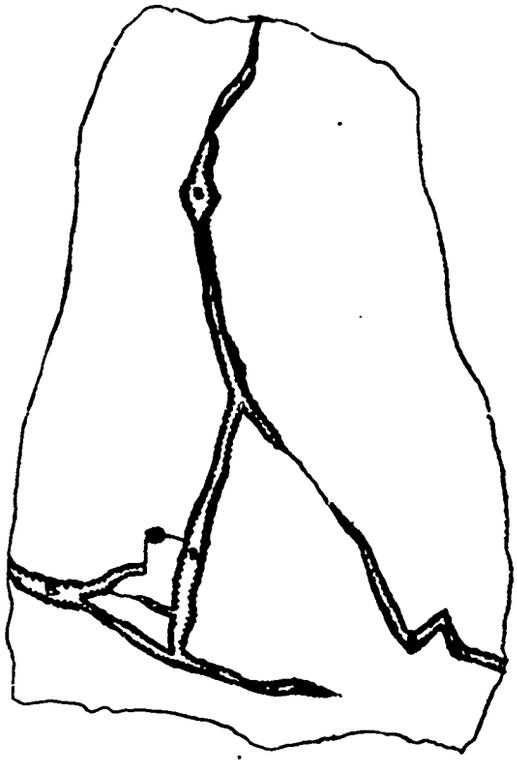
FIG. 31.—Section showing occurrence of blende in felspar porphyry. (Alamo Mine).

A, felspar porphyry; B, blende; C, ferriferous dolomite.
Scale one-fourth full size.

cavaties in the porphyry. Around each nest of blende is a narrow band of dolomite, the inner edge of which is irregularly serrated, as would have been the case if the dolomite had crystallised on the walls of cavities, as in Fig. 32. If we imagine the cavity there shown to be filled with blende, we have a set of facts practically paralleling those presented in Fig. 31.

A fact of exactly the opposite kind to those just mentioned may now be noticed. Most horses are pieces of country rock entirely surrounded by vein-matter, in which the metallic minerals may or may not occupy an important place, but in Fig. 33 a piece of country rock is seen to be entirely surrounded on the plane of the section by cubic galena. This section also presents another instance of duplication. Whether the included argillite was originally attached to the wall-rock cannot be said, as the piece of ore in which it occurred was severed from the vein before the inclusion was noticed Parallel to the plane of the section the argillite as well as the ore had been broken.

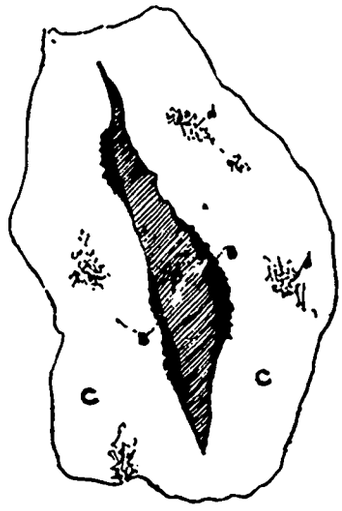
FIG. 32.—Section of partially filled cavity in argillite. (Idaho Mine).



A, argillite; B, cavity lined with bitter spar.
Scale three-fourths of full size.

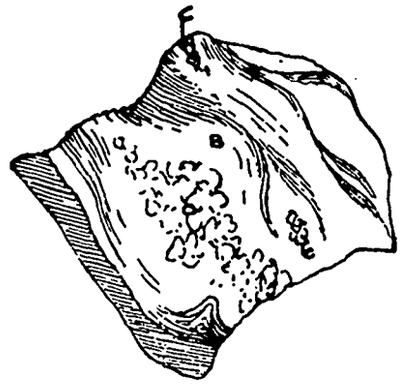
When we come to look closer into the ore, we find some curious facts relating to the order in which the various minerals have been introduced into the vein. Such facts have an important bearing on the genesis of the deposits, but it is not intended to enter at any great length upon that enquiry here. Figs. 34 and 35 show the manner in which granular and laminated galena are sometimes mixed. Fig. 36 shows how galena sometimes traverses blende in a raticulated form. Fig. 37 will explain the way in which tetrahedrite usually occurs in the galena, except that, in this case, the proportion of grey copper is abnormally high.

FIG. 33. (Washington Mine).



A, argillite; B, blende with quartz; C, cubic galena with nests of tedrahedrite *d*.
Scale half full size.

FIG. 34. (Alamo Mine).



A, argillite; B, galena, laminated where shown; C, quartz.
Scale full size.

Siderite is of frequent occurrence in the Slocan veins. Originally it was much more abundant than it is now, a large part of it having been converted into limonite, especially near the surface. Much of this iron oxide is shipped to the smelter under the name of carbonates. Some lead is shipped with it, but it is in the form of galena rather than of cerussite, although in some places this latter ore doubtless occurs in the vein, along with the limonite, and will then, of course, be shipped with it. Figs. 38, 39, and 40 illustrate the association of siderite with a variety of other metallic minerals. From the manner in which the galena in Fig. 38 runs into the siderite, it would appear as if the latter mineral had been deposited before the galena. Again, the occurrence of idiomorphic crystals of siderite in Fig. 39 leave little, if any, doubt in the mind that, in that case at any rate, the iron preceded the zinc. In Fig 40 pyrite has obviously followed siderite, and yet idiomorphic crystals of the former are bounded by siderite. This section also shows

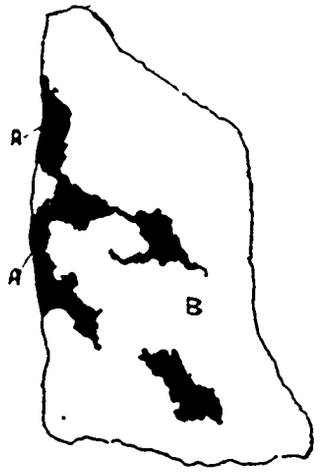
how, in places, tetrahedrite occurs in association with blende. Pseudo morphs of limonite, after siderite, are occasionally met with.

Chalcopyrite appears to have been one of the latest metallic minerals to enter the veins. A curious piece of ore which will illustrate this is shown in section by Fig. 41. This ore occurred in the clayey gouge, on the foot wall of the Whitewater vein. It was severely striated lengthwise, having evidently been subjected to considerable abrasion, a fact which shows that the Whitewater fault at least (if not others) has had a movement since the deposition of the ore. Fine threads of chalcopyrite, it will be seen, extend from the main body of that ore into both the galena, on one side, and the blende on the other. Chalcopyrite may, in some veins, occasionally be seen in the form of strings and threads in tetrahedrite.

FIG. 35. (Enterprise Mine).

A, blende; B, galena, coarsely granular, B', laminated.
Scale full size.

FIG. 36. (Wellington Mine).



A, galena; B, blende.
Scale full size.

FIG. 37. (Ruth Mine).

A, galena, coarsely granular; B, tetrahedrite.
Scale full size.

FIG. 38. (Whitewater Mine.)

A, siderite, altered to limonite at edge *a*; B, galena (granular); C, tetrahedrite.
Scale full size.

FIG. 39. (Wellington Mine.)

A, siderite; B, blende.
Scale full size.

Quality of the Ore.—Most silver-lead ores are so associated with gangue, or with the ores of zinc, copper, and iron, that it is not economically possible to ship them in a state of purity, but in a district like the Slocan, which is far removed from smelters, and where, consequently, high freight rates have to be paid, it is imperative to aim at a higher tenor. In the early days, *i.e.*, in 1892, when the ore had to

FIG. 40.—(Whitewater Mine.)

A, siderite; B, blende; C, pyrite; D, tetrahedrite.
Scale full size.

e "packed" out to the lakes, only the best ore in a mine could stand the cost of shipping, so that then the ore had to be sorted most carefully. This will be illustrated by a few figures relating to the output of the Dardanelle Mine, one of the first shippers. 314 tons of ore shipped from that mine in two years ending December, 1895, gave 23·7 per cent. lead and 260.9 oz. of silver per ton, but the first 10 tons, packed out during the fall of 1892, yielded 55·6 per cent. of lead and 370.2 oz of silver per ton.

In most of the Slocan mines some very high grade ore can be found, if only small samples be taken, but that, it need scarcely be said here, is not the way to judge of the product of a mine The yield of large quantities shipped in the ordinary course of business, is the only reliable guide. The following assay results are averages derived from smelter returns relating to the quantities standing opposite the names of the different mines named in the table :—

Name of Mine.	Shipments. Tons.	Silver. Oz. Per ton.	Lead. Per cent.	Zinc. Per cent.	Silver. Oz.	Lead. Lb.
Payne	11,675	112	56	n.d.*	1 to	10
Whitewater	5,610	113	33	18·8	1 "	5·8
Ruth (galena)	1,010	105	05	n.d.	1 "	12·5
" (carbonates).....	957	48	25	n.d.	1 "	10·4
Idaho	1,531	152 0	46·5	14 5	1 "	6
Alamo	2,782	129	44	16 9	1 "	6·8
Slocan Star.....	10,012	80	67	n.d.	1 "	16·7
Enterprise	1,054	177	22	21	1 "	2·4
Reco	1,690	239	39	n.d.	1 "	3·2
Washington	1,600	95	56	12·7	1 "	11·7
Dardanelles	255	265	26	12 5	1 "	1·9
Monitor†	427	179	38	15	1 "	4·24
Antoine	230	246	46	n.d.	1 "	3·7
Cumberland	263	78.9	58 4	12·8	1 "	14·8

* Not determined. † Also contained gold, 0·35 oz. per ton.

This table shows better than many words the highly argentiferous character of the Slocan ores. It includes probably the highest and the lowest grade yet found. When we compare these results with those obtained from the ores of other important silver lead areas, the greater richness of the Slocan ores is at once evident.

In New South Wales, at the Broken Hill Proprietary, during six months ending the 31st May, 1897, 145,473 tons of ore were smelted, with the following average yield :—

Silver... .... 22·97 oz. per ton.
Lead .... 8·42 per cent.
Or 1 oz. of silver to 7·3 lb. of lead.

From Block 10, in the same locality, the following quantities and yields were produced : —

Tons.	Silver. Oz. per ton.	Lead. Per cent.	Zinc Per cent.	Silver. Oz.	Lead. Lb.
1,023	30·0	30	27·5	1 to	20
2,107	31·8	28·4	20·2	1 "	17·8
28,058	19·87	19·28	28.5	1 "	19·4

In the Coeur d'Alene Mines, Idaho, U.S.A., the average, over six years, was 1 oz. of silver to 34·3 lb. of lead.

