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NINETEENTH YEAR OF PUBLICATION

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Established 1882

Vol. XX—No. VI.

OTTAWA, JUNE 30th, 1901.

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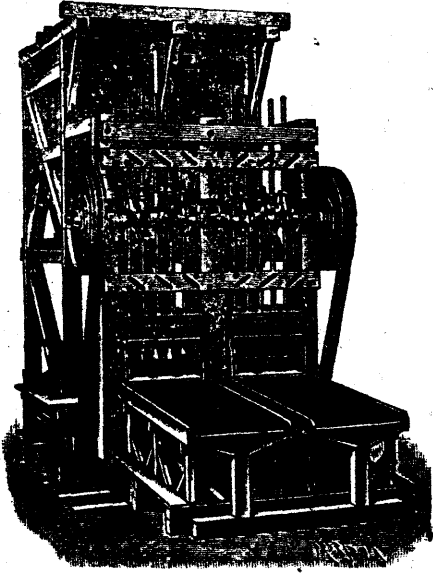
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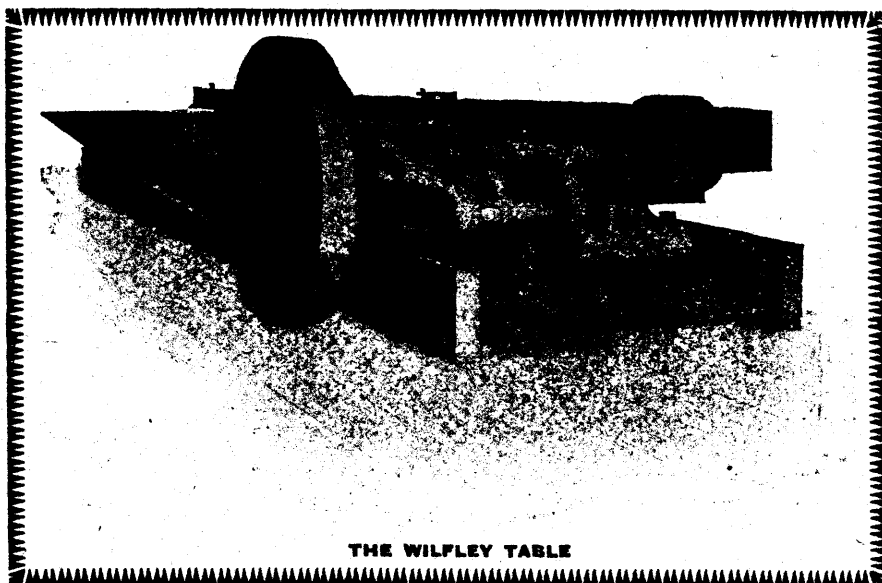
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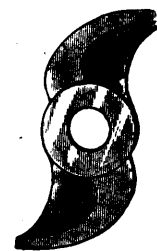
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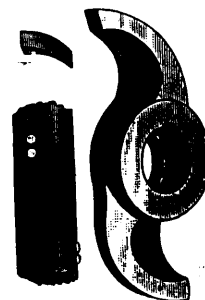
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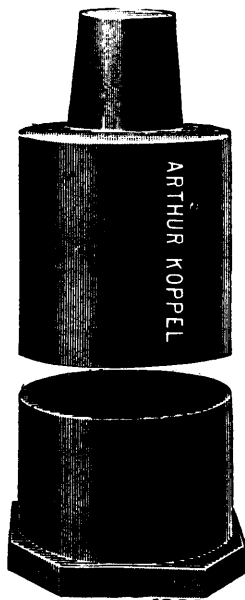
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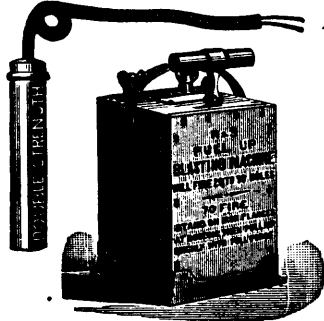
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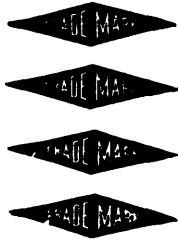


