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Established 1882

Vol. XX—No. VII.

OTTAWA, JULY 31st, 1901.

Vol. XX—No. VII.

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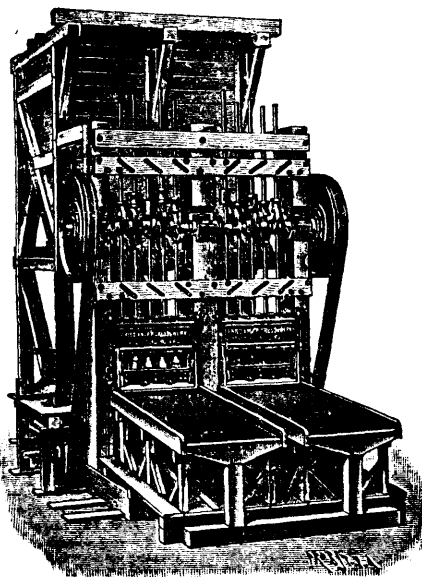
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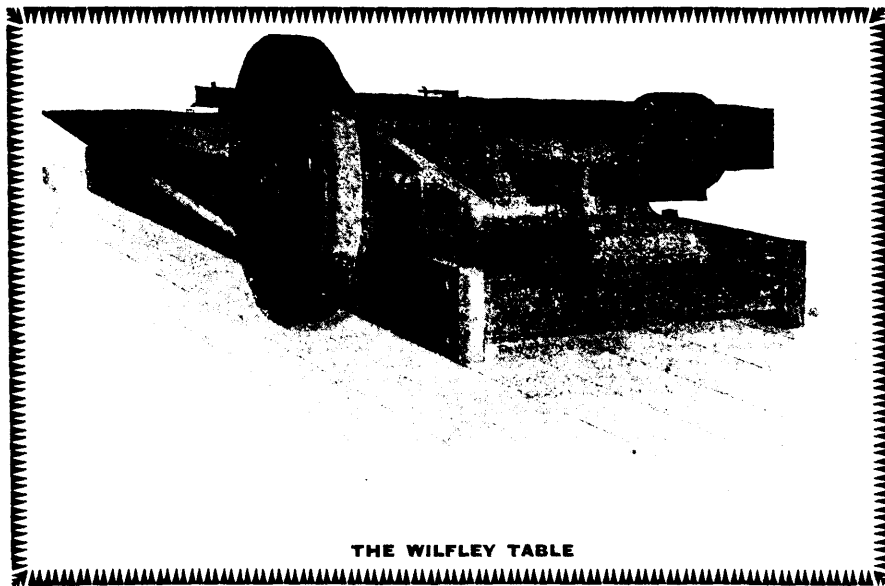
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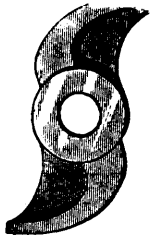


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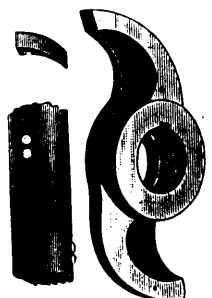
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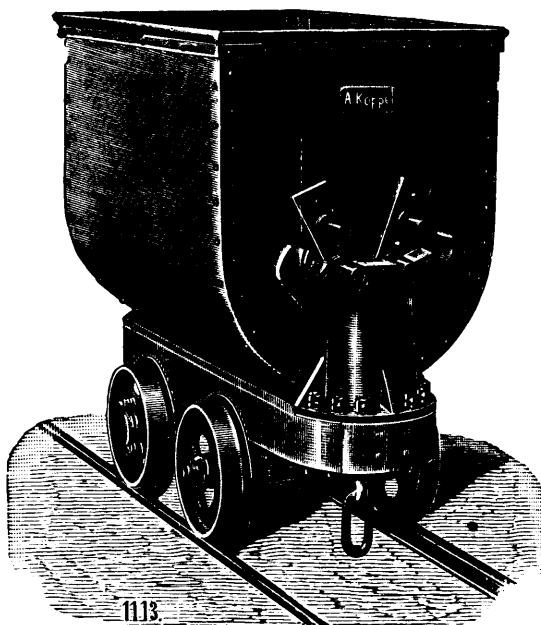
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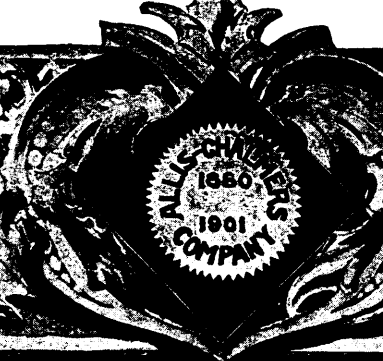
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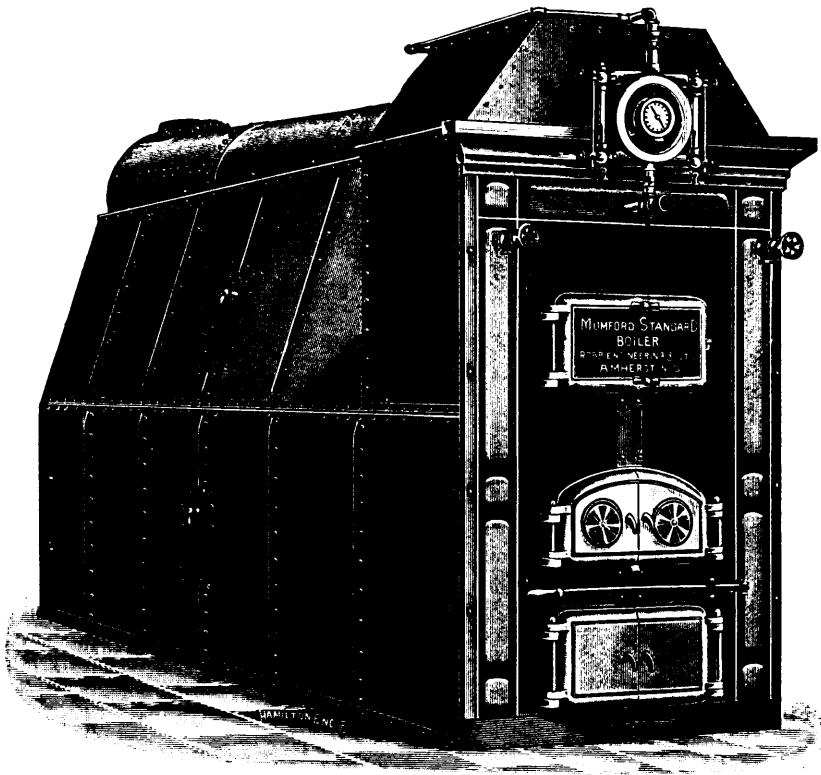
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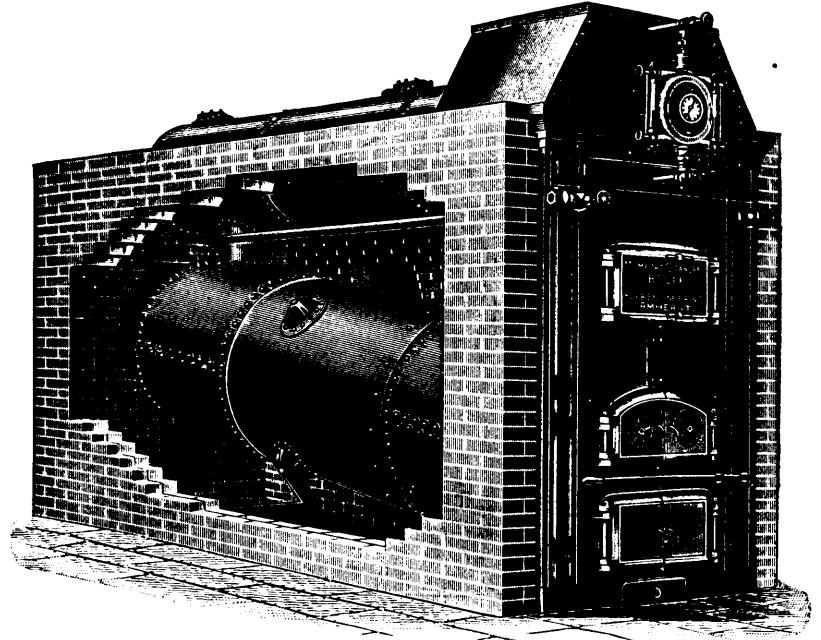
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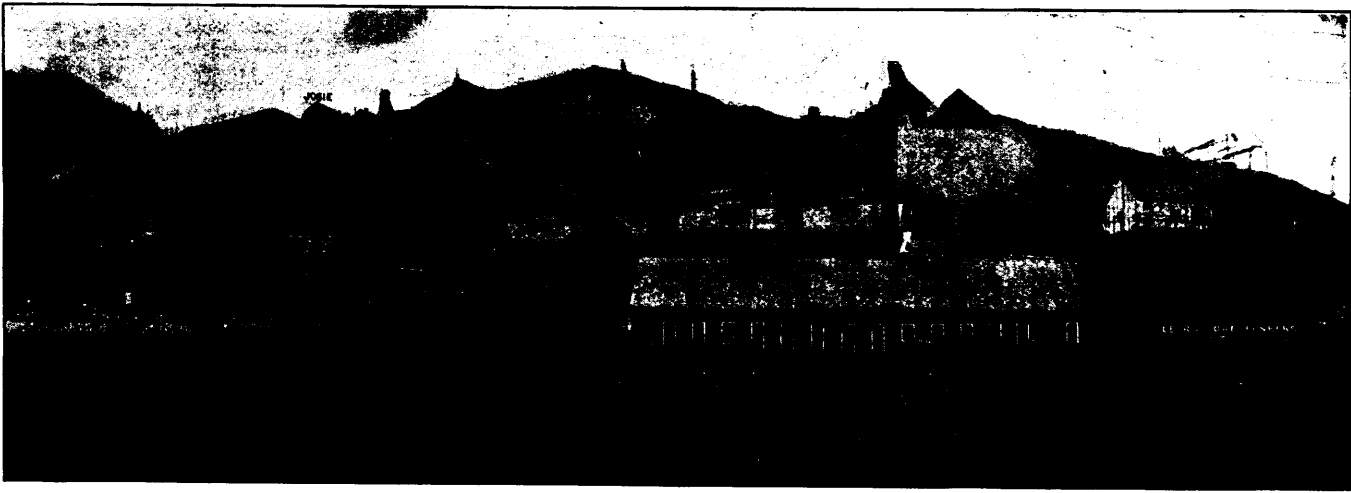


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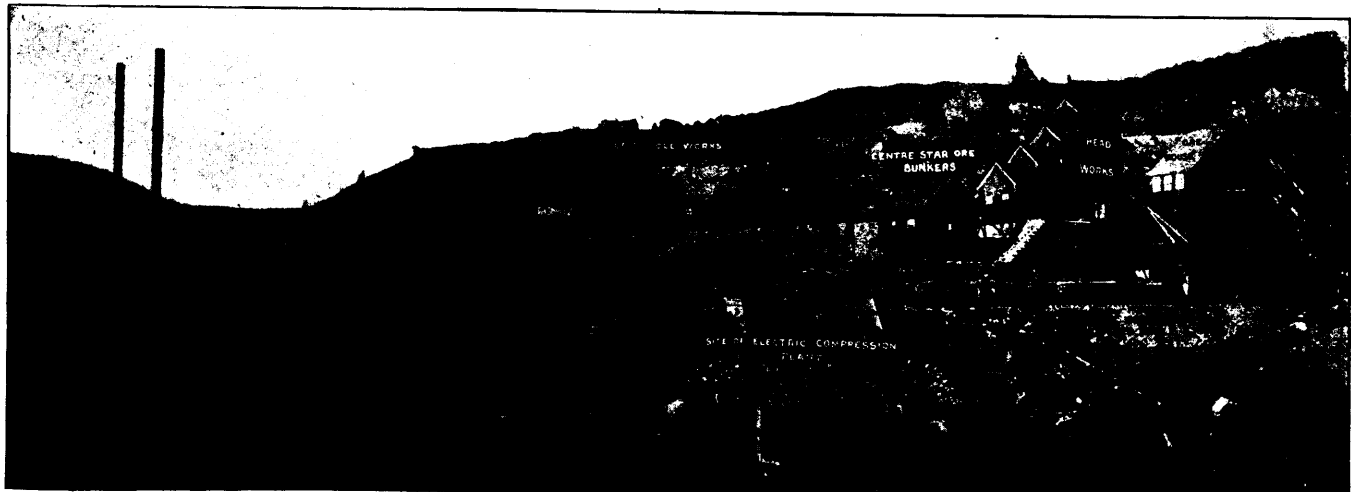
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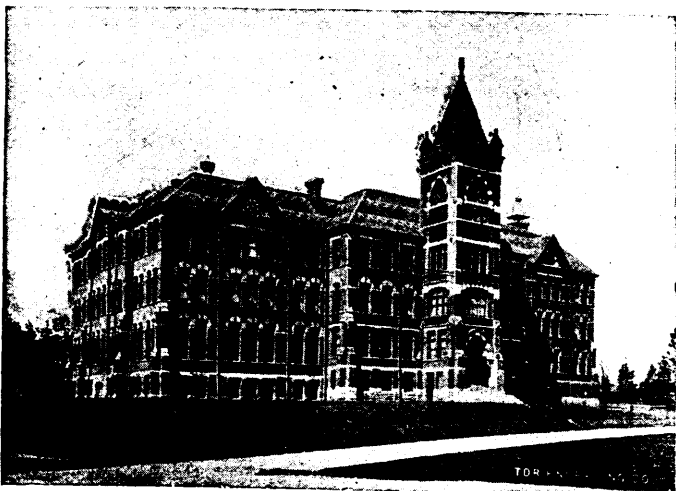
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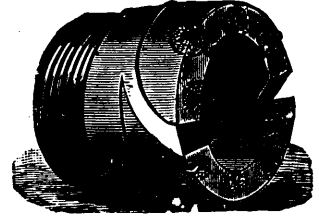
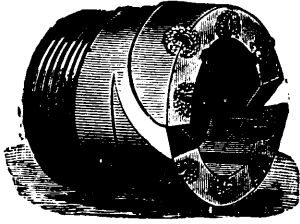
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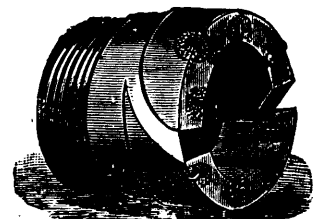
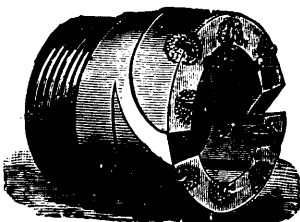
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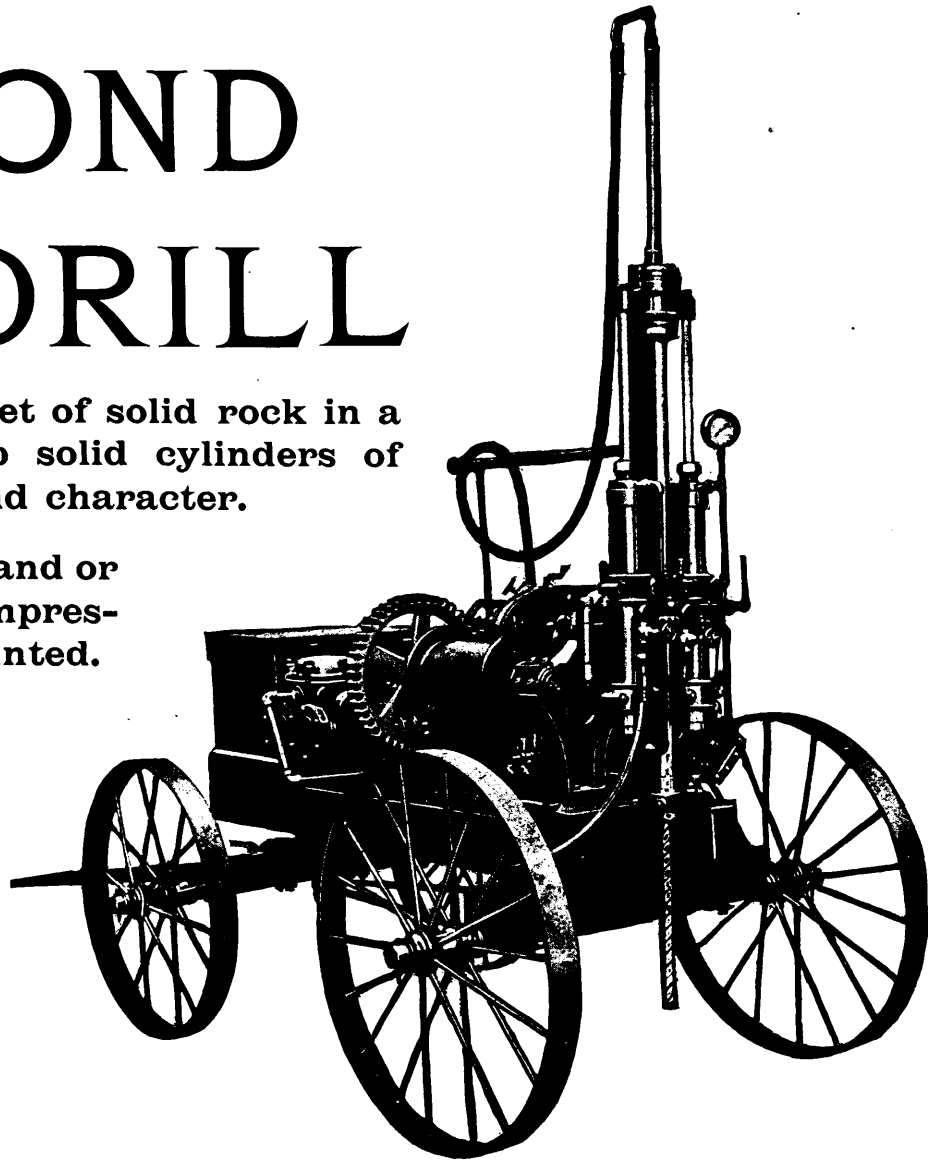
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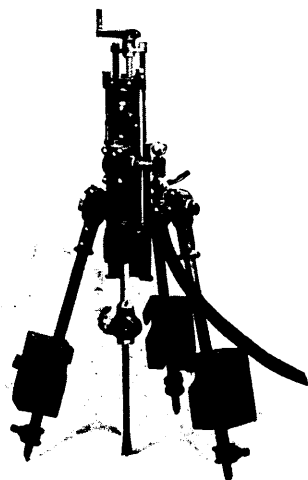
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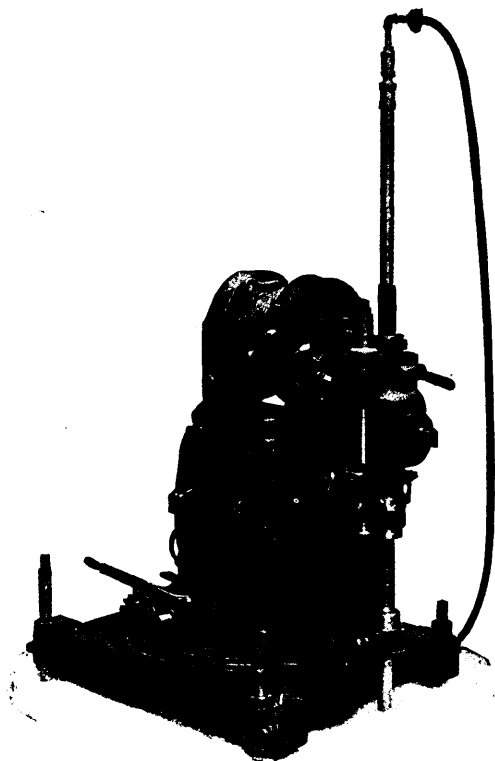
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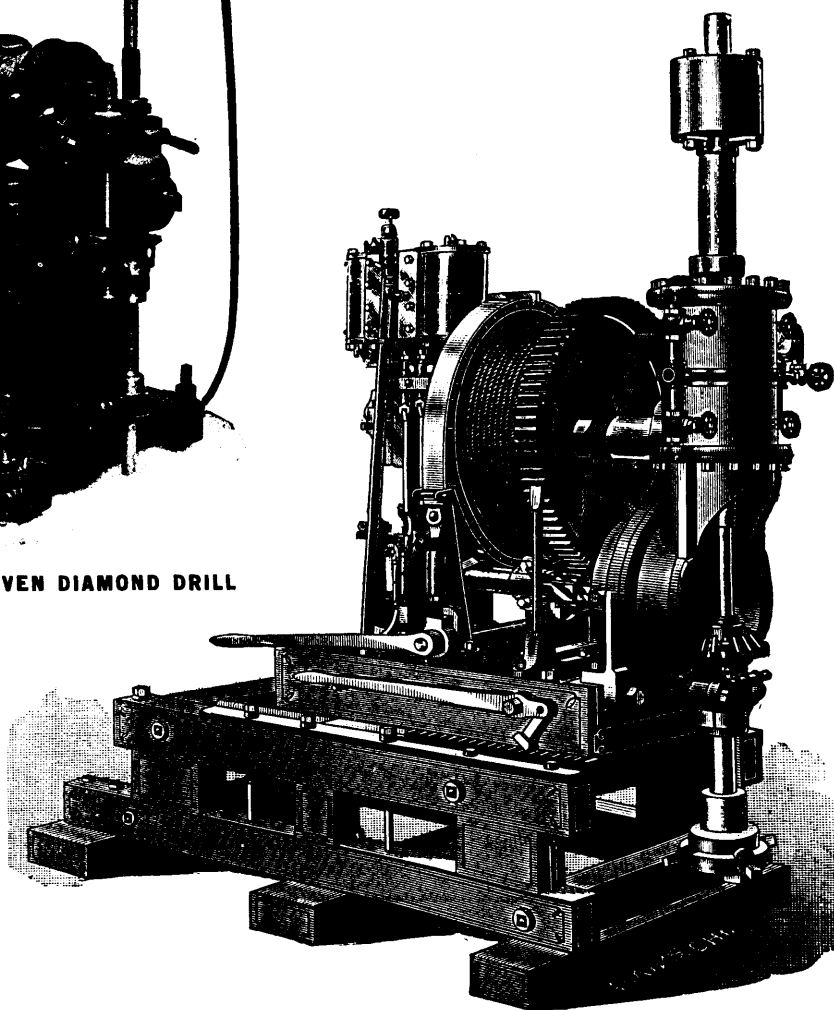
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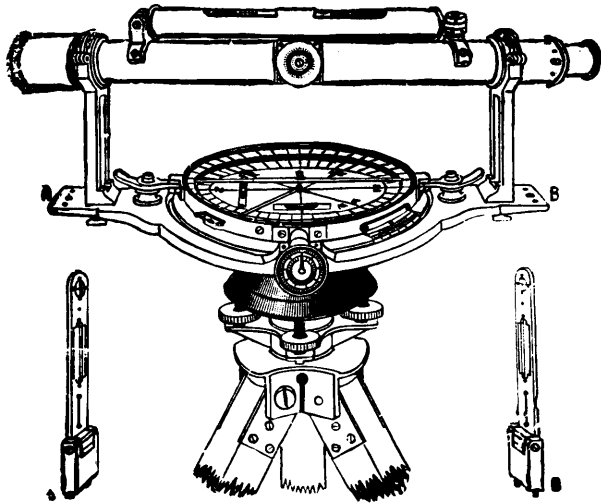
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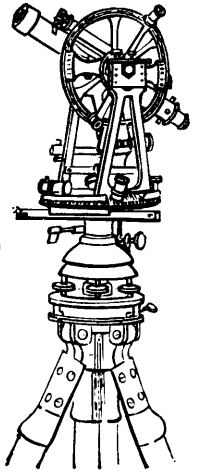
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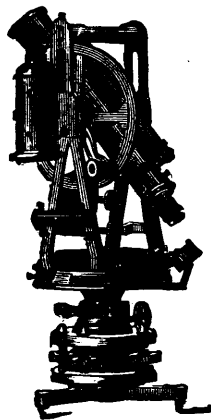
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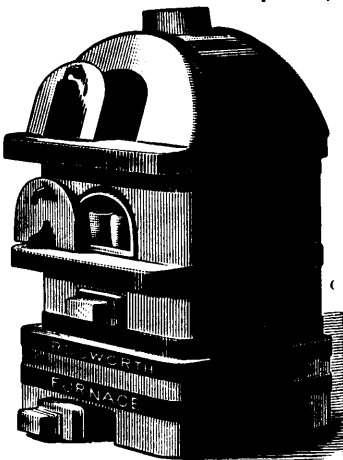
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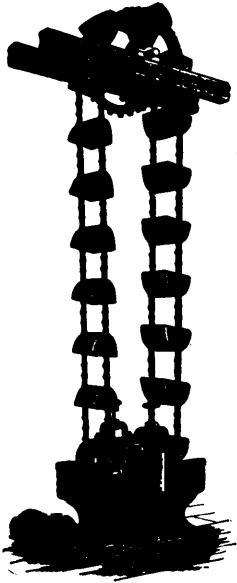
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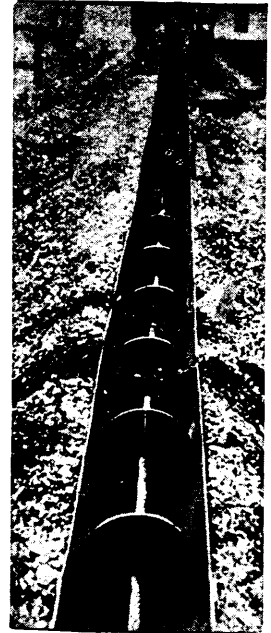