In Colorado, the ratio of silver to lead in the carbonate ores was as under :—

Tons.		Silver. Oz.		Lead. Lb.
10,561	from Fryer Hill gave	1	to	6·5
6,315	" Carbonate Hill gave	1	"	8
4,794	" " " "	1	"	32
152,457	" Iron " "	1	"	26

From the sulphide ores of the same area the following ratios have been obtained :—

	Silver. Oz.		Lead. Lb.
Moyer shaft.....	1	to	62 8
Colfeller's Mine	1	"	20·3
Minnie Mine..... .	1	"	35·1

The average grade of the ore shipped from the Sierra Mojada, Mexico, was about 30 per cent. lead and 35 oz. of silver per ton, or 1 oz. of silver to 17 lb of lead.

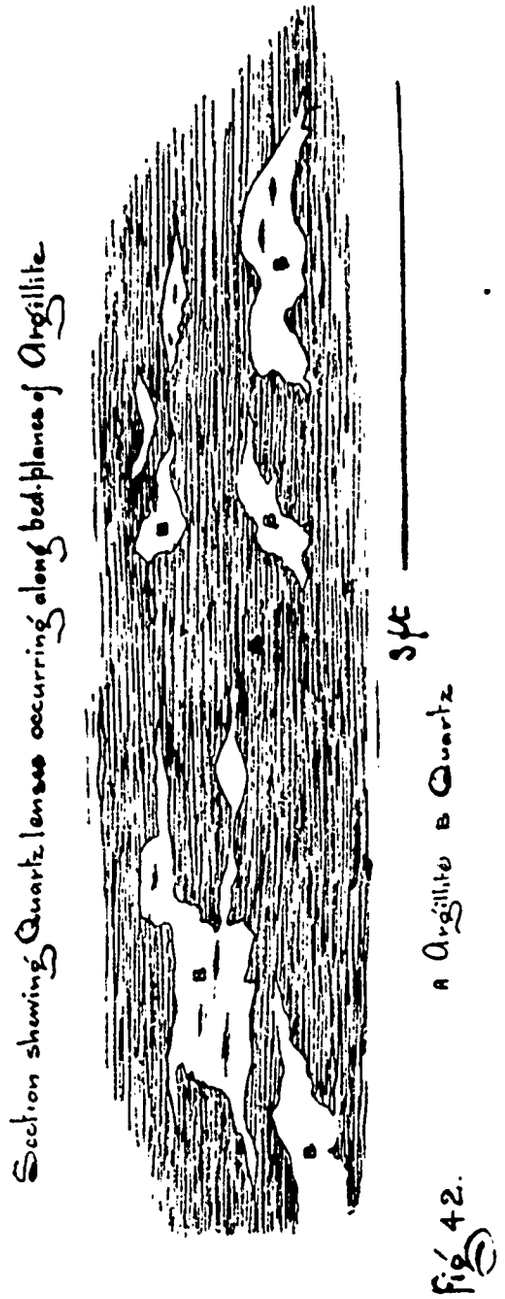
Returning to the Slocan ores, a further insight into their character may be obtained from a study of the variations among their metallic contents, as shown in the following tables, which give the highest and lowest yields of silver, lead, and zinc in carload lots :—

	Silver. Highest. Oz per ton.	Lowest.	Lead with— Highest silver. Per cent.	Lowest silver. Per cent.
Washington	141	75	67	49·1
Monitor.....	367·6	98·7	32	37
Antoine.....	386	151	54	45
Dardanelles	470·2	145·8	55·6	15·5
Payne (carbonate).....	166	61·5	76	32
" (galena)	207	109	75·5	30
Ruth "	124	97·5	67·5	62·5
" (carbonates) . ..	73	43·3	31·8	18
Whitewater	370	56	56·4	27·9
Enterprise	222·6	74	24	20

	Lead. Highest. Per cent.	Lowest. Per cent.	Silver with— Highest lead. Oz. per ton.	Lowest lead.
Washington	71·2	36·3	123·6	60·1
Monitor	54·5	19	304	128·4
Antoine	55	13	281	175
Dardanelles	55·6	15·5	470·2	145·8
Ruth (galena)...	73·3	62·5	105·8	97·5
" (carbonates).....	36·2	16.4	66	45
Whitewater	64·4	11.1	191·0	298·5
Enterprise	30	12·8	187·9	161·6

	Zinc. Highest. Per cent.	Lowest. Per cent.
Washington	17·5	4
Monitor	23	8
Dardanelles	17·5	10·6
Payne (galena).....	13	6·57
Whitewater	24	4·2
Enterprise....	26·2	19

Fig. 41. (Whitewater Mine.) A, galena; B, chalcopyrite; C, blende. Scale full size.



A considerable part of the silver found in these ores is in the galena, which occurs in three principal forms, cubic, wavy and granular (coarse and fine.) From a number of assays of ore from different mines made with the object of learning in which of these forms the silver was most abundant, the following results were obtained.

	Silver. Oz. per ton.	Average of—
Wavy	165·1	11 assays
Cubic	117·4	16 "
Granular (fine)	109·8	7 "

These figures must not be taken for more than they stand. The variation in the quantity of silver in each of these forms was considerable; but the lowest silver in any of the 34 samples was in the fine-grained ore, and the highest in the wavy ore, which is the same relation as that established by the averages.

Part of the silver resides in the blende. The average of the assay results of six random samples of blende gave 17·6 oz. of silver per ton, ranging from 9 to 35. Some of the blende is cadmiferous. A sample from the Enterprise Mine gave 88·5 oz. of silver per ton, the highest found in the non-cadmiferous being 35 oz. of silver per ton of blende. Sometimes tetrahedrite is intimately mixed with blende, as in the lower part of Fig. 40, then the silver yield is high. Three carloads of this ore shipped from the Wellington Mine, gave the following assay results:—

Tons.	Silver. Oz. per ton.	Lead. Per cent.	Zinc. Per cent.
10	281·5	9·5	42·5
17	320 0	14·6	39·1
18	158·2	15·5	37·2

The silver yield of the ore is also affected by the tetrahedrite which is frequently scattered through the galena. It is further increased by the metallic silver and silver sulphides. The tetrahedrite sometimes carries as much as 6,000 oz. of silver per ton of that ore.

When the metallic minerals are much scattered through the gangue their percentage of the total vein contents is low, as will be seen from the following assay results of mill feeds:—

	Silver. Oz. per ton.	Lead. Per cent.	Zinc. Per cent.
Idaho	74·7	5·4	10·45
Slocan Star	16·21	7.6	—

The gangue of some veins carries as much as 18 oz. of silver per ton when there is not a visible trace of any of the base metallic minerals, but analysis generally reveals their presence, in quantities sometimes exceeding 4 per cent.

Age and Origin of the Deposits.—On this part of the subject very little can be said that would be more than mere hypothesis, as the geology of the country has not been sufficiently studied, whilst the genesis of ore deposits is a subject much too vast to be dealt with in a communication of this character. But the tendency of suggestion in some of the more prominent features of this new-born mineral district may not unprofitably be considered for awhile if only in outline.

There is no evidence in the Slocan as to the age of these deposits, and perhaps the most that can yet be said as bearing even remotely on the question is that in other parts of the province galena has been found in rocks of triassic age.

Mineral veins, *i.e.*, true veins, are usually supposed to be filled fissures, but there is no evidence of a fissure as ordinarily understood, in the Slocan veins. The greater part of the vein stones consists of country rock. Here and there we meet with evidence that some of the vein contents have been deposited in cavities, as, for example, in Figs 30 and 31; but such phenomena are rare, and when they occur are invariably on a small scale. Crustification, as Posepny very appropriately called the crystallised lining that forms on the walls of cavities, is an uncommon occurrence.

All the Slocan veins are on the line of one or more faults. As faults they differ in no respect from those which cross the veins. The latter we know are not accompanied by deposits of metallic mineral, nor yet by fissures in which such minerals might some day be deposited. but if veins were preceded by fissures that were formed simultaneously with the faults we now find on one or both sides of veins, why should there not be fissures (ready to receive veins) alongside the cross faults? So far as relates to Slocan veins the idea of filled fissures is not permissible. Fifteen years ago the writer showed that it was equally impossible in another area.* During the interval he has examined hundreds of veins in various parts of the world, but has not seen a case where it was either necessary or helpful to assume a pre-existing cavity of the nature of a gaping fissure

Let us suppose for a moment that all the metallic minerals, all the quartz, and other xenogenous non-metallic minerals occurring in any one of the Slocan veins were removed. Should we have a fissure left? No. We should have a complicated network of cavities traversing the altered country rock in all directions (within the vein space), and varying in width in the different chambers, and sometimes even in the same chamber, from narrow joints—the sides of which are almost touching

* "The Mineral Veins of the Lake District," *Trans. Manchester Geo. Soc.*, 1884.

—to spaces 5 or 6 feet wide, varying also in length and depth in the several chambers from a few inches to 40 or 50 ft. Let us in this connection look at Figs. 21, 22, 25, 27 and 30, and ask ourselves if the cavities that would be produced by a removal of the metallic and xenogenous non-metallic minerals are such as could be produced by dislocation—whether they are not much rather of the nature of what Posepny calls spaces of dissolution.

Microscopic as well as macroscopic study of the order in which the various minerals found in these veins were introduced makes it evident that quartz preceded the metallic minerals, although doubtless in cases of crustification like that shown in Fig. 30 it also followed them. The peculiar forms of the quartz in the vein stones make it also clear that it does not occupy spaces of dislocation. In illustration of this Fig. 42 is introduced. The spaces occupied by the quartz in that figure are obviously more of the nature of spaces of dissolution than of spaces of decission, but they are exactly like many of the quartz forms seen in Slocan veins.

It has been seen that the country rock forming a large part of the vein stone of every vein is, as a rule, very much altered both mechanically and chemically, that the chemical alteration has been effected by the removal of the alkalis and bases. In some places the metamorphism is much more advanced than in others. Let us assume it to be continued until practically all the alkalis and bases are removed; we should then have nothing left but silica, and seeing that such changes usually proceed outward from lines of jointing, and at different rates in different parts, dependent largely upon the varying physical condition of the rock, we should expect the quartz to assume forms resembling spaces of dissolution rather than spaces of decission.

An entire removal of all the minerals except quartz must result in the production of cavities. These may afterwards be filled by other quartz or by metallic or other non-metallic minerals. If vein quartz originated in this way we understand at once why it is absent, or nearly so, from deposits of which the enclosing rocks are calcareous.

As to the manner in which the metallic contents of veins were deposited we shall not stop to inquire here; the evidence seems, however, to warrant the statement that they were introduced at different times and perhaps in this order—siderite, blende, galena, pyrite, tetrahedrite, and chalcopyrite; that in some cases they were deposited in cavities like the galena and blende in Fig. 30, in others they were introduced metasomatically like the chalcopyrite in Fig. 41. In a few cases there appears to have been an alternation in the deposition of the metallic minerals, but they are usually on a small scale and such as are seen in most mineral veins, resulting, it may be, from the solution and reprecipitation of minerals that have already existed in the vein. These processes we know are going on in veins to-day on a small scale.