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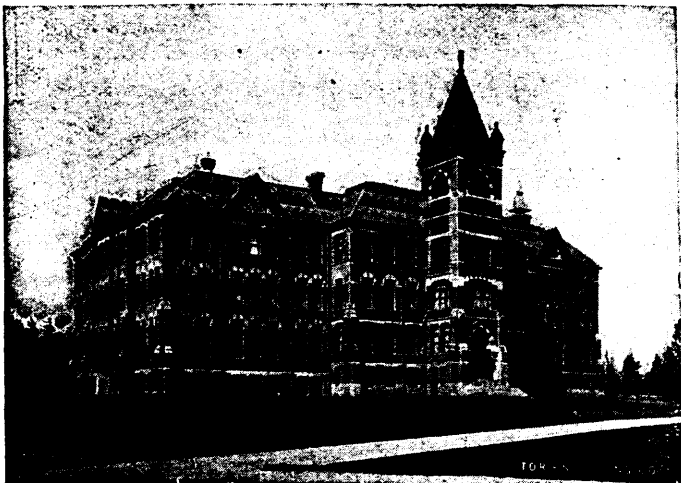
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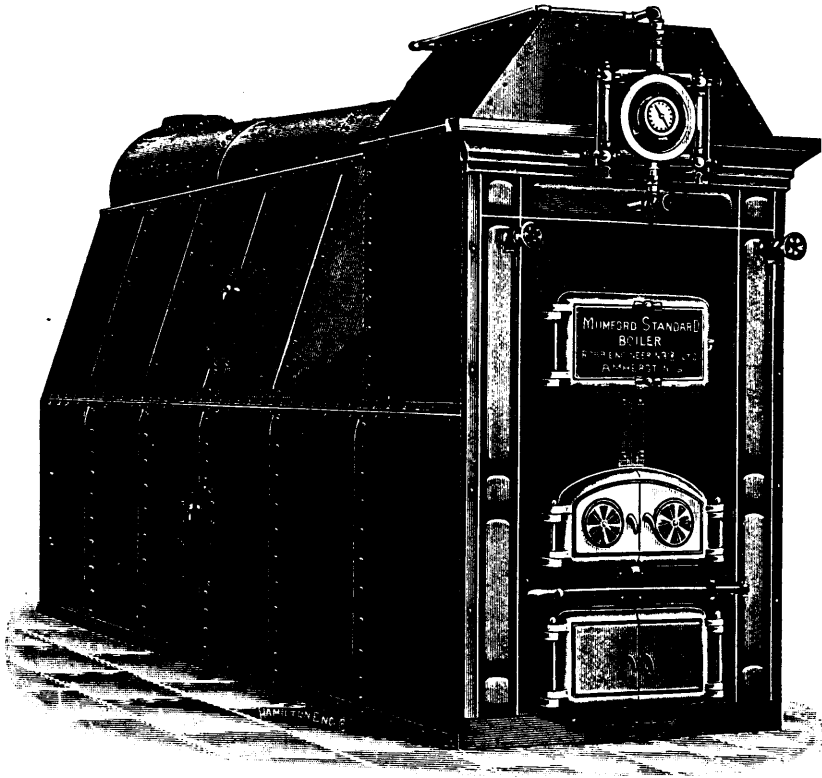
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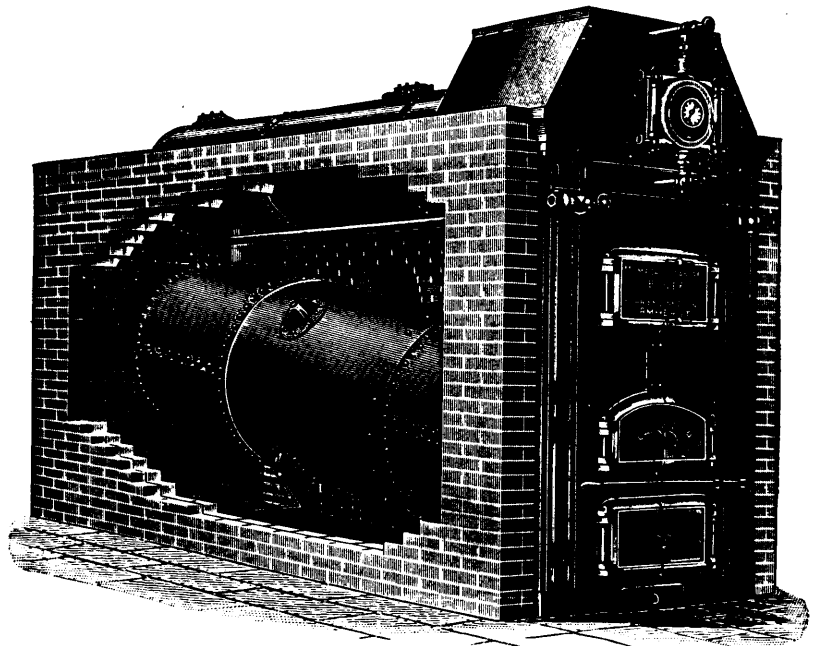
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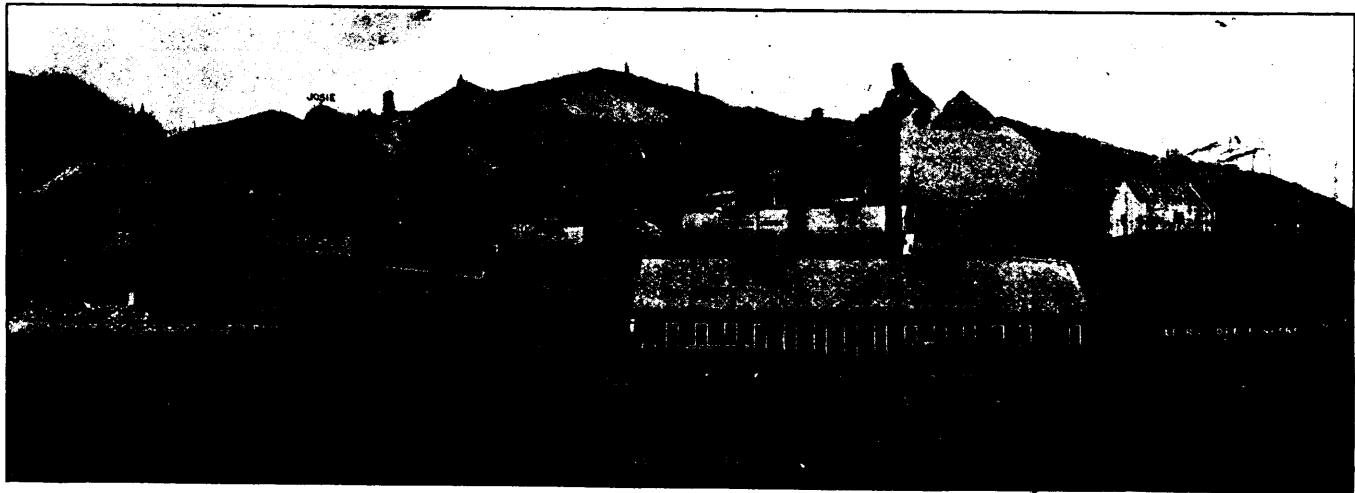
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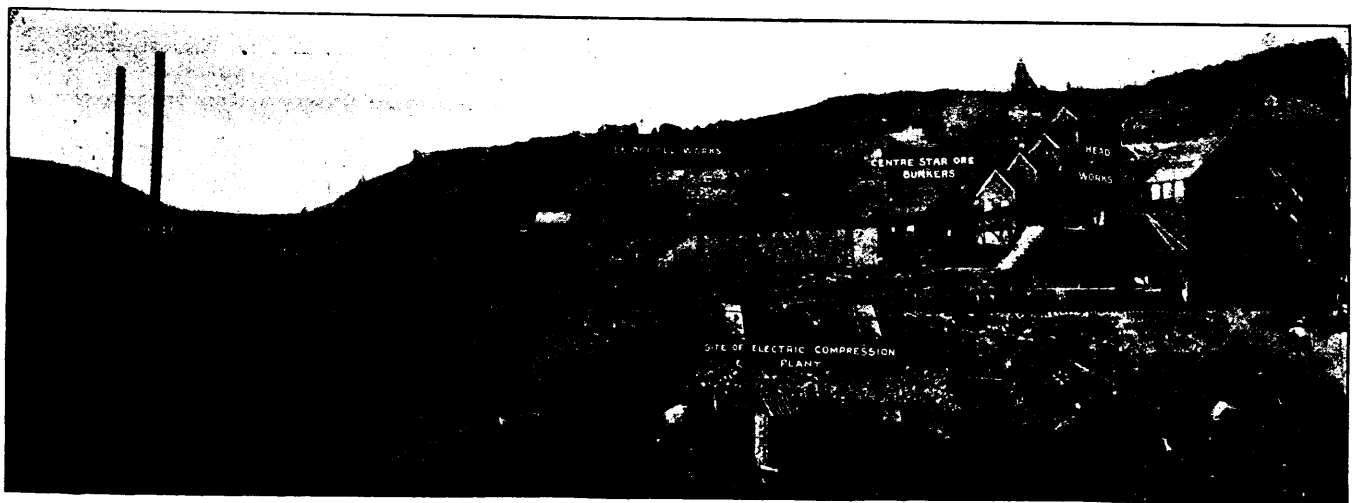
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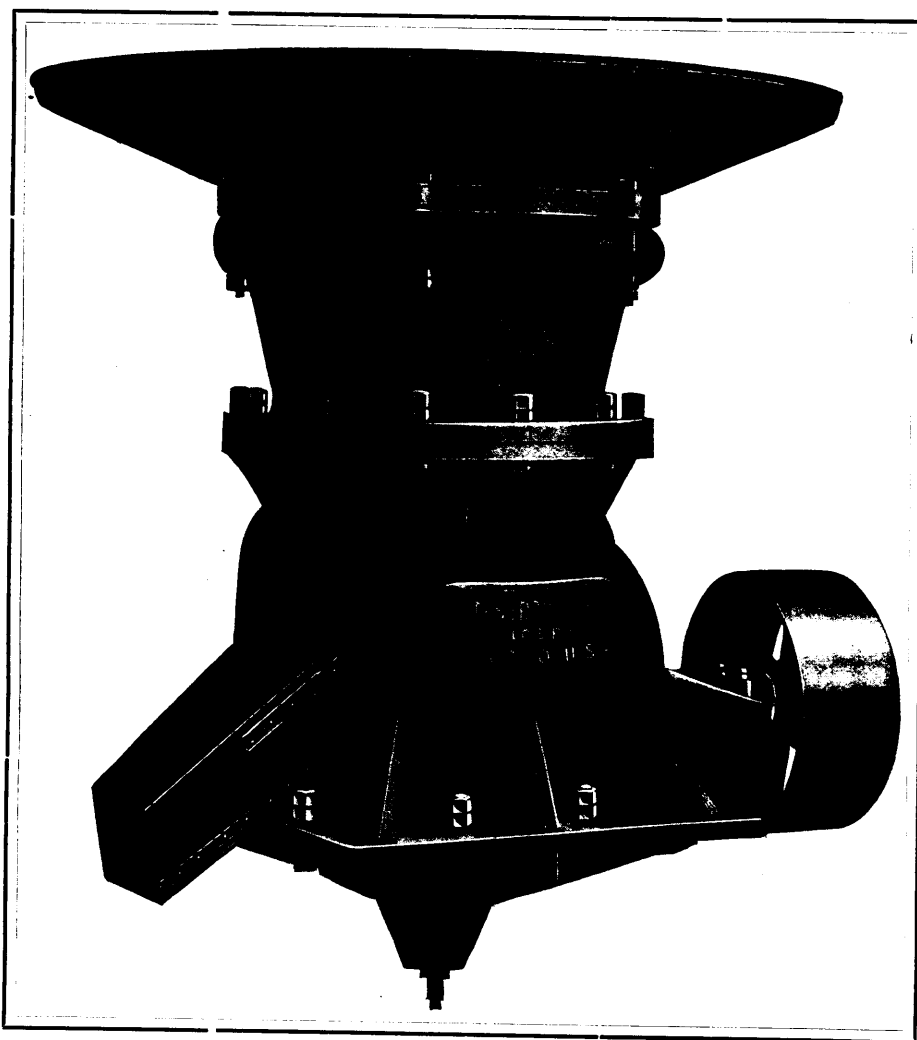
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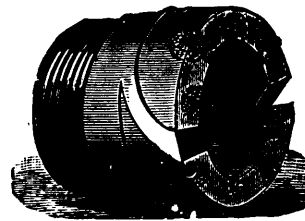
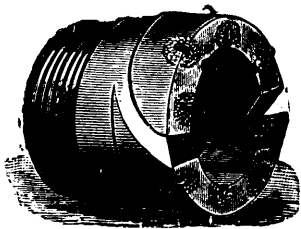
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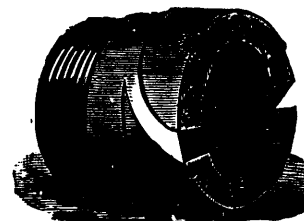
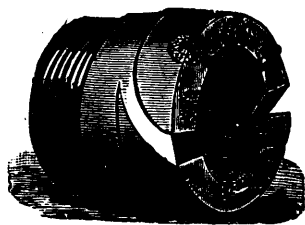
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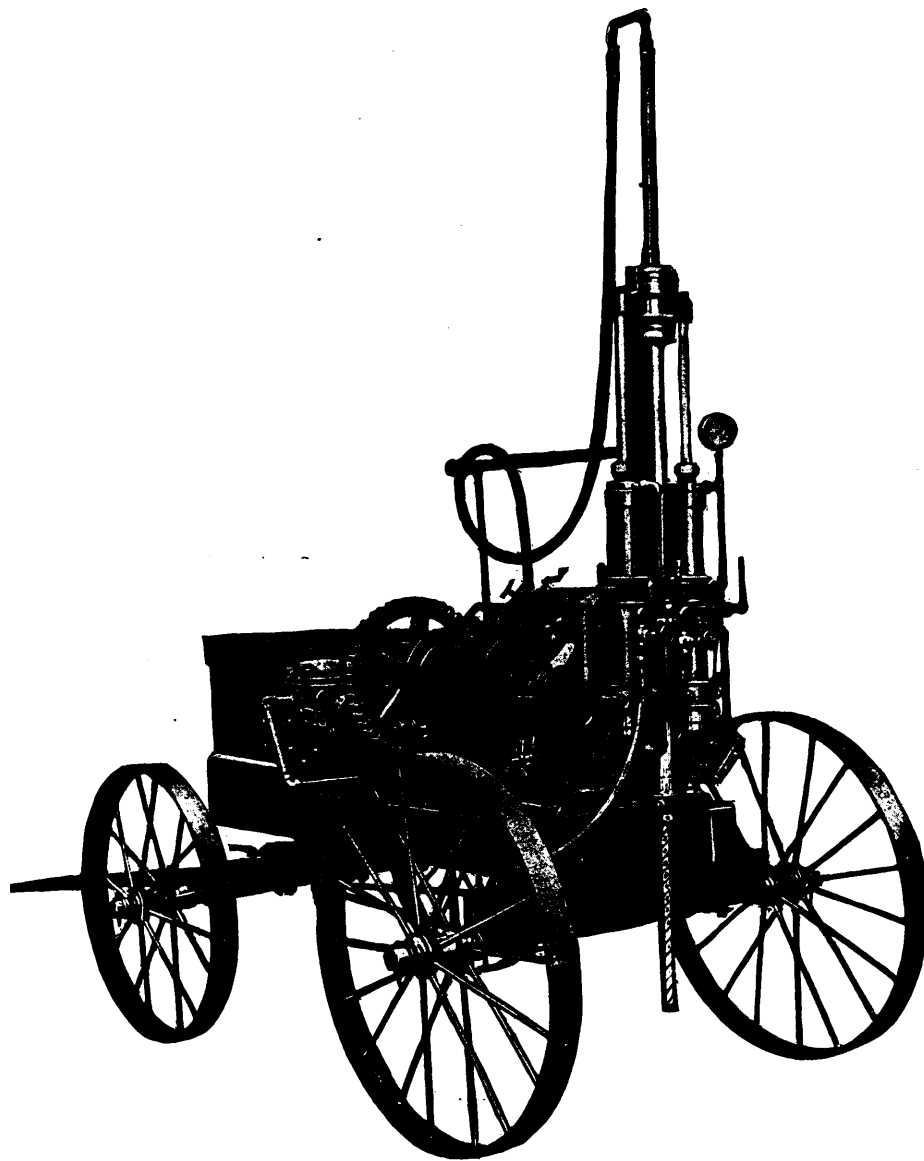
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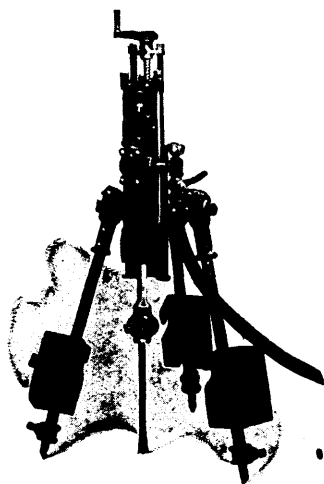
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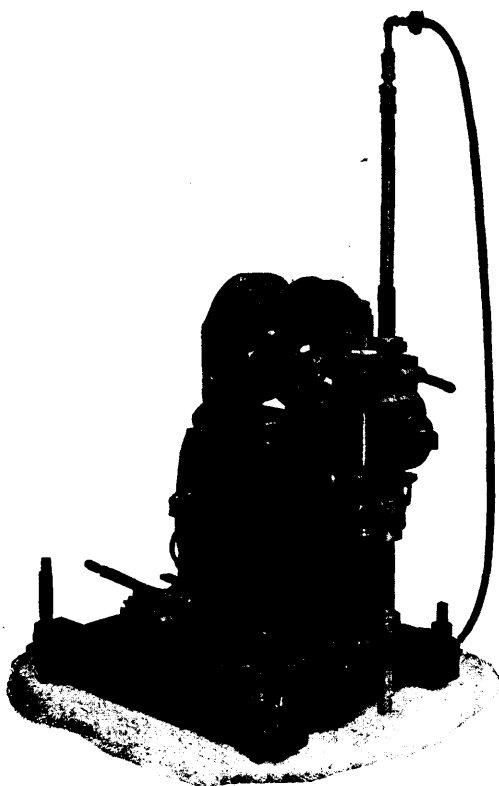
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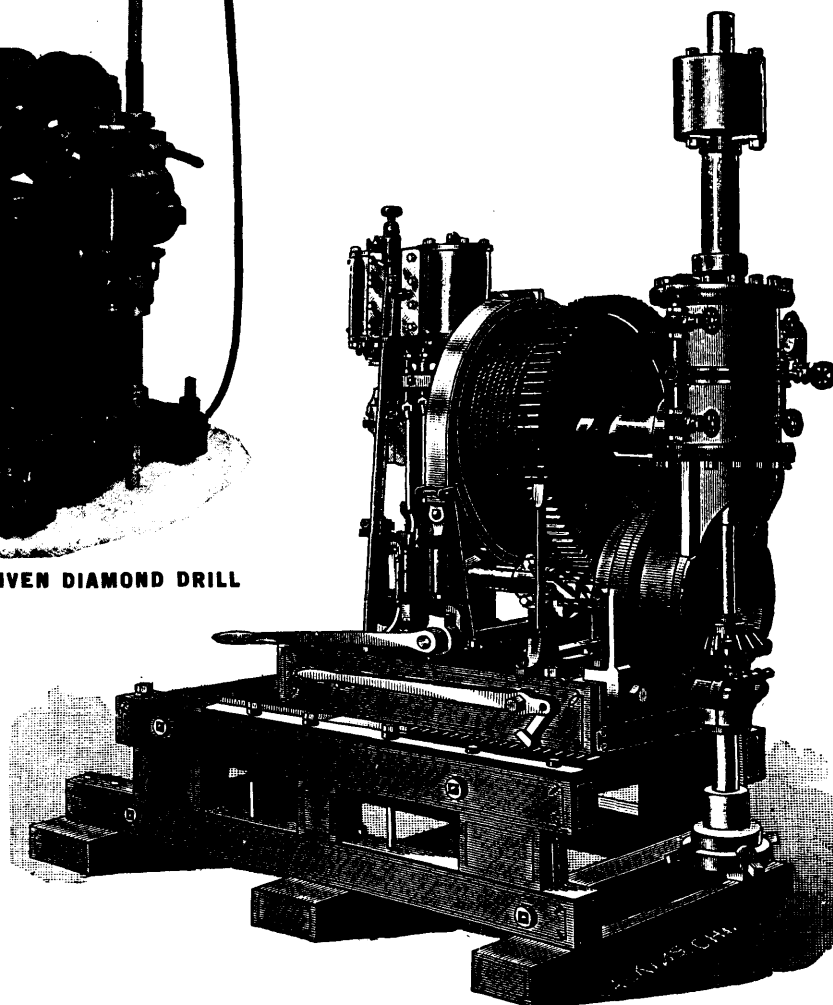
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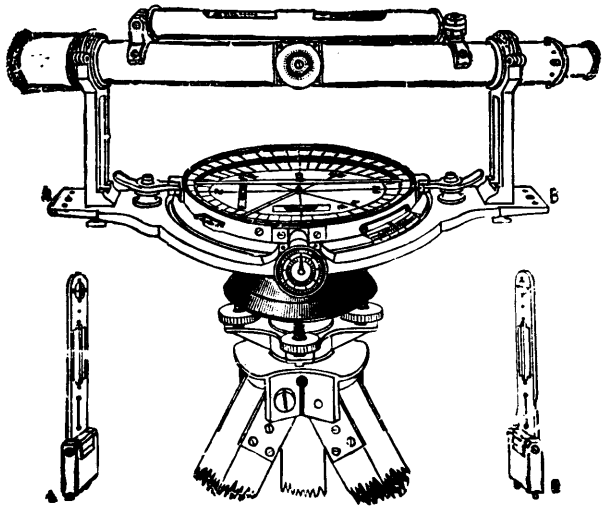
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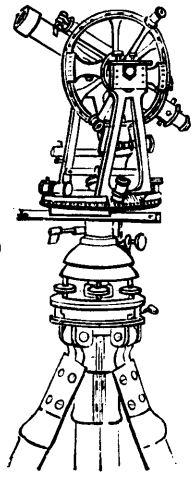
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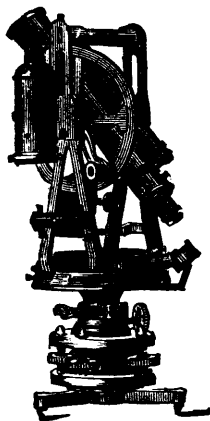
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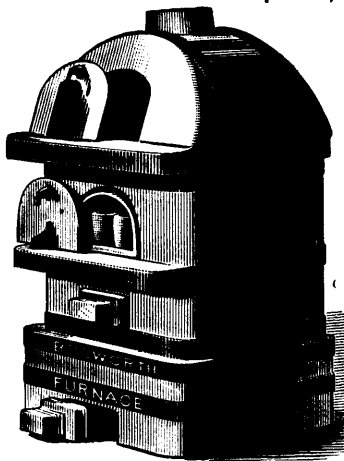
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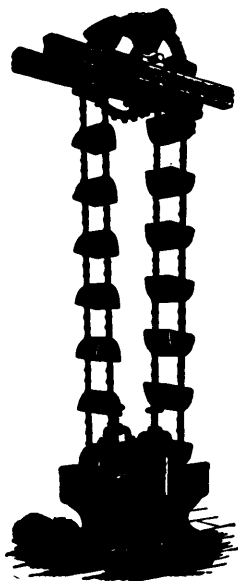
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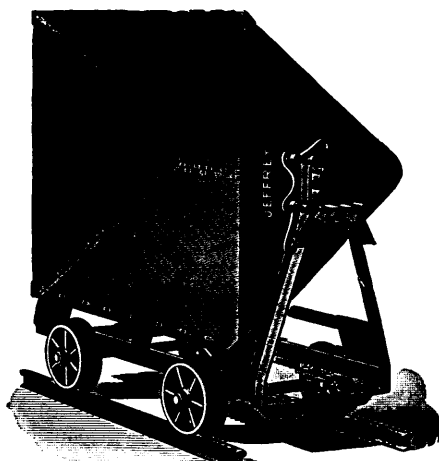
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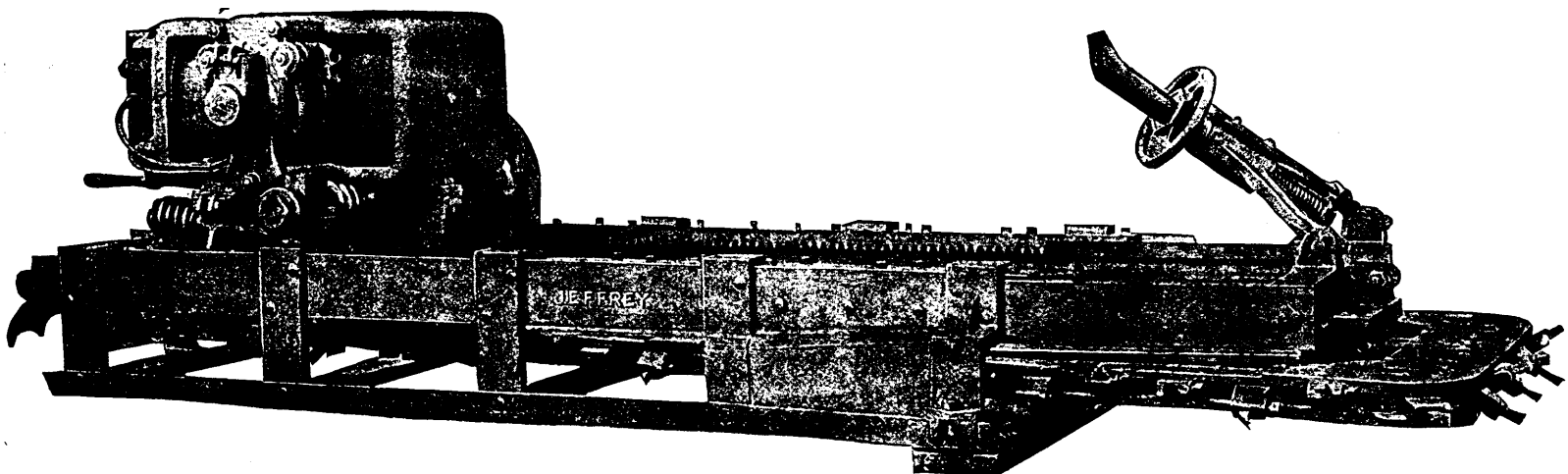