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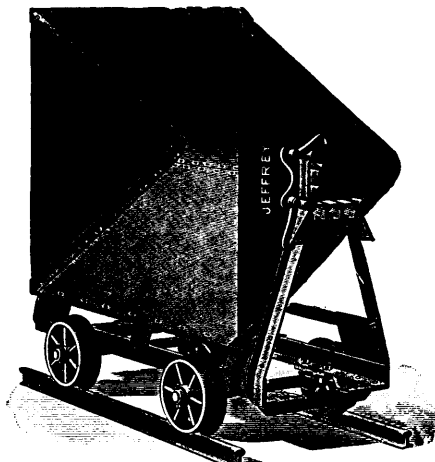
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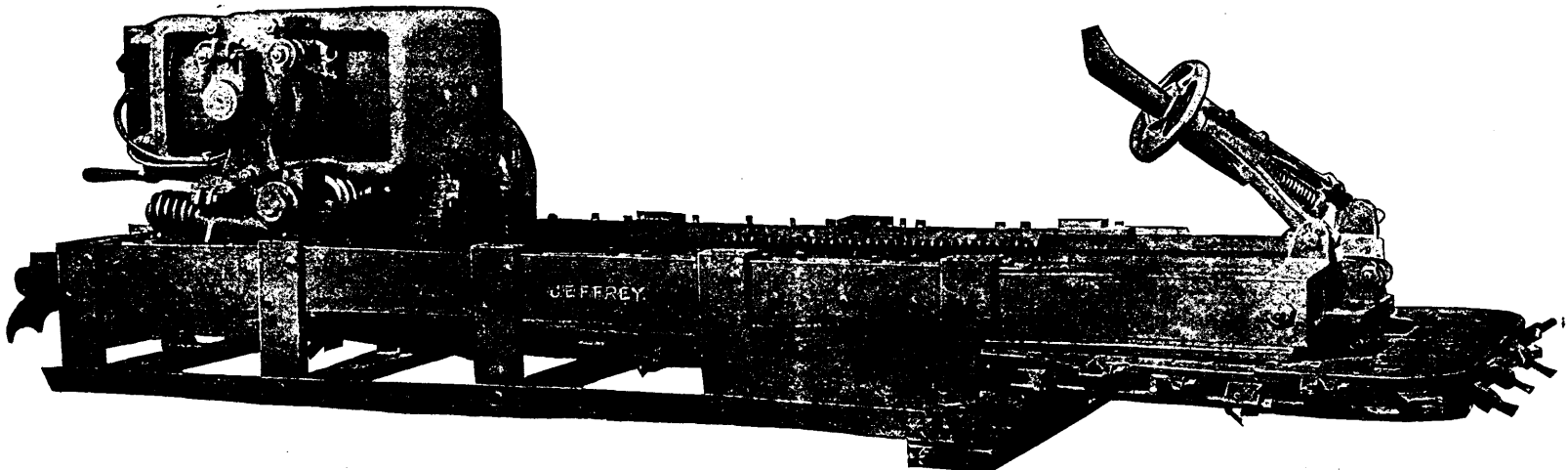


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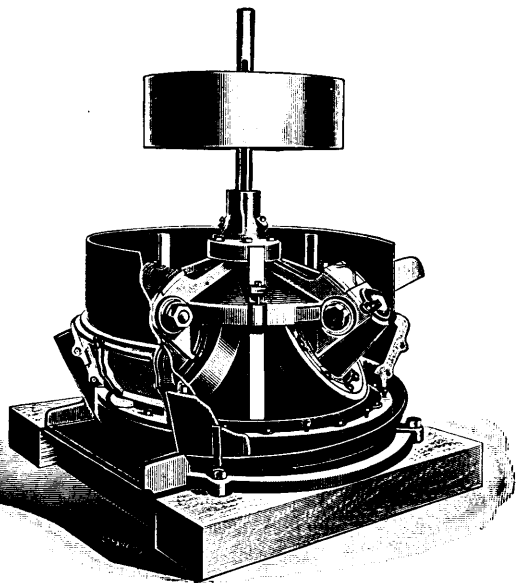
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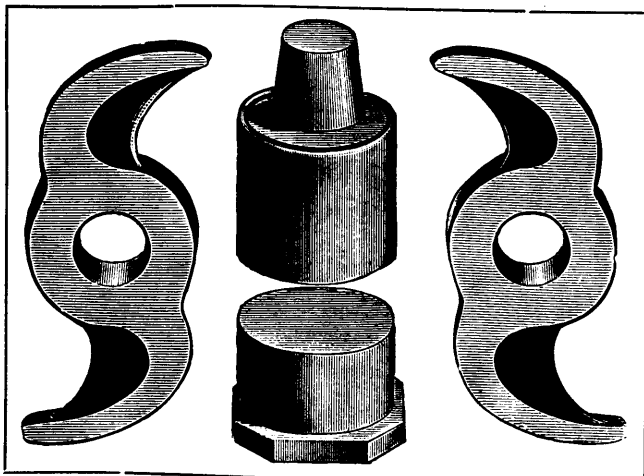
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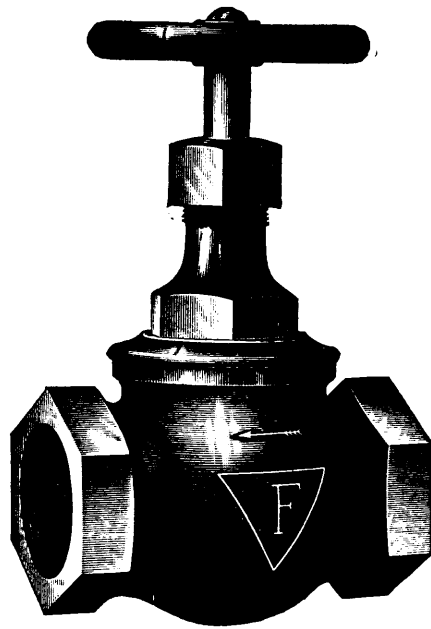
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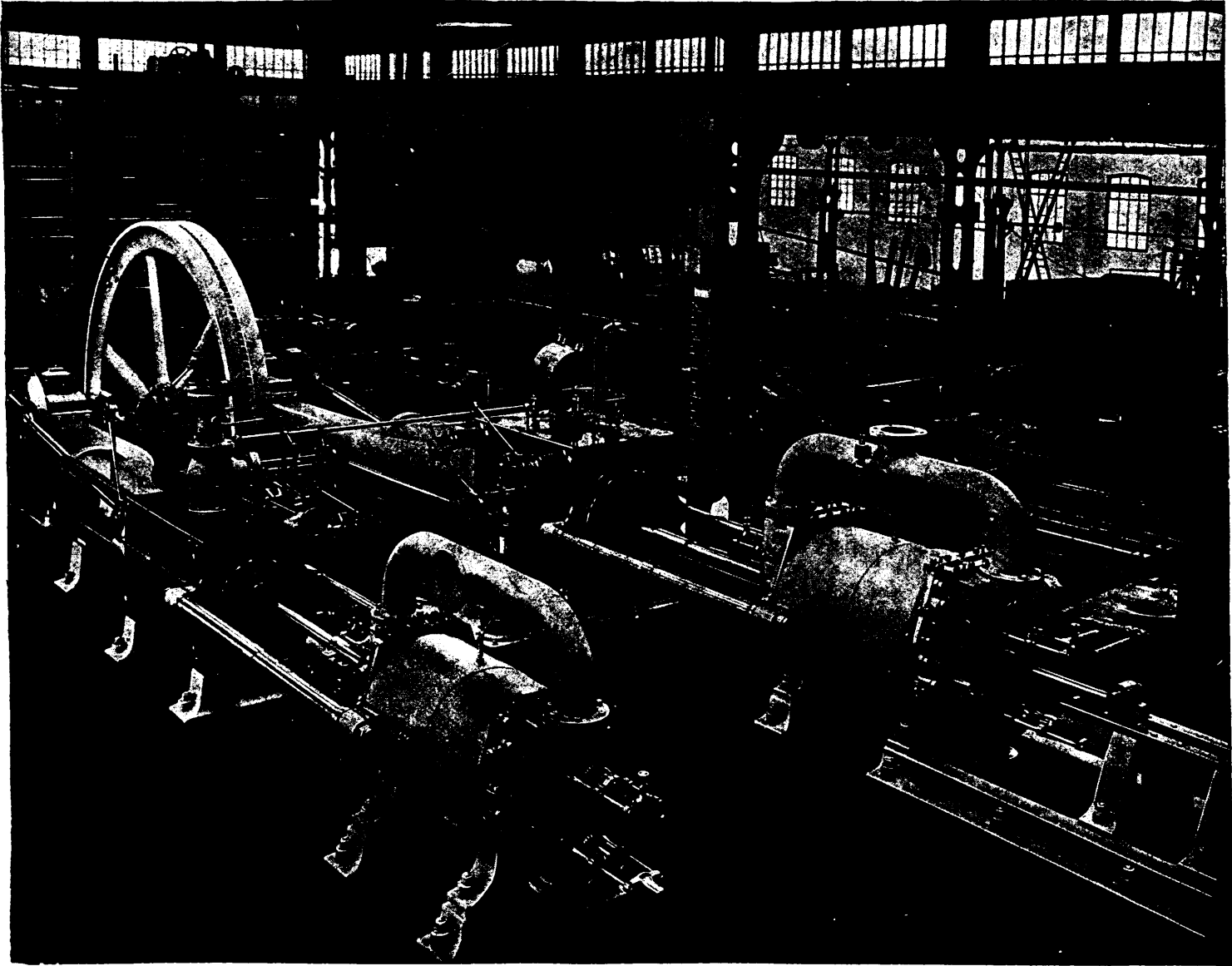
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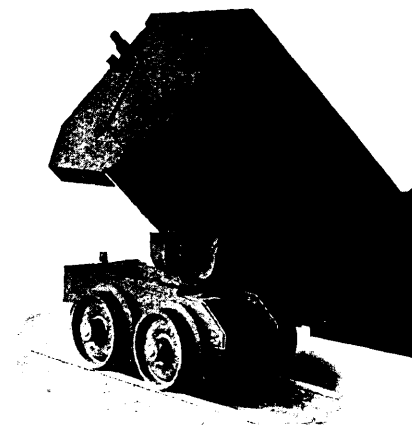
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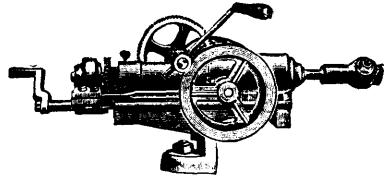
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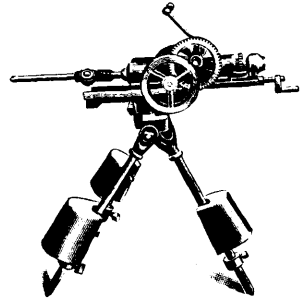


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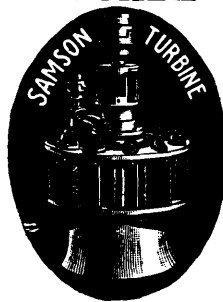
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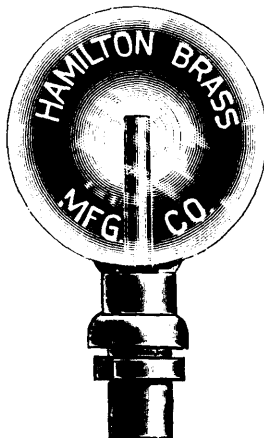
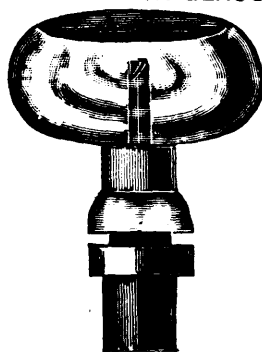
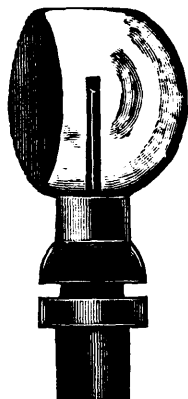
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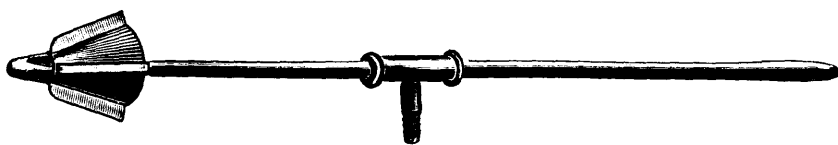
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Specialty made of Silver-bearing Ores and Mattes—  
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or work Minerals on any of their Lands and Reservations covering nearly a quarter of a million acres in Eastern Ontario, and principally within the belts containing Iron, Phosphate, Gold, Galena, Plumbago, Mica, Marble, Building Stone, and other valuable minerals, are issued by

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New York. Only  
two such on the  
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We are not Dealers or Refiners, but Receive Consignments, Weigh, Sample and Assay them, selling to highest bidders, obtaining advances when desired, and the buyers of two continents pay the highest market price, in New York Funds, cash against our certificates.

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ALSO ANALYZE EVERYTHING.**

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Various brands, for makers of Malleable Castings, for Furnace Lining and Annealing, for Mica Lubricants, for Fire-proof Paint and roofing mixtures, for paper makers, etc.

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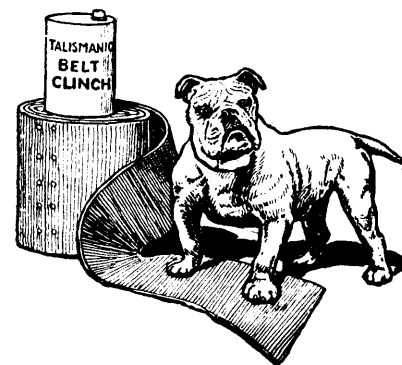
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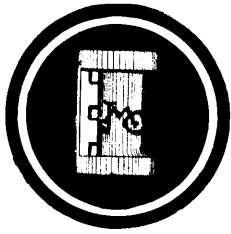
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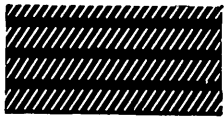
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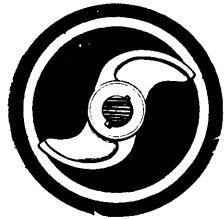


WE contract for the equipment of Complete Mining Plants, including Power Machinery. Stamp Mill Supplies carried in stock, in standard sizes, and of best material and workmanship.



A western mill Supt. writes us:—

“With regard to the Stamp Shoes and Dies, Cams, and Cam Shaft Boxes, they are the best I have ever seen. I would suggest that you hold fast to them without change of any kind.”



Write us, if you are in the market for a new mill, if you wish to enlarge your present plant, or if you need supplies, or duplicate parts of any kind. We can design and build a complete plant to suit your location, or fill your smallest order.

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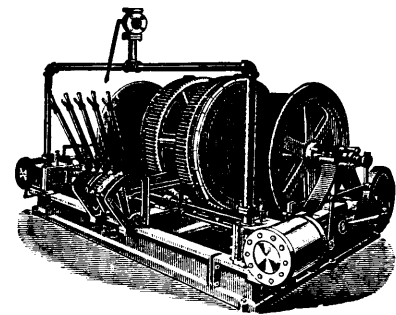
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Dredges, Ditchers, Derricks and Steam Shovels for Dredging, Dykeing, Ditching, GOLD MINING, Etc., of various Styles and Sizes to Suit any Work.

MINE HOISTS, HOISTING ENGINES, HORSE POWER HOISTERS, SUSPENSION CABLEWAYS, STONE DERRICKS, GANG STONE SAWS, Submarine Rock Drilling Machinery.

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WIRE MANUFACTURERS  
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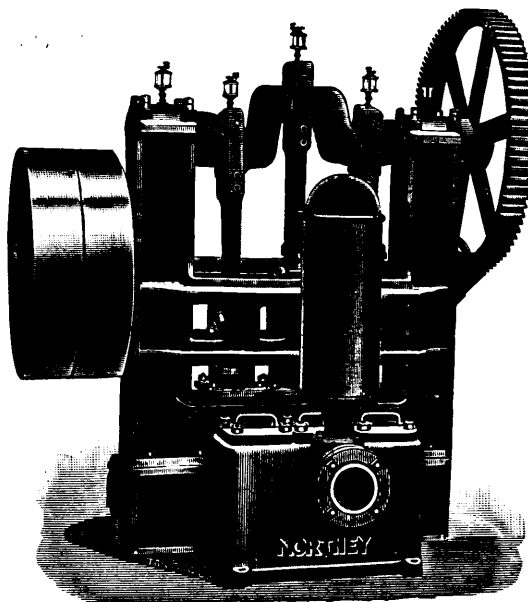
Perforated metal of Steel, Copper, Brass, Zinc, for all purposes. Special attention given to

**MINERS' REQUIREMENTS.**

## Pumps for Mine Work Triplex Power Pump . . . . .

We are manufacturing headquarters for all classes of Pumping Machinery. We have been in this business for a great many years and have given special attention to the construction of Mine Pumps. We are prepared to quote on Station Pumps; Pumps for bad Mine water; Pumps actuated by Electricity, Compressed Air or Steam; Sinking Pumps or Pumps for any special duty.

Catalogues, Plans and Specifications furnished on request.



We illustrate in this advertisement a typical Pump for Mine Work. This is our Triplex Power Pump, fitted with tight and loose pulleys as shown in cut. It is the regular Triplex type with the three cranks 120 degrees apart; crankshaft and connecting rods are of steel; gears machine-cut from the solid; plungers of brass and all details carefully worked out. This Pump is especially adapted for service with Electricity as the motor power.

**THE NORTHEY CO.,**

**Limited, Toronto, Ont.**

19th YEAR OF PUBLICATION.

# The CANADIAN MINING REVIEW

Established 1882

THE OLDEST AND ONLY OFFICIAL MINING AND ENGINEERING JOURNAL PUBLISHED IN THE DOMINION OF CANADA.

B. T. A. BELL, Editor and Proprietor.  
Secretary, Canadian Mining Institute, etc.

Published Monthly.

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

VOL. XX., No. 7.

JULY, 1901.

VOL. XX., No. 7.

## The Fuel Question Again.

We feel it to be part of our duty to revert again and again to this vital problem of fuel, since the future welfare of a large portion of Canada hangs upon a solution of it. The need of solving it may not appear as strongly to many minds as it does to ours while the wave of present prosperity lasts, and perhaps there are many who do not realize that such a problem exists. The general apathy on the subject of cheap fuel for Central Canada is surprising. But, while we dislike posing as prophets of evil, we cannot avoid the conviction that when contraction of values sets in, as is inevitable sooner or later, Canadian manufacturers will be among the first to suffer, and the ability of Canada to weather the storm will depend in large part upon her ability to secure cheap fuel. Water power will in some measure sustain her industries, but not every region is blessed with such advantages, and it so happens that abundance of water power exists only at two prominent points in the centers of population close to established lines of communication in Central Canada. Furthermore, the uses of fuel for purposes other than power are so vital in many arts that water power is by no means a complete substitute. This applies with peculiar force to the iron and steel industry, gas making, cement and brick manufacture. Also the bulk of our manufactures are the products of small plants, remote from water power, and for these only cheap fuel can prevent serious hardship during a period of financial depression.

All this is so obvious that it might seem unnecessary to advance the argument, but the fact that the duty on coal still stands, and that no one earnestly takes up the cudgels against it, proves that the facts need enforcement upon public attention. The sooner a strong sentiment on this question is aroused the better will it be for Canada. The case of Ontario is bad enough even if no duty were to be paid on coal. What excuse can there be for deliberately making a bad case worse by absurd legislation?

The solution of the fuel question for Central Canada would seem to involve two things, viz., first the placing of coal on the free list, and the granting of exemption from toll on fuels passing the Welland canal, and second, the intelligent development of the peat bogs which are found from one ocean to the other.

We are aware that difficulties have attended every effort in the Western Hemisphere to place peat on the market in competition with coal. The peat bogs of the Middle Atlantic and New England States have been fitfully worked, but such enterprises have failed because of the cheapness of coal. It must be borne in mind that peat

is a weak fuel as compared with coal, having an efficiency of from 40 per cent. to 50 per cent. less. This will enable coal to travel a long distance from the mines and still drive peat out of the market. No method has yet been devised by which peat may be dug, dried, and briquetted at a cost as low as that for which coal may be mined and laid at the pit's mouth. In order to compete in this respect peat must be prepared for market at considerably less than one dollar per ton. Again, most peats are unfortunately high in ash. It is only the exceptional bog which will yield a peat containing less than ten per cent. of inert matter, which is about the average ash content of good anthracite, and where anthracite will yield about 8,000 heat units the peat will give only about 3,500 units. Furthermore, peat contains exceptionally large quantities of volatile combustible material, which occasions some serious difficulties in economical combustion under boilers. Firing in the ordinary way, with the usual draft, is out of the question. In fact we may say that it cannot be used with entire success without automatic stokers and mechanical draft. But these limitations are not so serious, especially in a country so remote from the coal fields as is Central Canada. A thoroughly up-to-date power plant using coal is in these days equipped with stokers and mechanical draft, and the pressure of competition will gradually cause all plants of even modern size to discard the old unscientific method of hand firing. If then peat can be produced at the bogs in briquette form at \$1.00 per ton, allowing it to possess half the value of coal as a fuel, it can be sold at less than half the price of its competitor and still allow a good profit to the peat manufacturers.

The Peat Development Syndicate, of Toronto, has been making extensive studies of this question, and promises soon to meet the commercial conditions of the problem. Whether its method of briquetting is the best that can be devised or not we cannot say. The problem has been solved so far as to establish the business on a paying basis in Germany and Scandinavia, and while much may remain to be done in perfecting the details of briquetting, the main features of the process are worked out and well understood. Personally we incline to believe that the method of making moist briquettes, and subsequently drying these, promises to be more successful than previous drying followed by pressing. But this is after all a minor point. In one way or the other the thing can be done.