Working the Deposits.—The facilities for mining in the Slocan are great—a good climate, abundance of timber, the contour of the ground such that the deposit can be reached and worked by tunnels without the necessity for shafts and their accompanying costly machinery, a moderately hard country rock, and abundance of surface water for dressing purposes, in addition to numerous fine veins of high grade mineral, forming a combination of circumstances that could not easily be excelled in any part of the world. The greatest drawback hitherto has been absence of the means of transport, but by the construction of railways and other methods of communication this difficulty is being rapidly overcome. The erection of local smelters to reduce still further the cost of transportation will complete the union of conditions needed for working the deposits in the most economical way.

There has been a proportionately large amount of bad mining in the district, mainly because men have undertaken the work who had not the necessary preliminary training Out West men seem to think they can do anything, mining included, without previous preparation. Railway men (of whom there are a number in charge of mines) seem to persuade themselves that driving a tunnel between two points is somewhat akin to mining, if indeed it is not mining. As a result we see such men pushing through the ground regardless of geological structure, and making tunnels but not mines. For similar reasons we sometimes see costly dressing mills being erected where there is not sufficient ore blocked out to pay for a coffee-mill. Unfortunately, too, these mills are sometimes erected here, as elsewhere, with an entire disregard of the appearance of the mine and for the sole purpose of booming shares.

The usual method of working the Slocan ores is shown in Figs. 4, 11 and 13. It is practically the same as that employed everywhere in like conditions, so that there is no necessity to describe it further here.

Dressing and Marketing the Ore.—When the ore reaches the surface it is concentrated either by hand or by means of machinery. The hand-sorted ore is usually referred to in the smelter returns as "crude ore," that which has been machine-sorted as "concentrates."

The machinery employed in dressing is of the usual kind. There is often considerable loss of silver with the tailings, which is unavoidable, and can only be saved by treatment in other ways. So long as the silver-bearing minerals thrown off from a mill have a value less than the cost of freight and treatment, &c., they are properly rejected. The silver so thrown away may afterwards be recovered by other methods and in a concentrated form that can be shipped at a profit. Close dressing will become more of a necessity with the introduction of local smelting.

The first dressing* mill erected in the Slocan was the Alamo, near Three Forks, which was built in 1894. Since that time several others have gone up, as shown in the following table:—

Mill.	Capacity per 24 hours. Tons.	Erected.
Alamo	100	1894
Slocan Star	130	1895-6
Washington	50	1896
Noble Five	130	1897
Whitewater	100	1898

When dressed, the ores are mainly sent to one or other of the United States smelters. A little ore has been sent to the hall smelter, at Nelson. Recently the Canadian Pacific Railway Company erected a smelter, at Trail, for the purpose of dealing with the Slocan ores, but it has not got fairly to work yet. The heavy freight to U.S. smelters—ranging from $11 to $19 per ton—has hitherto been a serious item of cost. Local smelting will greatly reduce this charge, but it will not obviate the payment of duty unless a market can be found for lead outside the United States. If such a market were found the base bullion could be sent to the States (in bond) for refining until such time as a refinery be built in B.C. The present duty on lead in Slocan ores, entering the United States, is 1 5 cents per lb., and on the lead in base bullion 2·5 cents per lb. The average lead contents of the ore shipped from the Slocan has been about 50 per cent. The duty on ore of this grade, at present rate, is $15 per ton. On a ton of base bullion it is $50 per ton. It takes over two tons of average Slocan ore to make a ton of lead. The duty on that ore is about $31.80, against $50 if the same weight of lead be shipped as base bullion. Take the freight on ore at $17.25 per ton (of ore) and the cost per ton of lead must be $36.57. Let us see now how matters appear from the standpoint of the Canadian Pacific Railway Company, even with the U.S.A. as a market.

Smelting Slocan Ores in the United States.

	Per ton of base bullion.
Freight at $17.25 per ton of ore	36.57
Duty of 1·5 cents per lb. of lead in ore	31.80
	$68.37

* In the report of the Minister of Mines for 1896, it is stated that the Washington was the first concentrator erected, but that is an error.

Smelting Slocan Ores at Trail.

Freight on ore and bullion.....say	18.00
Duty at 2·5 cents per lb. of lead in base bullion ...	50.00
	$68.00

The difference is slightly in favour of smelting at Trail, even if the base bullion be sold in the United States. If it were sold elsewhere and simply refined in the States (in bond) the benefit to B.C. would be very great indeed. But this is only so long as the operation is in the hands of the Canadian Pacific Railway Company. The $18 per ton charged for freight in the second of the above statements is a figure which can of course be regulated by the railway company to suit themselves. If they were hauling base bullion, for others, doubtless they would demand a much higher rate than for hauling ore, but for themselves they need not do so. They will, in smelting at Trail, lose the long haul of the ore, but as much of the total ore-product now goes over other railway systems they would probably not be any losers ultimately, for they would get the carriage of the whole of the bullion which would probably much exceed in quantity the ore now hauled by them. Apart from that they would create a great industry which must benefit their system greatly in other ways. No one else (unless given special railway rates) can deal so satisfactorily with this problem, at present, as the Canadian Pacific Railway Company, and it is to be hoped their endeavours to develop the resources of the country in this way will meet with complete success.

Statistics of Output.

The figures given below are taken from the report of the Minister of Mines. Those relating to the first three years are for the whole province, and are, therefore, in excess of the Slocan output by about 60, 45, and 20 per cent. respectively. The figures for the last three years are for the Slocan Mining Division only, excluding that part of the Ainsworth Mining Division which has been included in other parts of this communication.

	Ore. Tons.	Gold. Tons.	Silver. Oz.	Lead. Lb.
1892.....	..	..	77,160	1,768,420
1893.....	..	..	227,000	2,135,023
1894.....	..	..	746,379	5,662,523
1895.....	9,649	6	1,137,040	9,751,464
1896.....	16,560	152	1,954,258	18,175,074
1897.....	33,567	193	3,641,287	30,707,705

The rapid increase of output which has taken place, and which will doubtless be continued with the growing facilities for operating, must, ere long, place the Slocan in a leading position among silver-lead producers. When to that be added the output from other parts of the Kootenay which will, almost certainly, increase at a similar rate, there is presented a very bright prospect for the silver-lead industry of British Columbia.

Dominion Coal Co., Limited.

DIRECTORS' REPORT OF CANADA'S GREATEST MINING ENTERPRISE.

The following is excerpted from the report submitted to the shareholders on 1st instant :—

"The increasing business of the company made it advisable to build an additional pier at Sydney, which has been done and charged to surplus for the year.

"It was also deemed advisable to provide increased facilities for banking coal during the winter, which has also been done.

"With the exception of some additional equipment for the railway, ordered but not yet delivered, all the expenditures necessary for mining and shipping the largely increased output have been made and paid for out of the surplus earnings within the last two years, without any increase in the capital account.

"Since the close of the fiscal year, Feb. 28, 1899, $58,500 of the bonds of the company have been retired through the sinking fund, leaving the bonded indebtedness $2,876,500.

"In addition to the increase in business expected from shipment to the United States during the coming year, the Canadian business promises to be much larger than ever before.

"Submitted on behalf of the directors.

"HENRY M. WHITNEY,
"President.

"Boston, June 1, 1899."

REPORT OF THE TREASURER OF THE DOMINION COAL COMPANY, LIMITED,
For the year ending February 28, 1899.

Net Proceeds Sales of Coal and Net Income from Steamships, Railroads, Barges, Real Estate, etc.			$679,304 78
Less—			
Renewals and Extension of Mines for Year			52,526 47
			$626,778 31
Less—			
Interests on Bonds		$176,100 00	
Sinking Fund, 1898		57,210 35	
			233,310 35
			$393,467 96
Less—			
Miscellaneous Interest		$20,208 02	
Dividend Preferred Stock Paid and Accrued		160,000 00	
			180,208 02
Balance			$213,259 94
Disposed of as follows :—			
Charges Off :—			
New Pier at Sydney	$46,921 66		
Railway Extension	16,532 06		
" New Equipment	9,805 15		
New Banking Trestle for Winter Work	31,955 53		
New Briquette Plant	5,328 38		
New Discharging Plant at Point Levis	6,821 98		
New Houses and Moving and Rebuilding Houses	9,959 92		
Sundry other additions to Property at Mines	5,348 88		
Coke Experiments	6,914 24		
Balance Stock in Sydney Hotel Co.	5,000 00		
		$144,587 80	
Balance to General Surplus		$68,672 14	$213,259 94

BALANCES FEBRUARY 28, 1899.

Assets :—		
Property Accounts		$20,108 39
Cash Assets —		
Cash in Banks and Offices	$44,518 21	
Accounts Receivable	112,752 07	
Balances due from Agents and Coal on hand	333,772 00	
New Supplies in Warehouse and Stores	127,373 36	
Insurance Suspense	32,574 07	
Interest Suspense	1,614 38	
Cash in N. E. Trust Co. for Outstanding Coupons	89,595 00	
Cash in N. E. Trust Co. for Sinking Fund	132,458 62	
Cash in Am. Loan and Trust Co.—Uncalled for dividends	1,848 00	
		$876,505 71
Total		$20,984,614 10
Liabilities :—		
Capital Stock, Common	$15,000,000 00	
" " Preferred	2,000,000 00	
First Mortgage Bonds	2,935,000 00	
Dividend Preferred Stock January and February 1899	26,666 67	
Sinking Fund, 1898	57,210 35	
Unpaid Coupons	89,595 00	
" Dividends	1,848 00	
" Royalty to Feb. 28, 1899	36,820 23	
Bills Payable	148,771 79	
Accounts Payable	320,000 00	
Balance General Surplus	368,702 06	
		$20,984,614 10

GENERAL SURPLUS ACCOUNT.

Surplus brought forward	$175,029 92
" from 1898	68,672 14
Railway Suspense Account	125,000 00
Total	$368,702 06

SINKING FUND, APRIL 1, 1899.

$111,800 U.S. Reg. 4s at cost	$124,817 62
Uninvested Funds	8,925 97
From 1898 business	57,210 35
	$190,953 94
Brought forward	$125,000 00
For Retirement of $58,500 Bonds	$ 65,953 94
Balance carried forward	125,000 00
	$190,953 94

J. S. MCLENNAN, Treasurer.

Boston, June 1, 1899.

General Mining Association, Limited.

DIRECTORS REPORT ANOTHER SUCCESSFUL YEAR AT OLD SYDNEY MINES.

The directors present to the proprietors their Annual Report, together with the Accounts for the year ending 31st December, 1898.