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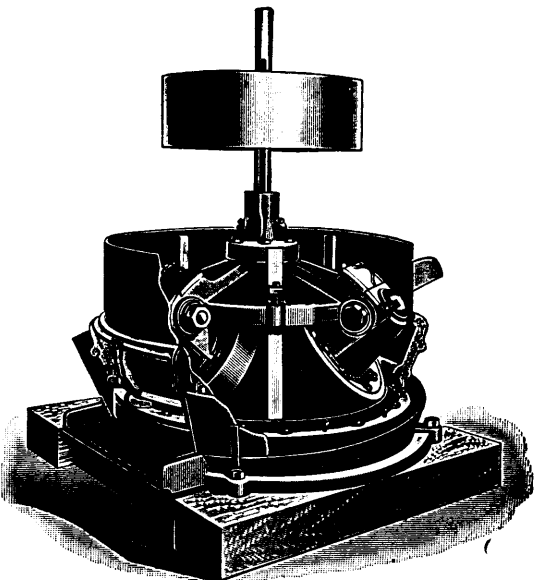
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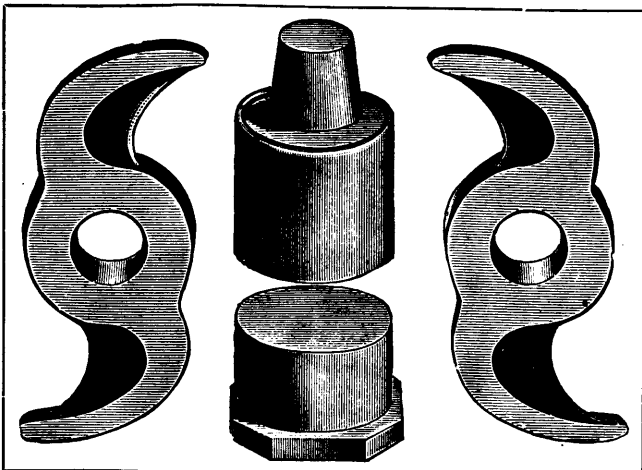
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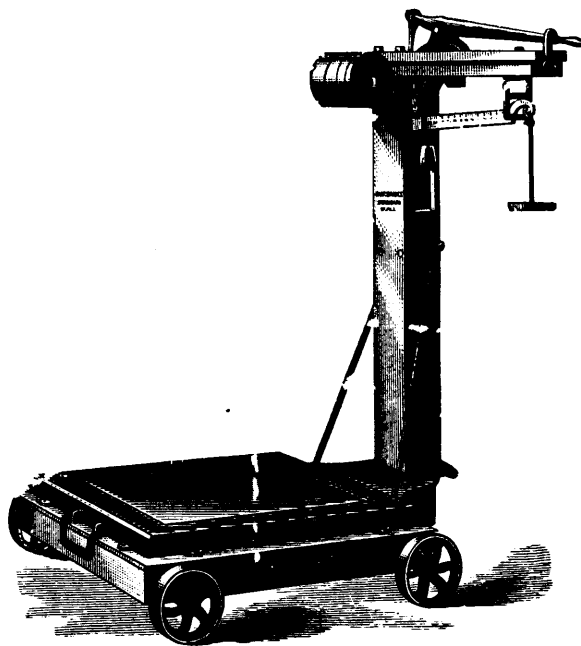
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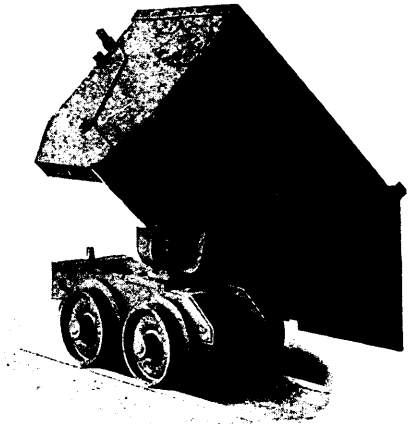
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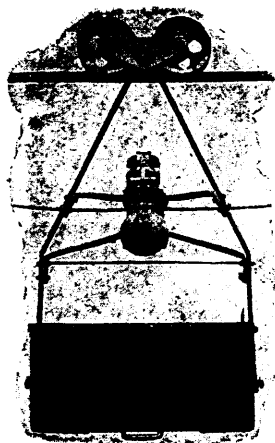
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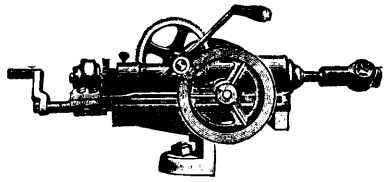
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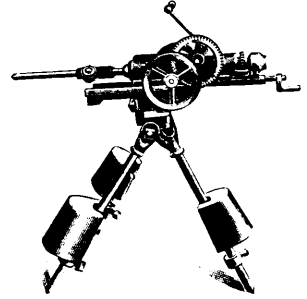


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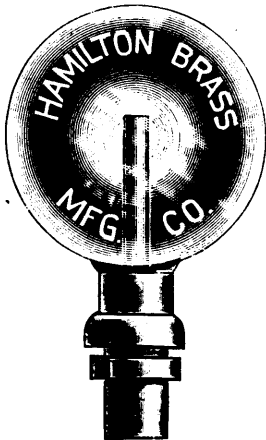
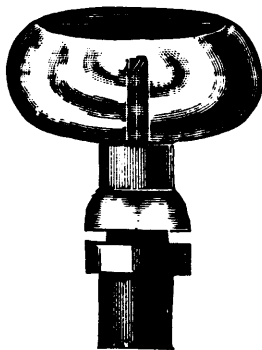
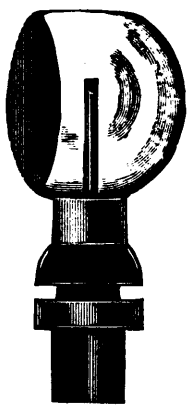
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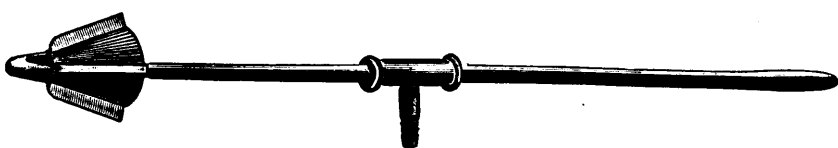
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We are not Dealers or Refiners, but Receive Consignments, Weigh, Sample and Assay them, selling to highest bidders, obtaining advances when desired, and the buyers of two continents pay the highest market price, in New York Funds, cash against our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

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ALSO ANALYZE EVERYTHING.