Another important matter remains to be noticed. The tendency in later years has been steadily toward the production of gas from fuels, especially from those of inferior grade, and then using the gas for steam generation, or for direct application in metallurgical processes. Owing to the high percentage of volatile combustibles in

peat this material is singularly well adapted for gas making. As a source of illuminating gas its value doubtful, though it is not proven that it may not to some extent be used to replace coal for this purpose. In the manufacture of producer gas, however, it seems indubitable that peat has a large future. For this purpose it does not need to be briquetted, so that a large cost in its preparation is saved. Experiments along this line have been making for some time, and recently a small plant has been erected at the Trent Valley Peat Fuel Works, near Kirkfield, Ont., whose operations will be watched with interest.

We sincerely hope that strenuous efforts will be made to solve the peat problem for Canada, which means the solution of a great part of the fuel difficulty, but the full solution, so far as it can be reached, will only come when the Dominion Parliament recognizes its duty in the fostering of Canadian industry by removing every tax and restriction of whatever sort from coal and coke, at all events when delivered in Central Canada.

### Nova Scotia Steel & Coal Co.

The reorganization of the Nova Scotia Steel Company Limited, to which we referred in a recent issue, has now been completed and this highly successful Canadian mining and industrial enterprise will hereafter be known as the Nova Scotia Steel and Coal Company. The history of this undertaking hitherto so shrewdly and economically managed has been one of marked progress and prosperity:—

In 1872 a business was established at New Glasgow, Nova Scotia, under the name of The Nova Scotia Forge Company, for the manufacture of railway and marine forgings. The enterprise prospered, and in 1882 the proprietors decided to establish another concern to engage in the manufacture of steel. The Nova Scotia Steel Company was therefore formed to manufacture steel from imported pig iron and scrap steel, by the "Siemens-Martin Open-Hearth" process.

Seven years later, namely, in 1889, to ensure economy in working these two concerns were amalgamated as the Nova Scotia Steel and Forge Company, Limited, and extensions and additions were subsequently made to the plant. In 1891 a company was incorporated called The New Glasgow Iron, Coal and Railway Company, and built a blast furnace for making pig iron at Ferrona, near New Glasgow.

In January, 1895, the Nova Scotia Steel Company acquired the interests of the New Glasgow Iron, Coal & Railway Company and the Nova Scotia Steel and Forge Company, and carried on the business, previously conducted by these companies, until the present year. During the year 1900 the Nova Scotia Steel Company purchased as a going concern the business and property of the General Mining Association, Limited.

The General Mining Association was formed by Deed of Settlement in 1829, and (inter alia) took over the lease of the Duke of York's extensive coal areas in Nova Scotia. In, or about, 1858, by arrangement with the Provincial Government of Nova Scotia, the Association released some of its rights and secured the exclusive right to all coal seams in certain areas. The leases have been renewed, and are now held under the general law of Nova Scotia. The Association had disposed of some of these coal areas before the property was purchased by the Nova Scotia Steel Company, but had retained the Sydney Mines and point Aconi Areas, which contain a superior quality of coal, with good facilities for shipment.

Owing to the acquisition of the business and property of The General Mining Association by The Nova Scotia Steel Company, additional capital is required for the development of the coal and other properties, and reorganization has been carried out in accordance with the resolution adopted at the Special General Meeting of the

Shareholders of the Nova Scotia Steel Company, held on the 25th day of October, 1900.

Under the arrangement decided upon, the shareholders of the Nova Scotia Steel Company receive in payment for their property \$3,090,000 of common stock and \$1,030,000 of eight per cent. cumulative preferred stock in the Nova Scotia Steel and Coal Company, Limited.

This Company was organized in June 1901, with a capital of 50,000 shares of common stock of \$100 each, 5,000,000; 20,000 shares of 8 per cent. cumulative preferred stock of \$100 each, \$2,000,000 also \$2,500,000 first mortgage 6 per cent. 30 year gold bonds.

After providing for the purchase of the property of the Nova Scotia Steel Company there will remain in the treasury, for the future needs of the new company: Common Stock, \$1,910,000, Preferred Stock, \$970,000.

The new capital required and which will be provided by the bond issue is for:—

Redemption of The Nova Scotia Steel Company's temporary loan . . . . .	\$1,500,000
Development of Coal Mines, erecting shipping pier coke ovens, coal washing plant, Furnaces, etc. . . . .	1,000,000
	\$2,500,000

The properties which will be taken over and owned by the Nova Scotia Steel and Coal Company, Limited, consist of:—

1. All the lands, shafts, buildings, plant and railways used in connection with the coal mines, together with the leases of the coal areas which were acquired by the Nova Scotia Steel Company, from The General Mining Association. These areas extend from Sydney Harbour to the entrance of the Great Bras D'Or, and comprise:—

(a) The Point Aconi and Sydney Mine areas of 11,700 acres, which contained in 1871, according to the estimate of the late Mr. Richard Brown, 155,000,000 tons of coal.

(b) The Sydney Mine submarine areas of 3,200 acres, estimated by the same authority, in 1871, to contain 66,000,000 tons of coal.

Since 1871 about 5,000,000 tons only have been worked out of the Sydney Mine and Sydney Mine Submarine areas. The Point Aconi areas have not yet been worked.

2. About 7,824 acres of Freehold Land in Cape Breton.

3. A Freehold Iron Ore Mine situated at Bell Island, Conception Bay, Newfoundland, and all deposits of Iron Ore held by the Company, in Fee simple, or by lease, in Nova Scotia.

4. Leases of coal areas, containing two coal seams of good quality now being opened up, situate within six miles of the Steel Works at Trenton.

5. A standard gauge railway, 12½ miles in length, with 3.87 miles of sidings, with rolling stock, in Pictou County, N.S.

6. About 160 acres of freehold land at Ferrona, Nova Scotia.

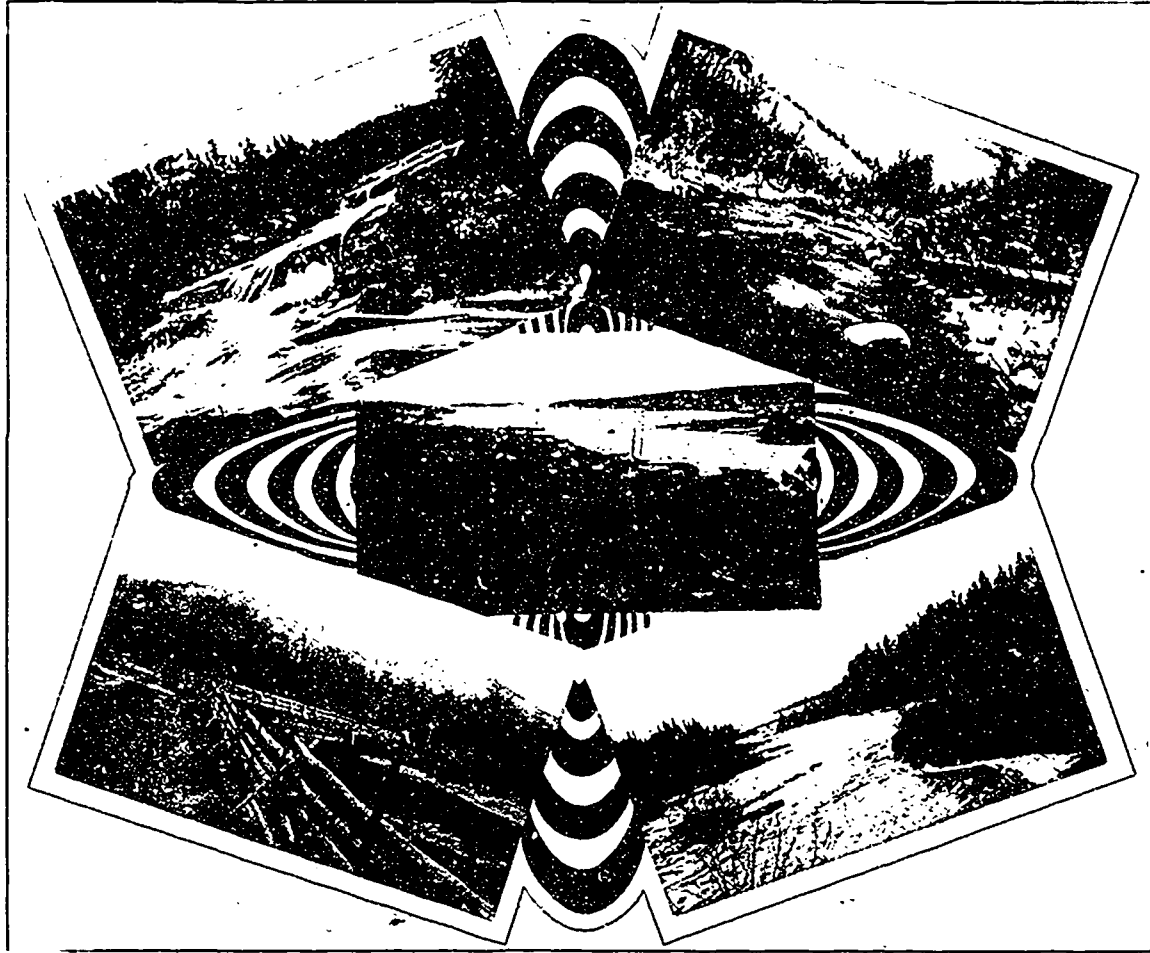
7. A blast furnace, Coal Washing and Coking Plant built in 1892, at Ferrona, with a capacity of 100 tons of pig iron per day.

8. About 50 acres of land at Trenton, near New Glasgow, on which are the steel works, consisting of four steel melting furnaces, together with the rolling mills, forges and other plant, capable of turning out 100 tons of finished steel a day. Over 4 acres are actually covered by buildings, and the tramways in and about the works aggregate about 4 miles in length.

9. Large limestone and dolomite properties, of excellent quality, in the County of Cape Breton.

10. Net assets represented by cash balances, book debts and stock in trade. (These amounted to \$635,789.48 on the 1st day of January, 1901.)

The property of the company at Newfoundland, Cape Breton, Ferrona and New Glasgow was examined in April, 1901, by Messrs Simonds and Wainwright, mining engineers, of 159 Front Street, New



These views show the location of the gold areas and water power at Upper Seal Harbour, Stormont District, Nova Scotia, now being exploited by the Doliver Mountain Mining and Milling Company.



MR. G. J. PARTINGTON,  
Upper Seal Harbour, N.S.,  
Manager of The Doliver Mountain  
Mining and Milling Co.



MR. FREDERICK KEFFER, M.E.,  
B. C. Copper Co.,  
Anaconda, B.C.



MR. P. KIRKGAARD,  
Canadian Gold Fields,  
Deloro.

York: and the books were, at the same date, examined and audited by Messrs Marwick and Mitchell, chartered accountants, of 27 Pine street, New York, who valued the property (exclusive of the good will) at from \$4,250,000 to \$4,500,000.

The geographical position of Cape Breton, on the Atlantic coast of America, makes the coal deposits in this island of great value, as they are the only available deposits at tidewater on the Atlantic coast of America. The areas owned by the Company adjoin the shores of Sydney Harbour, with a coal shipping pier at North Sydney, and are, therefore, most favourably situated for shipment to Europe, South America or the East, North Sydney being 1,000 miles nearer Europe than the United States coal deposits.

The Iron Ore Mine, situated at Conception Bay Newfoundland, and known as the Wabana Iron Mine, is estimated by R. E. Chambers, M.E., to contain 6,000,000 tons of red hematite ore. The average iron contents of last year's shipment of this ore to the United States was over 55 per cent. The mine is equipped for an output of over 300,000 tons during the shipping season. The shipping dock accommodates the largest class of modern steamers, with draught up to 28 feet of water, and boats of 6,000 to 7,000 tons capacity have been loaded at a rate of over 1,000 tons per hour. The situation of the property is central for export to either the United States or Europe, being six days, sailing from the principal foreign ore-receiving ports of the former, and eleven days from those of Europe. 60,000 tons of this ore have been sold for delivery during the present year at Philadelphia, and about 200,000 tons for Germany and Scotland.

The coal areas near Trenton are now being opened up, and by the close of the present year that property will supply all the coal required for steam and heating purposes at the steel works, Trenton; and in order to increase the output from the areas acquired from The General Mining Association, which during the last three years has averaged about 250,000 tons per annum, it is intended to open one or more new collieries on this property, by which it is estimated that the output will be increased to about 600,000 tons per annum.

The profits of the Nova Scotia Steel Company, Limited, for the years 1898 and 1899, as certified by the auditors, amounted to \$414,586.

The profits of the General Mining Association, Limited, for the years 1898 and 1899, as certified by the auditors, amounted to \$192,973.

The profits of the combined business for the year 1900, exclusive of bounties, as certified by the auditors amounted to \$530,581.

This makes the profits of the combined properties exclusive of bounties for the 3 years \$1,138,140, or a yearly average of \$379,380.

In addition to the profits already shown, the company received by way of bounties on pig iron and steel ingots from the Government of Canada, under authority of 60 Vict., Chap. 6, amended by 62-63 Vict., Chap. 8 (Can.) the sum of \$398,506, being a yearly average of \$132,835.

The total profits for the three years including bounties amounted to \$1,536,646, being a yearly average of \$512,215.

Unless further legislation is enacted, the bounties payable by the Government of Canada will be reduced annually after April 23rd, 1902, and will expire on June 30th, 1907.

It is estimated that the future average yearly profits will be:—

From sale of 275,000 tons of iron ore at 70 cts. . . . .	\$192,500
From sale of 500,000 tons of coal at 80 cts. . . . .	400,100
From iron and steel works . . . . .	150,000

Being a yearly average profit of . . . . .	\$742,500
Interest on bonds at 6 per cent. and sinking fund . . . . .	\$200,000
Dividend on preferred stock at 8 percent . . . . .	82,400
	<hr/>
	\$282,400

Leaving for dividends on common stock, depreciation and reserve	\$460,100
-----------------------------------------------------------------	-----------

### Mikado Gold Mining Company.

The accounts for the year ended 31st December last show that while this well known Lake of the Woods gold mining enterprise produced bullion of a value of £21,883 7s. 1d., the net profit of the year is somewhat disappointing, being but £1,903 1s. 2d. which together with the balance forward last year of £4,599 15s. 7d. makes a total profit of £6,502 16s. 9d. which the directors recommend should be carried forward. The returns from the mill and cyanide from 1st January until 31st August (when regular crushing was suspended to admit of the new works being carried out) were 7,811 tons crushed producing 4,705 ounces of gold and from cyanide 5,194 tons, 2,410 ounces of bullion, since when (up to the end of the year) the crushings have been irregular and the results disappointing. The previous years accounts, covering two years and three months operations showed bullion receipts amounting to £38,825 16s. 9d. A reference to the following figures of the monthly mill runs and cyanide returns, kindly furnished by the management will be of interest:—

#### OUTPUT 1898.

January . . . . .	462 ounces.
February . . . . .	550 "
March . . . . .	730 "
April . . . . .	444 "
May . . . . .	169 "
June . . . . .	240 "
July . . . . .	251 "
August . . . . .	265 "
September . . . . .	134 "
October . . . . .	227 "
November . . . . .	250 "
Cyanide . . . . .	74 "
December . . . . .	393 "
Cyanide . . . . .	74 "

#### OUTPUT 1899.

January . . . . .	407 ounces.
From Cyanide . . . . .	243 "
February . . . . .	316 "
Cyanide . . . . .	100 "
March . . . . .	236 "
Cyanide . . . . .	175 "
April . . . . .	334 "
Cyanide . . . . .	142 "
May . . . . .	313 "
Cyanide . . . . .	148 "
June . . . . .	288 "
Cyanide . . . . .	304 "
July . . . . .	372 "
Cyanide . . . . .	253 "
August . . . . .	451 "
Cyanide . . . . .	324 "
September . . . . .	557 "
Cyanide . . . . .	329 "
October . . . . .	657 "
Cyanide . . . . .	203 "
November . . . . .	658 "
Cyanide . . . . .	214 "
December . . . . .	691 "
Cyanide . . . . .	273 "

#### OUTPUT 1900.

January . . . . .	655 ounces.
Cyanide . . . . .	299 "
February . . . . .	621 "
Cyanide . . . . .	179 "
March . . . . .	697 "
Cyanide . . . . .	221 "
April . . . . .	607 "
Cyanide . . . . .	287 "
May . . . . .	569 "
Cyanide . . . . .	288 "
June . . . . .	531 "
Cyanide . . . . .	413 "
July . . . . .	518 "
Cyanide . . . . .	403 "
August . . . . .	507 "
Cyanide . . . . .	320 "
October . . . . .	118 "
Cyanide . . . . .	210 "
November . . . . .	138 "
Cyanide . . . . .	108 "
December . . . . .	116 "
Cyanide . . . . .	50 "

ASBESTOS MINING IN QUEBEC.



Cable Derrick plant at King Bros. Mines. The thriving settlement of Thetford Mines in the background.



Interior of open-cast workings, Thetford Mines, Ont.



### Mining Progress in Ontario.

The first report of the Ontario Bureau of Mines issued by Mr. T. W. Gibson since he assumed the duties of Director in succession to Mr. A. Blué has just been published, and reviews in an able and interesting manner the progress of mining enterprise in this go-ahead province during the year 1900.

It embraces very full statistics concerning each department of the mining and metallurgical industries, including the reports of the inspectors of mines, and also comprise several special reports by a number of technical officers dealing with the geological characteristics of the regions containing mineral deposits which are considered to afford promising fields for operation.

Last year was one of considerable activity in mining, the more important developments being of a solid and substantial character, with considerably less of the merely speculative element that has characterized former seasons. Forty eight companies were incorporated with \$35,818,999 capital, as against 74 companies with \$87,382,994 capital in 1899, and 9 outside corporations with \$6,585,000 were licensed to do business. Mining lands to the extent of 30,972 acres were sold and granted, and 28,127 acres leased, the total receipts for sales, leases, etc., being \$108,952.

Gold production, which has largely been on a speculative basis, has fallen off, the value of the yield being only \$297,861 as compared with \$424,568 for 1899. But notwithstanding this decrease and that of the production of natural gas, the total estimated value of the output of minerals has increased from \$8,416,083 in 1899 to \$9,298,624 in 1900, the increase being at the rate of 10 per cent. The number of workmen employed was 10,934, and had increased in nearly equal proportion, while the wages paid, amounting to \$3,366,601, were 15 per cent. more.

The iron industry has made great advances. The number of iron mines in operation during the year was 12, from which the aggregate output was 90,302 tons, valued at \$111,805. This is an increase of 73,391 tons and \$80,854 over the yield for 1899. The number of employees had risen from 100 to 438 and the wages paid from \$26,700 to \$107,583. The most significant feature in connection with this expansion has been the extent to which native ore has supplanted the American product in the manufacture of pig iron at Ontario blast furnaces. The output of pig iron was 62,386 tons, the value of which, \$936,066, exceeded the value of the previous year's product by \$127,909. In the process, 22,887 tons of Ontario ore were consumed, being a percentage of 23 per cent. of the whole. But as an abundant supply of hematite ore from the Helen mine is now available, this proportion has since been greatly increased. According to figures for the first three months of 1901, furnished in the introduction to the report, the proportion of native ore used in Ontario blast furnaces has risen to 43 per cent. of the whole. It is altogether probable, in view of the rapid development of the Michipicoton iron mines, that before long nearly the whole of the hematite required will be supplied from this source. The number of workmen employed in the blast furnaces have been more than doubled, the force in 1900 comprising 419 men, who earned \$97,915. Recent discoveries have considerably extended the area known to be iron producing, and there is reason to expect that a considerable region to the east of Lake Nepigon contains deposits which can be profitably mined.

In copper and nickel production steady progress has also been made, the principal producer of both of these metals being the Canadian Copper Co., whose operations were on a larger scale than in any previous year. The total output was as follows: 1899, nickel 2,872 tons, value \$526,104; copper 2,834 tons, value \$176,236; 1900, nickel 3,540 tons, value \$756,626; copper 3,364 tons, value \$319,681. The

values given are those of the unrefined metal as exported in the form of matte. The copper and nickel mines employ 1,444 workmen, 350 of them working underground.

An important new industry, returns of which are given for the first time, is that of steel manufacture. The output amounted to 2,819 tons, valued at \$46,380. Other items which have been added to the yearly increasing list of Ontario's mineral products are corundum and felspar.

The production of mica has considerably increased, the year's output being 643 tons, valued at \$91,750. Cement was produced to the value of \$698,015, an increase of \$136,749. The value of petroleum products rose from \$1,747,352 to \$1,869,045, while that of natural gas was reduced from \$440,904 to \$392,823 owing to the exhaustion of the supply.

The report will be found very useful to prospectors, miners and capitalists interested in mining and metallurgy. It is neatly got up and very well arranged for the purpose of reference, and is handsomely illustrated.

### A Lull in the Coal Trade.

Consumers of Nova Scotia coal anxiously watched the opening of trade in the spring in hopes of some reduction from the prices prevailing at the close of last year but failed to note any indications. The requirements seemingly demanded the full output and something more and spring contracts firmly maintained the rates. The call for coal has been continuous. But the month of July has seen a slackening off of the output at the mainland collieries, the first experienced for a couple of years, and several reasons have led to this condition. The miners have been working more regularly than they did last autumn and have produced more tons per man per month. More men also have gone into the coal mines. Midsummer also has a habit of being dull in demand at these pits, and then there was the large purchase of foreign coal by the Intercolonial Railway when the talk of strikes last Christmas threatened the vitality of that great consumer of fuel. Officials becoming justly alarmed laid in a supply of foreign coal and that road finds itself at the end of the financial year with some 100,000 tons of coal on hand and without contracts yet completed for the coming year. In order to profit the better by the higher prices prevailing in local markets fewer steamers in the Montreal trade were engaged out of Pictou than that port has seen for many a long year and the dullness of July's trade has resulted.

## COAL MINING AND TRADE.

Our notes in last issue on the subject of the Dominion Coal Company's Annual Reports and Balance Sheet have attracted considerable attention and given rise to much discussion, the general consensus of opinion being that our criticism might have been much stronger without straining the facts of the case. Much has been said from time to time about the superiority of American over Canadian management and the absolute necessity of utilizing the former in the exploitation of Canadian mining adventures. With this view we have never sympathized for while admitting the great energy, skill, and enterprise which characterize our successful neighbors of the South, we have never believed that they enjoy a monopoly of the qualities essential to commercial success. We do not believe that the watch word "Canada for the Canadians" means the exclusion of men of merit from other countries and we certainly do not believe that it involves the depreciation of our own people to the extent indulged in by some of our leading corporations. While our American friends

have made a few notable successes in Canada, they have also registered many disastrous failures largely in consequence of their disposition to expend large sums upon costly experiments. The banks of the Dominion Coal Company, as well as others we could mention, are strewn with the wreckage of abandoned experiments and not a little of this company's enormous capital expenditure has gone in this way. Probably in this as in many other instances it is the last straw which has broken the camel's back—we refer to the sum of \$179,327.51 charged on the balance sheet to Dominion No. 4, every cent of which according to the best authorities is absolutely wasted. This mine is in the Emery seam which was well tested near Reserve mine in 1893 and very properly condemned and abandoned by the present company. It was found to be a coal of good quality but uncertain thickness, the floor was fire clay which was rendered so soft by the large quantity of water in the seam that it was impossible to maintain the roads and workings. After closing down the best mine they possessed (Victoria) in a moment of foolishness they attempted to open another mine, Dominion No. 4 in the Emery seam and before ascertaining whether the conditions were any more favorable at the new site than the old they erected a most elaborate surface plant at a cost exceeding \$100,000, which is now of no value whatever for the purpose intended since the Emery seam has turned out worse, if possible, in the new venture than the old, the coal having gradually diminished from five feet to two feet in thickness. The last extraordinary device, in order to prevent the entire abandonment of the plant was to put down a haulage system to convey the coal from No. 3 a distance of a mile and utilize the surface appliances at No. 4 for loading. This is indeed a remedy which is worse than the disease as it handicaps No. 3 for all time while the cost of removing the plant and setting it up at No. 3 would be repaid the first year. This is only one of many similar blunders which have helped to swell the capital account of the Dominion Coal Company to \$20,801,500 and has providentially hastened the down fall of a regime which in a little while would have overwhelmed this splendid concern with irretrievable disaster. We do not for a moment suppose that with a Canadian in supreme control no mistakes will be made but we venture to think that the new management will profit by the experience of the old. The record of Mr. James Ross is a sufficient guarantee that the interesting but expensive luxury of "kite flying," will no longer be indulged in. There is already evidence of the introduction of a new element into the management, economy, and with a good year's trade, the absolute closing of capital account, and the vigorous development of recovery work this large enterprise may in a year's time find itself in a position to show a fair working profit and to produce coal at 80 cents which was the cost in 1898.