The sales of coal were as follows :—

	1898 Tons.	1897 Tons.	Increase. Tons.
Sydney Mines.....	252,327	241,327	11,000

The profit on the year's trading, as set forth in the accounts, amount to	£16,716	14	11
Brought forward from 1897	3,108	2	7
	£19,824	17	6
Amount transferred to New Sinking Account.....	2,500	0	0
	£17,324	17	6
Out of which the directors propose a dividend at the rate of 10%, free of Income Tax, viz.....	15,107	19	0
Leaving balance to carry forward	£2,216	18	6

The shipping season which opened at the beginning of May continued without interruptions from ice until the end of the year, and a good demand was experienced for coal in most markets, with the result that the quantity disposed of shows a satisfactory increase over the total for the year previous.

The profit for the year was, however, not quite so satisfactory as might have been expected in view of the increased sales, which in some cases had to be made at a slight reduction on last year's prices. Work in connection with the new sinking continued uninterrupted by any serious difficulty to the end of 1898, the upper seam of coal having, as mentioned in the last half-yearly report, been reached in July. Latest advices from the mines report that the lower seam has also been reached, viz., on 10th March. It is impossible as yet accurately to determine the value of this seam, as further exploration will be necessary before this can be arrived at, and, of course, much will depend on the uniform thickness of the coal.

So long as the present works are in progress, the directors recommend that a substantial sum should be carried forward as a contribution towards outlay.

The Manager's report annexed gives the usual details of the colliery's works during the past year.

For the Board of Directors,

J. D. HILL, Chairman.

REPORT FROM THE MANAGER.

The average number of colliers employed during the season was 323 men; the pit worked 287½ full days drawing coal; and the total quantity of 267,773 gross tons of coal was raised. The best month's output made during the season was in August, when 26,320 tons of coal were brought to bank.

Of the above-mentioned output, 50,500 tons were banked out during the winter and early spring, and refilled and shipped during the succeeding months of open navigation.

Some 7,000 tons of coal were shipped in the month of January; a small quantity was shipped in both February and March and some 5000 tons in April. Regular shipping work for the season commenced on 1st of May.

The largest months' shipment of coal was made in August, when 30,535 tons were put on board vessels. The total shipments for the year were 231,603 tons, and the local coal sales of all kinds were 20,724 tons of screened large, run of mine and slack coal.

The length of our main haulage engine planes has been advanced during the year; that on the north side is now 2,563 yards from the pit bottom to the landing in No. 3 district, and the south side engine plane has reached the distance of 2,084 yards to the landing in No. 4 district. For the secondary haulage, another air winch, having two 7-inch cylinders by 10 inches stroke, has been added to those already in use. Compressed air pipes have been put in to supply air to operate the winches on the south side. New stables for one half our number of horses have been erected in the south side workings, as they were put into the north side the previous year; and water pipes have been put in from pit bottom to these stables. These water pipes on both sides of the workings, traverse our main haulage roads, and, besides supplying the horses with water, they give us the means of wetting our haulage planes whenever necessary. At every 200 feet distance on these pipes we have tap-cocks, to which we can attach flexible hose of 100 feet length when desired. The water in these pipes comes from our reservoir on the surface, giving a pressure due to a head of 600 feet, if called for. Our arrangements thus made for watering the main haulage roads, probably would not suffer by comparison with those of many of the most advanced collieries in England. There are at present in our workings 6,137 yards length of iron pipes for compressed air, and 4,537 yards for water, of which quantity some 3,194 yards were put in this last year.

On the surface we have replaced one or more of our old cylindrical egg-ended boilers by a Lancashire boiler, so that we now have a battery of five Lancashire boilers in use.

A new engine to work our north side main haulage has been erected on the surface, but it is not yet at active work, for the reason that the clutch gear with which it was mounted was found inadeqnate for the very heavy work which the engine now has to perform; consequently an improved form of friction gear had to be ordered, and it was not delivered by the close of the year.

Ten new coal cars, of 6 tons capacity each, were ordered from Rhodes & Curry, of Amherst, and were added to our stock in July.

Three of our locomotives were provided with a number of new tubes, and a set of new tyres was procured for the locomotive "John Bridge."

Part of the railway was relaid with 4,300 yards of steel rails of 65 lbs. to the yard, and a large number of sleepers, or crossties, was replaced by new ones.

Eight new cottages of the commodious design adopted of late years and three smaller cottages, were built for the accommodation of our workmen; and many of their older dwellings were repaired, while some that were in bad condition were partially rebuilt.

The summer of 1898 was unusually dry, much inconvenience was suffered by our workpeople and others from the want of water, and at one time the supply in the reservoir, upon which our boilers depend for their feed, was alarmingly low. The services of a boring machine were procured, and some expense was incurred in boring several holes along the line of our railway. Several feeders of good water were found. A portable engine and pump were provided and set to work at the nearest borehole, and our supply of feed water was thus made safe until rains set in and replenished our reservoir.

The new shaft, known as the Jubilee Pit, which was commenced in 1897 to test the No. 3 seam of coal, reached that seam on July 21st, 1898, at a depth of 468 feet from the surface. The seam of coal was there found to be 4 feet 4 inches in thickness.

It was then determined to push on the sinking to find and test our No. 4 seam, which it is expected to reach at about 191 feet below our No. 3 seam. After completing the tubbing of the shaft to shut back the water that was finding its way in, the sinking was resumed on the 11th of November, and by December 31st the total depth of 563 feet 9 inches from the surface had been reached.

A number of new pit tubs or boxes were built during the year; coal cars, stationary engines, and the older boilers were repaired, and the various other plant and appliances of the colliery generally have been kept in efficient condition and working order.

(Signed) R. H. BROWN.

Bell's Asbestos Company.

THE POSITION OF THE COMPANY EXPLAINED.

The eleventh ordinary general meeting of the shareholders of Bell's Asbestos Company, Limited, was held last month in London.

The Chairman said: The directors regret the delay which has taken place in presenting these accounts to you, but however desirous we may be that you should have them in good time, such delays become more and more unavoidable as the business of the company expands at the various agencies established in distant parts of the empire. It is evident we can no longer expect to issue our report and balance-sheet with the same promptitude as we were able to do when our trade was confined almost entirely to this country. Upon the whole we have had an uneventful year. The strike of several months duration in the South Wales coalfields interfered somewhat considerably with our sales, not only to colliery proprietors and to the many works dependent upon the supplies of coal for motive power and manufacturing purposes, but also to steamship owners, whose ships were laid up in consequence. Nevertheless, our position has been well sustained and our trade developed whenever and wherever an opportunity presented itself. At our head establishment in Southwark Street the turnover has been fully maintained; but the ever increasing competition for orders, more especially by German manufacturers, has prevented our obtaining the favourable results which might reasonably be expected from the large volume of business that we have done. You will remember my saying at our last meeting that for any manufacturing company to "stand still" was "to go backward"; that if we were to continue our dividends the company must persevere in that "go ahead" policy which we have had in view, and that your directors considered the time was approaching when additional premises would be necessary for our business. I am pleased to be able to announce that excellent riverside premises have been secured at East Greenwich, which will enable us to bring crude asbestos and other raw materials imported from Canada and elsewhere to alongside our own wharf, where the lighters can be readily and rapidly discharged by steam cranes into our own warehouse. The buildings already erected are ample for storage purposes, and there is in addition sufficient building accommodation for the manufacture of our lubricants and cement. The greater portion of the additional rent which we shall have to pay will be covered by the saving effected in carriage and dock dues on the raw material, and the space accommodation available will be eight to 10 times that which we have given up. Moreover, considerable benefit will result, from the relief which will be afforded to our overcrowded premises in Southwark Street, and our ability in consequence to increase the output of materials for which there is a ready and increasing demand. Our colonial and other agencies continue to make satisfactory progress, and the demand for our manufactures for export has considerably increased in volume. Naturally it takes time to establish a business, whether in the colonies or anywhere else, but I think I am safe in saying that, taken as a whole, the result is fully up to what we could reasonably expect. The managing director paid an early visit to our mines this year, and reported to the board that everything appeared satisfactory. A considerable amount of new ground has been opened up, which will give more surface to work upon and enable the manager gradually to employ more quarrymen and so increase the output as desired. It will, I feel sure, be a satisfaction to you to learn that the demand for crude asbestos from your mines exceeds the supply, and that the prices we are able to obtain are more remunerative than they have been for some time past. Your directors, in order to take every advantage of the present improved condition of trade, have made additions to the mill buildings and to the machinery, and such additions have been carried out in an efficient and satisfactory manner in spite of the drawbacks incidental to a Canadian winter, and to a very serious outbreak of diphtheria, which I am sorry to say attacked not only many of the miners but the manager also. It is satisfactory to know that this epidemic is declining, but the short supply of labour will be felt for some time to come.

You are aware that judgment was given against us in our action against the Johns Manufacturing Company of New York for breach of contract, and that we decided to appeal against the verdict. The usual notices were given, and some day soon certain points of law in connection with this case will be argued, and a decision given a few weeks later. If our advice is correct, we have reason to expect the decision will be in our favour. Of course, we have had to pay the costs up to and including the last trial, and they have been provided for out of the revenue of the year. As regards the balance-sheet, the figures are so very clear and explicit that I need say very little about them. It will be noticed that a further sum of £10,000 has been borrowed at a low rate of interest, on the security of the Southwark Street property, in order to provide money for the purchase of the leasehold premises down the river, and for the necessary alterations and additions thereto, and also for the additional plant at the mines. It will further be noticed that 5 per cent. has been written off the machinery and buildings account for depreciation, and that the sum of £500 has, in addition, been carried to the machinery reserve account. The result of the year's operations is a net profit of £5,033 18s. 2d., to which has to be added £2,339 12s. 5d. brought forward from the previous year, leaving for appropriation £7,373 11s. 7d. I need not say that I shall be pleased to answer any questions in reference to these accounts, and now beg to move: That the report of the directors and of the auditors, with the financial statement submitted to this meeting, be, and the same are hereby approved, adopted, and confirmed."

Mr. T. B. Lightfoot seconded the resolution.

Mr. Thompson said he was only a small shareholder in the company, but the balance-sheet seemed to be unsatisfactory from the shareholders' point of view. No trading account was given ; therefore the shareholders were not competent to form a judgment as to what the amount of the output had been and what the expenses had amounted to. They did know, however, that £10,600 of gross profit had apparently been earned, and of that amount over £5,000 had been carried to the balance-sheet. This was an exceedingly small amount to be derived from the large amount of capital involved. He would also draw attention to the fact that the remuneration of directors and managing director represented about one-third of the net profit which was carried to the account. He would move that a small committee of large shareholders should be appointed to consult with the directors.