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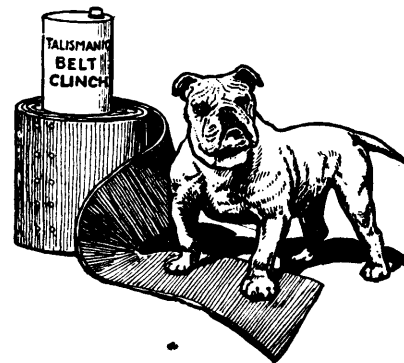
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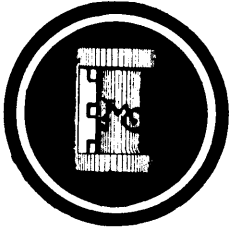
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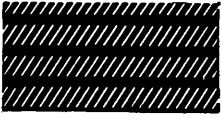
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A western mill Supt. writes us:—

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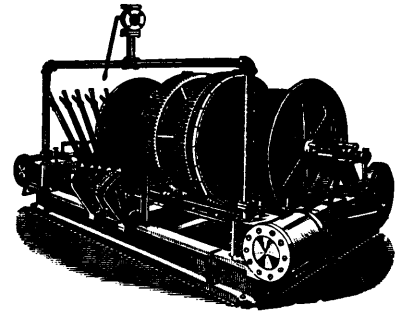
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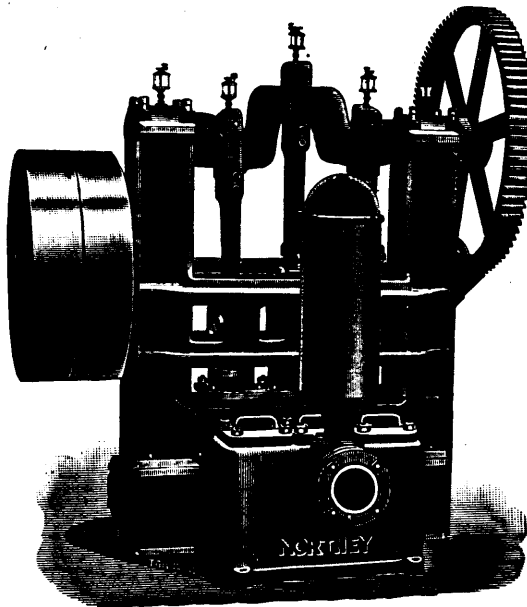
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MINERS' REQUIREMENTS.

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.

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JUNE, 1901.

VOI. XX., No. 6.

Company Law Reform and Mining Stock Exchanges.

They who would see the investment of capital in mining enterprise placed on an honest basis are brought face to face on the one hand with the indisputable fact that the modern Joint Stock Company, without personal liability, with duly licensed capitalization, and with power to issue stock at any fraction of par, is an institution which is inherently rather adopted to purposes of swindling than to promote legitimate investment in industrial enterprise; and on the other hand must face the facts, that the charter mills of several American States will supply any Joint Stock Company with authority to issue stock regardless of any limitation whatever, and that the Canadian Provinces, for the sake of international comity, license any such corporation to hold land and issue stock. It is urged that our Provincial Governments should not be outdone by any foreign state in the sale of licenses to raise money by any of the means known to company promoters; that such licenses are a proper source of revenue, and that practically the provinces should not neglect the interests of their treasuries from any squeamish care for the morals or the pockets of the community when such noble examples as the States of New Jersey, Delaware and West Virginia will sell, for a consideration, to any three or more, persons an unlimited charter of incorporation, valid in any quarter of the civilized world, subject to merely such local license as may be required in this or any country alien to the State granting the charter, and which license cannot on the ground of comity be denied if the applicants will pay a reasonable fee, which is customarily not greater than that levied for the grant of a charter. The answer to every objection raised to the grant of such a franchise is that the purchaser of mining company shares is not entitled to any special protection, and that all that the law undertakes is to register the name and head office and officials of the company upon which it has conferred the status of a corporate name and entity. Beyond this, say the free traders in charters, every buyer of stock should look into the character of the investment offered. If he invests, as in nine cases out of ten he does, on his confidence in the names which compose the directorate, he will in eight cases out of ten find that the directorate have had judgment less than his own, having themselves invested upon grossly insufficient information of the worth of the property, or with uttermost incapacity for wisely directing the expenditure of capital in the enterprise. The personal element upon which so many women and clergymen have banked when taking shares in mining companies is too frequently the element of least worth to guide to the valuation of an investment. Many philosophers have wisely pointed out that defect in human nature which imparts an artificial

weight to the opinions and dispositions of our friends, predisposing us to accept them idly and dispense with the rational tests which they require, or even to suppress incipient doubts of their correctness and uphold them without clear assurance of their truth. We have in fact more to learn from our enemies than our friends. While it may be a fairly good reason for taking shares in a life insurance company or bank, that the ex-premier of a certain province with a fair reputation as a sound business man is at the head of either concern, it is quite possible that at the same time he may be utterly incapable of a reasonable judgment of the value of a mine. Were this axiom as widely known as it should be, there would be less bad investments in mining stocks to complain of. It is evident that a large share of the disastrous investments of the last three years are chargeable to the gratuitous assumption on the part of company directorates that they were qualified for their position. Malebranche sagely remarks that "the man ambitious of social or political eminence is surrounded by admirers and partizans who fill him with the idea that he knows all that is worth knowing, and habituate him to look down upon intellectual superiors of more modest station, and he is dependent on the suffrage of others who know and think even less than himself and whose ignorant humors he must consult. Enveloped in these influences, he lives and breathes in an atmosphere of illusion."

At the outset let it be set down before all else that honesty in the promotion of any mining adventure requires proof of the existence of a mine. The public in the majority of cases dispense with this proof and gamble on a few samples and the certificate of an assayer. The stock-in-trade of the average promoter is not the value of the property, but the credulity of people with money in their pockets. One reads in any book of political economy that the transfer of this money from one class of the community to another does not necessarily represent a loss, and is not of itself an unmixed evil. The befooled buyer of mining stocks will draw the wise conclusion that political economists are not necessarily more moral than company promoters, and that in the presence of either he will do well to heed the legal maxim, "caveat emptor," which, being interpreted, is "beware of pick-pockets."

Having sized up the incapable directorates who flourish occasionally in the fertile soil of an ignorant, credulous community, it remains to discuss the class by whom they are brought into affinity or mutual relation, the stock brokers. There is not room for the least doubt that honest stock exchanges in Montreal and Toronto could effectually, to the advantage of their members, promote investment in mining enterprises and discourage the formation of ill-considered or dishonest schemes. Why they do not take this course, fraught with the very best results to the community and their members, baffles inquiry. The

organization of stock exchanges in Montreal and Toronto having a code of rules that would exclude from the list of stocks for sale on change every adventure not vouched for by a competent investigating committee, aided by an engineer of the highest technical skill, would afford the public reasonable guarantees of the security of their investments in mining shares. The only reason why this plan is not adopted would appear to be that the commissions might be for a time less numerous. The opportunities for rigging the market would be fewer under a system which would ensure careful investigation of the merits of a property before listing the stock of its corporate owners. The position of the Canadian stock broker under the present system could not be well worse than it is. Those of them who have brought out mining companies are heartily sick of the business. The paper in the *Monthly Review* for May on "Investment, Trade and Gambling" will afford some of these gentry food for reflection. The writer commends well-chosen, adventurous investments as more fertile and nationally beneficial than the purely speculative or than those which may be called securities. "The doctrine must be preached that the adventurous investment is the truly patriotic form of using capital; that in the creation of new industries and new ventures lies the hope of the nation; that he is not a gambler who accepts his risk in an investment like a man and abides by it, fairly making his choice; but that every member of the investing public who yields to the stock jobbing ideal of seizing a turn on the market with the "Devil take the hindmost" notion in his mind is doing what he can to sap our (Great Britain's) national pre-eminence and undermine the commercial integrity upon which as a nation and empire we depend."

London has its "open sore" in the facilities for swindling under the Imperial Joint Stock Company Act. Numerous are the amendments proposed as remedies. The writer in the "Nineteenth Century" for April would abolish the liability of the directors for matters in a prospectus whereby a shareholder has been deceived. He contends that such matters are properly chargeable to the promoters with whom the ignorant directors who issue the prospectus have no relation, and that the result is that practical honest men are shut out from a sphere of usefulness as directors and incompetents fill the places which would otherwise be occupied by capable men. It would be difficult, as some of our mining company affairs are now managed, to convince many that there is no guilty relationship between promoters and provisional directors. In fact Mr. Hooley, who still appears to flourish defiance in the face of creditors and to enjoy the good things of life with much splendor thrown in, would tell us that between the promoter and the provisional director there is a relationship which costs the former in proportion to the title and social rank of the latter.

Would the amendment of the law, which as it stands is some check upon the purchase of titled directors, lead promoters to seek a less distinguished but more capable class to give their names as provisional directors of mining or other companies? It may be doubted; for the reason that the share-subscribing community would not as a rule purchase shares quite so readily under other than the present system. It is a comfort to so many to know that if they are swindled they are in the same boat with the owner of a title. Company law reform will make progress only by some means of sharply distinguishing between stocks which are purely speculative and without character and those which, with proper safeguards, are issued for the aid of legitimate enterprise. For the latter people might go to the stock brokers, for the former they would seek the dealers on the curb-stone and promoters. The lines of separation would be speedily known. A listed stock would have character as a legitimate mining proposition, having a sufficient fund for development, competent miners and managers, and a reasonable prospect of dividends in sight. An unlisted stock might be brought out with a large acreage, a few samples, a glittering assay, and those prospects of large returns which

are realized in one case among one hundred and ninety-nine failures. The gamblers for the off-chance will naturally seek such "solid and inexpansive" investments at the hands of the unctuous and persuasive vendors

But while the rare good work of winnowing the wheat from the chaff might thus go on, may any reasonable hope be indulged that sound mining investments will, in the Province of Ontario, occupy a fair share of public attention at home and the favor of foreign capitalists while there looms in the distance the possibility of provincial taxation indicated by the legislation of last session.

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
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Sultana Mine of Canada.—Mine manager's report for the week ended May 25th:—Stopping ore in progress in south workings, also below the floor of No. 4 level south. The average assay value of the ore broken, and sent to the mill, during the week is \$5.13 gold per ton. Mill tailings, \$1.03 gold per ton. The diamond drill work during the week resulted as follows:—No. 1 bore hole—South-westerly from No. 4 level south heading. Depth of hole, 50.5 ft., penetrating vein matter and porphyry. No. 2 bore hole—Westerly from No. 4 level south heading. Depth of hole, 40 ft., penetrating quartz stringers, vein matter and porphyry.

CORRESPONDENCE.

Superintendent of Mines for Canada.

To the Editor:

SIR,—To you, as one wide awake and having an all-round eye on events as they are marshalled out, I, for one, turn for information.

The item that I am in want of to-day relates to the recent appointment by the Federal Government to the office of Superintendent of Mines for Canada. I assume that others like myself, engrossed in details of mining operations and long governed by local statutes enforced by Provincial Inspectors of Mines, are unfamiliar with the object, authority and duties of such an officer. Can you tell us of the statute under which the appointment is made, our liability, if any, in the matter of regulations and statistical returns, and then if the appointment has a practical bearing, with a mind disposed towards the preservation of life and property, wherein has a career spent in university teaching found that experienced believed essential to the correction and instruction of men practiced in the art, for it is an art, of following up veins, beds, pockets, shewings of ore, excavating with economy and protecting the resulting works at a minimum of cost? But if this appointment means no confliction with provincial laws and duties, and relates merely to Federal interests in the Yukon, why are we overshadowed by so comprehensive a title and our overwrought nerves thereby worried unnecessarily?

NOVA SCOTIAN MINER.