The exorbitant prices asked for coal areas in Cape Breton have effectually prevented any transactions and now it seems that the terms which same owners are seeking to attach to options are so ridiculous as to raise a doubt as to their sanity. One of the latest, which would hardly be believed if it were not stated on the authority of the "Maritime Record," is that the optionee should furnish to the owner a *daily* record of the borings. This seems too much for Senator McKean and he has promptly declined to proceed with the negotiations. This is a pity because there is little doubt that valuable coal seams exist near the Mira within a few miles of Burkes and no one is better able to ensure their exploitation than the Senator and his associates. The easy access to large areas of good coal on the property of the Dominion Coal Company has discouraged exploration in other parts of the Island where the conditions are not as favorable, but now that the demand has so greatly increased these outlying properties will

have a chance and if reasonable terms are asked there will be no difficulty in bringing them into the market. Having regard to the greater expense attendant upon recovering and transporting coals in the back lands \$10,000 a square mile is the outside value of the most promising properties, and any holder of supposed coal areas would be well advised in granting an option for a reasonable time, say six months, without any deposit, on condition that a satisfactory amount would be expended in proving the property. The old argument that an optionee should pay for the luxury of proving an uncertain property belonging to some one else on the ground that the property is "tied up," is exploded, and, in our opinion, the owner gets all the best of the deal in having his property proved without cost to himself. He is sufficiently protected by the fact that the men who put up the money for this purpose cannot afford to turn it down afterwards if it is of value and they have the greatest interest in carrying through the deal.

An important and interesting meeting of the Nova Scotia Steel and Coal Company was recently held in Halifax when the new concern took over the property of the Nova Scotia Steel Company and financial arrangements were concluded for the future conduct of the business. The purchase consideration is \$4,120,000 and in addition it is estimated that the company will require the sum of \$2,500,000. Of this \$1,000,000 is for the development of coal mines, erecting shipping pier, coke ovens, coal washing plant, furnaces, etc. It is intended to establish a new mine at Cranberry Head with a capacity of 300,000 tons a year. The estimates of the profits of the company is as follows:—

Ore, 275,000 tons at 70 cents.....	\$192,500
Coal, 500,000 tons at 80 cents.....	400,000
Iron and Steel Works.....	150,000
	\$742,500

After paying interest on bonds at the rate of 6 per cent. and on preferred stock at 8 per cent. this would leave \$460,100 for dividends on common stock being nearly 10 per cent. and we should say a very moderate estimate. The whole conduct of the affairs of this company, and the business like and fair manner in which they have put their properties upon the market is deserving of note as contrasted with the outrageous figures asked for same properties of far less value, and we cordially wish them every success in their new venture.

The dispute between the C. P. R. and the Crow's Nest Coal Company does not appear likely to be settled amicably for, according to the latest advices, the former have secured from the courts an injunction restraining the latter from building a branch line up Morrissey Creek. The ground on which the application was granted is that the Crow's Nest Southern Railway Company had failed to comply with the provisions of their Charter in several important respects notably in not making the necessary cash deposit required as a guarantee for the proper carrying out of the Charter. In consequence of this injunction all railway operations have been suspended and the whole matter is to be fought out in the courts. It is not unlikely that the issue will be much wider than the mere question of a branch siding as the C. P. R. have raised a question as to the title of the Coal Company to all the property of which they became possessed in consequence of the building of the Crow's Nest line. It will be remembered that the B.C. Government many years ago made a grant of 250,000 acres of coal lands to the B.C. Southern Railway as a subsidy for building the C. N. Ry. As they failed their grant by arrangement passed to the C. P. R. when they built the line under a

Dominion Charter. As is well known the latter company agreed to transfer the bulk of this enormous subsidy to Messrs. Cox and Jaffary for political services, and they in turn formed the Crow's Nest Coal Company to carry out the provisions of their agreement. In the action which has now commenced it is alleged that the Coal Company have broken their agreement, both with the Government and the C. P. R. in such a manner and to such an extent as to disentitle them to receive the coal lands upon the terms originally provided, if at all, and as the title has never yet been transferred to them it is claimed that they should not now receive it. The important respects in which it is alleged that they have broken their agreement are: 1st in failing to supply the requirements of the Province; 2nd in charging the B.C. consumers a higher price than stipulated in the Charter; and 3rd that not having made their selection of coal areas within the stipulated time they are not now entitled to do so. What the outcome may be it is impossible to say, but it will be observed that these allegations are upon lines repeatedly canvassed in these columns and that they raise for the decision of the courts matter of vital importance to all parties concerned as well as to the interest of the Province.

### **The Collin's Process of Heating and Drying Compressed Air.**

By E. J. WALSH, C.E., Lake Temiscamingue, Que.

A patent embodying all that the above specifies, and entitled a "Process of Heating and Drying Compressed Air," has recently been granted by the Canadian Patent Office, to John J. Collins, and Edmund J. Walsh of the city of Ottawa, the former being the discoverer, and the latter an interested party in the invention.

The discovery made by Mr. Collins is of the most important nature, is based on thoroughly scientific principles, and by its application the use of Compressed Air, Liquid Air, and Air power in all its various forms will be rendered so complete, as to revolutionize the economic application of all natural forces whether utilized for driving stationary machinery, moving trains, operating street railway systems, navigating the oceans, rivers and lakes, cooling and ventilating, and for every purpose for which power, other than manual labour, is desired.

Compressed Air is one of the most valuable, and most economical powers in use to-day, and while it has been largely used hitherto, its general application, in preference to other forces, has been somewhat curtailed in view of the fact that serious difficulties have arisen in the use of it at an atmospheric temperature of 40° Fahrenheit, or lower, on account of the freezing of certain essential portions of machinery which are necessary for utilizing this power. The inventor having been associated with various large undertakings on this continent where Compressed Air plant had been installed, but which in every instance had been rendered useless for several months in each year, by reason of the freezing, as referred to above, applied his energies to overcome those difficulties, with the result that his efforts have been crowned with success, and the use of Compressed Air, in any form, is now available in all latitudes, all altitudes, and at any degrees of temperature. I can personally vouch for this, as Mr. Collin's process was adopted at the mine of the British and Canadian Lead Company, Limited, at Lake Temiscamingue, Quebec, in November, 1900, and has constantly been in use since.

The temperature during the past winter has frequently been as low as 40° below zero, yet not the slightest difficulty was experienced in operating the machine drills, the hoist engine, and the mine pump by Compressed Air. Previous to this we were unable to operate the hoist engine by Compressed Air, and had to use steam for the purpose,

even difficulties were experienced in operating the mine pump. I tried various means to overcome the freezing of the air, and consulted several manufacturers of Compressed Air Machinery, on the subject, and while some advised the adoption of various expedients, yet none were positive as to their efficacy. Being aware that the difficulty regarding the freezing of Compressed Air in operating machinery had always existed, I was unwilling to incur any expense in experimenting, but when Mr. Collins placed his proposition before me, and satisfied me that he could put in his process without any expense I readily acquiesced, and he applied it while the hoist was still in operation, increasing its power in effectiveness, and also enabling us to largely reduce expenses in the matter of fuel and wages.

This discovery will place Compressed Air in the forefront of all physical forces, whether used as a power, or for ventilating, and there can be no question but that its adoption will become universal in a very short time.

## **EN PASSANT.**

We regret to learn of the death in Arizona of Mr. Lionel H. Shirley, C.E., an engineer who has been familiar in Eastern Canadian railway and mining circles for many years. Mr. Shirley will perhaps be remembered by many of our readers as the engineer who opened the celebrated Villeneuve Mica Mine away back in 1885-6.

Professor Courtenay De Kalb who, for a number of years has ably fulfilled the position of Inspector of Mines in Ontario in conjunction with that of Lecturer in Mining and Metallurgy at the Mining School at Kingston, has resigned and will go into professional practice on his own account in Boston. Mr. De Kalb's services to the Government and mining industry of Ontario have been of the greatest possible value, and to him, more than any other, has been due the marked elevation of the status of the Kingston School to a practical training college for Canadian mining engineers.

Volume IV. of the Journal of the Canadian Mining Institute is rapidly nearing completion and should be in the hands of the members by the end of August. It will be a handsome volume of close upon 400 pp. profusely illustrated with line and half tone engravings illustrating the text.

Sufficient funds having been subscribed to meet the expense of painting the Dawson and Selwyn portraits, this fund is now closed. The portraits, which have been admirably executed by Mr. Franklyn Brownell, the Canadian artist, will be formally presented to the Survey sometime in the fall when the members of the staff return to Ottawa from their season's operations in the field.

It is not unlikely that both the Canadian Mining Institute and the Mining Society of Nova Scotia will hold meetings in September. The Institute contemplates a visit first to the Sudbury nickel and copper mines, thence on to Sault Ste. Marie for an inspection of the great copper and iron and steel industries at that point, returning by way of Central Ontario where a stop of several days' duration will be made to permit the members to see the mines and works of the Canadian Gold Fields, the Cordova Exploration, the Atlas Arsenic Company, and other features of this unusually interesting mining section. The proposed excursion, it is expected, will occupy at least ten days. The Mining Society's meeting will, as usual, be held in Halifax.

Mr. Charles Fergie, M.E., President of the Canadian Mining Institute, has returned to Nova Scotia, from a well earned holiday in the old country.



THE LATE MR. JAMES F. LEWIS,  
PRESIDENT CANADIAN RAND DRILL CO., SHEERBROOKE, QUE.,  
Died-23rd July, 1901. Age 61 years.

The present number of the REVIEW had been made up and printed before the intelligence reached us of the death of our dear old friend "Jim" Lewis, and we have only time at this writing to merely chronicle the sad event. He had been ailing for some time and was on his way South with his family, when, at Boston, his illness took a serious turn and, after much sufferings he passed away on Tuesday, the 23rd instant. Mr Lewis was widely known and immensely popular among mining people in the United States and Canada. As president of the Canadian Rand Drill Company he came to Canada a few years ago to direct the affairs of the large establishment of that company at Sherbrooke, Que. He was for a number of years an officer of the American Institute of Mining Engineers and during the memorable visit to America of the Iron and Steel Institute he rendered conspicuous service as the successful organizer of one of the most arduous portions of that remarkable programme. He was also a Vice-President of The Canadian Mining Institute among whose members he was a great favorite. Less than a year ago he was the life of the party which visited Cape Breton, and at the succeeding March meetings he took, as usual, a foremost part in contributing to their success. In his death we lament the loss of a warm personal friend.

### The West Gore Antimony Deposits.

By Mr. W. R. ASKWITH, Halifax.

Through the courtesy of Mr. Alex. McNeil, the writer is enabled to give this brief description of the West Gore antimony deposits of Hants County, Nova Scotia.

In the year 1880, float antimony ore was found by John McDougal on his own farm, and trenching was commenced with the view of discovering its source, but owing to the idea that the vein would run parallel with the strike of the country rock considerable work was done before the outcrop of the vein was reached.

During the years from 1880 to 1892 the mine was worked with varying success, and under a number of managements, when it was closed down, and remained so until the present owner acquired the property about two years ago, and since then considerable prospecting work has been done.

About 1,100 feet from the McDougal discovery, in a south-westerly direction, another vein of this same ore was found by Gould Northrup in 1887.

The North and South veins as they have been called, each have the same course, dip, and general characteristics, but as it was from the north vein that the large proportion of ore was obtained, the writer will confine himself almost entirely to it in this description.

The north vein is a true fissure vein; it has a course N. 45° W. and a dip to the S.W. averaging 85° from the horizontal, and has been traced upon the surface for over 1200 feet. The jumbled up slate, calcite and quartz which constitutes the vein filling is cut by numbers of small quartz stringers from the footwall side. This footwall is irregular and indistinct, but the hanging wall is always clear cut and smooth. The country rock is made up of grey slates and quartzite, which have a strike almost east and west, and a dip of 45° from the horizontal, towards the south, and no faulting has occurred since the vein was formed.

The ore as a rule clings closely to the hanging wall, but in one or two places it splits in two and one part follows the hanging wall and the other the foot wall, while at times it will break entirely away from either and follow the centre of the vein.

The ore is stibnite, solid some times, and then again is mixed with quartz. Where the stibnite has been exposed it has oxidized into the orange-colored kermesite and the white valentinite, but these oxides are in very small quantity and only as a thin coating over the solid ore. Sometimes the stibnite is replaced by iron pyrites, arsenical iron pyrites and galena. More or less gold is always found in the ore, and seems as a rule to be richest in that metal when the percentage of stibnite is high. With the exception of where a cross vein of quartz comes into the vein at No. 1 shaft, none of the gold is free, even in ore assaying as high as 10 oz. gold to the ton.

The ore has varied in size from a few inches to 7 feet, and in its widest place has been solid stibnite. The ore chute has an average dip of 45° to the south-east.

No attempt will be made to give any history of the development, but a glance at the plan and sections will show what has been accomplished.

It will be seen that a great many shafts have been sunk on the vein, but the one now called No. 3 was the first deep shaft put down (the outcrop was a little to the west of this), and reached a depth of 170 feet. No. 2 shaft, 220 feet to the eastward, was sunk to a depth of 170 feet, but has since been extended another 70 feet. No. 1 shaft, vertical for 240 feet, with its cross-cut to the vein and crooked winze shaft of 188 feet, was the last sunk and is situated 156 feet east of No. 2 shaft; besides these, four shafts from 20 to 40 feet deep have been sunk on the vein east of the Rawdon road, and two more west of No. 3

shaft; in these, except in No. 4 shaft, the ore was very low grade, but they demonstrate the great strength and continuity of the vein.

The amount of ground stoped is estimated roughly at 76,000 square feet of the vein, and this no doubt is the outside limit, for no account is taken of a little low grade ore which is left in the stopes as pillars and in other places, for the writer is informed that only ore carrying 50 per cent. of antimony and over was marketable. Of course some of the second class ore was sorted up to the standard. From the above amount of ground stoped there has been shipped, according to the export returns of the Customs Department, 3,121 tons, and since the present owner secured the property they have shipped 1,236 tons of second class ore from the dump—550 tons of this were sold to "The Antimony Gold and Complex Ores Extraction Company," sampled and assayed by Claudet, of London, assayers to the Bank of England, etc., and gave 12 per cent. antimony and 18 dwt. in gold—686 tons were bought by the St. Helen's Metal Recovery Company, and sampled and assayed by Messrs. Harrington & Co., and gave 11.83 per cent. of antimony.

From the many assays made of the high grade ore, it is safe to say that the 3,000 tons shipped previous to 1892 averaged between two and three ounces of gold per ton. For a long time it was not known that the ore contained any gold, and when it was discovered the smelters refused to give any value for it.

The greater demand for antimony ore has increased the price, and the improved metallurgical processes have not only made possible the utilization of a much lower grade ore, but have enabled the smelters to pay for a considerable proportion of the gold.

The St. Helen's Metal Recovery Company after putting up a trial plant and proving it successful are erecting works to treat 600 tons a month, and will not only buy ore as low as 12 per cent. antimony at regular market prices, but expect to be able to pay for 75 per cent. of the gold contents.

There are several thousand tons of this second class ore in the mine to-day not stoped, besides large quantities are said to be lying on the scaffolds, which, at the time operations were carried on, it did not pay to hoist to the surface.

The following list of assays will show the value of the second-class ore, but it must be borne in mind that all of the high grade ore was gouged out before the mine was closed down, and that greater depth will have to be obtained before any more high grade ore can be mined. The numerals ranging from 1 to 21 on the longitudinal section indicate from where the samples were taken, and it may here be noted that samples were large, and that every care was exercised to make them an average.

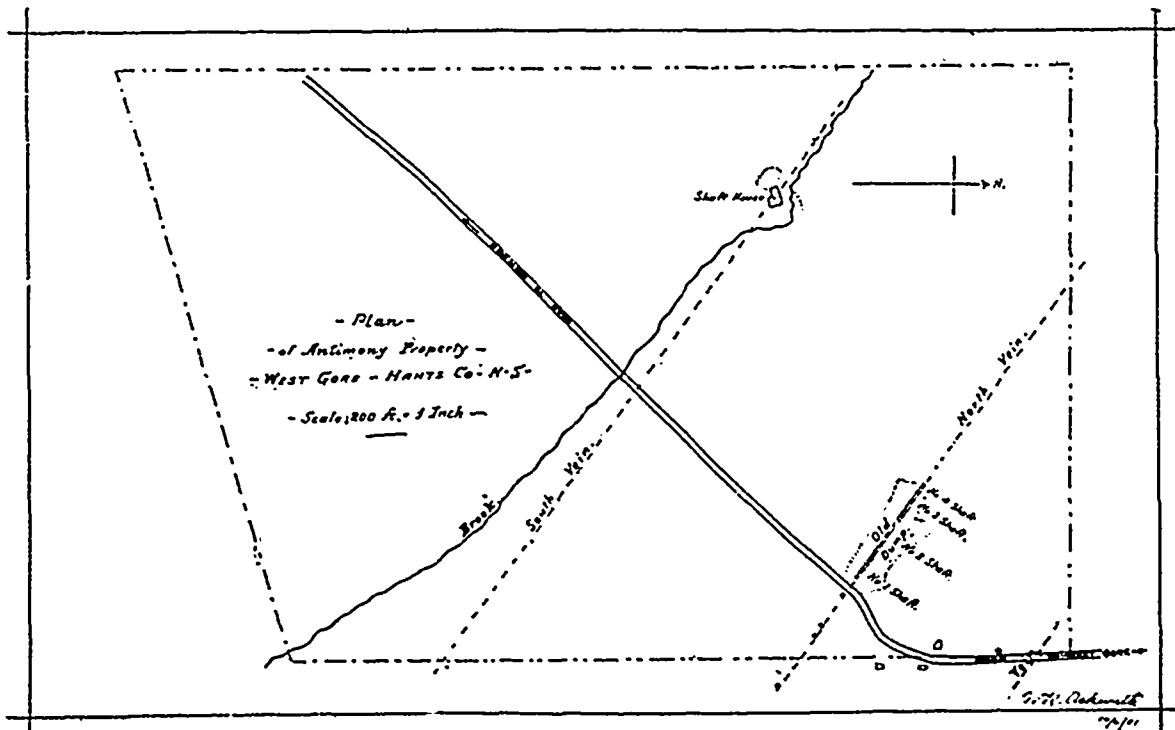
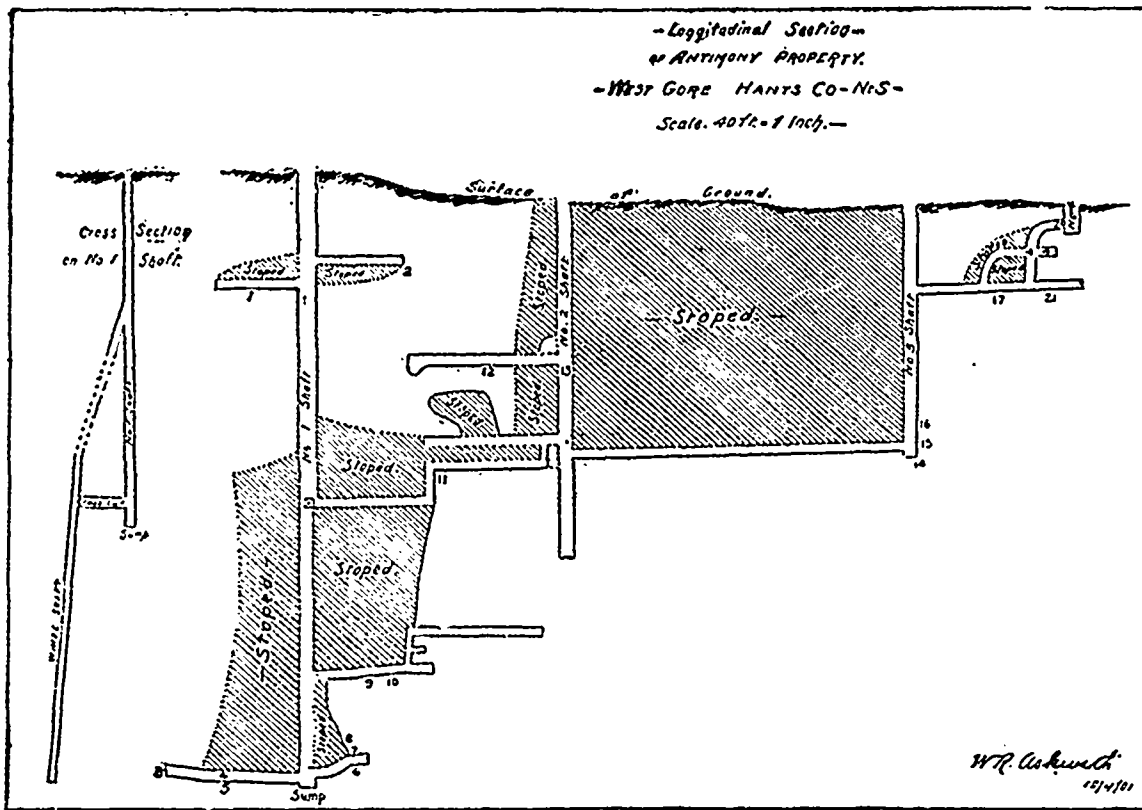
No.	% of Sb	Value of Gold.	Thickness of Ore	Remarks.
1	5.50	\$26.00	12 inches	
2	10.50	30.00	6 "	
4	4.95	3.60	6 "	
5	41.13	186.00	24 "	
7	1.14	14.65	24 "	
10	33.00	35.40	6 "	
12	9.99	21.32	9 "	
13	7.26	1.50	— "	
15	21.80	8.00	8 "	
16	5.37	8.00	1. "	
18	13.61	37.30	4 "	Foot wall ore.
19	28.60	80.00	4 "	Hanging wall ore.
20	0.18	58.00	— "	A greenish slate.

Note.—The Gold value is based on 2,000 lbs. to the ton.

A very conservative estimate of the second class ore left in the vein will give it an average thickness of 6 inches—containing 12 per cent. antimony and \$23.00 in gold to the ton of 2,240 lbs.

According to the miners who worked in the mine during the whole period of operations the ore stoped averaged one foot in thickness, and

WEST GORE ANTIMONY DEPOSITS.



it coincides with the writers calculations. This stoped ground is the high-grade ore chute, and it is practically worked out down to the bottom of No. 1 shaft.

Samples were also taken of the slate and soft vein material ; care was taken that no ore would get into the sample, and these assayed as follows :—

No.	% of Sb.	Gold Values.	
3	0.20	\$0.50	Gold values estimated at 2,000 lbs. 1 ton.
8	Trace	2.00	
9	"	0.50	
11	1.76	2.50	
17	0.15	Nil	
21	Trace	Trace	

South Vein—Assays of high grade ore from the south vein gave 60.29 per cent. antimony and 2.66 oz. gold per ton of 2,000 lbs., and a second class ore 5.27 per cent. antimony and 1.38 oz. gold per ton of 2,000 lbs.

Five tons of ore assaying 56.96 per cent. antimony and 25 tons assaying 12 per cent. antimony were shipped from this vein to the St. Helen's Metal Recovery Company.

A shaft has been sunk on the south vein 105 feet.

Another vein of stibnite ore was found by John McDougal a couple of years ago about 700 feet north-east of his original find. There has been found at times rich float ore on a hill situated between the north and south veins, and which it does not seem possible could have come from either of these veins.