Mr. Lewis seconded the amendment, and asked the auditors what the reserve fund was invested in.

Mr. H. R. White considered the statement was one upon which the board could not be congratulated. The reserve fund, he took it, was not a liquid one, but was merely employed in the ordinary business.

The Chairman, in replying, thought that the remarks which had been made were caused through disappointment at their not being able to distribute more than 4 per cent. He would, however, ask them if competing companies were doing any better. It was not conducive to the interests of the company that they should particularise the accounts too much, though private information could be obtained by any shareholder. The reserve fund existed as working capital in the business.

Mr. H. A. Bell (managing director) said that in 1888, the first year of the company, they had in assets a total amount of £89,950, which they took over from the original vendors ; to-day the same items represented a total of £165,300. In 1888 the liabilities were £94,000, against £103,000 now. The result was that the increase in the assets was £75,350, and in the liabilities £9,000, the balance in the increase of the assets being £66,350, while the reserve fund was £65,000. The company had solid assets in the shape of cash, debtors, stock, freehold property, and a magnificent factory. This had not been taken out of the pockets of the shareholders. A certain amount was taken out of reserve, and the balance of £40,000 was the premium on shares when the company was in a flourishing condition.

Mr. Cooper (auditor) said there were two kinds of reserve funds—a reserve fund which was set aside, and one which was employed in the business. The reserve of this company had been employed in the business from the formation. The goodwill was the price paid for the business, and if the shareholders liked to write off that item it was open to them to do so, though not for the auditor to insist on it being done. As to the value of the Asbestos estates, it was exceptional to write down the value of a mine which the directors believed was worth as much as when the company started.

Mr. Bell said if the shareholders wished it he could obtain a buyer for the properties within twenty-four hours. He believed they had a good property in this company, and that the mining property was a magnificent one.

The amendment was then withdrawn, and the original resolution unanimously agreed to.

On the motion of the chairman, seconded by Mr. Burnett, a dividend at the rate of 4 per cent., free of income-tax, was agreed to.

The retiring director (Mr. T. B. Lightfoot) was re-elected, as were the auditors (Messrs. Cooper Brothers and Co.)

A vote of thanks to the chairman closed the proceedings.

Hastings (B.C.) Exploration.

PROMISING DENELOPMENTS IN THE ARLINGTON MINE—A TRUE FISSURE VEIN REPORTED.

The second ordinary general meeting of the shareholders of the Hastings (British Columbia) Exploration Syndicate, Limited, was held this month in London.

The Chairman said : The balance-sheet speaks for itself fairly well, and from it you will see that we have expended something like £6,000 in developments, and that, I may say, has been almost entirely devoted to one purpose, namely, the development of the Arlington Claim. The syndicate, as you are aware, has acquired a great many other properties, but we have concentrated the whole of our attention on the Arlington as the one most deserving of it, and I am glad to say that in this we have not been disappointed The Arlington promises to-day to fulfil every expectation, and, indeed, we hope we shall find this really a mine, and not merely a hole in the ground, or, as one gentleman reported it to be, at an earlier stage, a mere saddle-bag deposit. A saddle bag, as you will easily understand, is not a deposit that goes very far into the ground. However, we are down something like 400 ft., and testing the vein by drifting to the north and south of it. So far, we have hardly got such full particulars from our mining engineer on the spot as we should wish. He was to have sent us a cablegram to-day giving us the latest information, but we have only his report received ten days ago, when he told us he was beginning to cross-cut north and south about 30 ft. from the incline shaft, through which all our explorations have been done so far. We are most anxious to ascertain what the results of the drifting north and south may be, and also particularly as regards the cross-cutting, for we have been working, as I glean from his reports, in a shaft which takes up 5 ft. of the vein, and in that so far we have been working on the footwall, and have a body of ore which, we hope, will extend a good many more feet in width ; but it certainly extends to 5 ft. Until we receive a report from our mining engineer as to the results of the cross-cutting, it is quite impossible for us to make any prophecy as to what we have before us. The assays have been exceedingly favourable. The latest assay he took—a carefully selected general assay—amounted to something like $28 per ton across the entire width of the vein as fas as it had been opened. That tallies with the results of our ore that we sent to the smelter. We sent three carloads of ore to the smelter with the result that we netted about £3 10s. a ton profit, and as you will know if you have a property which contains ore which can be sent to the smelter in bulk and return a profit of £3 10s. a ton, you have something very handsome indeed, if you can only prove your vein to be anything like a true fissure vein. (Hear, hear.) The formation appears to be of a settled nature, and we are in great hopes that the further developments which are now taking place will prove the vein not only to be permanent, but of considerable width. As I said, we are most anxious to confirm all the reports we have heard of it, and so, with that object, Mr. Astley and myself propose to proceed to the Arlington Mine next Saturday, and by the time we arrive there the manager will have reached the point which I think will test what we have. Our late managing director, Mr. Dewdney, who resides in British Columbia, has just come over here in the "Campania." He paid a visit to the mine shortly before he left, and he has kindly volunteered to tell us what he thinks of it. I am sure you will be interested to hear him, as he will be able to speak with more accuracy and possibly better information than I can myself from the reports of our manager. I will now formally move the adoption of the report and accounts. (Applause.)

Lord Hastings seconded the motion, which was at once agreed to.

The Chairman next proposed the re-election of Mr. B. F. Astley to his seat on the board. He remarked that Mr. Dewdney also retired, but found himself so busily engaged in British Columbia with other affairs that he was unable to devote his attention to the affairs of this company any longer. He (the chairman) was very sorry such was the case, because Mr. Dewdney had been with them from the initiation of the company, and had rendered them very valuable services—especially in the acquisition of the Arlington Mine.

The motion was seconded by Sir Edward Birkbeck, and carried unanimously.

The Hon. Edgar Dewdney said it gave him great pleasure to be able to attend this meeting, especially as he thought all the shareholders might be congratulated upon having secured what he considered a first-class property out of the few the company had taken up during the short time it had been operating. The Arlington Mine, which was the one in which they were specially interested, he visited a few weeks ago ; he had business in that portion of the country, and Mr. Bucke, their engineer, was anxious that he should see it, although at that time he did not anticipate that he would be over here. The mine itself—and he spoke from some knowledge of mines, especially in British Columbia—he considered to be of a number one character. If this meeting had taken place a few months ago, he, probably, would not have spoken in such a sanguine manner, as he might possibly do that day, as they had not secured at that time some adjoining properties which it was imperative in the interests of the company that they should have. He had been glad to hear since he arrived in this country that Mr. Bucke had secured one of the adjoining properties, namely, the Directorate, which was on the right, although he had been in hopes that they would also have secured the Original, which was on the left. At any rate, the Arlington, with the Directorate and the Arlington Fraction, which they had been fortunate to secure, and the value of which he thought there was no question about, gave the company a most valuable property. There was enough work done on the Arlington to-day to show that they had a well-defined and most regular lode. Until they came to what engineers call the roll in the vein, which they were liable to meet with at any time, it was most regular, the footwall and hanging-wall being almost as perfect as a sheet of paper, showing that they had a true fissure vein. Whether it was one of an intrusive nature, which had been suggested by a few, he was not prepared to say, but that they had a true fissure vein there was no question about, and the ore already in sight in the incline shaft made it beyoud question that they had a very large body of ore in their ground. If that had been the property of any other parties they would have heard of it, not only from one end of British Columbia to the other, but in the City of London, he was sure ; but the object for keeping the workings quiet had been to enable them to secure adjoining property if possible at reasonable figures. The owners of the Canadian King, a property which lay immediately to the north, having sold the Arlington to this company, had now put plant on their ground for extensive working. They sold the Arlington because they had ore on the Canadian King, which was, apparently more valuable ; it carried free gold, and gave them a greater idea of value than the Arlington. They were poor men ; but since this company had developed its mine, and shown they had a large body of ore, they had managed to raise sufficient money for working, and, to show the value they put on their mine, he might mention that they were offered 4 cents a share for 700,000 shares, and refused it. That showed they attached a great deal of importance to it—more so than he did, because he thought their values were ahead of this company's, and they had a comparatively small piece of ground which he thought would carry the ore, whereas this company, with the Arlington, the Directorate, and the Fraction, had quite a large area. He hoped Mr. Bucke would succeed in securing for them the Original ; if so, they would have all the territory they wanted, and, he considered, as valuable a property as any in British Columbia. The operations were very disappointing until they reached the 230 ft. level, where they commenced to get a good body of ore, which increased in width as they went down. At the bottom of the shaft there was a little disturbance, to which he did not attach much importance, nor did the engineers, and they had 12 ft. of ore when he was there, that being the only stopping that had been done in the mine. If the company thought it advisable they could at once ship ore ; by putting in a turntable or two, and having three or four cars at work instead of one, they could take out a very large body of ore daily, sufficient to give them handsome returns ; but it was a question whether that course should be adopted, or whether it would not be more advantageous to concentrate it. That ore, if tested to-day, would return at least $100 to the ton. But, of course, it was not all like that. The question was as to whether it was advisable to put up machinery for treating it. Mr. Robertson, the Government Metallurgist of British Columbia, had advised him that it would be well to do so, and if it were wished he (the speaker) would be willing to send a few hundred pounds of it to the McGill Institution at Montreal, where they had the most clever professors to be found on the continent of America, at any rate, and the best appliances for testing, and advising how ore should be treated. They would treat it free of expense, and he would strongly advise the board to adopt that course before making up their minds to erect a concentrator. He had it in his mind whether it would not be to their advantage to ship the ore just as it was. The silica in the ore was of great value, especially to the Le Roi smelter ; they used that ore in the second treatment of their own ore, and he thought arrangements could be made with them to have it treated at a very much cheaper rate than they had done hitherto. For the few tons that had been sent them they had been charged $8.50 for freight and treatment ; but no doubt if they sent it to the smelters they would get it done for about $6, which would be a great saving in itself. In conclusion, he again congratulated the company on having what he considered a first-class property, and he was quite certain that when Mr. Head and Mr. Astley visited it, they would be strongly of the same opinion. (Applause.)

In reply to Mr. A. E. O'Brien, Mr. Dewdney said they had a wagon road built from the mine to the railroad, a distance of 3½ miles, and there was then a three hours run to the smelter.

The Chairman said he was sure that shareholders were very much obliged to Mr. Dewdney for his graphic description of their property. The least they could do would be to pass that gentleman a hearty vote of thanks, and that he begged to propose.

The motion was seconded by Mr. Coombe, and carried unanimously.

An extraordinary general meeting was then held for the purpose of making alterations in the regulations of the company.