The appointment to which our correspondent refers is that recently vacated by Mr. Wm. Pierce, D.L.S., of Calgary, and appertains to lands in the North-West and British Columbia known as Dominion Lands, under control of the Department of the Interior. The following letter received from the Secretary of the Department explains itself:—"I am directed to acknowledge the receipt of your letter of the 18th instant, addressed to the Minister of the Interior. In reply I am to state, in answer to these enquiries, that the office of the Superintendent of Mines was created by Section 6 of Chapter 54 of the Revised Statutes of Canada, under which the Governor-in-Council has power to appoint an officer who is styled "The Superintendent of Mines;" and such officer is declared to have the powers and perform the duties that are from time to time prescribed by the Governor-in-Council. It is not considered that the statutory title of the officer in question need necessarily have any disturbing effect upon the community. Being an appointee of the Federal Government, his duties are of a federal and not of a provincial character, and will appertain to the promotion of the mining industries of Canada. It is believed that the appointment recently made will prove highly beneficial to the country as a whole.

There is at present no liability on the part of mine owners, where the public lands in which they are operating are owned by the provincial government, to make statistical returns to the federal government. The mining regulations passed by the federal authority do not apply to mine owners so engaged, or interfere in any way with local statutes.

I have the honour to be,

Sir,

Your obedient servant,

P. G. KEYES,
Secretary.

The Virginia Mining Co. of Ontario.

SIR,

I have felt inclined on several occasions to call your attention to the rather reckless statements of your Rat Portage correspondent in reference to Lake of the Woods properties in general, and the Virginia in particular, but have always refrained from doing so.

In your issue of May 31st he surpasses himself, and in three lines makes more false insinuations about the Virginia than is generally allowed. I well understand the animus of the statements—that is another story, and a personal matter—but as the general public is unaware of this, his statements might prove misleading to some and I therefore hope, that as a just and fair minded journal you will allow me space to reply.

1. There is no deal pending on the Virginia that I know of.
2. We have not expended \$40,000 on the property as our books would easily show.
3. If your correspondent will duplicate the work done at the Virginia for \$10,000 we will give him steady employment at a higher salary than he is able to make in his present calling.

Your correspondent probably thinks that because I personally built a fine house at the mine and furnished it, that this was done at the expense of the company and he probably estimates quite a snug figure for that house, which is unfair to both the company and myself.

I know personally that he never saw the mine workings. During my absence they were flooded and before that he was expressly prohibited, hence his statements are mere gossip, the only true thing being that the Virginia does deserve a chance.

Pardon my taking so much space; we are a close corporation, not seeking notoriety and are sorry that it is necessary to answer such idle rumours.

Yours truly,

S. H. BROCKUNIER.

Wheeling, West Va., 4th June, 1901.

Copper Smelting in British Columbia.—A Review of the Operations of the Granby Smelter and Proposed Improvements.

By A. B. W. HODGES, Grand Forks, B.C.

The plant and water power were about finished in August, 1900, and the first furnace was "blown in" during the latter part of that month; the other furnace was not blown in until October of the same year, when sufficient coke supply was on hand. Since that time both furnaces have been in continuous operation, No. 1 having run 10 months and No. 2 8 months without either being "blown out."

From the time of starting up to June 1st we have smelted a total of 162,000 tons of ore, which is a very fair record for a new property.

The two furnaces are 44 x 160 inches at the tuyeres, and 14 feet high from furnace floor to feed floor, and are double water jacketed and continuous slag flow, and were built for a nominal capacity of 250 tons each per 24 hours, but they have put through an average of over 300 tons per 24 hours, making a total smelting capacity of from 610 to 640 tons per day of 24 hours.

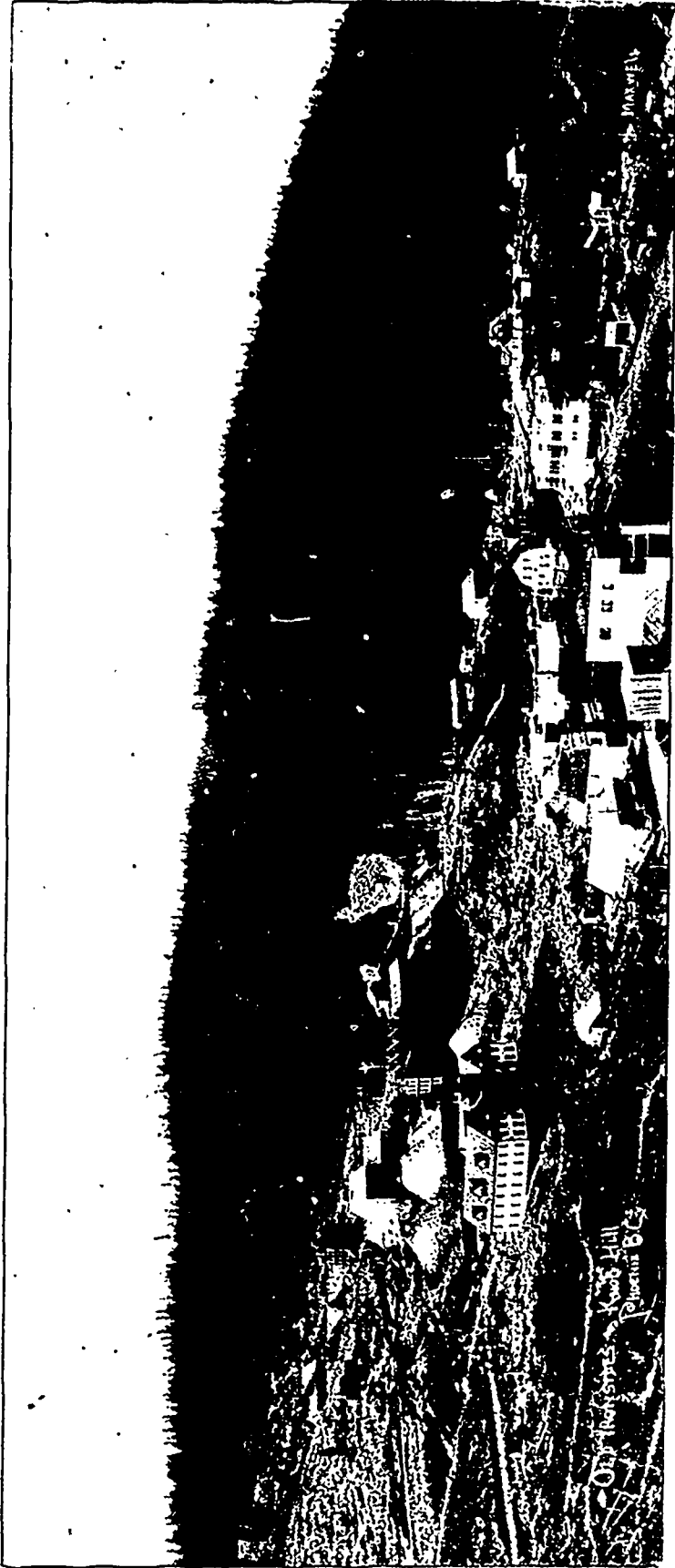
As is well known, our entire plant is run by electric motors, which are driven from the main electric generator situated in a power house, about 1,000 feet below our main works.

I might say in this connection that since we started we have not had occasion to stop five minutes on account of any break or repair to our water power or electrical system.

Our sampling and crushing plant, which has been in operation for the past 10 months, and crushed and sampled 170,000 tons of ore, and which has a capacity of 800 tons per day, has been very satisfactory, and has only shut down at short intervals to replace crusher plates, which, of course, wear out.

As our ore is low grade, the works were built with a view to handling large quantities with the least possible labor and expense, and from the time the ore arrives at the smelter it is not handled with a shovel once until it is deposited on the dump as granulated slag and the matte shipped to the East to be refined.

GRANBY CONSOLIDATED MINING, SMELTING AND POWER CO. LIMITED.

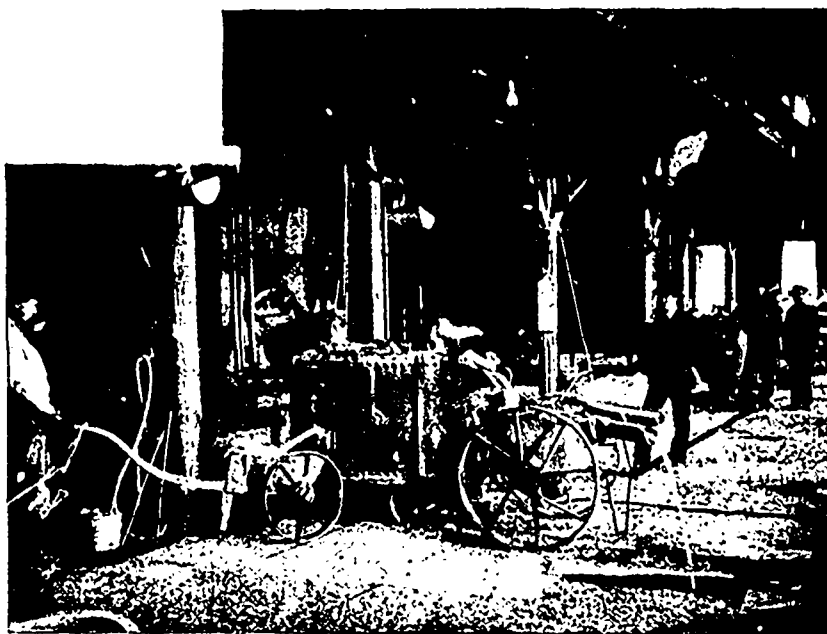


Knob Hill, Old Ironsides, Grey Eagle and Victor^{ns} Mines, Phoenix, B.C.

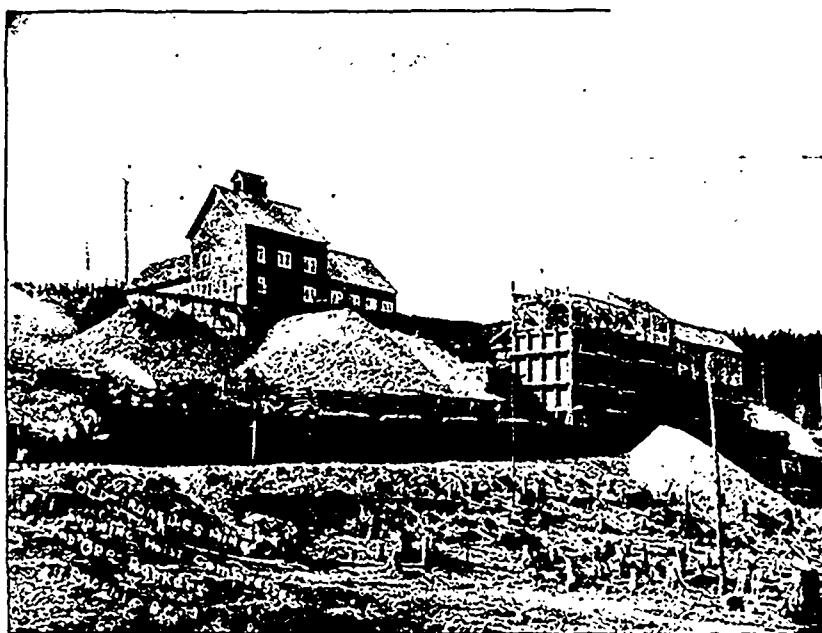


Granby Smelting Company's Works, Grand Forks, B.C.

GRANBY CONSOLIDATED MINING, SMELTING AND POWER CO. LIMITED.



Furnace in Operation, Granby Smelting Company's Works, Grand Forks, B.C.



Old Ironsides Shaft House No. 2 and Ore Bunkers.

To save shovelling the coke and charge into the furnaces by hand I invented and patented a furnace charging car, which does away with hand feeding, and it has been in continual operation ever since we started the works last August. This is the only one in use in Canada, and is a great labor-saving machine.

We think that we are smelting copper ore as cheap, if not cheaper, than any other smelting company in Canada or the United States, for the following reasons: It is well known to smelting men that the cost of smelting is made up of four large items—1st, cost of coke; 2nd, cost of power to run works; 3rd, cost of labor; and, lastly, the character of the ore smelted.

In regard to the first, the cost of coke is fixed by the coke people and railroad freights, and while this is not as large as it is in some parts of the United States, it is still too high in proportion to our low grade ore, and we hope some day to see it reduced.

The cost of power in our case is at a minimum, as every one knows that water is the cheapest power.

In regard to labor, I will say that the wage in this country is exceedingly high, and the only way to bring this cost down is to so arrange the plant with mechanical handling of ores and fluxes that the number of men employed is small.