A mile to the south-east of the West Gore mine, and in range with the direction of the course of the vein, a ton or more of antimony ore was picked up, but so far its source has never been successfully traced.

Float antimony ore is also found to the north-west of the mine.

Now that the Midland Ry. passes through the district affording cheap transportation facilities, and that the market for this class of ore is so much better than it ever was before, the writer thinks some of the Nova Scotia prospectors should turn their attention to this most promising field.

**Potters Clay at Middle Musquodoboit.**

By Mr. F. H. MASON, Halifax.

(Paper read before the Mining Society of Nova Scotia.)

A sample of what appeared to be true china clay was brought to my office by a prospector last summer, who informed me that there were millions of tons of it. The clay was very unctuous to the touch, slightly off color, due to organic matter, and burned to a dead white in both oxidizing and reducing atmospheres. It stood the highest temperature I could give it in the wind furnace, without showing signs of even incipient fusion on sharpened edges.

An analysis of it showed it to be composed of :—

Silica.....	50.90
Alumina.....	37.30
Oxide of iron.....	trace
Lime.....	nil
Fixed alkalis.....	0.65
Loss on ignition.....	11.19

This analysis corresponds to the best Cornish and Chinese Clays, as will be seen by the following analysis given by Thrope in his dictionary of chemical technology :—

	Chinese.	Cornish.
Silica.....	50.5	46.32
Alumina.....	33.7	39.74
Oxide of iron.....	1.8	0.27
Lime.....	nil	0.36
Magnesia.....	0.9	0.44
Fixed alkalis.....	1.9	} 12.67
Water.....	11.2	

Satisfactory terms being arranged as to prices, and a working option being given, I started for Middle Musquodoboit with ideas of untold wealth swimming in my head, and, armed with a tool made like a large cheese scoop, to which could be attached steam piping, thus enabling me to penetrate 30 feet into the ground. On arrival I found that the white clay cropped to the surface at intervals over a distance of 1,000 feet in a valley, or interval, between two and three hundred feet wide.

The first bore hole, however, scattered my ideas of untold wealth ; the result was 4 feet 6 inches white clay, then 2 feet of micaceous sand, in which occurred fair sized pieces of iron pyrites, then 11 feet 6 inches of mottled clay, palpably containing too much iron to be any good as a fire clay, at the end of which we dropped the piece of wood which was used for driving the core out of the borer down the hold, and, after unsuccessful efforts to recover it, abandoned the hole. The next hole, some 600 feet higher up stream, gave 6 feet white clay, followed by 12 feet mottled clay.

Another hole, 100 feet away from the last, gave 1 foot white, 7 feet mottled, then 17 feet of white, which was the extent of piping I had with me.

Another hole put down at the bottom of a shaft sunk through 10 feet of surface alluvium, gave 22 feet of white clay.

It is not necessary to go through details of all the shafts sunk and bore holes put down, the accompanying plan shows this clearly.

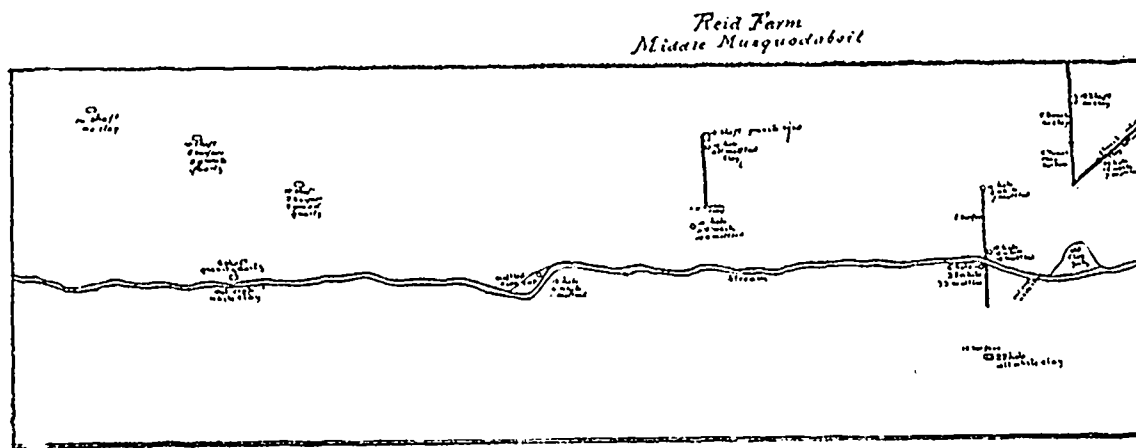
The conclusions I arrived at from the prospecting done were : That there is undoubtedly a large body of clay at this point ; that it is formed from the decomposition of granite is clearly proved by the presence of granite quartz at several places in the interval ; that at the time the clay was deposited pieces of pyrite were deposited with it. These have since become oxidized, forming oxide of iron and sulphuric acid, the latter being leached out, leaving the oxide of iron. It will be noticed by carefully examining the mottled samples that the mottling appears to radiate from centres, the latter being composed of pure oxide of iron ; that the clay bed does not lie evenly at a given distance from the surface, but appears to undulate. This may be due either to movement since its deposition or to the action of streams, the courses of which have since altered.

Analysis of the borings were made by cutting V-shaped pieces out of each section of the core, giving the following results :—

	Average sample white clay from 18 ft. bore hole.	Average sample mottled clay from 15 ft. bore hole.	Floated mottled clay	Floated white clay.
Silica.....	53.20	63.91	52.90	53.00
Alumina.....	30.25	18.60	29.00	32.10
Oxide of iron.....	1.72	5.75	3.20	1.70
Lime.....	Nil	Trace	*.....	Nil
Magnesia.....	Trace	Trace	*.....	Trace
Alkalies.....	1.33	*.....	*.....	0.97
Loss on ignition.....	12.00	20.30	12.10	12.20
Titanic oxide.....	1.47	*.....	*.....	†.....

\* Not determined. † Not estimated.

With regard to the analyses, they were made by what is known as the sulphuric acid method. The alkalies were determined by evaporation with hydrofluoric acid and a little sulphuric acid. Titanium was estimated in the residue and in the precipitate formed by adding ammonia to the solution. The traces of lime were removed with ammonium oxalate, and the solution evaporated to dryness, and the alkalies weighed as sulphates. In the cases where titanium oxide were not estimated, it would be determined with the silica, and a little may possibly come through and be determined with the iron. The iron in



Potters Clay at Middle Musquodoboit, Nova Scotia.

all cases was calculated as ferric oxide, although some of it is ferrous oxide.

Just exactly what part titanium plays in a fire clay is rather a disputed point. I am inclined, however, from experience with this clay, to the opinion that it acts as a base to the silica.

From the analysis of this clay, it should stand fire. That it did not do so is a matter of fact.

Col. W. C. Trotter, of the Standard Drain Pipe Co., of St. John's P.Q., kindly undertook to make some bricks for me and have them tested in the heat of the blast furnace, with the result that it was cut up in 24 hours. The brick was made with the addition of 25 per cent. of silica sand.

His opinion of the clay is interesting, and I will quote from his letter to me :

"The clay is good, and as I mixed it (25 per cent. silica sand) will make a good ordinary fire brick, but will not stand for blast furnaces or cupola purposes, although it is quite possible that further experimenting with different mixtures of clays in the bank, together with judicious mixture of gray or silica sand, or both, would produce a good brick." . . . "The clay works well, and should be treated on the semi-dry process. Its shrinkage at 2,500 deg. F. is  $\frac{7}{8}$  inch to the foot with 25 per cent. silica sand, and  $\frac{1}{8}$  inch to the foot pure.

The result of this test, together with a 14-mile haul, was hardly sufficiently encouraging to prosecute further development.

Should, however, the long-promised railway ever penetrate Middle Musquodoboit, it might be worth further investigation.

For the manufacture of pottery, for a high grade building brick and for pipe-clay it would undoubtedly be excellent."

### Gold Dredging in New South Wales.

(From *Mineral Resources of N.S.W.*)

It has already been stated that the beds of many of our running streams contain gold in their gravels, and there is reason to believe that, in a number of instances, these deposits are richer than the Tertiary or Pleistocene drifts. Many rivers were continually changing their courses, and in doing so they cut through the older deposits of auriferous drift, and, acting as natural sluices, they concentrate in their beds the gold washed from these older deposits. Again, in many of our river valleys older auriferous drifts occur at considerable elevations above the bed of the present stream, marking the positions which the river bed occupied in Tertiary or Pleistocene times. The older drifts have been continuously subjected, since their deposition, to the destructive operations of the atmosphere, and their gold contents have for long periods, been washed down the sides of the valley by rain and

running water into the stream below, where they have been naturally sluiced or concentrated by the action of the water. Not only has this action been going on for many centuries but it is in operation at the present time; and every creek which finds its way through auriferous country to a river, may be regarded as contributing its quota to the enrichment of the gravels in the river bed. In view of these considerations, it is not difficult to believe that some of our existing rivers, confined as they are to much narrower channels than were the ancient rivers, and receiving the drainage of wide areas of auriferous country, should contain in their beds extremely rich deposits of gold. Miners, generally, are thoroughly alive to the conclusions just mentioned; but it is, as a rule, extremely difficult for them to extract the gold from the gravels in the beds of the river, on account of the presence of such large bodies of water. In exceptionally dry seasons it is possible to work portions of such deposits, and this has been done in a number of instances with considerable profit, the gravels being removed and treated in ground sluices. Again, in some cases, it is possible to divert a stream to one side of the valley by means of a dam, and then extract the gold from that portion of the gravel from which the running water has been excluded. Where a river makes a horseshoe bend, again it is frequently practicable to drain the bend by making an open cutting, or a tunnel, across the neck or narrowest part of the enclosed land, and thus divert the water. Still the fact remains that it has been impracticable in many cases to extract, by ordinary methods, the gold which is believed to exist in our river beds.

In New Zealand the difficulty has been solved by the introduction of gold dredges. The industry of gold dredging has been in existence in that colony for some years; but great improvements have recently been made in the appliances used, with the result that enormous profits are now being obtained, and the method has been demonstrated to be the most economical for saving gold hitherto practiced in the world. Gravels, containing at the rate of only one grain of gold per cubic yard, have been made to yield handsome profits, and so efficient is the machinery for the saving of extremely fine gold, that a hundred of the small particles of gold recovered by a dredge were found to weigh, in the aggregate, only .097 grains; their average weight was, therefore, slightly less than one-thousandth of a grain.\*

A special pamphlet on the subject of gold dredging, written by Mr. J. B. Jaquet, geological surveyor, was published by the Mines Department of New South Wales, in 1898, and has been the means of directing a considerable amount of attention to the question of the successful working of the river beds of this colony. The following is an outline of the process:—

The dredge consists of a strongly built pontoon, having an open

\*New Zealand Mining Journal, 1st September, 1897, p. 296.



well-hole extending down its centre for about two-thirds of its length. Over the inner, or rear, end of this well-hole is pivoted one extremity of a beam, called a "ladder," which is furnished with rollers at each end, over which revolves an endless band, having buckets attached to it at intervals. The free, or forward, end of the ladder can be raised or lowered at will, by ropes and pulleys, suspended from a frame, called a gantry, fixed in the bows of the pontoon; and, by means of this gear, the buckets can be made to excavate gravel at any depth down to about forty feet below the surface of the water. The endless belt, carrying the buckets, is caused to revolve on its rollers by a steam engine. At intervals on the belt one of the buckets is replaced by a grab, for the purpose of catching up very large boulders. Just abaft the pivoted end of the ladder, and extending lengthwise towards the stern of the pontoon, is placed a cylindrical trommel, or revolving screen, which is slightly inclined from the horizontal. The perforations in this screen increase in size towards its lower end, where they measure about half an inch in diameter. The gravel, as it is brought up by the buckets, is discharged through a shoot into the trommel, where it meets a strong spray of water issuing from a perforated pipe. As the trommel revolves, the finer material, carrying the gold, is washed through the perforations and falls upon inclined tables, while the coarser portions of the gravel, including the large boulders, pass through the inclined cylindrical trommel, and are raised by an elevator and discharged in the rear of the dredge. As the ejected material occupies a larger space than the gravel did before it was excavated, the elevator is so arranged that it can deliver the waste material at the top of a heap from twenty feet to forty feet high, if necessary. Briefly stated, the method involves the excavation of the auriferous drift from the front of the dredge, and the stacking of the tailings, or waste material, at the stern. The inclined tables, upon which the finer material with the gold falls, after issuing from the perforations of the trommel, are covered with cocoanut matting and upon the top of this is laid either wire netting or a plate of what is termed "expanded metal." This consists of wrought iron, perforated with slots, one side of each slot being raised slightly. These form riffles, and serve the purpose of catching the grains of gold. The tailings from the tables pass into a launder, by which they are conveyed to the stern of the dredge. The cocoanut matting from the first table is rinsed in a box of water every night, and those from the other tables are washed once a week, for the purpose of collecting the concentrates. The washings or concentrates are then treated in what is termed a "streaming-down box," in which the gold is finally separated from the last traces of the worthless material.

The dredge is moored by five wire ropes, viz., two on the port side, two on the starboard side, and one (head-line) from the bows. The outer ends of these ropes are firmly attached to stout planks buried in the soil. The inner ends pass round pulleys fixed on the deck of the dredge, and are attached to the barrels of steam winches, so that, by means of the winches, the dredge can be moved laterally, in either direction, or forwards, as desired.

The dredge is capable of cutting a channel for itself into the bank of a river, and thus letting in the water necessary to keep it afloat; and as many rivers are bordered on either side by wide alluvial flats, which have been formed by the stream changing its course from time to time, the whole width of these flats can be dredged down to the bed-rock, and the gold recovered. The dredge can also be launched in a hole, excavated by manual labour, in one of these alluvial flats; and as the draught of a large dredge is only about 3 feet 6 inches, sufficient water will generally drain into the excavation from the surrounding gravels to keep her afloat.

The dredge works three (eight-hour) shifts per day, and requires

a crew of six men, besides a master; the latter, however, may superintend the work of several dredges. Two men are required for each shift. One of these attends to the steam winches, and gives the dredge a slight lateral travel whenever he sees the buckets begin to come up empty; the second man attends to the engine, and acts as stoker. The remainder of the work is entirely automatic.

With regard to the success of the dredging industry in New Zealand, Mr. Jaquet mentions one instance where a dredge, which cost £5,000 to build, obtained more than sufficient gold to pay for itself within seven weeks after starting work. Another small dredge obtained £3,570 worth of gold as the result of two months' work. A third, belonging to the Clyde Dredging Company, Limited, recovered gold to the value of £10,156 for nine months' work. In this last instance the capital of the company was only £4,000.

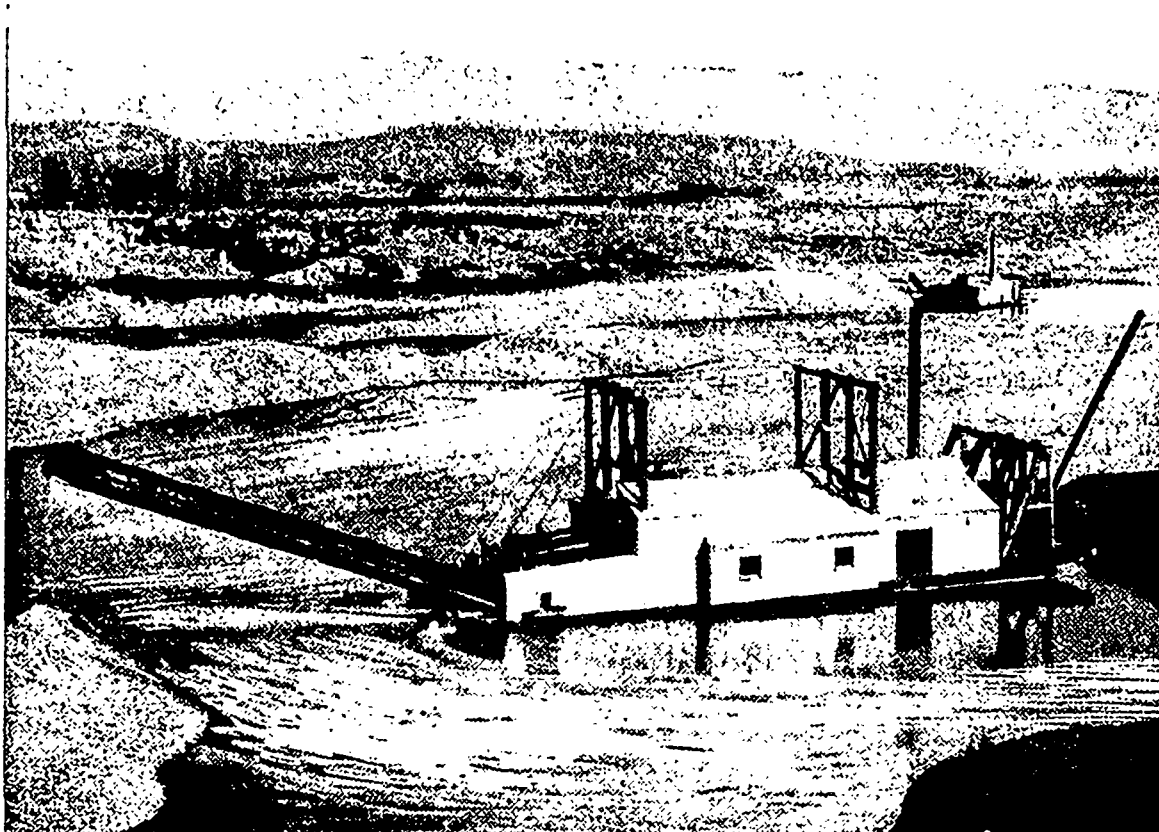
The principal question of interest, so far as the colony of New South Wales is concerned, is whether the conditions under which the auriferous gravels occur in our rivers are favourable to the employment of dredges? It has been contended by some persons that dredging cannot be successfully carried out in this colony on account of the uneven nature of the slate bottom which characterizes many of the rivers, and which would prevent any gold lying in crevices from being recovered by the buckets. There is no doubt that the New Zealand rivers (the Clutha and its tributaries) are exceptionally favourable for dredging, by reason of the general character of their bed-rock, their depth of water, and the enormous extent of their alluvial flats. The New South Wales rivers may not possess so many advantages in these respects; nevertheless, successful results have already been obtained in a number of cases, and it is hoped that any difficulties that may arise in the future will be overcome. In regard to this question, Mr. Jaquet remarks:—\*

"It is necessary, however, that one should be very cautious in expressing an opinion as to whether a river bottom is adopted for dredging or otherwise. Indeed, when the drift deposits extend to a great depth, this question can only be satisfactorily answered after prospecting operations have been carried out. In several places upon the Clutha the same schists, which appear hard and unyielding upon the bank, have been found to be soft and pliable beneath the river. In working upon flats, or in shallow, sluggish rivers—and the majority of our New South Wales rivers are of this character,—it may be possible to dredge close down to the bottom and finally clean the same with the aid of divers. For the purpose of raising a small quantity of gravel which the buckets were unable to reach, and for cleaning out the crevices, sand-pumps, controlled by the divers, might, perhaps, be used with advantage. The rapid current would render it dangerous to employ divers on the Clutha.

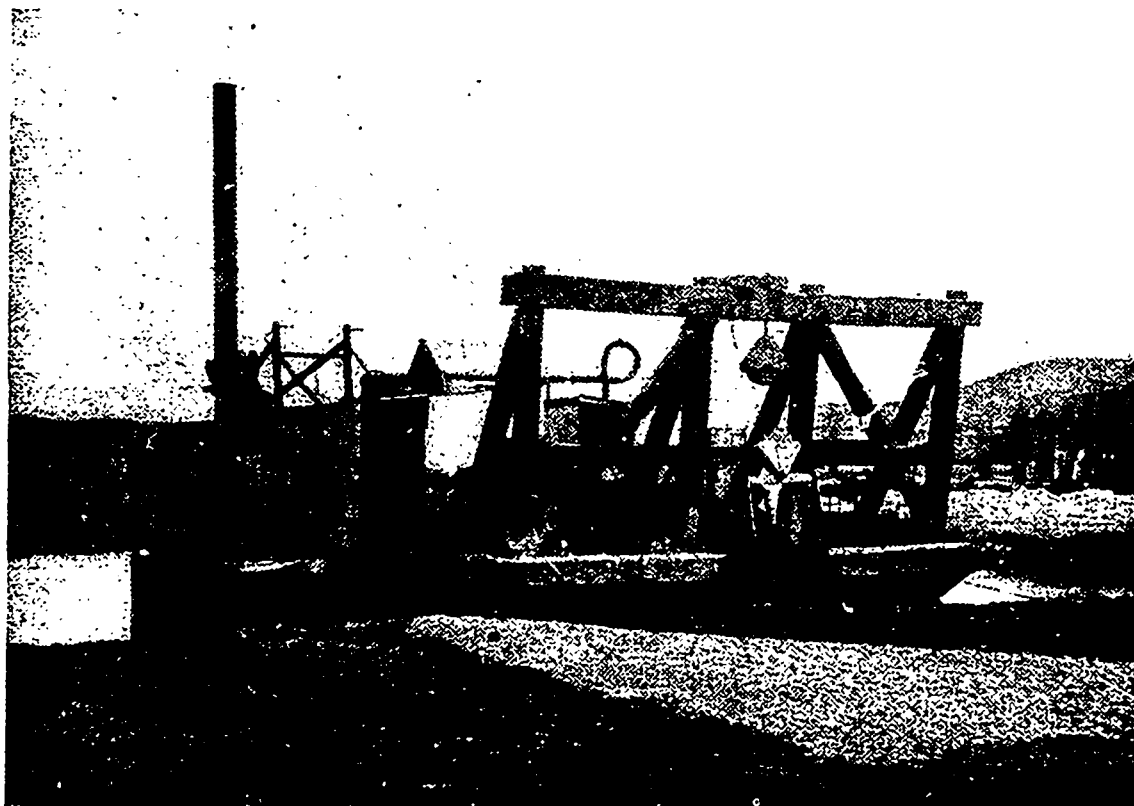
"In this connection it is important to note that the gold, in many river drifts, is not confined to the bottom, but is more or less evenly distributed through a considerable thickness of gravel, or a portion of it may have been deposited upon a false bottom at some distance above the bed-rock. While prospecting the auriferous gravels upon the Sholhaven River in 1893, I obtained, in many instances, a higher yield of gold from a false bottom than from the bed-rock below, and several beds of gravel were tested in which no concentration of the precious metal upon the bottom could be detected. It is obvious that, under such circumstances, dredging might be profitably carried on, notwithstanding the presence of a hard, rough bottom.

"Another impediment to the industry is to be found in the occurrence of decaying logs or tree stumps. The Clutha is practically free from these obstacles, but they have given considerable trouble to the

\*Mineral Resources, No. 3: Notes on Gold Dredging, 1898, p. 15.