The Chairman said when this syndicate was formed there was no idea of the extent to which it would develop, and it was thought that they would be able to work under Table A, with certain modifications. But they had found Table A very inconvenient, and he thought shareholders would agree with him that a company that had attained such importance as their own should have a set of articles of association. Mr. Gibson had therefore prepared a set of articles, and he (the chairman) now begged to propose their adoption by the meeting.

The motion was duly seconded and passed, and the proceedings then closed with a vote of thanks to the chairman.

Cape Breton Smelting Works.

OUTLINE OF THE OPERATIONS OF THE DOMINION IRON AND STEEL CO. IN NEWFOUNDLAND.

ST. JOHN'S, NEWFOUNDLAND, May 23.

An undertaking of considerable magnitude, and of special importance to the English iron trade, is comprehended in the new venture of the famous Whitney Syndicate, the American industrial corporation which has lately been extending its ramification through the eastern provinces of Canada. Already, under the title of the Dominion Coal Company, it has secured control of the coal mines of Cape Breton, with an annual output of 1,250,000 tons of soft coal, and it is now undertaking the establishment of an immense smelting works there, the iron for which will be procured in Newfoundland. Some idea of the scope of the proposed enterprise will be gleaned from the fact that the syndicate intends to mine at least 1,000,000 tons of iron ore every year, whereas at the present moment the total quantity of iron smelted in Canada is only 77,000 tons annually. The Dominion Government grants a bounty of $2.50 a ton on all iron smelted in Canada, and this stimulus the Whitney people desire guaranteed for a period of years, when they will at once begin operations and fight for a footing in the British markets.

As a preliminary they have obtained an option on the hematite deposit on Bell Island, near St. John's, to continue until October, and for the sum of $1,000,000. The islet is about six miles long and three broad, and is a veritable mass of the ore, which forms in many respects the most remarkable mineral deposit in the world. It is an immense quarry, so to speak, and is reached by simply stripping off the surface coating of earth. The ore lies in a horizontal stratum about 5 ft. thick, covering an area three miles long by a quarter-mile wide. Above it lies a bed of rock about 2 ft. thick, and below it is a similar bed of rock, succeeded in turn by a second stratum of ore, and probably rock and iron in alternate layers to an unknown depth, though the prospectors have not themselves felt called on to go below the second hematite bed, as the two together show about 40,000,000 tons of ore in sight, with the liklihood of the deposit being inexhaustible. To mine the ore the upper crust of rock is first removed piecemeal, giving access to the hematite, which is displaced by dynamite charges, the shock breaking the mass into small cubes, measuring a few inches either way, which are so easily handled that they can be shovelled into barrows, like small stones, and conveyed to the shipping pier, where steamers are loaded with the stuff for the markets where it is taken to be refined.

The property has been held under lease for some years by the Nova Scotia Steel Company, whose operations have been conducted on a fairly large scale, they mining about 100,000 tons yearly and having spent some $200,000 in erecting a loading pier, constructing a tramway to the mine therefrom, and providing the equipment essential to the efficient working of the property. They have secured a market for the crude product in Great Britain, Germany, the United States, and their own works at New Glasgow, Nova Scotia. The ore contains not less than 53 per cent. of iron, sometimes increasing to 65 and 70 per cent., and it is almost absolutely free from obnoxious elements. The working capacity of the property now is 1,000 tons daily, and the place is open to navigation for eight months of the year, while the building of another pier and tramway would enable the output to be doubled. And this is but one of several similar properties on the island, while the north shore of Conception Bay, which it faces, shows an outcrop of the same ore, exceedingly rich and in immense quantity, extending over an area of 18 miles along the sea coast, and capable of being developed in a like manner, two or three English ironmasters having already started work on different claims there.

It is therefore evident that for smelting operations, as extensive as even the Whitney Syndicate would undertake, the supply of ore in this colony is abundant. It only remains to consider the feasibility of the scheme which they have on foot. They propose to erect a large smelting works at North Sydney (Cape Breton), contiguous to one of their largest coal mines and within easy access of a deposit of limestone suitable for use as a flux. From that humble beginning the syndicate aim to establish a great iron shipbuilding concern in the neighbourhood, to be ultimately developed into a depot for the construction of warships and liners, like Clydebank and Belfast. The chief advantages of the Newfoundland ore are that it is obtainable in practically unlimited quantities, that it lies almost at the sea shore, and that it can be mined for about 25 cents a ton, and freighted to Cape Breton for a similar figure. Newfoundland, with its iron, and Cape Breton, with its coal, lie in such close proximity that the industries of mining and smelting can be carried on more cheaply and advantageously there than almost anywhere else. Steamers loading at Bell Island pier can be discharging at the smelting works within forty hours, thus enabling them to repeat the performance with marked expedition. The demand for pig-iron, steel bars, and ships' plates is now so great in Europe and America that the Whitney people are convinced that they can sell all they produce. England's principal dependence is Spain and the other continental nations which produce iron ore; but the depletion of the deposits, together with the export duties levied by these impoverished nations, has caused an advance in prices of late, which has set British iron dealers casting about for other centres from which to replenish their stocks. Only that the men who work in the Spanish mines do so for the equivalent of 20 cents a day, the Bilbao ores would have ceased to be saleable long ago; and, as it is, the attention bestowed on Newfoundland the past year or two, by capitalists interested, indicates the belief that this country was to be the future mainstay of the iron trade. The Whitney project is founded on a different basis. It aims to have the smelting done at home, and the product—in its different finished forms—exported to Britain or America, which, it is claimed, can be done at such a low rate as to completely undersell any native or other imported iron. The only competition to be feared in the United States is from Alabama iron, which is the cheapest now available; but the cost of hauling it 300 miles to the seaboard is a serious item. Besides which, the nearest port that it could be shipped to England from is 2,500 miles further away than North Sydney; so that this Alabama iron would be severely handicapped in the competition with ours in the British markets. Furthermore, the fact that even now our ore goes to Baltimore in yearly increasing quantities proves that it has certain qualities of value which the home article does not possess. As regards the competition from Swedish ores, it is felt that the economy effected in smelting the output of the mines within a day or two's journey of the pit-mouth and then shipping the refined product to England, will enable the Whitney article to hold its own with any other which may be put on the markets in competition with it.

In connection with the project it is noteworthy that an iron deposit held by Contractor Reid, our railway magnate, in Placentia Bay—much nearer North Sydney than Bell Island is—consists of that from which spiegel, or specular pig-iron, is manufactured. Spiegel is largely used in making Bessemer steel, and is said to be of great value, being reputed to be worth as high as $400 a ton. Samples of this have been analysed and otherwise tested in Hamburg, which proved to be of the very best quality. This property is to be included in those which the Whitney people will ultimately operate, and it will ensure big profits for those who embark in the enterprise if the deposit is of any size; at any rate, in combination with the other ventures proposed, the whole enterprise promises exceedingly well for the keen, calculating capitalists who have taken it in hand. Contractor Reid is believed to be largely interested in it, as it is through him the mining of the 1,000,000 tons of ore per annum is to be carried out. Besides the Bell Island property, several other likely locations will be operated, nearly all of which are included in the land concessions secured by him under the great railway deal now associated with his name. The contract for the working of these was signed last December between one of the Reid firm and the secretary of the Dominion Coal Company, and matters have been gradually shaping themselves towards a practical outcome since.

The enterprise is one of great importance to Mr. Reid, inasmuch as it will enable him to develop some of these splendid mining properties, now lying dormant. It will be of wide-spread benefit to this colony, because it will give constant and remunerative employment to thousands of people, and lay the foundation for a much higher standard of prosperity throughout the island. The advantage which will accrue to British industries which call for large supplies of iron and steel, it may be too early now to do more than indicate by the merest outline; but capitalists and others interested can readily appreciate what the venture portends in the hands of capable progressive organisers like those composing the Whitney Syndicate. The project is no mere visionary one; negotiations for the establishment of the smelting bounty for several years are now proceeding with the Canadian Cabinet; the province of Nova Scotia has already agreed to remit for eight years half the royalty payable by the Dominion Coal Company on the output of its mines, and the Newfoundland Legislature will be asked to contribute its quota to quickening the venture into life by relieving of Customs dues and marine charges the fleet of whaleback steamers which it is intended to use in conveying the ore from the mines in this colony to the smelters in Cape Breton. Within a year the Whitney people hope to be putting on the British market a better and cheaper supply of iron and steel than is now obtainable, and the quantity of which to be prepared for disposal there will only be kept within the demand. The syndicate look for the yearly product to steadily increase, and they believe that within a few years they will be supplying the major portion of the British iron trade—a not unreasonable boast when the character of the men and the vastness of their scheme are taken into consideration.

LAKE OF THE WOODS.

At the Keewatin Reduction Works a run has just been completed of the quartz from the Triggs Mine. Eighty-five tons were put through, and the yield in gold was $24.50 per ton from the plates, and about $3.00 per ton from the concentrates. The bullion is 900 fine, or worth about $18.00 an ounce in gold. The ore was easily crushed, so that stamps working on ore of this kind should have a high capacity as regards amount crushed per diem per stamp. At the mine the shaft is now down 108 feet, and at this point a cross-cut towards the north-west has been started to cut the vein. Some of the slaty rock, or altered trap in the bottom of the shaft, carries visible gold. The work is done by single hand drilling.

On Mining Location W.A. 41, south of the Chemical Co.'s property, and about a mile west of the Triggs, R. H. Ahn has started work on a promising vein of bluish quartz, well mineralized and well defined, and crossing the "formation."

The Chemical Co., east of the Stella, have camps built and a gang of miners at work.

At Camp Bay, Captain Proudlock has his contract of sinking 60 feet almost completed; this is on a location which is under option by the Sentinal Consolidated Gold Mining Co., Limited, from the Coronada Gold Mining Co. By the terms of the option the shaft must go down 100 feet. The rock from this shaft assays very well.

In the same neighbourhood, the Combines Mining Co. are continuing their preparations for the erection of a mill. They are building a short tram road, or narrow guage railway, on which a small locomotive will be used. They are not doing any mining at present, but are about to let a contract for a 150 feet shaft.

The deal concluded last winter on the Beck Mine, immediately adjoining the Triggs on the south-west, has been consummated by the payment of the balance of the purchase money by Mr. Peter Thornton, of Edinburgh, Scotland, the optionee. The total sum was $4,000.00. Work is suspended at present, Mr. Thornton having left town for a couple of weeks.

Four claims have recently been surveyed in Long Bay, about 30 miles south-east from Rat Portage, and a surveying party has just returned from the survey of a number of locations in the Deer Lake country, whilst another surveying party is proceeding to the same locality to lay out some dozen or so more. That part of the country appears to be the principal scene of operations for prospectors this spring.

RAT PORTAGE, June 9th, 1899. J. M.

FROM THE SLOCAN.