As to the last cost, due to the character of the ore, our mine produces self-fluxing ore, which means that no flux is required. That is, we have no iron ore or limestone to buy or take up room in the furnaces; our ore does not require any preliminary roasting; it contains just enough of sulphur and copper to make a 50 per cent. copper matte, which is required in the next step of the process of separating copper from the other values.

From the above it will be seen that we have ideal conditions, and it is these ideal conditions with which we are surrounded which enables us to handle our low grade ore at a profit, which might not be possible if we had to generate power by steam and coal, buy iron and lime fluxes, roast our ore or re-roast and resmelt our matte to bring it up to 50 per cent. copper for the converter.

Ever since we started the ore from the mines arrives at the smelters in two trains daily comprising 10 to 11 cars of 30 tons each to each train, and during the past 10 months there was hardly a day but which saw the regular tonnage arrive with the regularity of clock-work. This has been the greatest surprise to experienced mining men in this country, as there is no where on record, I believe, a case of a mine jumping from a purely development stage into a producer of 600 to 650 tons per day and keeping it up without a stop for ten months, which we have accomplished.

This proves two things:—1st, that we have an enormous ore body to work on, and 2nd, how well the management of the mines laid out and planned and worked out the developments to produce this large tonnage.

The ore is taken out of two small single compartment shafts, one long tunnel and one open cut, and the machinery at the mines at present, one might say, is only light and suitable for development and prospecting work.

It is the intention of the company this summer to begin the sinking of a large 3 or 4 compartment working shaft, equipped with large modern hoisting machinery and large compressors.

In view of the success we have made so far, our company has decided to double the smelting capacity of the works, and contracts were let with this end in view, and we propose to instal the following plant—

The ore bins at the works will be increased in number to hold about 5,000 more tons.

A new ore sampler and crusher of a thousand tons daily capacity will be built.

Two new 44 x 160 inch water jacket copper furnaces, with their necessary complement of motors and blowers.

The flue dust chambers will be enlarged 250 feet; enough water-wheels and electric generators will be added to the water power plant to bring up the total horse power available to 1,080 h.p.

Besides this, the next step in copper metallurgy will be added:—that of converting copper matte into metallic copper.

This converting is a distinct and separate department and process by itself, and will be the most modern and up-to-date in existence anywhere.

All the converting machinery will be installed in a steel building 160 feet long and 68 feet wide, and will contain two 72 x 100 inch barrel type converter stands with a combined capacity of 80 to 110 tons of matte per 24 hours.

Each converter stand will have three extra converter shells and three reclining stands; also a 20-ton tilting reverberatory furnace to receive matte from the 4 blast furnaces and converter slag and charge the converters with their charge of matte.

At one end of the building will be located the quartz crushing plant and grinding pan to mix and prepare the linings for the converters, as in this process of converting the iron in the matte attaches to the lining, so extra shells with new lining are being constantly prepared to take the place of those which are eaten out by the process of converting.

This lining plant is quite an item in itself, and consists of a 9 x 15 Dodge crusher, one set of 24 x 16 in. rolls, one 10 in. bucket elevator, one 6 ft. grinding pan, and a 45 h.p. motor.

A 40-ton 40 ft. span travelling electric crane runs the entire length of the building and handles the charge of matte, and also changes the converter shells.

Another 10 ton electric crane runs in front of the 4 blast furnaces and brings the molten matte from each furnace to the tilting furnace.

The converters are rotated when pouring the copper into moulder by an hydraulic cylinder controlled by a valve at the converter.

An hydraulic cylinder also tilts the reverberatory furnace when pouring out the matte for the charge.

The copper mould carriages are also moved by hydraulic power.

A short distance from the converter building is located the blowing engine house. In this building is a large 36 x 36 inch blowing engine, run by a 200 h.p. motor. This engine delivers compressed air to the tuyeres of each converter, which sets up the chemical action which gives us metallic copper from matte.

In this building is also the high pressure hydraulic pump which moves the various parts as above described.

The contracts for all the improvements were let last March, and are all to be in the ground by the middle of July. At the works here, at the present writing, all the stone foundations are in, also the concrete foundations for all steel buildings and large machinery. The timber work on the ore crushing plant and ore bins will be completed during June, when the installation of machinery, part of which is on the ground, will begin.

We hope by September or October to have our new work finished and in operation and handling at least 1,250 tons of ore per day, besides converting our matte.

Our converter plant is really larger than we need, but we anticipate treating matte from other Canadian smelters, thereby saving them the long haul to the Atlantic seaboard.

We have so designed the works that we can still add two more copper matting furnaces, which would make our plant complete, thereby giving us a daily capacity of nearly two thousand tons per 24 hours, which is large enough for one plant.

COAL MINING AND TRADE.

By the accession of Mr. T. J. Brown to the general management of the Old Sydney Mines, the Dominion Coal Company lose one of the ablest and most promising of their officials, and by a turn in the whirlgig of time Mr. Brown returns to the scene of his earliest labours. It is little more than a year since we had the pleasure of congratulating him on being appointed assistant to the resident manager of the D. C. Company, and now, whilst still a young man, he succeeds to the management of the historic mines which have been associated with the Island of Cape Breton for nearly 100 years. Now that this property has passed into the hands of the Nova Scotia Steel Company, it has taken on a new lease of life, and if the policy, already outlined, of opening up a large mine on the Point Aconi areas is carried into effect, Mr. Brown will have on hand an enterprise worthy of his powers, and one which all who know him are assured he will successfully accomplish.

The large shaft at Dominion No. 2 is rapidly approaching completion, being down 790 feet, and it is expected that the Phalen seam will be cut at 800 feet. This will crown an undertaking commenced two years ago and prosecuted with energy ever since. In the earlier stages of the sinking many difficulties had to be contended with, chief among them being a heavy influx of water, and several reputations were buried whilst contending with it. Once, however, the water-bearing strata was passed through things went more smoothly and nothing now stands in the way of a successful finish. Whilst the sinking has progressed to the Phalen, work has been carried on in the Harbour seam and during the present season a tonnage reaching 500 tons daily is likely to be shipped. Very little can be raised from the Phalen for a year, as it will take this time to complete equipment and development, but in 1902 there is no doubt 2,000 tons a day can be shipped, and from that figure the increase will be constant until 4,000, and possibly 5,000, tons are reached—in any case this may become the largest mine in the world—as every condition is favourable to an enormous output. We doubt, however, whether the idea of large outputs is not being carried too far. There is no physical impossibility in raising as much as 10,000 tons a day from one mine, but “the game is surely not worth the candle,” as it is certain such concentration passes the limit of economical working, and we shall be surprised if Dominion No. 2 with an output of 5,000 tons a day ever ships coal as cheaply as Dominion No. 1 with 2,000 did in 1898. There are those who think that the “craze” for big tonnages has become “crazy.”

The annual report of the Dominion Coal Company possesses several features of note to which attention may be called. First among these is the substantial increase in output since 1895, when the total was 884,000 tons as compared with 2,044,877 tons in 1900. The ratio of increase is much greater during the latter half of the term owing to the extensive installations of machinery, and the Directors state that this will still be the most important feature of their future development, as it is the only means of securing a large output.

The fact that no dividend can be declared on common stock after such a record year in the coal trade as the last when all over the world enormous profits have been made by colliery owners, will come as a surprise to those who are not acquainted with the actual conditions, and is in any event a matter for regret. It will probably be many years before such another boom arrives with a practically unlimited demand for coal at \$3.50 to \$4.00 a ton f.o.b. Although the receipts for coal are not given separately in the balance sheet, being mixed with the steamship returns, we have it on good authority that the average selling price was about \$2.25, an increase of only 50 cents a ton over the previous year. This was due to the obligations incurred by the com-

pany under low priced contracts, which claimed nearly 90 per cent. of the output, and in face of the advances in wages and materials it is not surprising that the profit is even less than in 1899. At the recent arbitration in Halifax it was officially stated that if the advance in wages asked for was granted it would involve the company in an actual loss on the year's trading and the arbitrators in their award cited this as the chief element in governing their decision. The whole situation is a comment on the policy which has kept mine development at a low ebb during the lean years and so prevented the company from reaping the benefit of the first good trade which has existed since their incorporation. With such splendid natural advantages as they possess there is no reason why the mines should not have been equal to an output of at least 5,000,000 tons, the whole of which could have been disposed of at \$3 to \$4 a ton, and deducting 2,000,000 tons for contract liabilities, there would have been a surplus of 3,000,000 tons, an increased profit for the year of at least \$4,000,000, which would have put the company in a healthy financial position and afforded a handsome dividend as well. It cannot but be a matter of regret that this golden opportunity has been missed and that after seven years' trading the common stock still stands at 34. How dearly the company has paid for its experience is sufficiently shown by the gradual increase in capital expenditure, and we can only hope that the lesson has been well learnt and that the policy of the future will be continual development in mine work until a capacity of four or five millions is reached, as we have little doubt this tonnage will be required within a few years, and the experience of everyone who has been in the coal trade confirms the opinion that no trade is so subject to extreme fluctuations or so excessive in its demands when “boom” time comes along, but of its approach there are few indications and the notice is generally so short that unless preparation has been continuous it is impossible to participate.

Without intending the slightest disrespect to the American gentlemen who have hitherto formed the majority on the Board, we can express our satisfaction that recent changes have placed Canadian capitalists of the highest standing in control of this Canadian concern, and the more active interest being taken in the management by such men as Sir Wm. Van Horne, Mr. James Ross, Mr. R. B. Angus and Mr. L. J. Forget, is a good omen for its future. A more enlightened policy is already discernible and we believe there is a great future before what should be one of the greatest and most prosperous coal companies in the world.

The operations of the Port Hood Coal Company have been retarded by continual difficulty in connection with their shipping pier. This has been a most expensive structure and after costing nearly \$50,000 is still of little use. This is due to the effect of wave and storm and an insecure foundation. To those conversant with this coast and with the fiasco at Broad Cove, where the notorious Penn Hussey spent many thousands of dollars in endeavouring to establish a shipping point, the result at Port Hood is not surprising and only confirms the opinion we have held from the first that all the mines on the Northwest shore of Cape Breton will have to ship their product at the Straits of Canso. The cost of haulage will be more than compensated for by having deep water and an open port all the year round. In other respects this company is making good progress and will realize a fair output during the present season.

The boom in Cape Breton coal areas continues, but is confined to the sellers as there are no buyers in sight at the ridiculous figures asked. “One swallow does not make a summer” and one year's boom in trade does not make a bonanza for speculators in areas. If reasonable prices had been asked several properties would have been sold this season, but a jump from \$10,000 a square mile for good areas

to \$50,000 for more than doubtful ones has effectually quenched the ardour of would-be buyers and all the properties actually bonded under the influence of last year's trade, except one, have been relinquished. It may safely be said that in Cape Breton there are no coast areas on the market worth more than \$10,000 a mile and most are of too speculative a character to be worth that. In any case the boom is subsiding and after this year there will be a plethora of coal on the market until the next rush takes place, and according to the history of the last 50 years that will be just one decade.

There is much excitement and not a little curiosity as to the outcome of the struggle for supremacy in the Crow's Nest Pass. There are three competitors and apparently only two interests. The C.P.R. and the Crow's Nest Coal Co. are playing a hard game for coal areas, whilst the Government is looking on. The C.P.R. and the G.N.R. are fighting out the question of railway extension in East Kootenay and the Coal Company is the looker on. By 30th September the selection of coal areas has to be made by the Government and it is to be hoped the public will get 50,000 acres "of equal value to the residue of the coal lands," as prescribed by the charter. To facilitate this they have allowed the Coal Company to secure Mr. Jas. McEvoy from their service, the only man who, since the lamented death of Dr. Dawson, could efficiently advise them. Meanwhile the C.P.R., who alone can furnish effective competition and cheapen fuel in British Columbia, are looking for six sections and wondering where they will come in after the Government have taken what they want. The public are wondering whether there will be anything left worth having for either after the Coal Company has cornered Morrissey Creek, the only accessible spot remaining. On this creek they are grading for a branch railway and opening a mine on sections outside their freehold and which should in all fairness be secured for the country before it is too late. We have said little on this subject lately, but events are rapidly moving in the direction we indicated several months ago and we see no reason to alter our opinion that the chances of effective competition or of a fair selection of areas for the Government are "slim."

Important discoveries of coal have recently been made east of the Rockies at the entrance to the Crow's Nest Pass. Some of the coals are "coking" and cover a large area. The most important is McVittie and Leitch's property of 10,000 acres, which contains 15 workable seams and is likely to be developed during the present year. We shall have something to say in detail about this important coal field in our next issue.