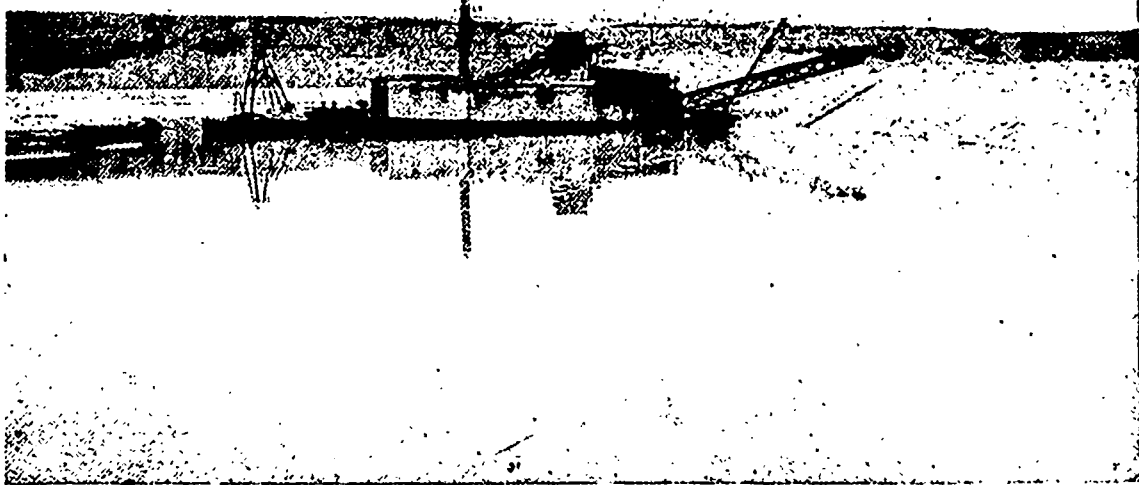


The Molyneux Hydraulic Company's Dredge is probably the largest working machine on the Clutha. The great length of the elevator (60 ft.) enables the tailings to be stacked at any height not exceeding 35 feet. There are two revolving screens. A nozzle has been erected on the bow of the Pontoon, so that when a steep bank is being attacked the ground can be hydrauliced in advance, and the risk of the ladder and buckets being buried beneath heavy falls thereby minimized.

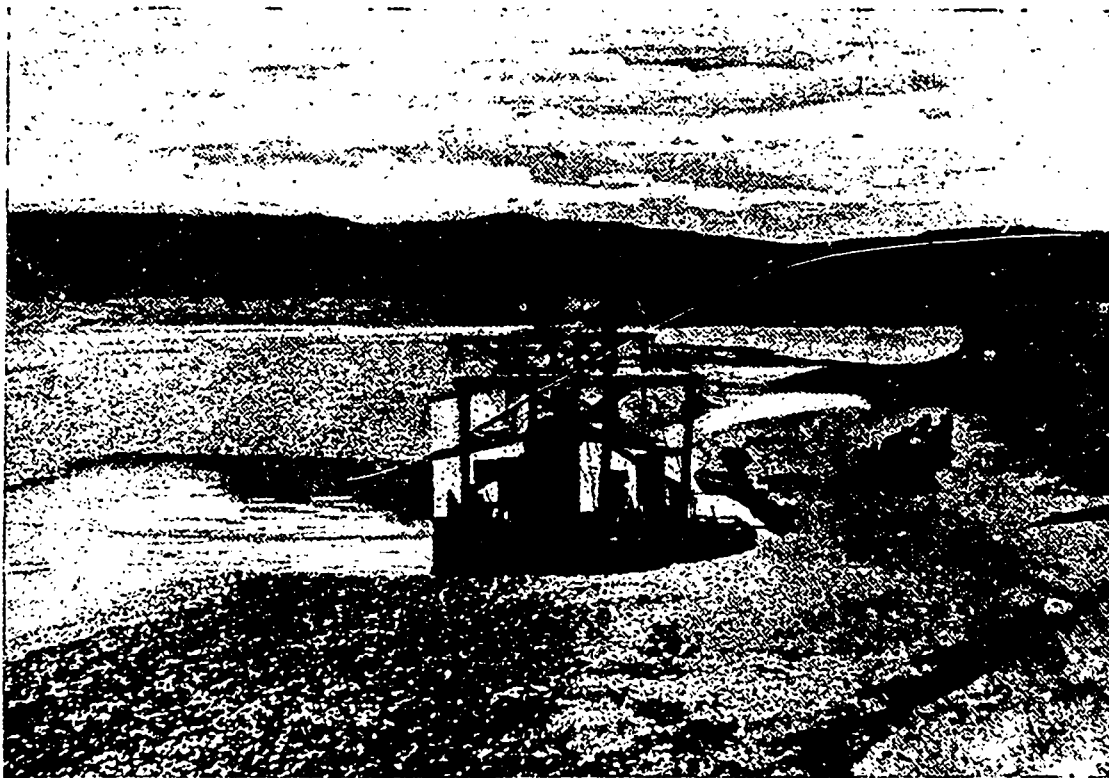


THE MANORBURN DREDGE.

Here a dredge is seen exploiting an auriferous flat away from the river altogether. It is cutting a channel for itself, and stacking it when delivered of its gold behind.



A tailings elevator is here seen at work and the variation between the height of the loosely stacked tailings and the face of the ground being attacked is apparent.



THE EARNSCLEUGH No. 1 DREDGE.

This dredge is represented leaving the Clutha River and commencing to attack a river flat.

dredges working the Buller River, upon the west coast of New Zealand."

All the rivers of New South Wales which drain auriferous country have now been taken up for dredging purposes. Many dredges are in course of construction, while at least a dozen have already started operations, and the result must cause a considerable increase in the production of gold in the near future. Mr. C. L. Garland's dredge was the first to start, in 1899, on the Macquarie River, near Stuart Town, and the proceeds are understood to be satisfactory, although considerable difficulty was met with owing to the occurrence in the bed of the river of an extremely hard cement, which caused great wear and tear on the buckets and machinery generally, necessitating frequent stoppages for repairs. The experience gained in this instance has been taken advantage of in the construction of later dredges, and the lips of the buckets are now being made much stronger.

The following are the particulars of the pioneer dredge of New South Wales, owned by Mr. C. L. Garland, and working on the Macquarie River: Length of pontoon, 100 ft.; beam, 31 ft.; depth, 6 ft. 6 in.; draught when loaded with 100 tons of machinery, 3 ft. 6 in.; total dead weight of dredge, 200 tons; steam power required, 75 h.p. (actual); capacity of dredge, 12 buckets per minute; capacity of buckets,  $4\frac{1}{2}$  cubic feet each.

The dredge is provided with 3 steam engines. The main engine is for actuating the buckets; the second is to work the winch, with 6 drums; the third engine is to work the electric light. The ladder is 68 ft. long, and is fitted with 38 buckets and 2 grab hooks, which will lift boulders up to one ton in weight. The weight of the ladder is 15 tons, and with the buckets attached it weighs 25 tons. When the ladder is inclined at an angle of  $45^\circ$  the machine will dredge to a depth of 40 ft. below the water line. The trommel is 20 ft. long, and has an inside diameter of 5 ft. The dredge is fitted with a 12-in. centrifugal pump, playing water on the gravel in the trommel from a perforated pipe. The capacity of the pump is 2,000 gallons per minute. The elevator will stack the coarse boulders 25 ft. above water level. There are 10 inclined tables, 5 on each side of the trommel, and arranged back to back. The length of the tables is 16 ft., and they are covered with cocoanut matting and expanded metal. The fine tailings escape by launders from the bottoms of the tables, and are conveyed to the stern of the dredge.

Bucket dredges of several other types are now at work in different parts of the colony; thus, in some a pair of revolving screens is used instead of one, while at Araluen 2 dredges are to be seen without either screens or elevators. In the latter case the gravel is discharged direct from the buckets into a sluice box, which delivers the tailings at the rear of the dredge, while the gold is caught in a variety of riffles. Some of these are formed of longitudinal bars, others of angle iron placed transversely, and others again consist of perforated iron plates resting upon coir matting. It is claimed that as much and as good work can be done by a dredge of this construction as by one fitted with a revolving screen, and that the initial cost is appreciably less. On the other hand there is considerable wear and tear of the riffles in the sluice box, owing to the big stones and boulders being carried over them; moreover, it seems probable that the saving of fine gold would be assisted by the action of the revolving screen in separating the large stones and allowing only the finer material to be treated on inclined tables.

However, experience with the different types of dredges will soon determine which are the most suitable for the different conditions met with in various localities. It is obvious that those dredges which have no elevators can only work in deposits of limited depth, since the tailings occupy more space than the original beds of gravel. If,

therefore, the deposits be more than 15 or 20 ft. deep, the only way to find room for the tailings is to deposit them in high stacks, and hence the necessity for elevators.

Another method of dealing with auriferous gravels is by means of what are known as pump dredges, which have been introduced into this colony from Victoria. The term pump dredge is somewhat of a misnomer, since the machines do not work by dredging. The process consists of hydraulic sluicing, the necessary pressure being given to the water by means of a powerful centrifugal pump. The water and the gravel which it breaks down gravitate into a suction well or sump in the lowest part of the workings, and from this they are raised by another centrifugal pump and delivered into sluice boxes at a height of about 50 ft. from the floor of the excavation. The bottom of the sluice box is fitted with the usual riffles, which retain the gold, while the water, carrying with it the gravel, flows over the end of the box to the dump. The machinery is all fitted on a pontoon so that it can be floated to a fresh position when desired. When work is about to be commenced on a deposit, and excavation is made of sufficient size to accommodate the pontoon, the water is allowed to accumulate in this and the dredge is launched. The excavation is then drained by means of the centrifugal pump, so that the pontoon can rest on the bottom, and the bank of gravel is worked away by hydraulic sluicing. When the excavation has been so much enlarged that the shifting of the dredge is desirable, this is effected by letting in the water and floating the pontoon to the most convenient position for continuing the work.

The pump dredge has several advantages which make it more efficient than a bucket dredge under certain conditions. Thus, where the bed-rock or "bottom" consists of hard and uneven rock, it would be impossible to obtain the gold lodging in the crevices by means of buckets, whereas no special difficulties would be experienced in such cases with the so-called pump dredge. Again, where a deposit of gravel exceeds, say 50 ft. in depth, it is doubtful whether it would be practicable to work it with buckets, whereas there would be nothing to prevent its being successfully dealt with by the method of hydraulic sluicing and elevating.

When the question of cost, however, is considered, the comparison is all in favour of bucket dredges, which can be worked by two men per shift of eight hours, whereas the pump dredges require eight men per shift. Moreover, as much more powerful engines are necessary for the pump dredges, the consumption of fuel with these is much greater than with the bucket dredges.

Finally, it may be said that in the case of deposits of auriferous river gravels of moderate depth, resting upon fairly soft bed-rock, the bucket dredge is unquestionably the cheapest and most efficient appliance for recovering the gold; but where the deposits are of great depth, or the bed-rock is too hard and uneven to allow of the employment of bucket dredges, the process known as pump-dredging can be successfully employed, provided the gravels be sufficiently rich to cover the extra cost.

The Federal Centrifugal Gold Sluicing Company have recently completed a pump-dredging plant on their mine at Jembaicumbene, near Braidwood. The pontoon is 47 feet long, 39 feet wide and 5 feet deep; it rests on the bottom of the excavation when in operation, but can be floated when it is desired to move it. The engine is a horizontal compound one, of 300 h.p. indicated, with cylinders of 18 and 30 inch diameter, and with a 33 inch stroke. Steam is supplied by three boilers 7 feet 6 inches in diameter by 14 feet long. The flues are 50 feet high by 26 inches diameter. There are two centrifugal pumps of the Kershaw type, each with a 12 inch delivery pipe, the runners and casing being fitted with removable liners. Each pump is driven independently by rope gearing from the crank shaft of the engine. One of the pumps is used for working the hydraulic giant nozzles, while the other elevates the water and gravel to the sluice boxes, which are 45 feet long, and are fixed on a trestle work erected on the pontoon. The engine is sufficiently powerful to drive much larger pumps if desired.

### Positive Knowledge.

By ZEKKE, in the "Age of Steel."

There is no question but what this is a day of positive knowledge, a time when it is one of the first essentials for a man entering into any business enterprise to know positively what he is doing, and know it beforehand, and young America is to-day being duly impressed with that fact, and receiving all manner of training in keeping with this spirit, but—and this is the point at issue here—how and what is positive knowledge?

We have long since come to understand that there must be some closer relation between theory and practice than was had in days gone by—that the main spring of theory must be wound by the key of practice—and have added manual training to our technical schools, have built various and expensive devices for experimenting and demonstrating theories before offering them to the world in a product. All this, too, is at it should be, and there is no criticism to offer on this point, but it will not hurt us to stop and think a little once in a while in the hope that we may see a way to further extend the closer relationship of theory and practice to get positive knowledge of the kind that is in keeping with the spirit of the day. In other words, experiments and manual training schools, while they do much in their way, do not go to the extent that might be desired in surrounding these tests and experiments with some of the various circumstances that arise in the real industrial work of the day. Every once in a while something turns up which, while it was entirely unlooked for, and can be easily explained after it is over, might have been expected if not prevented. It is not explanations and excuses that we want in his day, though they are pretty good guides for the future and cannot be entirely eliminated, but it is deeds we want, and as near an exact and positive understanding of what is going to happen as possible beforehand.

For example, there was a recent little tilt between a couple of scientific authorities on riveted joints in a steam boiler, as to its efficiency, etc. On the question in controversy here it is not the intention to speak right now, but to point out this something taken from the impressions of an old school engineer on the whole question of stress. He looks at a boiler as he sees it at work in a factory, and when he gets to thinking on the stress problem there is present in his mind the strains on the boiler due to its settings. If it simply has a rest under the front end and another under the back end, as is very common, he sees in his mind a strain on the bottom part of the boiler, the part, too, that is subject to the heat, which, though rather indistinct in his mind if he tries to reduce it to figures, means to him a representation of the weight of the boiler and the water it contains. From this same source of reasoning he figures it out in the same dim way that there is really a tendency toward compression in the top part of his boiler. In such ideas he has some of the richest soil from which positive knowledge grows, and more of this soil is what we need as a fertilizer for scientific propagation of the branch of knowledge that the spirit of the times demands.

A point that must not be overlooked, however, is the fact that we must have this material of practical experience at first hand, or as nearly so as possible, for like some of the stories of old that were handed down from generation to generation, from mouth to ear, the colouring is likely to change so that ridiculous errors will frequently result. An instance in illustration of this point comes to mind at this writing. An English scientific journal of the very highest class, in treating on the subject of corn as fuel following the time when Kansas set the world talking by growing so much corn that it was used in instances as fuel as being cheaper under the circumstances than coal, had an illustrated head piece to the article showing men at work in a field of barley corn. This was nothing serious, of course, but it points us to what may

happen in handling information for positive knowledge. The puzzling point in the whole problem is, then, how are we to combine the two essential features for positive knowledge in the mechanics of the day? How are we to get the unadulterated fertilizer of experience, that which is gained by rugged men who have spent years in harness, and have learned, not from schools as we know them now, but from experience unguided except by the brain of the individual, to and mixed with the systematic schooling of young America to day? We are progressing, of that there is no doubt, and we are getting nearer each year to the point of positive knowledge in mechanical knowledge, but the soil is losing some of its qualities as we go along, and it is in order to look closely after this feature lest a future crop of positive knowledge turns out to be only nubbins at the harvest time.

## MINING IN EASTERN ONTARIO.

By C. DE KALB, Inspector of Mines for Ontario.\*

The condition of the mining industry in the Eastern District of Ontario is in many respects more satisfactory than ever before. There has been a still more conspicuous reaction from the tendency so common in previous years to organize companies and sell stock based upon undeveloped mines. A perusal of the following report will show that a very large number of promising properties are undergoing extensive development by syndicates or close corporations offering no shares in the public market. By some of these large sums of money have been expended in opening up deposits, in advance of any effort to start production. In nearly every instance the result has been to put in sight important quantities of ore which assays demonstrate can be worked at a profit. This is all in the direction of permanent and successful mining, the good effects of which will be seen later on. There is also a notable increase in the employment of skilled management, many highly trained mining engineers and experienced foremen for mines and works having been brought into the Province within the year, and the local labour is receiving in consequence a better training. A larger number of men than heretofore have adopted mining as a regular vocation, many of whom are improving themselves by taking courses of instruction in correspondence schools. The effect of this is to create a most desirable *esprit de corps*, and at this rate Ontario will soon possess a large body of skilled miners, which will be of incalculable benefit to the mining industry. The absence of any legally enforced qualification for mine foremen is still a drawback, and there seems to be no question that such a requirement would act as an additional stimulant to higher efficiency on the part of the workmen, to their own good and to that of the mine owners.

The copper industry is growing rapidly and promises to assume large proportions. The development of the veins occurring west of the Sudbury district at Massey and in the vicinity of Bruce Mines, is most gratifying. At all of these places the ore in sight has warranted steps for the construction of large mills and reduction works. The future of the Parry Sound copper district is as yet somewhat uncertain, but active development is going forward, and the results are by no means discouraging.

Iron mining is becoming a large factor in the mineral industry of the Province, due chiefly to the extensive operations undertaken by the Lake Superior Power Company at Michipicoton Harbour, but the mines in the extreme eastern portion of the Province are also promising good returns in the near future. Extensive shipments have been made from some of these properties during the year, and in several cases development work has revealed large bodies of high grade ore.

The gold mines in the vicinity of Marmora are on a sound basis,

\*Report Bureau of Mines, 1901.

and increased plant at these mines, now being installed, will soon lead to a substantial enlargement of the output of bullion. The production of arsenic as a by-product from the gold ores at Deloro has added a new article to the mineral output of Ontario, and the steady manufacture of this material is assured. Only two gold mines of the Eastern district which have figured prominently before the public have closed down, and one of these will be re-opened in 1901 under a new management.

There has been a veritable boom in mica mining in Frontenac and Lanark counties, and a large output has resulted. A careful study of these deposits by the geological corps of the Bureau of Mines might yield information which would prove valuable as an aid in prospecting for this mineral and help to establish the industry on a more permanent basis. The uncertainties attending development work in the mica mines renders the owners averse to continuing exploration where mining temporarily ceases to be profitable. A number of these mines in which work had been discontinued have been reopened with success, but on the other hand many which have produced largely at one time have been abandoned. Reasonably safe criteria upon which to base further development would be a great boon to the industry, and such knowledge can only come by detailed study on the part of trained geologists.

The peat industry is apparently about to become of great importance. The difficulties attending the cheap manufacture of briquettes have been overcome through the courageous and intelligent efforts of the Trent Valley Peat Fuel Company, and it would seem possible to derive a cheap domestic and steam fuel from the numerous peat bogs in the Province. The Peat Fuel Syndicate of Toronto has also been investigating the preparation and uses of peat in foreign countries, and has been conducting experiments which will tend to develop fully the commercial possibilities of the industry. The utilization of peat as a source of fuel and illuminating gas is being tested, and bids fair to prove successful. A special investigation is being made by the Bureau of Mines into the value of peat for fuel and gas, which will shed much light on this question.

#### GOLD MINES.

The working gold mines of the Eastern District are at the present time confined to the vicinity of Madoc and Marmora. The work here has passed the experimental stage and gives every indication of permanent operations. Development has been carried on systematically, putting large ore reserves in sight; and the problem of extraction has been thoroughly solved in each case.

#### THE BELMONT MINE.

This property has been operated under option granted to the Cordova Exploration Company, Limited, of Newcastle-upon-Tyne, from Mr. A. W. Carscallen, of Marmora, for several years. During this period development work has been actively in progress under the skillful superintendence of Mr. D. G. Kerr. At the same time a 10-stamp mill has been working upon ores taken from various mines on the property, the object being chiefly to test the value of the ore by mill-runs. The stoping consequently has not been extensive in any one part of the deposit. In September, 1899, the property was purchased from Mr. Carscallen, and production upon a larger scale will soon commence. All the improvements now in progress are of a permanent character, but extensive development of the deposit is still being prosecuted, which may lead to a further enlargement of the milling plant in the near future. The property acquired consists of 300 acres owned in fee simple in Belmont township, Peterborough county; mineral rights in 125 acres in Marmora township, Hastings county; mineral rights under the county roads, acquired from the township councils; and 160 acres of land including a water power on Deer river, at the outlet of Deer lake, 2 miles west of the mine.

Development work has been carried on in ten shafts, of which Nos. 1, 2, 3, 6, 7 and 10 are in actual operation. Shaft No. 1 has attained a depth of 310 feet, being an increase within the year of 175 feet. Hoisting is done by a skip, using telescope rails at the lower end of the skipway to admit of hoisting rock from the bottom while sinking is in progress. Shaft No. 2 is 165 feet deep, being an increase of 130 feet. This shaft is connected by levels with No. 3, which is the main shaft for this mine, No. 2 being practically an air shaft, although ore and rock are at times hoisted through it. Shaft No. 3 had reached a depth of 185 feet when sinking was discontinued. A new pump is now being installed to permit of going to deeper levels. Shaft No. 6 has been sunk since the inspections of 1899, and is located 750 feet north-east from shaft No. 1. It has been carried to a depth of 85 feet, with a cross-section of 12 by 8 feet, inclining 75 degrees towards the south-west. It is divided into two compartments for a hoist-way and man-way. The hoisting works consists of a head frame 12 by 14 feet at the base, and 20 feet high to the centre of the sheave. Shaft No. 7 is also new. This is located 425 feet north of shaft No. 1. It is vertical, with a depth of 80 feet, and a cross-section of 16 by 9 feet. The hoisting works are 17 by 35 feet at the base, and 35 feet high, and are equipped with a 30-h. p. double drum hoist actuated by compressed air taken from the central air compressor plant. Shaft No. 10 is likewise part of the recent development of the property. It is 560 feet east of shaft No. 5, the latter being 1500 feet southeast of shaft No. 1. The shaft inclines 75 degrees to the south, and has been sunk to a depth of 35 feet, maintaining a cross-section of 14 feet by 10 feet. No permanent hoisting works have yet been erected over these shafts.

In shaft No. 1 there has been no change in the 75-foot and 120-foot levels. A new level has been driven at a depth of 200 feet from the surface, extending 50 feet east and 50 feet west from the shaft. A level has also been driven at 300 feet distance from the top, 50 feet east and 30 feet west. A sump has been excavated near the shaft on both these levels, and on the 200-foot level a Northey pump having a capacity of 250 gallons per minute has been installed, while a new pump of 150 gallons capacity is being set up on the 300-foot level. The motive power for these pumps is compressed air at 85 lbs. pressure.

In shaft No. 2 a level has been run at 50 feet from the surface, 260 feet northwest and 110 feet southeast to shaft No. 3; and at a depth of 90 feet is a level extending 350 feet northwest and 110 feet southeast to shaft No. 3. In the east drift is a new stope, 100 feet long, 10 feet high and 6 feet wide.

In shaft No. 3, at a depth of 25 feet is an incline connecting with the 50-foot drift southeast from shaft No. 2. At a depth of 95 feet in this shaft is the connection with the 90-foot drift southeast from No. 2 shaft, and at 185 feet is a drift northwest 250 feet in which a raise has been started to connect with the bottom of shaft No. 2.

A level has also been started in shaft No. 7, extending 20 feet northwest and 65 feet southeast.

As the levels from these several shafts are extended they will connect with each other, linking the shafts into one connected mine. A trestle for a 24-inch gauge tramway track is being continued from shaft No. 1, which will extend to shafts Nos. 7, 6, 2, 3, 5 and 10, in the order named, thus making a large arc.

A new shaft-house has been erected over No. 3 shaft, with a head frame 18 by 35 feet at the base, and 30 feet high to the sheaves block. The skip in this hoist is operated by a 30-h.p. compressed air hoist.

The stamp mill is being quite thoroughly overhauled, and 10 additional stamps are being installed, as well as a cyanide plant for concentrates.

The requirements made for additional safety are being suitably attended to. The official signal code is being used at all shafts. It was advised that the powder man be required, among his other duties,

to include that of preparing all primers in and about the mines. The company has been peculiarly unfortunate in losing four men by dynamite explosions during the year, two of these being the result of negligence on the part of the miners, and two the result of a premature discharge of explosive while loading a hole, the cause of the explosion being undetermined.