That an almost inexhaustible supply of treasure lies waiting merely to be removed from the surrounding mountains would scarcely be credited by a casual visitor to these parts at the present time. Silence reigns supreme; not alone from the orderly demeanour of the miners, who decline to work at the wages offered, but by reason of the fact that the large majority have already gathered together their personal belongings—usually of a severely portable type—and left for pastures new, metaphorically speaking. Business of all descriptions is at a standstill in sympathy with the prevailing conditions at the mines, and the Slocan presents as listless and apathetic an appearance as one can well imagine; in fact any of the lake towns might well serve as an illustration for Goldsmith's "Deserted Village." Matters have apparently come silently but surely to a climax, and the anticipated labour conflict has begun in deadly earnest. So far as this division is concerned at least, the strike

is devoid of all dramatic incident; the most perfect order and discipline obtaining at all points. This, of course, does not affect the seriousness of the situation, the one consolation being found in the fact that many of the mines were contemplating a temporary suspension of operations on account of the large quantity of water which finds its way into the workings at this season of the year.

There appears to be no disposition to yield on either side just yet, so the only thing to be done is to sit placidly by and await the outcome.

Not a single mine of consequence is now being operated in the Slocan, although one or two smaller concerns continue to adhere to the standard wage of $3.50 for eight hours. The prospects of a speedy settlement would, however, seem to be somewhat remote, as a period of lethargy has apparently set in, and neither side is displaying undue anxiety.

Under the circumstances, it is difficult to see how we are to maintain our output for this season at anything approaching that of last year, which in its turn was considerably below that of 1897. The total production since the first of January has been approximately 15,000 tons, and, with a continuation of favourable conditions, there was no reason why we should not easily eclipse any previous effort. For the four weeks ending June 12th the shipments were roughly 1700 tons, the Slocan Star being credited with two hundred, and the Enterprise—which has undergone a general clean up preparatory to resuming operations on a large scale under the new management—four hundred and sixty tons, the remainder coming from the Payne, Last Chance and Whitewater, with smaller contributions from the Bosun and Madison. This latter has just been taken over by McCuaig, Rykert & Co., the well-known firm of Montreal brokers who floated the Payne and Sovereign among others. Clarence J. McCuaig was in Sandon during the month, and at a meeting which was held, formally ratified the sale of the Payne to the new company, so that all details in connection with this colossal transfer may now be considered as finally arranged. Although the property will remain closed until the labor difficulties are overcome, outside improvement will be proceeded with as rapidly as possible, this being the policy pursued by most of the other managers. A magnificent new bunk house, 140 feet long, is to be completed and ready for occupancy in a month's time, so that the men will have no occasion to complain of lack of accommodation when they return.

Work is proceeding rapidly in connection with the Ruth tramway and concentrator, and if all anticipations with regard to this famous mine are realized, we shall expect to see it resume its old-time prominence before the year is out.

The risk to which miners and prospectors are continually exposed was brought forcibly to mind by the recent discovery of the body of the victim of the snow-slide disaster which took place near the Ajax mine in January last. The enormous tonnage which is required to form an avalanche of this nature can hardly be realized by those who have not witnessed its destructive effects. Another source of discouragement, if not of actual danger, is found in the number of bears which have been seen from time to time, although as a rule they are harmless unless provoked.

The praiseworthy desire of the Government to simplify matters by substituting a recurring date on which all miners' licenses must expire, in place of the heterogeneous arrangement at present in vogue, has resulted unwittingly in general misunderstanding and inconvenience, which can hardly be attributed to the wording of the Act. While the measure could clearly not be made retrogressive in its operation, there were a great number who preferred renewing their licenses on May 31st of this year—notwithstanding that they had at the time several months to their credit—to involving the small element of risk in connection with waiting until their license expired before attempting to renew it. As a result the deluded ones are now clamouring for a rebate proportionate to the time that their former license held good after May 31st. All complications will fortunately be avoided next year, never to recur, as every license will by that time expire on the one date.

The reported bonding of the Mountain Chief received confirmation in the employment of a number of men on the property a week or so ago, but the disturbing factors in the labour market have make a suspension of operations imperative.

One of the small mines in this vicinity—worked by a number of men on the co-operative system—namely, the Noonday, has set an example in economy which is well worthy the attention of others. While it is obviously impossible for all to erect complete concentrating plants, there are many instances where a somewhat crude arrangement may be made to attain the same ends, on a rough and ready plan. At the mine above mentioned a considerable amount of otherwise worthless material is turned into a valuable product by the use of a small hand jig, and similar economies might easily be effected elsewhere with advantage.

H. W.

BOUNDARY CREEK.

Copper Camp.

The only property being worked to any extent in this camp is the Copper Queen under the direction of Mr. George. This property is controlled by D. C. Corbin, who also owns the adjoining property, the King Solomon.

The Big Copper passed into strong hands last winter, and it is expected that work will be resumed on it this summer.

Providence Camp.

Very little is being done at present in this camp. Work is to be resumed on the Boundary Creek Mining and Milling Coy's properties very shortly, a diamond drill being now on the way in.

Skylark Camp.

Last Chance.—A boiler, hoist, and compressor have recently been installed here. Sinking is in progress, a depth of 125 feet has now been reached.

Wellington Camp.

Winnipeg.—A seven-drill compressor and a new boiler have just been installed. At present the mine is being unwatered preparatory to continuing drifting. Mr. Duncan McIntosh is in charge of the property.

Golden Crown.—A compressor is being installed here also. Mr. Geo. Collins, managing director, is in charge.

Greenwood Camp.

Brooklyn.—Mr. Frank Robbins, superintendent. The shaft is down 275 feet. Drifting and cross-cutting are in progress.

Stemwinder.—Under the same management. The shaft is being continued.

Ironsides.—The new shaft is being continued, and the bottom is reported to be all in ore.

Knob Hill.—Cross-cutting and drifting are still being continued.

The machinery on these two properties consists of two boilers, a hoist, and air compressor.

These two properties are under the superintendency of Mr. Williams.

Snowshoe.—Mr. Murray is in charge of the property recently bonded for $70,000 by Mr. Astley of Rossland. A boiler and hoist are now on the way in, when work will be resumed upon their installation.

Gray Eagle.—Work is being prosecuted here by the Knob Hill and Iron Sides people.

War Eagle.—This property has been recently floated in the East, and work is to commence very shortly.

Greenwood Mines, Ltd.—This company owns the Pinhook, World's Fair and Missing Link No. 2 adjoining the War Eagle. Development is to be prosecuted this month.

Grahams' Camp.

Bruce.—Work is to be started in a few days with a force of 8 men. The property will be incorporated.

There is a very fine showing of chalcopyrite here.

Long Lake Camp.

Jewel.—25 men are at work; Mr. Mahan being the manager.

Drifting on the ledge at the 270 foot level is in progress.

The mine is looking very well at present in the lower levels.

Some experts have been examining the property with a view of installing a cyanide plant.

North Fork.

A very fine strike of high grade chalcopyrite has been made on the Golden Eagle owned by Mr. Moulton-Barrett of Greenwood.

Negotiations are under way for the sale of this property to Eastern capitalists.

Considerable work is being done on the Path Finder, O.K., and Humming Bird.

A strike of rich ore is reported on the Path Finder.

West Fork.

A number of prospectors have gone up the river. The Carmi has been bonded to a Butte company.

Deadwood Camp.

Mother Lode.—25 men are at work here, under the management of Mr. Keffer. Drifting on the lead is in progress at the 200 foot level. Good ore is being met with. The machinery here consists of two 60 h.p. boilers, one 10-drill air compressor, one Lidgerwood hoist 30 in. drum, two steam pumps, a 50 light dynamo, and a 6 h.p. engine for operating the same.

Morrison.—12 men are at work here with a steam drill. A 400 foot tunnel has been run, and a raise is now being made from the tunnel to connect with the shaft. Two blind leads were met with while tunnelling.

Sunset.—14 men at work, Mr. McFarlane, superintendent. Drifting is in progress.

Buckhorn.—It is expected that work will be started almost immediately.

Iron Top.—7 men are at work under the direction of Mr. Von Beilenberg.

Work on the C.P.R. spur from Greenwood City to Copper and Deadwood Camps is being carried on.

Summit Camp.

B. C. Mine.—40 men are at work here under the superintendence of Mr. John Scrafford. The shaft is down 150 feet, and drifting is in progress on the 50 and 15 foot levels. A new working shaft is to be started at once. The shewing in the drifts is improving steadily. There are now 3,000 tons of shipping ore on the dump, all of which has been taken out in development work. There are few ore dumps in the country that can compare with this one.

The machinery consists of one upright and one horizontal boiler, a hoist, and a four-drill air compressor.

Oro Denoro.—A boiler and a hoist are being installed under the direction of Mr. Aldridge. The mine is looking very well. Mr. D. J. McDonald, late of the Columbia-Kootenay Mine in Rossland, is consulting engineer.

Remington.—Six men are at work sinking on the lead. 100 feet of low grade ore has been cross-cut on the surface. The main shaft is now down 30 feet.

R. Bell.—Five men are at work drifting on the 50 foot level of the No. 1 shaft. Some very fine chalcopyrite is being taken out. The No. 2 shaft, which is down 80 feet, is to be unwatered, and cross-cutting to the lead commenced.

Homestake.—Mr. Beecher, president of the Winnipeg Mining and Smelting Company, has obtained control of this property. It is to be incorporated and mining started very soon. There is a very well-defined vein of chalcopyrite lying in a quartz porphyry. A 30 foot shaft has been sunk, and a 30 foot tunnel driven.

A waggon road is being made from Eholt to Summit Camp.

Work is being pushed on the C.P.R. spur connecting Summit and Greenwood Camps with the main line at Eholt.

Greenwood, 15th June, 1899. H. & L.

GOLD MINING IN NOVA SCOTIA

Returns from the various mines for the past month are fairly good, and there is increased interest in mining of all kinds throughout the province.

Large blocks of areas are being taken in all the gold districts, and new finds are being constantly reported, but few, however, of such reports are confirmed by results.

The Tunnel Mine at Waverley, recently sold by Gue & Wilson to Messrs. Hood, McNulty *et al*, is being developed by sinking and driving on the main vein. The results of this work is highly satisfactory, very rich ore having been encountered in all directions. A few days ago an English gentleman, representing large capital, offered to Messrs. Hood & Co. an advance on their purchase price of $75,000, which was refused with thanks. There is now at the tunnel mouth some 250 tons of ore, which will be treated in the Tudor Co.'s mill. It is the intention of the company to determine, by treating a 1,000 or more tons of ore in this mill, just the character of mill best adapted to the treatment of the ore from their mine, and then build. Their power will be generated at Fall River, a stream 1½ miles distant, and brought to the mine by electricity.