The deflection of Mr. J. McEvoy from the staff of the Geological Survey at a critical time, emphasizes the importance of the representations made by the Canadian Mining Institute to the Government with reference to the miserably inadequate pay of that department. There are no men less mercenary than the members of that department, but when it becomes a question of the difference between \$1800 and \$6000 a year no one can blame a man for choosing the latter. It is not suggested that the Government can compete with healthy mining companies in the matter of salary, but it is a well-known fact that the members of the staff would prefer working in their own groove for far less than the salaries which tempt them to leave. We believe it would be only bare justice to raise the salaries of the experienced and qualified men at least 50 per cent. Under the present system they leave just when they are becoming valuable, and in some instances invaluable to the public service, and in the interest of the country it is the worst of all policies to let them go. We hope recent deflections will stimulate the Government a little in the direction of a much needed and too tardy reform.

Manganese in Newfoundland.

Reports from Newfoundland advise the discovery of an immense quantity of manganese. The deposit occurs in an almost flat vein and is situated on the southern shore of Conception Bay, within a very few miles of the famous Bell Isle (or Wabana) Hematite mine, now being worked very extensively by the Dominion Iron & Steel, and Nova Scotia Steel Companies. It is not too much to say that there are many hundreds of thousands of tons of the mineral in sight within considerably less than one mile of the salt water.

Analyses of the ore have been made and show the following results, the specimens assayed being taken at random from the vein:—

ASSAY NO. 1.	ASSAY NO. 2.
Manganese, 42 per cent.	Manganese, 34.92 per cent.
Silica, 13 "	Silica, 7.00 "
Iron, 2 "	Iron, 3.10 "
	Phosphorus, Trace.
	Sulphur, Nil.

The fact that the deposit lies only from three to six feet under the soil, and that it lies almost flat, is sufficient warrant for the cheapness of cost of production, and in the near future there is little doubt that the deposit will be extensively worked.

Dominion Iron and Steel.—The following financial summary was presented at the annual meeting of the company held in Montreal this month:—

Bonded indebtedness.....	\$ 8,000,000 00	
Preferred stock.....	5,000,000 00	
Common stock.....	15,000,000 00	
Bills payable.....	90,808 77	
Accounts payable.....	545,848 25	
		<u>\$28,636,657 02</u>
Property account.....	\$14,551,480 00	
Plant account.....	9,668,406 42	
Interest on bonds.....	232,522 32	
Expenses, preferred stock.....	22,711 13	
Construction material on hand.....	241,014 89	
Warehouse material.....	64,500 75	
Bell Island (winter work).....	96,440 26	
Freight and advances to vessels.....	117,075 51	
Operating suspension.....	76,747 06	
Undistributed accounts Marble Mountain, coke ovens, foundry and R.R.....	63,898 12	
Warehouse suspension.....	32,854 74	
Manufacturing supplies.....	530,553 75	
Bills receivable.....	27,431 66	
Prospecting.....	6,093 25	
Freight undistributed.....	14,527 53	
Sundry small expense items.....	3,548 87	
Accounts receivable.....	225,431 73	
Bell Island (sales).....	19,986 32	
Due from preferred stock.....	1,435,849 20	
Cash on hand and in banks.....	1,205,583 51	
		<u>\$28,636,657 02</u>

Ontario Graphite Company.—The output of this successful company, last year, was about 2,500 tons graphite of high grade quality, shipped to United States. In addition to the present machinery there is being installed an electric plant of 500 h.p. driven by a water power situated two miles from the mine on the Madawaska River, and a stamp mill having a capacity of 20 tons per day, is being erected, which, it is expected will be in operation by 1st November. The Jenckes Machine Co. of Sherbrooke have the contract for the water wheels and stamps and the Canadian General Electric Co. have the contract for the Electrical plant which consists of a 250 K. W. revolving field 4,400 volt machine, equipped with induction motors, etc., which will supply ample power for the operation of the Air Compressors and all the other machinery as well as the lighting of the same and drying of the ore. The whole outfit when completed will be one of the most up to date plants in Canada and will cost in the neighbourhood of \$75,000.00. The deposit has been developed to a depth of 120 feet, showing an average width of 10 feet. About \$1,000,000 of graphite is exposed.

Rosland Great Western.—Shipments for month ending May 31st, 2,825 tons, yielding 817 ounces gold, 1,866 ounces silver, 37 tons copper. Estimated value, £6,142.

The British Lion Gold Mining and Development Company has obtained a supplementary charter, enabling it to increase the capitalization from \$80,000 to \$180,000. The company is operating the Big Four Group, about five miles from Ymir, B.C., and is now in a position to expend considerable sums this summer on the development of its property. The group consists of the Big Four, Hercules, Lerwick and Snow Flake claims. On the Hercules claim there is an immense showing of pyrrhotite ore. The surface assays gave \$5.30 and \$6.70. The principle work will be done on this claim during the present summer, and will be in ore from the commencement.

Company Law.

By J. M. CLARK, M.A., LL.B., K.C.

Mining operations are now so generally carried on by joint stock companies with limited liability that it is somewhat difficult for us to realize that such companies are, so far as English law is concerned, a modern invention.

It was not till 1855, less than half a century ago, that the principle of limited liability was introduced. It was only in 1825 that the famous Bubble Act was repealed. That Act was passed in 1719, 6 Geo. 1 chap. 18 to prevent the formation of dangerous and mischievous companies tending to the grievance of the subjects of the realm. Under this statute a company with shares transferable without restriction was held clearly mischievous. A learned Chief Justice thought such a company tended to introduce gaming and rash speculation to a ruinous extent to the grievance of numbers of His Majesty's subjects. In fact it is well known that the modern idea of a joint stock company met with the most strenuous opposition. Dryden condemned it as a scheme to divide the empty nothing into shares and set the public by the ears—Carlyle denounced it as a mischievous invention.

The idea however has made rapid progress. In England the paid up stock of such companies amounts to over five billion dollars. There they have gone from unlimited liability to limited liability; in Ontario following the example of some of the Western States—we have gone a step further and have mining companies with no personal liability by the shareholders on their stock.

In all mercantile communities questions as to the formation, organization and management of joint stock companies have in recent years received great attention.

In the United States the science of corporations has been greatly developed. There every possibility of corporation law for good or evil has been exploited. In Germany and France there are provisions tending to discourage the investment of small sums in company shares.

In Great Britain the Board of Trade appointed a committee to enquire what amendments were necessary in the Acts relating to joint stock companies incorporated with limited liability, especially with a view to the better prevention of fraud in relation to the formation and management of companies and to consider a report upon the clauses of a draft Bill which was laid before them for that purpose.

This committee, which was appointed on November 12th, 1894 made their report on the 27th June, 1895. In that report the general lines upon which, and the limits within which, the Legislature can safely or usefully interpose are discussed and the committee say:—

"It is a trite observation that legislation cannot protect people from the consequences of their own imprudence, recklessness or want of experience. The Legislature cannot supply people with prudence, judgment or business habits. It must be remembered that the majority of companies are honestly formed for carrying on a legitimate though it may be a speculative enterprise or business, and the business is conducted with honesty and reasonable ability and judgment. In consequence partly of the facilities which exist for the formation of companies in this country a vast amount of foreign enterprise and foreign business comes to England. Banking, railway, and other business is now carried on in every quarter of the globe by British capital and managed by British officials. According to the recent report of the Board of Trade there were in the United Kingdom in April, 1894, 18,361 companies with a paid up capital of 1,035,029,835L., whereas the capital of all companies in France, anonyms and en commandite, was, in December, 1894

"calculated approximately at 420,000,000L. The capital of German companies was estimated by Mr. Gerb of H. M., Consulate General in Berlin at 200,000,000L., but Mr. Schuster puts it at 300,000,000L. The capital embarked in English companies therefore exceeds that represented by French and German companies together by at least 315,000,000L. The number of persons who are interested either as shareholders or bond or debenture holders in these companies is of course enormous. It is obvious that legislation affecting interests of this magnitude and widespread character demands great caution and care. Restrictive provisions, which may have the effect of either curtailing the facilities for the formation of companies which bring so much business to England or of embarrassing the administration of companies, or deterring the best class of men from becoming Directors, are not to be lightly entertained."

In the course of their investigation the committee came upon a curious instance which they record in their report, where a company was registered in January, 1891 whose capital of £10,000 was divided into 9,600,000 shares of one farthing each and the total subscribed capital was one penny and three farthings.

The committee report that they dismissed from their consideration every suggestion for public enquiry by the Registrar or other official authority as to the soundness, good faith and prospects of the undertaking at the commencement or any other stage of a company's formation.

"On the other hand, it must be generally acknowledged that a person who is invited to subscribe to a new undertaking has practically no opportunity of making any independent inquiry before coming to a decision. Indeed, the time usually allowed between the issue of the prospectus and the making of an application does not permit of any real investigation. The maxim of Caveat Emptor has in the opinion of your committee but a limited application in such cases."

The ultimate result of the report of this committee was that after much further consideration and many alterations of the draft Act, there was passed the companies Act, 1900 (63 and 64 Victoria, Chapter 48). This Act provided that the certificate of incorporation given by the Registrar of joint stock companies should be conclusive evidence that all the requisitions of the companies Act in respect of registration and of matters precedent and incidental thereto had been complied with, and that the association is a company authorized to be registered and duly registered under the companies Act. This is an exceedingly important provision, and prevents points which created great anxiety under the previous legislation from being agitated. These points were matters considered in what is known as the one man company case, *Saloman vs. Saloman & Co.* (1897 A.C. 22).

The Act requires a Statutory declaration as to the compliance with these requisitions, and provides that the incorporation of the company shall take effect from the date of incorporation mentioned in the certificate of incorporation. This section of the Statute is expressly made retroactive.

Another very important provision in the new English Act is that contained in section 2, that a person shall not be capable of being appointed director of a company by the articles of association, and shall not be named as a director or proposed as a director of a company in any prospectus issued by or on behalf of the company unless he has by himself or his agent authorized in writing (1) signed and filed with the Registrar a consent in writing to act as such director.

(2). Either signed the memorandum of association for a number of shares not less than his qualification, or signed and filed with the Registrar a contract in writing to take from the company and pay for his qualification shares, if any.

Stringent provisions are made in regard to the qualification of directors. What is one of the most important features of the Act is contained in section 4, which provides that no allotment shall be made of any share capital of a company offered to the public for subscription unless the following conditions have been complied with, namely: The amount, if any, fixed by the memorandum or articles of association, and named in the prospectus as the minimum subscription upon which the directors may proceed to allotment, or

(b) If no amount is so fixed and named, then the whole amount of the share capital so offered for subscription has been subscribed and the sum payable on the application for the amount so fixed and named, or that the whole amount offered for subscription has been paid to and received by the company.

This will effectually prevent the practice, which gave rise to grave scandals, of going to allotment on an obviously inadequate subscription, so that the company was from the start doomed to failure. This amount is referred to as the minimum subscription, and the amount so fixed and named is to be reckoned exclusively of any amount payable otherwise than in cash, and the amount payable on application on each share shall not be less than 5 per cent. of the nominal amount of the share.

If these conditions have not been complied with on the expiration of forty days after the first issue of the prospectus, all money received from applicants for shares shall be forthwith repaid to the applicants, without interest. This section provides that any condition required or binding any applicant for shares to waive compliance with any requirement of this section shall be void.

An irregular allotment in contravention of the provisions of the Act is made voidable at the instance of the applicant, within one month after the holding of the Statutory meeting, and directors are made personally liable for any loss, damages or costs which the company or the allottee may have sustained.

Section 6 of the Act places salutary restrictions upon the commencement of business by a company. These provide that a company shall not commence any business or exercise any borrowing powers unless shares held subject to the payment of the whole amount thereof in cash have been allotted to an amount not less in the whole than the minimum subscription. (b). Every director of the company has paid to the company on each of the shares taken or contracted to be taken by him and for which he is liable to pay in cash a proportion equal to the proportion payable on application and allotment on the shares offered for public subscription, and that there has been filed with the Registrar a Statutory declaration of compliance with the provisions of the Act.

This section also provides for the giving by the Registrar of a certificate that the company is entitled to commence business, and that such certificate shall be conclusive evidence that the company is so entitled.

This provision is open to the objection that it will give the public an unreal sense of security.