#### THE DELORO MINE.

The extensive development work carried on upon the property of the Canadian Goldfields, Limited, during the year 1899 has apparently assured permanent work at Deloro, and in consequence important additions to the plant and equipment are being made. The stamp mill is being enlarged to double its former capacity and Mr. P. Kirkegaard, the manager, has developed an improvement in his method of treatment which will enable him to mill upwards of 100 tons of ore per diem. The plant when complete will comprise rock breakers, jigs, 20 stamps of 850 lbs. each, Wilfley tables, Bartlett concentrators, and Frue vanners. The cyanide plant is also being enlarged by the addition of an extra vat. The mill is a model of scientific arrangement, and includes some new features of great merit, permitting of the elimination of barren gangue early in the process, by which means large capacity is secured at very low cost. The arsenic works constitute a prominent part of the plant, and are turning out a purer grade of white arsenic than any of the foreign competitors, with the result that the product is in large demand at the highest market prices. The arsenic is sold chiefly in New York, though a portion of the output is taken in Canada. At the present time the arsenic plant is undergoing complete reconstruction, for the purpose of securing a larger yield at reduced cost per ton. The difficulties formerly experienced at Deloro from the loss of arsenic, and the consequent imperilling of live stock in the vicinity, have been entirely overcome by modifications in the construction of the condensing chambers, coupled with the introduction of mechanical draft. No cases of arsenic poisoning have occurred, great care being observed to preclude accidents of this sort. Separate rooms are provided for the clean clothing and the working clothes of the employees, and ample facilities for bathing are connected with the dressing rooms. The men are required to bathe at the end of each shift, no deviation from this rule being permitted. Antidotes are freshly prepared at frequent intervals, and are kept accessible in two places in the works, and certain men in each shift are instructed in their proper use.

The company is also making provision for the entertainment of the men, and for the education of their children. To this end a lecture hall and library, and a school are in process of erection near the general office building. Books and periodicals will be provided free of cost for the use of employees of the mine.

The surface plant is being further increased by the installation of a new air compressor to provide air for a Harris air lift which is to raise all the water from that portion of the property reached by the Gatling and Tuttle shafts. An electric lighting plant is also being provided, the engine and dynamo being placed in the present engine house near the stamp mill.

In place of the old stone dynamite magazine, which was too close to the mines and works, a new one constructed entirely of wood, well ventilated, and with sand filling in the hollow wall spaces, has been provided, standing detached 600 feet from the arsenic works, and 1,000 feet south of the mill. A new dwelling has also been erected for the mine foreman.

The progress in underground work during the year is as follows: Gatling level No. 3 south, increased 169 feet 3 inches to a total of 426 feet 3 inches; Gatling level No. 4, increased 360 feet to a total of 393 feet 6 inches; Tuttle crosscut level, south, increased 41 feet to 135 feet; Gatling crosscut level, south, increased 8 feet to 120 feet 6 inches, 3rd level stope beginning 200 feet south from Gatling shaft, working under-

hand, the full height of the block between the second and third levels; a raise is also being driven up from the fourth level, 250 feet south of Gatling shaft, which at the time of last inspection was 23 feet high. The Tuttle shaft has been connected down to the fourth level. Work is also in progress in the Red shaft, stopping south on the 40 foot level, in oxidized ore.

All recommendations for safety have been carefully attended to, chief among which was the construction of a new magazine in a place of greater security. The official signal code is not in use, but its adoption was requested in conformity with the resolutions.

#### THE ATLAS ARSENIC COMPANY.

The mines and works of this company, as previously stated, are situated upon a tract known as the Gatling Five Acres, entirely surrounded by the property of the Canadian Goldfields Limited. The ores are identical in character with those encountered in the Deloro mine. The shaft has attained a depth of 100 feet, being an increase of 15 feet. Level No. 1 northeast, has been lengthened 65 feet to a total of 185 feet. The southwest drift remains unaltered. Overhand stoping has been carried on in level No. 1, northeast, a slice 45 feet high and 125 feet long have been removed. A raise through this stope-block has also broken through into the old surface workings, 20 feet southeast of the new mine. A power house has been erected 60 feet west of the shaft, having foundations 50 by 30 feet. This contains two rooms, one for the 80-h.p. boiler and a small duplex hoist, and one for a 9-drill duplex Rand air compressor. The old boiler-house adjacent has been converted into a blacksmith shop. A new dynamite magazine has been erected in accordance with the regulations in the Mines Act, 400 feet west of the power house, having a hill between it and the works. The stamp mill is temporarily idle, but will soon be in operation again. Instructions were given to put up a gate at the mouth of the old workings leading from the surface into the first level stope.

#### THE SOPHIA MINE.

The Sophia mine is the same as that referred to in previous reports under the name of the Diamond mine. Through the efforts of Mr. D. E. K. Stewart of Madoc this property has been placed upon a substantial footing, and is now owned by Messrs. Peter McLaren, Leopold Meyer, and Charles Meyer. It is being operated under the management of Mr. Leopold Meyer of Madoc. Its situation is seven miles east northeast from Madoc, and about one mile from Queensboro. The holdings of the syndicate consist of the west half of the east half of lot 14 in the tenth concession of Madoc, the west half and the west 20 acres of the east half of lot 15 in the same concession. There are two veins on the property, viz., the "mispickel vein," with a course due north and south, and the "free milling vein," running northwest and south east. The workings consist of the following: On the mispickel vein, No. 1 shaft, with a cross-section of 9 by 18 feet, and a depth of 60 feet. Drifting has just commenced at that depth. Hoisting is still done by hand windlass, operating a bucket on a skidway. On the free milling vein is the principal working shaft, known as No. 2. This has a cross-section of 9 by 18 feet, and a depth of 105 feet. There are two levels, the 60-foot and the 100-foot. On the 60-foot level there is a northwest drift 20 feet long, and a southeast drift 10 feet long. At the 100-foot level the northwest drift has been run 58 feet, and the southeast drift 10 feet. A skipway was being installed, and an inclined trestle carried the track to the upper part of the mill, where was located the hoisting engine. The skip will thus be drawn directly from the mine into the mill and then dumped. No. 3 shaft is also on the free milling vein. This is 60 feet deep, with the same cross-section as the other shafts. At the time of my visit this working was closed and full of water. It was kept securely fenced. Water was lifted by buckets from No. 1 shaft, but No. 2 was kept unwatered by a duplex steam pump. The ladder-way was being put into suitable condition, with a partition between it and the hoisting compartment.

The reduction works consist of a 10-stamp mill erected by the William Hamilton Manufacturing Company of Peterborough. The equipment comprises a 7 by 10-inch Blake crusher, 10 stamps of 900 lbs. each, a Wilfley concentrator, a 70-h.p. return flue boiler, and a 50-h.p. Corliss engine. There is also a blacksmith shop 100 feet south of shaft No. 2, and an assay office 150 feet south of this shaft. Dynamite was temporarily stored in a dug-out 300 feet southeast of shaft No. 2. Instructions were given to promptly provide a suitable magazine at a distance of not less than 400 feet from any workings or structures.

#### HELENA MINES.

The Helena mines are situated 18 miles northeast from Kaladar in Barrie township, Frontenac county, embracing lots 19 and 20 in the sixth concession, and lot 20 in the seventh. The owners are Mr. Michael Seitz of Brooklyn, New York, and Mr. A. M. Chisholm, whose address is Cloyne P. O., Ont. The ores consist of copper and gold, in a quartz vein through crystalline limestone. The workings consist of three shafts. The "Hill shaft" is on lot 20 in the sixth concession. It is a two compartment inclined shaft, 16 by 12 feet in cross-section, and 125 feet deep. The angle of inclination is 45 degrees. The "Valley shaft" is 600 feet northeast from the Hill shaft, having the same cross-section and inclination, and has also reached the same depth. A drift has been run from the bottom of this slope, 25 feet east. The "Bill shaft" lies 300 feet north northeast from the latter working, and has attained a depth of 185 feet with a cross-section of 10 by 12 feet. This is a one-compartment shaft, with a ladder-way not yet boarded off. Hoisting is done with steam hoisting engines at each shaft, and a 20-drill Rand air compressor is being installed at the Bill shaft. The power for this compressor is taken from a 16-foot waterfall on the Mississippi river. Extensive development of these mines is contemplated for the year 1901.

#### COPPER MINES.

The continued high price of copper has led to active development of veins in several localities, and the present indications are that considerable quantities of copper will be produced from Ontario mines in the near future, independently of that obtained in connection with nickel in the Sudbury district. Outside of the aforesaid district copper veins of more or less promise occur in four fairly well defined zones in eastern Ontario.

In the eastern part of the Province copper is found at many points in Frontenac and Hastings counties. The Helena mines are the only ones in which important development has so far been made. The veins are usually well defined, containing chalcopyrite in quartz, with occasionally some bornite, and at a few places a little chalcocite and tetrahedrite has been reported. This district is one which apparently might justly deserve more attention than has hitherto been given to it. Gold occurs throughout it, and is generally associated with the copper.

The next belt towards the west is in the Parry Sound district. The veins occupy the lines of shear faults, and have produced considerable quantities of bornite near the surface. Development work has not yet been sufficiently extensive to demonstrate the value of the deposits, but the region is a promising one, and work is being prosecuted at a number of points which will soon show the character of the veins.

To the westward of the Sudbury copper-nickel group of mines there succeeds another group of veins carrying copper, with small quantities of gold in some cases. These are all highly silicious ores, averaging about 4 per cent. of copper, and at one locality high-grade shipping ore was produced down to a depth of about 100 feet. The most easterly of these veins so far discovered is in the vicinity of Massey, and the most westerly at Bruce Mines.

The fourth group embraces those on Michipicoton Island, with which the writer is not familiar.

#### BRUCE MINES.

This old, well-known group of mines has been acquired by the Bruce Copper Mines, Limited, of 31 Palmerston Building, Old Broad St., London, E.C. The area controlled consists of 5,000 acres held in fee simple, and mineral rights in 12,800 acres additional lying in the township of Plummer and Plummer Additional. The resident manager is Mr. William Braden, formerly of Helena, Montana.

The shafts have been renamed as follows:—No. 1, the old shaft northwest of the old Copper Bay or Bray shaft; No. 2, formerly called the Bray shaft; No. 3, formerly the Mitchell shaft; and No. 4, formerly the Scott shaft. The work so far done under the new management is the following: No. 2 shaft deepened from 420 to 435 feet, and at the 420-foot level a crosscut driven southwest 18 feet. In the same shaft, fifth level, the southeast drift has been prolonged 19 feet, and the northwest drift at the old caved ground is being straightened. In No. 4 shaft the old timbers, and the old Cornish pump rods and column pipe have been drawn, and temporary cribbing has been carried down 40 feet to facilitate cleaning out preparatory to equipping this for the main shaft to serve future mining operations on the property.

Work was only beginning, at the time of my visit, upon the surface plant, which is to be one of the most extensive in Ontario. Large hoisting works will be erected over No. 4 shaft, in which will also be located the rock breaker. From this point the broken ore will be conveyed about a half mile to the new mill which will be erected near the site of the original concentrating works operated in the early days of mining at Bruce Mines. This mill will be equipped with the latest improved concentrating machinery, and will have a daily capacity of 400 tons. Close by the concentrator will be erected a smelting plant, consisting of ordinary blast furnaces and a refinery.

Dynamite was stored in the old stone magazine erected many years ago about one mile east of the mine. This contained a quantity of old black powder and other materials which had been left there for a long period. Instructions were given to clean this out, and destroy all old stock. It was also advised to provide a separate structure near the mine for a small supply of explosives for immediate use. Some minor recommendations were made concerning timbering in the mine, and attention was called again to the necessity of fencing off the old workings east of the Wellington vein.

#### ROCK LAKE MINE.

Important work has been done upon this property in the development of the ore bodies, and in the erection of surface plant, within the past year. The main shaft has been deepened to 420 feet, being an increase of 252 feet, the cross-section of 9 by 16 feet being maintained to the bottom. It is divided into three compartments—a manway and two hoisting compartments; one hoisting compartment being fitted with guides for a kibble cross-head, and one fitted up for a cage. The shaft is well trimmed up and securely timbered. The 100-foot level has been extended north-west 65 feet, giving it a length of 114 feet, while the south-east drift has been lengthened from 45 to 127 feet. The 200-foot level, started since my last inspection, has been driven 93 feet north-west and 76 feet south-east. The 300-foot level has been driven 26 feet north-west from the cross-cut into the ore body, and cross-cuts have been run from the 400-foot depth in the shaft, preparatory to drifting. A cross-cut 27 feet south-west has been run on the first level, starting 110 feet from the shaft in the south-east drift, and another starting 113 feet from the shaft in the north-west drift extends 38 feet south-west. In the second level a cross-cut 27 feet long extends south-west from the south-east drift, commencing at a point 74 feet distant from the shaft; and another, starting 90 feet from the shaft in the north west drift, extends 27½



feet south-west. In the third level the cross-cuts start from the shaft and extend respectively 37 feet north-east, and 38 feet south-west. The 20-foot extension of the shaft below the fourth level is used as a sump. In addition 27 open cuts have been made on the vein at intervals through a distance of two miles from the shaft to Rock Lake, in a north-westerly direction.

A railroad has been graded from the mine down the gorge, following the general direction of the vein, and terminating at a mill site on the shore of Rock lake. A locomotive and other rolling-stock had arrived at Bruce Mines station on the C.P.R., 12 miles distant, and was soon to be transported to Rock Lake for the equipment of this line. (The rolling-stock has since arrived on the ground.) The mill, or concentrating works, were in process of erection.

The mill will contain a 250-h.p Corliss compound condensing engine, with three horizontal tubular boilers, and crushers, jigs, Wilfley tables, and accessory appliances. The capacity of the plant will be 200 tons of ore per diem. Accessory plant consists of a brickyard equipped with a pug mill and an improved Martin brick machine, having a capacity of 10,000 bricks a day. This is located one mile west of the shaft. A saw-mill is also erected adjacent to the brickyard.

In order to ship the concentrates from the mine to navigable water on Lake Huron, the company has organized the Bruce Mines and Algoma Railway Company, Limited, and hopes to construct the line as far as Bruce Mines within the near future. This is a necessity for the economic operation of the property.

#### MASSEY COPPER MINE.

This is the most recently developed copper mine promising permanent operation in the Province. The lode was uncovered in the south-west quarter of section 14 of Salter township, Algoma, and extends both eastwardly and westwardly for some distance in the same township. The entire property comprises 800 acres, and is owned by Mr. R. M. Thompson, of New York, and Major Robert G. Leckie, of Sudbury. The same parties also own options on two waterfalls on the Sable river, 2½ miles from the mine, and on two falls near Massey, aggregating 2,000 h.p. The purpose of the owners is to operate air compressors on the Sable river, and transmit this power for use at the mines. The main shaft is on the south-west quarter of section 14, and is about three miles north-west from Massey. It has reached a depth of 80 feet, with a cross-section of 7 by 14 feet, being divided into a hoisting compartment and manway. Hoisting is done with a horse whim, operating a bucket on a skidway. A temporary whim shed and blacksmith shop have been erected at the shaft mouth.

The vein has been opened for a distance of one mile by test pits, revealing a continuous ore body in what is apparently a shear zone in the green schists, following the direction of fissility of the enclosing rocks. The lode is brecciated at places, the fracture planes having been healed with deposited quartz. The chalcopryite, however, seems to bear no direct relation to these accidental quartz veins, being the result of misplacement in the schist itself, unassociated, so far as exposed, with any other gangue than the residual decomposed country rock. The lode is approximately parallel with the contact between the schists and the granite, lying from a few hundred feet to a quarter of a mile south of the contact between these formations. The ore is said to vary from 3½ to 6 per cent. copper, with small amounts of gold.

The proposed treatment is to sort out the higher grade ore, shipping this to the New Orford smelter at Copper Cliff, where the silicious ore from Massey will be desirable in order to produce clean, relatively acid slags. The lower grade ore will be transported by an aerial tramway down grade to the Sable river, where it will be treated in concentrating works.

#### PARRY SOUND COPPER MINING COMPANY, LIMITED.

This company, controlling what are popularly known as the

McGown mine and the Wilcox mine, has done some further development within the year, and latterly has revealed extensions of the ore body in the McGown property which give promise of permanence, although the mine is still in an experimental stage. The incline shaft, after attaining a depth of 160 feet, was abandoned, and a new incline about 100 feet north-east of the former shaft was started towards the south, on an angle of 45 degrees. The main shaft, which is vertical, has reached a depth of 238 feet. At a depth of 160 feet is a level, driven 25 feet north-north-east, and 30 feet south-south-west. This is still in process of sinking. Hoisting is still done with a kibble, which is also used for lowering the men, the ladders being carried only to a depth of 85 feet. Five days were given as a limit within which a ladderway to the bottom must be provided, after which hoisting and lowering men in the bucket was to be prohibited. The hoisting engine was located in the same building which enclosed the gallows-frame. The official signal code was in use. Another test pit had been sunk 33 ft., with a cross-section 10 by 8 feet, on the shore of McGown Lake, 200 feet southeast of the main shaft. The old Discovery pit is also being deepened by an incline on an angle of 10 degrees toward the south-west, having reached a depth of 30 feet below the surface, the lower end being under the lake. Hoisting here is done with a derrick and horse whim, provided with a band-friction brake. Cribbing at the mouth of this pit was recommended to insure safety. Further ventilation was also advised for the dynamite magazine, which is located 500 feet south of the main shaft. The mill has been operated for a short period, but is now idle.

#### Dawson & Selwyn Memorial Portraits.

In recognition of the invaluable services rendered towards the development of the mineral wealth of Canada by the late Dr. George M. Dawson and his predecessor, Dr. A. R. C. Selwyn, late Directors of the Geological and Natural History Survey of Canada, the Canadian Mining Institute invites subscriptions from the Canadian mining public towards its fund for the purpose of presenting suitable portrait paintings of the late Directors to the Museum of the Survey with which their life work has been so prominently identified. Remittances marked "Dawson and Selwyn Memorial Portraits" should be sent to the Treasurer of the Canadian Mining Institute, Mr. J. Stevenson Brown, Temple Building, Montreal, or to the undersigned. All subscriptions will be acknowledged in these columns. The following amounts have been subscribed to date:—

B. T. A. BELL,  
*Secretary.*

Lord Strathcona.....	\$150.00
Canadian Mining Institute.....	100.00
Officers of the Geological Survey.....	54.00
Hon. Sydney Fisher, M.P., Ottawa.....	25.00
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Canadian Mining Review, Ottawa.....	25.00
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Eugene Coste, Buffalo, N.Y.....	5.00
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G. J. Ross, Nelson.....	3.00

## MINING IN NOVA SCOTIA.

The Guffey Jennings Mining Company have sold their property in Caribon, Halifax County, to the Baltimore and Nova Scotia Mining Company. The figure we understand is in the neighbourhood of \$300,000. Mr. W. Prisk, who has developed this property so successfully for the late Guffey Jennings Company, will be retained as manager by the new company and Mr. L. W. Getchell, who is a large stock holder in the new company, will act as superintendent.

The Guffey Jennings Company, who purchased the property from W. H. Sanders some three or four years ago, have thoroughly developed the property and to-day there are over 250,000 tons of ore of known value in sight. The new company have given instructions to sink the shaft, which is now at a depth of 600 feet, to 1,000 feet, and open up levels every 100 feet. They will also erect a new modern mill, capable of dealing with the large body of ore they have in sight. It appears likely that within the next twelve months this mine will be one of the principal producers in the province.

The Richardson Mining Company started a vertical shaft at the east end of their property with the view of cutting the eastern extension of the Richardson vein on the turn of the anticlinal, at a depth of 430 feet; the shaft is now down rather more than 200 feet, and in that depth three new veins have been cut, giving a combined width of over 60 feet of quartz in the shaft. Prior to the starting of this shaft these veins were not known to exist. All the new veins show gold more freely than the old Richardson vein. The company have erected a wharf at Isaac's Harbour and are putting in a line of railway from the wharf to the mine. All these expenses are coming out of the profits of the Richardson vein and no call has been made upon the shareholders for them. Truly 3 pennyweight ore is a paying proposition in Nova Scotia.

The Great Belt Mining Co., who have purchased the old Cunningham and Curran property at Mount Uniache, are in the field with a glowing prospectus, including a report by one Malt Alderson by name. We scanned the report roughly, which reads like a dream and is really quite poetical in places, but our feeble imagination cannot realize billions of dollars in gold to be obtained by merely scratching the surface—it is beyond us. But why did that report ever see the light of day with such excellent names as appear on the directorate? We have seen the hole upon the edge of which Malt probably sat when he had his day dream, and a more dangerous or uglier looking place to work in it would be difficult to imagine; but at the same time we can well imagine that if the property is mined in a workmanlike fashion good profits may accrue from it. The property is situated on the south dip near the anticlinal axis and there are a large number of small veins, many quite close together, and three or four could be conveniently worked at a time in safe underground workings, but if the present system of open cut working is followed there will most certainly be death in the pot before very long.

Mr. W. R. Askwith (who for the last two years has been in private practice with Mr. F. H. Mason at Halifax as consulting Mining and Metallurgical Engineers) has taken a position with the Clergue Syndicate at Sault Ste. Marie.

Mr. F. W. Edleston has several mining properties under examination.

Mr. Link is making an examination of the Cow Bay mines with view to purchase.

The National Mining Co. are developing the Prince of Wales and Queen veins at Mount Uniache. Mr. F. H. Mason, of Halifax, is acting as their consulting engineer.

## BRITISH COLUMBIA NOTES.

The Lade Group, Lardeau, has been bonded by W. B. Pool for \$100,000.

The output of concentrates from the St. Eugene Mine, Moyie, East Kootenay, for the month of June was 2,200 tons.

Mr. E. Bigelow, representing the International Gold Mining and Development Co., has taken up the bond on the Mastodon Group on Salmon River.

The Silver King Mine, Nelson, has resumed shipments to the company's smelter, which had been running on custom ore for some time. 130 men are employed at the mine.

A recent strike of six inches of dry ore, running 7,860 ounces silver to the ton, has been made on the Silver Glace, Slocan Division. The property is owned in Kaslo.

The mines at Sandon, Slocan Division, are all working a more or less limited number of men. The Slocan Star employs 125; the American Boy 35; the Payne and Last Chance 30 each.

The free milling gold belt, in the Lardeau District, continues to attract considerable attention. The properties now being worked are developing nicely, among the most promising of which is the Oyster Group. The area of free gold ledges is found to be more extensive than at first supposed.

The total output of coal from the Fernie Fields for 1900 was 206,803 long tons. The total coke production was 65,915 tons. Total amount of coal used in making coke, 103,031 tons. Of the coal production 89,841 tons were consumed in Canada and 7,968 tons exported to the United States. Of the coke production 27,065 tons were sold in Canada and 38,958 tons were exported to the United States.—Report of the Minister of Mines.

The Mine Owners' Association is in session at Nelson this week. The labour situation and the lead market are the chief subjects of discussion.

Owing to the low price of lead and the excessive charges for smelting and transportation, the North Star Mine will reduce its output from 2,000 tons to 1,000 tons per month.

The Eva Mine on Fish River, Lardeau District, has been sold by the Imperial Development Syndicate, Limited, A. H. Gracey, Manager, to the London and B. C. Gold Fields for \$250,000. There are a number of free milling gold ledges on this property. The development work, consisting of numerous open cuts, tunnels and winzes, shows that the ledges maintain their size and ore values with depth.

A. F. Rosenberger, of Nelson, has bonded the "Oyster" group on Lexington Mountain, adjoining the Eva Mine. Development work will be started at once. Mr. Rosenberger has also bonded the "Sir Willfrid" group, the "Noble Four" group and the "Excelsior" claim on Pool Creek, for the purpose of developing which he has organized a local syndicate.

Shipments from the mines of the Slocan Division for this year, to date, are:

Arlington .. . . . . .	1,845 tons.
Enterprise .. . . . . .	240 "
Two Friends .. . . . . .	40 "
Black Prince .. . . . . .	100 "
Bondholder .. . . . . .	23 "
Chapleau .. . . . . .	15 "
Speculator .. . . . . .	10 "
Phoenix .. . . . . .	23 "
V. & M. .. . . . . .	20 "

Total .. . . . . . 2,316 tons.

New discoveries of free milling gold ledges are reported from Lexington Mountain and Camp Creek, Lardeau District.

About 1,000 tons of ore from the Payne Mine are being treated at the Noble Five mill at Cody.

At the Last Chance Mine, in the Slocan Mining Division, a cross-cut tunnel is now in 1,400 feet. The results so far have been very promising. This property is not shipping at present, work being confined to drifting and cross-cutting, on which 16 men are employed.