The returns made at the Mines Office from the "Montreal & London Co." of 217 ozs. of gold from 2,716 tons of rock has caused no little comment, particularly in view of the fact that the company are increasing their 30-stamp mill to one of 60 stamps.

The Blue Nose Company of Goldenville continues their large returns as usual. For May 1173 tons were milled, which gave 418 ozs. The profits on the month exceed $5,000.

Geo. A. Hirschfeld, with associates, have been for the past month putting the New Glasgow in shape for re-opening.

Messrs. Copeland & Co. of Antigonish are, under the management of W. J. McIntosh, erecting a pumping and hoisting plant on their property in the north-west section of the district.

The Guysboro' Gold Mining Co., of Wine Harbour, has returned for May 90 oz. from 192 tons of ore. This company are increasing the capacity of their plant by additional pumping, hoisting, and drilling appliances.

The Modstock Gold Mining Co., of Forest Hill, returns for three months 1,020 ozs. from 1,547 tons of ore.

A movement is on foot to consolidate this district and work it under the management of a strong Canadian syndicate.

J. S. Low has recently returned 141 ozs. of gold from 30 tons out of a small rich lead discovered on the old "Plough Lode" areas, belonging to Henry Piers of Halifax. This return gives Mr. Low and associates very handsome profits, and we trust may so encourage them as to continue the search for the continuity of the lost Plough Lode.

The Richardson Co., Isaacs Harbour, are doing a considerable development work, yet they have milled 2045 tons for the month, which gave them 212 ozs.

Tributors on the "Golden Group" of Montague returns for May 148 ozs. from 186 tons of quartz.

A trial crushing of 10 tons by J. B. Neily from the "Bonanza" Mine, Oldham, gave the very satisfactory return of 21 ozs.

A clean up at the "Block House" Mine, Lunenburg Co., from 80 tons gave 168 ozs.

W. L. Libby, of North Brookfield, has encountered a very rich zone of ore in his deepest level, which is now some 750 feet from the surface on the dip of the lode. The ore is the richest Mr. Libby has yet seen in his mine, which certainly speaks well for deep mining in the Province. Mr. Libby's returns for the month are most satisfactory, being 426 ozs.

TRURO, 21st June, 1899. G. W. S.

COMPANY NOTES.

North-West Mining Syndicate.—Bosun Mine.—Cablegram from the manager reports returns from smelters for 60 tons lead ore shipped in April, $2,520. Returns for zinc shipment not yet received.

Enterprise (British Columbia) Mines, Limited.—Registered May 15, by Neish & Co., 66 Watling Street, E.C., with a capital of £150,000 in £1 shares. Object, to acquire the whole or any part of, or interest in, the Enterprise Mines, situated on Ten Mile Creek in the Slocan Mining Division of West Kootenay, British Columbia, Dominion of Canada, comprising two claims and a fraction of a claim known as the Enterprise, Slocan Queen and Enterprise Fraction, and with a view thereto to adopt an agreement expressed to be made between the London and British Columbia Goldfields, Limited, of the one part and this company of the other part, and to develop and work the said properties.

Le Roi.—The following cablegram has been received from Mr. Carlyle, the manager: —"Have received the following returns from smelter Le Roi:—First 15 days May, 4,450 tons yielding 2,650 oz. fine gold, 4,750 oz. fine silver, 150,000 lb. copper. Gross estimate value, $75,000."

"Le Roi shipments second half May: 4,550 tons, 2,150 oz. fine gold, 4,700 oz. fine silver, 140,000 lb. copper. Gross estimated value (reckoning copper at £70 per ton of 2,240 lb.), $68,000."

Hall Mines, Limited. The following smelter returns for the four weeks ending 2nd June are officially reported:—1,792 tons of Silver King and 1,173 tons of Custom ores were smelted, yielding (approximately) 26 tons of copper, containing 26,930 ounces of silver; 378 tons of lead bullion, containing 306 tons of lead, 75,870 ounces of silver, 578 ounces of gold.

Mikado Gold Mining Company. Clean-up to May 31st for thirty days, crushed 082 tons, yielding 313 oz. of gold, and from cyanide 509 tons, yielding 148 oz. bullion.

Athabasca.—Cablegram from the manager at Nelson, B.C.: "404 tons milled. The approximate value, $11,000."

Copper Company of British Columbia, Limited.—Registered May 16, by Renshaw, Kekewich & Co., 2 Suffolk Lane, E. C., with a capital of £100,000 in £1 shares. Object, to adopt and carry into effect an agreement bearing date May 16, and made between P. H. Stevens of the one part and this company of the other part for the acquition of the copper mines known as the Lancaster, Simcoe and Toronto Fraction, situate in the district of East Kootenay, British Columbia, and to develop and work the same.

Centre Star Mining Company. A contract has been let for the erection of a large steel gallows frame on the property, similar to that which has been installed at the War Eagle Mine. It is expected that this will be in place about the 1st November when the facilities for handling a large tonnage will be excellent. With the present plant it is estimated that about 250 tons per day can be turned out.

Cariboo Consolidated Mining and Milling Co.—*Total amount of dividends* paid, including dividend 31st May, $320,000.

Hammond Reef Consolidated Mining Co., Ltd.—This company has been reorganised, the capital having been increased to $5,000,000. The directors are:—Sir Richard Cartwright, President; Hon. G. A. Cox, Wm. Mackenzie, Clarkson Jones, Col. S. A. Sweny, Lyman Melville Jones, John Merty, London, Eng.: B. W. Folger, G. H. Watson, Walter Macdonald, H. M. Pellat, James Hammond and J. R. K. Sproule. A 40 stamp mill is to be erected.

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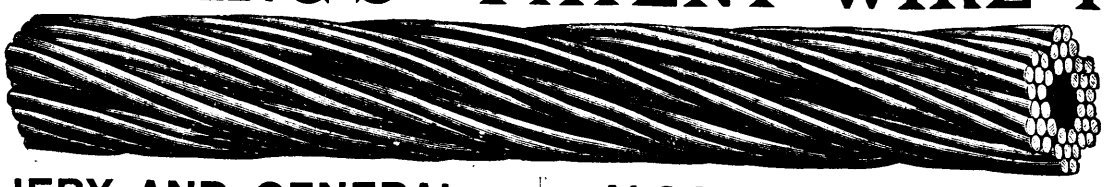

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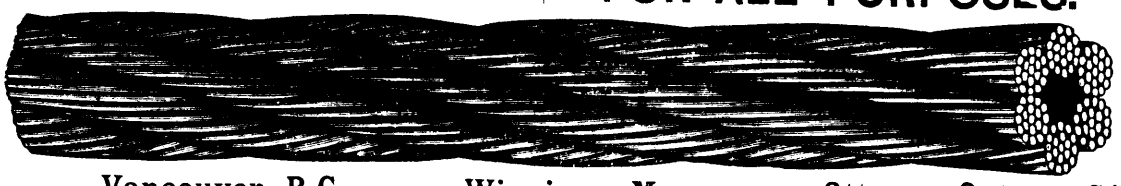

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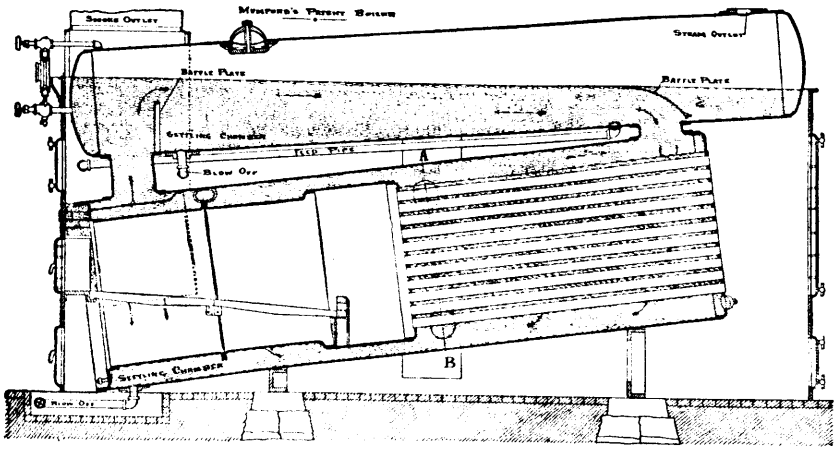
MUMFORD'S IMPROVED BOILER



Usually built with sheet steel case, but if preferred the case may be left off and bricksetting substituted.

High Economy is obtained on account of being internally fired, and having perfect water circulation as shown in cut.

Two Settling Chambers are provided for catching deposits of scale and every part of the boiler is accessible for cleaning.

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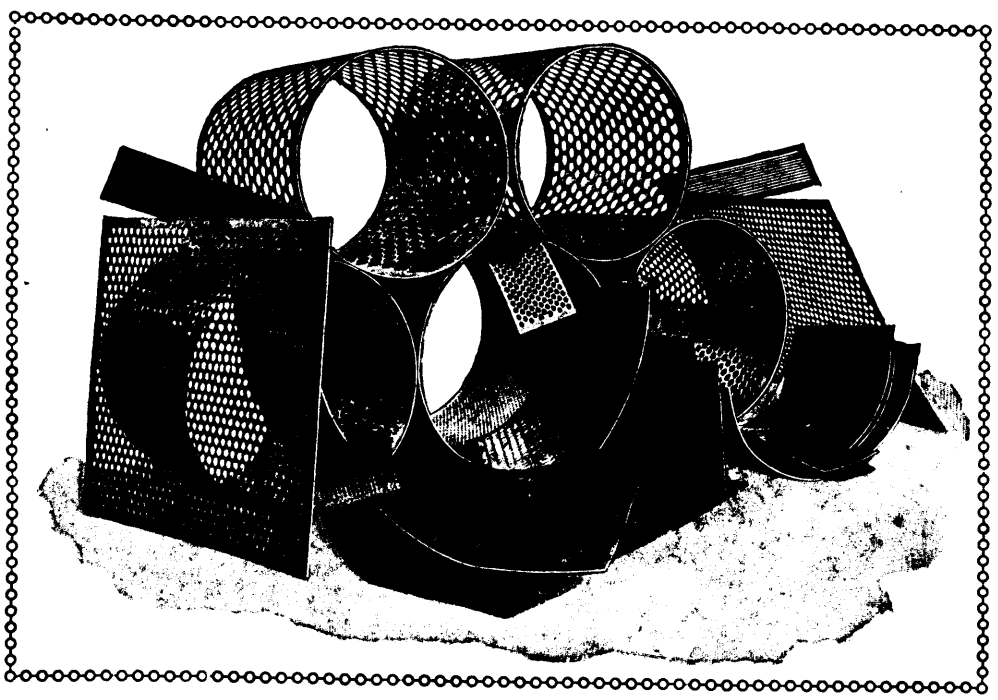

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