At the Silver Hill Mine, in the Ainsworth Mining District, development work will soon start on a large scale. The management will build a tramway from the mine to the wagon road, which will effect a very considerable saving in the cost of handling the ore. The success of the Silver Hill Co. in developing its property has greatly stimulated prospecting in this vicinity.

The last payment on the bond of the Iron Horse, Ten Mile, Slocan City Mining Division, has been deposited in the bank. The original amount of the bond was \$19,500, held by Spokane capitalists. The property is being steadily developed; machinery will be installed, and work will now be carried on on a large scale.

Last year's exports from the Slocan Division amounted to 2,847 tons, made up from 10 properties. Shipments for this year, to date, are as follows:

## LAKE OF THE WOODS.

*Sultana*.—Diamond drill exploration is still being pursued at this mine. It is announced that a few days ago the drill penetrated six feet of valuable ore to the east of the workings. It is expected that this ore body is the continuation of the main Sultana ore body which was lost near the bottom of the main shaft.

*Black Eagle*.—A large force of men are employed in excavating the foundation for the new mill of thirty stamps which is being constructed by the Jenckes Machine Co. A double shift of miners are engaged in straightening the main shaft, which will be equipped with a first-class modern hoist.

*Mikado*.—Manager McMillan reports striking ore of phenomenal richness below the 8th level in the inclined shaft, which is now close to 1100 feet deep. The mill is kept going part of the time on ore from development. The Company have placed \$75,000 more working capital in the hands of the management to be used for development only and have given instructions that the product of the mill is to be used for this purpose for 12 months.

*Golden Horn*.—Fine specimens are being shown from the new shaft, which is down nearly 50 feet.

*Olympia*.—A deal is now assured on this property, near the Mikado, by which a large amount of capital will be provided for development.

*Esclimider*.—A force of men under Mr. Hunter, of Milwaukee, are exploring this group of properties on Hilly Lake, 6 miles east of Rat Portage.

*Scramble*.—It is rumoured that this famous property will be placed at once under development.

*Nish-shish-in*.—This property has been shut down pending negotiations for an extension of the option under which the work is being done.

*Boulder*.—Sinking and cross-cutting are being carried on at this mine.

*Gordon*.—James Gordon is sinking a shaft 100 feet on this property, lying east of the Champion.

*Homestake*.—The new hoist is working satisfactorily, and Mr. Breidenlach has a new sampling and testing outfit at work to find the most economical method of treating the somewhat complex ores produced by this mine.

*Sakoose*.—Shipments continue steadily to the mill at Keewatin.

*Larson Reef*.—This property, situated south of Dryden, has recently been equipped with hoist and compressor.

*Big Master*.—Sinking on the main shaft and drifting on No. 1, or "Little Vein," are proceeding at a rapid rate.

*Reliance Co*.—The ten stamp mill is to be erected at once and a new hoist and compressor installed at the Independence.

*Golden Eagle*.—A recent mill run of 19 tons was made at the El Dorado mill on Eagle Lake and returned \$8.53 per ton on the plates. A small force of men are drifting to the south pending the installation of a hoist, when sinking will be resumed.

*Grace*.—Charles Brent, M. E., last week reported on this mine in the interest of Buffalo capitalists.

## EAST KOOTENAY.

The Windermere Mining District of North-East Kootenay is attracting a fair share of attention this season. At the present time there are two government wagon roads in course of construction. One road leads from the Town of Peterboro up Toly Creek, some fifteen miles, to North Fork Creek, and will afford an outlet for the ore from the Paradise and Delphine mines, owned by Messrs. Hommuel & Bruer. There are other properties in course of development which will be benefited from the ease and economy of getting in supplies. The Richmond Mining Company, of New York, are developing the Monarch Group, and a force of men are driving a tunnel to the ledge on the Mineral King. On this property a good ledge of concentrating galena has been encountered. The owners of the Elora claim are preparing to prosecute work on their copper property, which has a foot ledge of chalcopryite carrying 32 per cent. copper and 30 ozs. silver. The pay dirt begins at the grass roots.

The other wagon road was begun last week (about July 2nd), and will lead from Peterboro to the Macdonald Mine, some thirty miles from town, and will afford an outlet for the properties on Horse Thief Creek and its tributaries, which are Boulder, Law and Macdonald Creeks. The Macdonald Mine was a year ago known as the Red Line. It was purchased early in 1901 for \$50,000, and development work is being pushed with the view of having it on the list of shippers when the snow comes. In the absence of railway transportation from the mine ore can be hauled to the Peterboro steamboat landing in winter at a minimum cost. The Macdonald Mine is blocking out a large body of ore, and promises to be a heavy shipper.

The Tecumseh and Silver Thread and Paying Teller are on Law Creek, in the same locality, and will be developed this season. They have large ore bodies exposed on the surface and only need development work to place them on the shipping list.

Boulder Creek has the Delos, a copper property which is crown granted. There is a good body of ore, but, on account of the cost of transportation, has been idle for two seasons. It is understood that the construction of the wagon road will result in this property being worked. The Sitting Bull group of claims is on this creek, also the Alps group and the White Cat. The Sitting Bull consists of three claims, crown granted, and with pay ore in all the workings. The White Cat has over three feet of high grade galena exposed for a considerable distance. The owners are content to let it lie until better times, with only work enough to hold the property. From surface indications it is one of the best properties in this district.

These few mentioned have most work done, but there are other properties that have surface showings from nine inches to two feet in width. The bulk of claims are in the hands of original owners, who are looking for the advent of the capitalist. There is probably no better field for the conservative inventor than the Windermere District.

## NEW COMPANIES.

### BRITISH COLUMBIA.

**Consolidated White Bear Mining Company, Limited.**—Incorporated 24th June, 1901. Authorized capital, \$300,000, in shares of 10 cents. Formed to acquire and work the "White Bear Mine," situate at Rosstand, B.C.

**Gopher Mines, Limited.**—Incorporated 29th June, 1901. Authorized capital, \$100,000, in shares of 10 cents each.

**Lardeau Valley Mines, Limited.**—Incorporated 22nd June, 1901. Authorized capital, \$150,000, in shares of 10 cents each.

**Snowshoe Gold and Copper Mines, Limited.**—Incorporated under the Companies Acts, 1862 to 1900. Authorized capital, £250,000, in shares of £1 each. Formed to acquire the Snowshoe Mine and certain adjoining properties, situate in the Boundary District, near Phoenix, B.C. Head office: T. J. Morris, Secretary, 7 Poultry, London, England.

### ONTARIO.

**H. H. Vivian Company, Limited.**—Licensed under the Laws of Ontario, 6th May, 1901. Authorized capital, \$15,000. Formed to acquire and develop certain nickel mineral lands in the District of Nipissing, Ont. Head office: A. H. Lefroy, Barrister, Toronto, Ont.

**Ontario Portland Cement Company, Limited.**—Incorporated 11th July, 1901. Authorized capital, \$350,000, in shares of \$100 each. Head office: Brantford, Ont.

**Canadian Salt Company.**—Licensed 17th July, 1901. Head office: E. G. Henderson, Windsor, Ont.

### NEW BRUNSWICK.

**Gold Zone Mining Company, Limited.**—Incorporation to be applied for. Authorized capital, \$350,000, in shares of \$1 each. Head office: Rothesay, New Brunswick.

## COMPANY NOTES.

**Mikado Gold.**—The accounts of this Company for the year ended 31st December last show: Receipts from bullion, £21,883 7s. 1d.; Rents, £250 19s. 6d.; London, £92 5s. 3d.; general expenditure, £14,881 0s. 9d. (mining £6828 8s. 6d., milling £2891 8s. 7d., cyanide plant £2,238 16s. 1d.); depreciation written off, £1,987 4s. 3d.; expenditure in London, £1,485 3s. 10d.; net profit to balance sheet, £1,903 1s. 2d.

**Ymir.**—Cablegram from the company's representative at Nelson, British Columbia:—"Mine Car sample, level No. 4, west of the dyke—sample assays gold \$35 (£7), silver \$5 (£1) per ton of 2,000 lbs. Represented width of 15 ft. The

average width of the vein is greater." The following circular has been issued to the shareholders: "Referring to the circular of 31st May last, the company's engineers have now fully reported the result of the cyanide operations, and they strongly recommend that the present small plant be supplemented by one sufficiently large to treat the whole of the tailings as they pass from the mill. The order for this plant has been given, and the work will be pushed on with all the speed possible. The installation of this plant will cost approximately £10,000, and, as the shareholders have already been informed, it will produce an estimated profit of not less than £17,000 per annum, equal to an additional  $\frac{3}{4}$  per cent. on the Company's capital. The policy of the Directors in the past has been to pay for all additions and improvements out of profits of the mine. The shareholders will doubtless learn with satisfaction that the installation of the requisite cyanide plant will be made without any increase of capital and without entrenching upon the funds required for the payment of quarterly dividends. The news from the mine continues to be of the most satisfactory character, and the high returns are being maintained. It will be remembered that two interim dividends of 1s. each per share were declared on 28th January and 15th May of this year respectively, and the directors anticipate declaring another similar dividend early next month, and further quarterly dividends should follow in due course."

**Asbestos and Asbestic.**—The report of this company, recently issued from the London office, for the year ending March 31st, 1901, says that "the trading, after providing for directors' remuneration and all expenses in London and Danville, resulted in a loss of £6,964, from which has to be deducted the balance at credit of profit and loss brought forward from last account, £1,323, leaving a debit balance of £5,641. The serious loss is to be accounted for by the unfortunate fire at Danville, Quebec, in March, 1900, which proved more disastrous than was anticipated, and work was stopped for more than six months, and at that time of year when business operations should have been at their best. The production for the year has consequently been very small. The new plant put in has not a large capacity, but it is now working well, and the production of asbestos is immediately disposed of. There has been considerable disappointment in respect of the sale of asbestic in the United States, but in Europe the sale has continued to improve. The quantity of asbestic on dump in bulk has been reduced by 1,912 tons during the year, and now stands in the stock account at 47,402 tons.

"The endeavour of the board to induce the shareholders to find the necessary funds for the carrying on of the business of the company having failed, and Mr. James Graham Cannon, of New York (who, with Mr. William C. White, of New York, was elected a director of the company in June, 1900), having obtained control of the majority of the capital of the company, and having stated that he is prepared to find the necessary money to re-equip the mine, and to provide for the floating indebtedness of the company, including accrued directors' fees, on condition that the management of the company's affairs be entrusted to him, with the support and good-will of the shareholders, the directors resident in London will resign their seats on the board immediately after the meeting to be called for June 26th, and will carry out the necessary steps for the transfer of the company's affairs to a board which will be composed of Mr. Cannon and others to be nominated by him. The directors believe that the plans of Mr. Cannon and his friends are submitted for the purpose of benefiting the interests of the general body of shareholders, and are the means most likely to bring the business of the company to a successful issue within a reasonable time.

"Mr. Cannon, with his friends, holds the strong belief that, when properly equipped, and in view of the expanding market for its products, the property of the company will become remunerative, and in making the foregoing recommendation the board believes it is submitting a solution of the present difficulties, which should prove of great advantage to the shareholders. The members of the board, other than Mr. Cannon and Mr. White, also wish to place before the shareholders their belief that, in evidencing faith in the ultimate success of the company by the investment of additional funds in the capital of the company, and by arranging to find funds with which to carry on and develop the company's business, Mr. Cannon has given the best possible guarantee that every effort will be made to place the company in a strong and profitable position. Mr. Cannon has promised that in raising the fresh capital necessary for the equipment of the property and the development of the company's business, he will offer the shareholders that capital and will give preference to their subscriptions to it."

**Ruth Mines.**—The directors' report says that two new claims have been added to the company's property, the purchase consideration being 30,000 shares. The capital of the company has, therefore, been increased from £120,000 to £150,000. There is reason to believe that these claims will prove a valuable acquisition. In addition to these the Blue Jay claim was acquired as being the most suitable site for the concentrator. The anticipations expressed at the general meeting, held on December 30th, 1898, have been partly realised and partly disappointed, but they were wholly postponed for a time by the occurrence of a strike on the part of the miners, which lasted for some nine months, and involved the complete shutting down of the mine. The strike came to an end in February last, but for some time afterward it was difficult to get the necessary number of men. Meanwhile the concentrator had been erected, and started work in the early part of the summer of 1900. It is working satisfactorily. The ore which has been treated in the concentrator has been taken partly from the backfilling of the old stopes and partly from the ore dumps. A large amount of development work will, without doubt, be necessary before the mine can be put into thoroughly good shape again, and the shipment of ore is at present limited to such a small amount as will pay current expenses.

The directors regret to state that the development work upon the Aurora ledge has hitherto failed to prove the existence of ore bodies of value, and attention has therefore latterly been concentrated upon the original claims. A new discovery has been made upon the Hope claim, and a well-defined vein has been opened up by means of two tunnels, and a considerable body of ore has been revealed. As this new discovery lies ahead of the older workings of the property, it may be a continuation of the vein which has been cut off by the breaks in the formation, but it is at present impossible to speak with any certainty upon this point. Ore has been opened up in various parts of the older workings, and, generally speaking, the appearance of the mine is better than it has been since the fault was encountered. The most important development, however, has resulted from the driving of a tunnel to cut the vein at the fifth level, some 250 ft. below the fourth level. This extensive work, which necessitated driving a distance of some 1,200 ft., resulted in cutting the vein.

The accounts for the year ended June 30th, 1899, show a profit of £2,912. The accounts for the year ended June 30th, 1900 (for some eight months of which period the miners' strike was in operation), show a loss of £3,022.

**Dominion Mining, Development and Agency Company, Limited.**—The accounts for the 18 months ending December 31st, 1900, show that after charging expenditure on properties abandoned, loss on shares sold, and after writing off the balance of the Reindeer Skin contract, and the whole of the original purchase account, and after making a reserve of £24,162 against various shares held by the company, there remains a profit for the period of £1,257, which is subject to the realization of the various shares held at the prices at which they are taken for the purposes of the present account.

During the period under review the Kettle River Power Company, Limited, has been formed to take over the Cascade water rights and interest, and the company has received its proportion of the fully paid shares and part of the cash consideration for the sale. A company, under the title of the Gilbert River Gold Fields, Limited, has also been formed to take over the property hitherto worked on a small scale by the Beauce Syndicate, Limited, and the company has received part of the fully paid shares coming to it under the terms of the sale. Latest reports from this property are most satisfactory.

The Queen Bess Proprietary Company, Limited, has been engaged upon the driving of the main tunnel at a much lower level to meet the shaft sunk from tunnel No. 5, and the proceeds of all ores mined have been used for the development of this important work. The connection between the shaft and the main tunnel has been made. No. 6 level has been opened up in good ore for a considerable distance, and the engineer in charge of the mine intimates that shortly shipments from the mine will be greatly increased, while the expenditure on development will very materially decrease, so that the mine should at once be earning a surplus for dividend purposes.

With regard to the Atlin Lake Company, Limited, the shareholders have been advised from time to time of the development in connection with this property, and have forwarded to them copies of the various reports made upon same. Mr. Mostyn Williams, who is now returning to Atlin to commence the present season's work, has intimated that beginning washing the pay gravel in Birch Creek by June, a dividend-paying stage will be reached during the present season.

In order to carry through the various contracts in which the company is interested, to provide for the liabilities and to finance some of the subsidiary companies, the company has issued at par debentures to the amount of £10,000 in bonds of £10

each, for the term of two years, bearing interest at the rate of 10 per cent. per annum, payable half-yearly (first payment to be made October 1st, 1901) and secured upon the whole of the assets and undertaking of the company, with liberty to the company to redeem at any time after twelve months from March 31st, 1901, on giving 6 months' notice.

The following is a complete list of the company's holdings on December 31st, 1900: 5,948 shares of £1 each in the Queen Bess Proprietary Company, Limited; 20,875 shares, £1 each, Gilbert River Gold Fields, Limited; 18,269 shares (£1) Atlin Lake Company, Limited; 31,384 shares (£1) Kettle River Power Company, Limited; 5,250 shares (£1) Pyramid Copper Syndicate, Limited; 250 shares (£1) Anglo-Canadian Publishing Company; 80 shares (\$10) Imperial Brewing Company, Limited; 33 debentures of \$10 each in the Beauce Syndicate, Limited.

The mining properties include the following, all in various stages of development: Cromwell and Champion, two copper properties, situated at Pitt Lake, near Vancouver; two-thirds interest. I. C. Group, two silver-lead claims, known as I. C. and Vancouver, situated in the Slocan District, at West Kootenay; three-fourths interest. Alice, Romance and Condor, three copper and gold claims, situated on Hall Creek, West Kootenay; half interest. M. & M., a gold claim, situated on Wild Horse Creek; whole interest.

#### Cost of Diamond Drilling.

A short but interesting paper read before the Institute of Mining and Metallurgy gives in tabular form the details of a number of borings made with a 1¾-inch Sullivan drill, at the San Pedro mine, Fresnillo, Zacatecas, Mexico. The total depth of the hole was 1852 feet, and the actual time consumed in drilling was 2,480 hours. The rock was hard greyish blue slate, with seams of quartz and heavy spar. The total cost per foot was 6 shillings 7 2-10 pence (\$1.64). Details of cost of labor, carbons, coal, bits, oil, etc., are given.

## McGill University, Montreal.

### CHAIR OF METALLURGY.

The Governors of McGill University invite applications for the Professorship of Metallurgy. Candidates for the appointment are requested to send their testimonials, with a statement of age, qualifications, etc., to the Secretary of the University, before September 1st.

The duties of the post will commence on October 1st.

Full particulars of the work, salary, etc., may be obtained from the Secretary.

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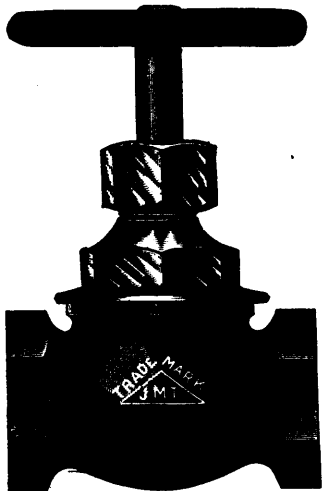
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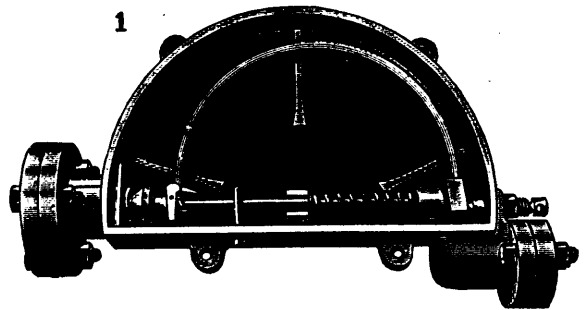
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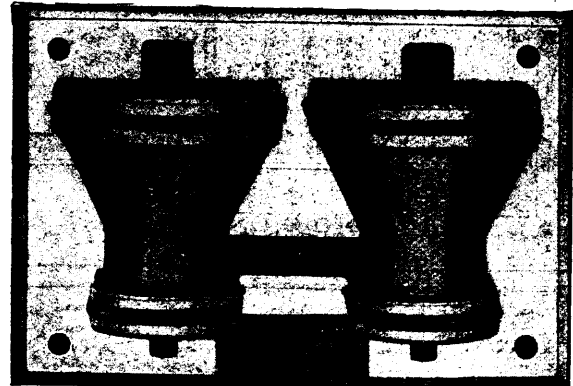
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# Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite : copper in sulphide and native form ; gold, mostly in free milling quartz ; silver, native and sulphides ; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1900 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

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For reports of the Bureau of Mines, maps, mining laws, etc , apply to

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ORNAMENTAL AND STRUCTURAL MATERIALS IN BUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been  
specially framed for the encouragement of Mining.

Mining concessions are divided into three classes:—

1. In unsurveyed territory (a) the first class contains 400 acres, (b) the second, 200 acres, and (c) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (a) as a mining concession by purchase, or (b) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are \$5 and \$10 per acre for mining lands containing the superior metals\* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, \$2 and \$4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

\*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than \$500 if mining for the superior metals ; and not less than \$200 if for inferior metals. In default, cancellation of sale of mining lands.

(b) Licenses may be obtained from the Commissioner on the following terms:—Application for an exploration and prospecting license, if the mine is on private land, \$2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in unsurveyed territory, \$5 for every 100 acres, and (2) in unsurveyed territory, \$5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds : Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of \$5 and an annual rental of \$1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE HON. THE COMMISSIONER OF COLONIZATION AND MINES,  
PARLIAMENT BUILDINGS, QUEBEC, P. Q.





**PROVINCE OF NOVA SCOTIA.**  
**Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin**  
—AND—  
**PRECIOUS STONES.**

**TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.**

**GOLD AND SILVER.**

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

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

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

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

**MINES OTHER THAN GOLD AND SILVER.**

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

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

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

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

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

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

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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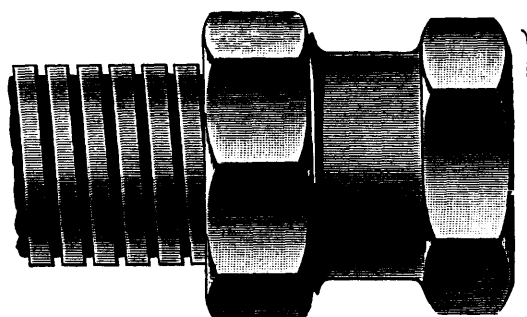
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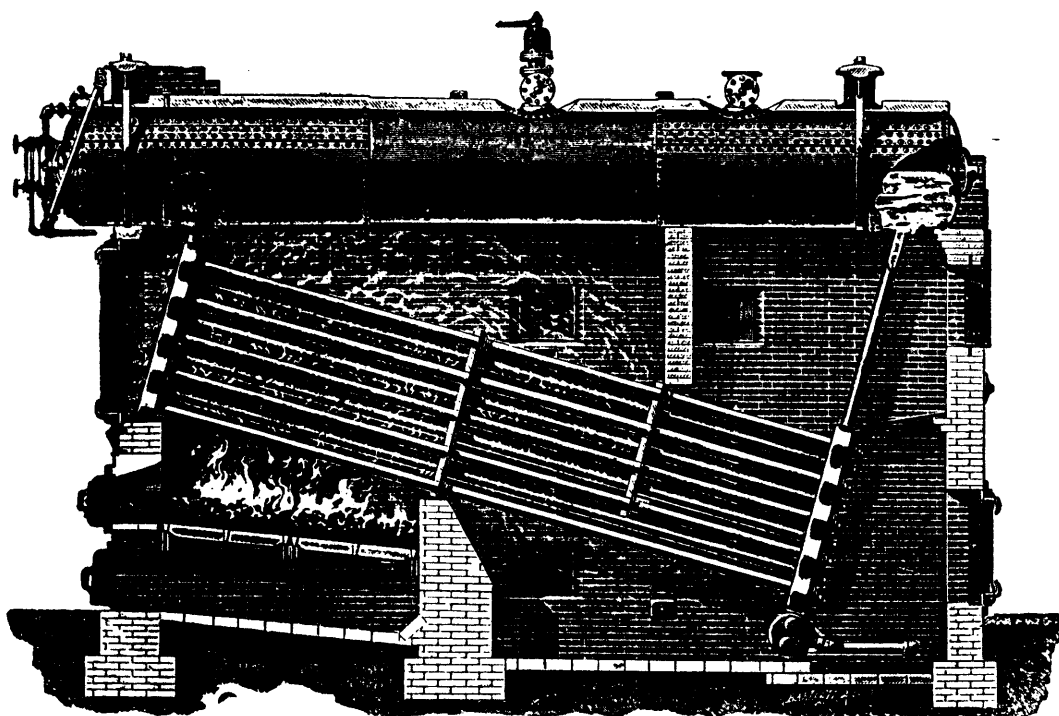
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