The Act also provides for returns as to allotment, and permits the payment of commissions for subscriptions.

In the previous company legislation there were attempts to define what should be in the prospectus of a company. The Directors' Liability Act of 1890 was largely for this purpose, but it was a dead letter. The present Act provides that every prospectus shall be dated, and that a copy of such prospectus shall be signed by every person who is named therein as a director or proposed director of the company, or by his agent authorized in writing, and shall be filed with the Registrar on or before the date of its publication. The Registrar is prohibited from registering any prospectus unless it is so dated and

signed, and the Act provides that no prospectus shall be issued until so filed for registration, and that every prospectus shall state on the face of it that it has been so filed.

Section 10 provides:

"(1). Every prospectus issued by or on behalf of a company, or by or on behalf of any person who is or has been engaged or interested in the formation of the company, must state:—

(a) The contents of the memorandum of association, with the names, descriptions, and addresses of the signatories, and the number of shares subscribed for by them respectively; and the number of founders or management shares, if any, and the nature and extent of the interest of the holders in the property and profits of the company; and

(b) The number of shares, if any, fixed by the articles of association as the qualification of a director, and any provision in the articles of association as to the remuneration of the directors; and

(c) The names, descriptions and addresses of the directors or proposed directors; and

(d) The minimum subscription on which the directors may proceed to allotment, and the amount payable on application and allotment on each share; and in the case of a second or subsequent offer of shares, the amount offered for subscription on each previous allotment, and the amount actually allotted; and the amount, if any, paid on such shares; and

(e) The number and amount of shares and debentures issued, or agreed to be issued, as fully or partly paid up otherwise than in cash, and in the latter case the extent to which they are so paid up, and in either case the consideration for which such shares or debentures have been issued or are proposed or intended to be issued; and

(f) The names and addresses of the vendors of any property purchased or acquired by the company, or proposed so to be purchased or acquired, which is to be paid for wholly or partly out of the proceeds of the issue offered for subscription by the prospectus, or the purchase or acquisition of which has not been completed at the date of publication of the prospectus, and the amount payable in cash, shares, or debentures, to the vendor, and where there is more than one separate vendor, or the company is a sub-purchaser, the amount so payable to each vendor; and

(g) The amount (if any) paid or payable as purchase money in cash, shares, or debentures, of any such property as aforesaid, specifying the amount payable for good-will; and

(h) The amount (if any) paid or payable as commission for subscribing or agreeing to subscribe, or procuring or agreeing to procure subscriptions, for any shares in the company, or the rate of any such commission; and

(i) The amount or estimated amount of preliminary expenses; and

(j) The amount paid or intended to be paid to any promoter and the consideration for any such payment; and

(k) The dates of and parties to every material contract, and a reasonable time and place at which any material contract or a copy thereof may be inspected: Provided that this requirement shall not apply to a contract entered into in the ordinary course of the business carried on or intended to be carried on by the company, or to any contract entered into more than three years before the date of publication of the prospectus; and

(l) The names and addresses of the auditors (if any) of the company; and

(m) Full particulars of the nature and extent of the interest (if any) of every director in the promotion of or in the property proposed to be acquired by the company, with a statement of all sums paid or

agreed to be paid to him in cash or shares by any person either to qualify him as a director or otherwise for services rendered by him in connection with the formation of the company.

(2). For the purposes of this section every person shall be deemed to be a vendor who has entered into any contract, absolute or conditional, for the sale or purchase, or for any option of purchase, of any property to be acquired by the company, in any case where:—

(a) The purchase money is not fully paid at the date of publication of the prospectus; or

(b) The purchase money is to be paid or satisfied wholly or in part out of the proceeds of the issue offered for subscription by the prospectus; or

(c) The contract depends for its validity or fulfilment on the result of such issue.

(3). Where any of the property to be acquired by the company is to be taken on lease, this section shall apply as if the expression "vendor" included the lessor, and the expression "purchase money" included the consideration for the lease, and the expression "sub-purchaser" included a sub-lessee.

(4). This section shall not apply to a circular or notice inviting existing members or debenture holders of a company to subscribe for further shares or debentures, but, subject as aforesaid, this section shall apply to any prospectus whether issued on or with reference to the formation of a company or subsequently: Provided that:—

(a) The requirements as to the memorandum of association, and the qualification, remuneration, and interest of directors, the names, descriptions, and addresses of directors or proposed directors, and the amount or estimated amount of preliminary expenses, shall not apply in the case of a prospectus published more than one year after the date at which the company is entitled to commence business; and

(b) In the case of a prospectus published more than one year after the date at which the company is entitled to commence business, the obligation to disclose all material contracts shall be limited to a period of two years immediately preceding the publication of the prospectus.

(5). Any condition requiring or binding any applicant for shares or debentures to waive compliance with any requirement of this section, or purporting to affect him with notice of any contract, document, or matter not specifically referred to in the prospectus, shall be void.

(6). Where any such prospectus as is mentioned in this section is published as a newspaper advertisement, it shall not be necessary to specify the contents of the memorandum of association or the signatures thereto, and the number of shares subscribed for by them.

(7). In the event of non-compliance with any of the requirements of this section, a director or other person responsible for the prospectus shall not incur any liability by reason of the non-compliance, if he proves that:—

(a) As regards any matter not disclosed, he was not cognisant thereof; or

(b) The non-compliance arose from an honest mistake of fact on his part:

Provided that in the event of non-compliance with the requirements contained in paragraph (m) of sub-section (1) of this section, no director or other person shall incur any liability in respect of such non-compliance, unless it be proved that he had knowledge of the matters not disclosed.

(8). Nothing in this section shall limit or diminish any liability which any person may incur under the general law apart from this section."

The Act contains exhaustive definitions of who vendors are, and provides for non-compliance with any of the requirements of the

section, and provides that any waiver of compliance with this section shall be void.

One of the most striking features of the new Act is the provision for the Statutory meeting, which must be held within a period of not less than one month or not more than three months from the date at which the company is entitled to commence business. Careful provisions are made to make this Statutory meeting a reality, and to ensure that the shareholder before the meeting shall have full and complete information.

Another important section of the Act makes provision for the registration with the Registrar of joint stock companies of certain classes of mortgages and charges which are defined by the Act. These are not complete, and as to certain other classes of mortgages and charges not covered by the Act, the law is left as it was before.

Provision is made for the rectification of the Registrar, and for penalties for non-compliance with the requirements of the Act, and for the enforcement of such penalties.

The contents of the annual summary required by section 26 of the Companies Act of 1862 are extended, and the present Act requires such summary to be so framed as to distinguish between the shares issued for cash and shares issued otherwise than for cash, or only partly for cash, and shall give certain other information.

Careful provisions are made in regard to the appointment of auditors, their remuneration, rights and duties, but these are not so stringent as the drastic provisions at one time proposed.

Important provisions are made as to the winding up of companies, and as to defunct companies, and for the purpose of rectifying certain abuses in regard to companies limited by guarantee.

Penalties are provided for false statements under the Act.

This most important legislation went into effect on the first of January, 1901, and its working will be watched not only in England but elsewhere with the keenest interest. In Canada the law at present is in a state of unfortunate confusion and embarrassing complication, and it is to be hoped that after a careful study is made of the working of this English legislation company law in Canada, not only the Dominion law but that of the various Provinces, will be placed on a more satisfactory basis. A comprehensive codification of the law affecting joint stock companies is quite feasible and would undoubtedly prove a great public convenience.

The Iron Ore Fields of Ontario.

By WILLET G. MILLER, School of Mining, Kingston.

The iron ore fields to which I desire to refer more particularly are those in what we are now accustomed to call New Ontario. In order however to conform to the title of the paper I shall refer briefly to deposits in the older parts of the Province as well.

The iron ores of the Province are of the following kinds: (1) Bog Ore, (2) Magnetite, (3) Titaniferous Magnetite, (4) Hematite.

We have had in Ontario what may be called two periods of iron manufacture. During the earlier of these, dating from 1800 to about 1855, the ore made use of was of the bog variety, chiefly. This material was found in loose deposits of recent age situated in one of the older agricultural districts. The area in which the industry achieved the greatest success was in Norfolk county not far from the shores of Lake Erie. The method of mining this bog ore was very simple. Trenches or ditch like depressions were sunk in the soil and the pieces of ore of various sizes were picked by hand from out of the earth.

At the picturesque but now forlorn village of Normandale in the

county referred to there was situated a small charcoal furnace all traces of which have now nearly disappeared. The iron produced here was used largely for the casting of stoves and kettles required by the pioneers and quite a trade was carried on with Hamilton, Toronto and other towns to the east. The writer has seen stoves made from this iron in the rural parts of the district not many years ago, long after traces of the furnace had all but disappeared.

It may be of interest to note that much of the charcoal used in the smelting of the Norfolk ore was produced it is said from the timber of the native Canadian chestnut which grows to a large size in that, the most southern district of Ontario. Traces of the old charcoal pits are yet to be seen here and there in the uncleared parts of the country. The eastern limit of growth of these trees is in the vicinity of Hamilton and when they are mentioned they are often mistaken for the common ornamental tree of our towns and cities, the imported horse chestnut. Another tree which has a like limited area of growth in the Province is the black walnut which was also at one time a valuable timber tree along Erie's shores.

The writer takes a special interest in these bog ore deposits as it was in these that he first saw mining operations carried on—during a "boom" in iron long after the Normandale furnace had gone out of blast.

In the same district there are numbers of paint or ochre deposits. These have been worked at different times and are similar in origin to the bog ore deposits but in their case the iron oxide is more intimately mixed with earthy matter than is the bog ore.

In this first iron period, furnaces were also erected in the more eastern part of the Province but they were of less importance. The ore used in these was obtained from bodies occurring in the crystalline rocks of the Laurentian. The sites of the industry here were in Hastings county and on the Gananoque River. The furnaces brought only financial disaster to those connected with them, unlike the Normandale furnace which was run with success from 1822 to 1847. Besides supplying the local market this furnace shipped castings of various kinds across the lake to Buffalo and one shipload of stoves and other castings was sent to Chicago.

SECOND PERIOD.

The second period begins with the mining of ores in eastern Ontario for export across lake Ontario to the centre of the iron industry in the adjacent United States after the furnaces in the Province had ceased operations.

Looking over the Reports of the Geological Survey the first reference I have found to the exportation of iron ore from the Province, relates to the early fifties.

The first furnace, built after the closing down of the Normandale works in 1847, which has met with success, is that erected at Hamilton a few years ago, about 40 years after the closing of the Norfolk furnace. This Hamilton furnace inaugurated a new era and has now two competitors for public favour, one at Deseronto and one at Midland, with two or three others as yet in embryo.

Leaving out of consideration the district in which bog ore was first mined as being now and for the future of no economic importance as a source of ore, our Ontario Ore Fields are divisible into two large areas or what may perhaps be more properly called regions, those of south-eastern Ontario and those of the northern and north-western parts of the Province.

These two regions are rather sharply defined both geographically and geologically.

The south-eastern region contains ores of economic value which occur, with the exception of a few pockets of Potsdam age, in what is

known as the Grenville series of the Laurentian. Titaniferous magnetites, of no value at the present time as ores, occur here as well as in various other districts of the Province.

Then there are the deposits, which are now beginning to attract so much attention, which are found in what is known as the Huronian series in the north and west.

In all our geological literature a quite sharp distinction is made between the Grenville and Huronian series of rocks. Whether this distinction will be found to hold in the future is of little importance to us in connection with a consideration of their respective iron ore deposits of economic value. So far, however, as the characters of the iron ore deposits are concerned the two series are quite distinct. The enclosing and associated rocks in the two regions are quite different in origin and appearance.

In the south-east many of the magnetite deposits have one wall of crystalline limestone and the other of gneiss. In other cases gneiss is the enclosing rock on both walls.

In the rarer districts of the Province the associated rocks are of totally different character and jasper or other closely related silicious material is a constant accompaniment of the ore bodies.

SOUTH-EASTERN ONTARIO.

We shall first deal with the ores of the first developed or south-eastern region.

The ores of economic interest here are of two kinds, magnetites and hematites. The former occur largely as contact deposits, as already stated, the wall on one side being in many cases composed of crystalline limestone while the other wall is some form of gneiss, often the scapolite-holding variety.

The two districts in this part of the Province which have been developed to the greatest extent are situated along the Kingston and Pembroke, the Central Ontario and the Irondale and Bancroft railways.

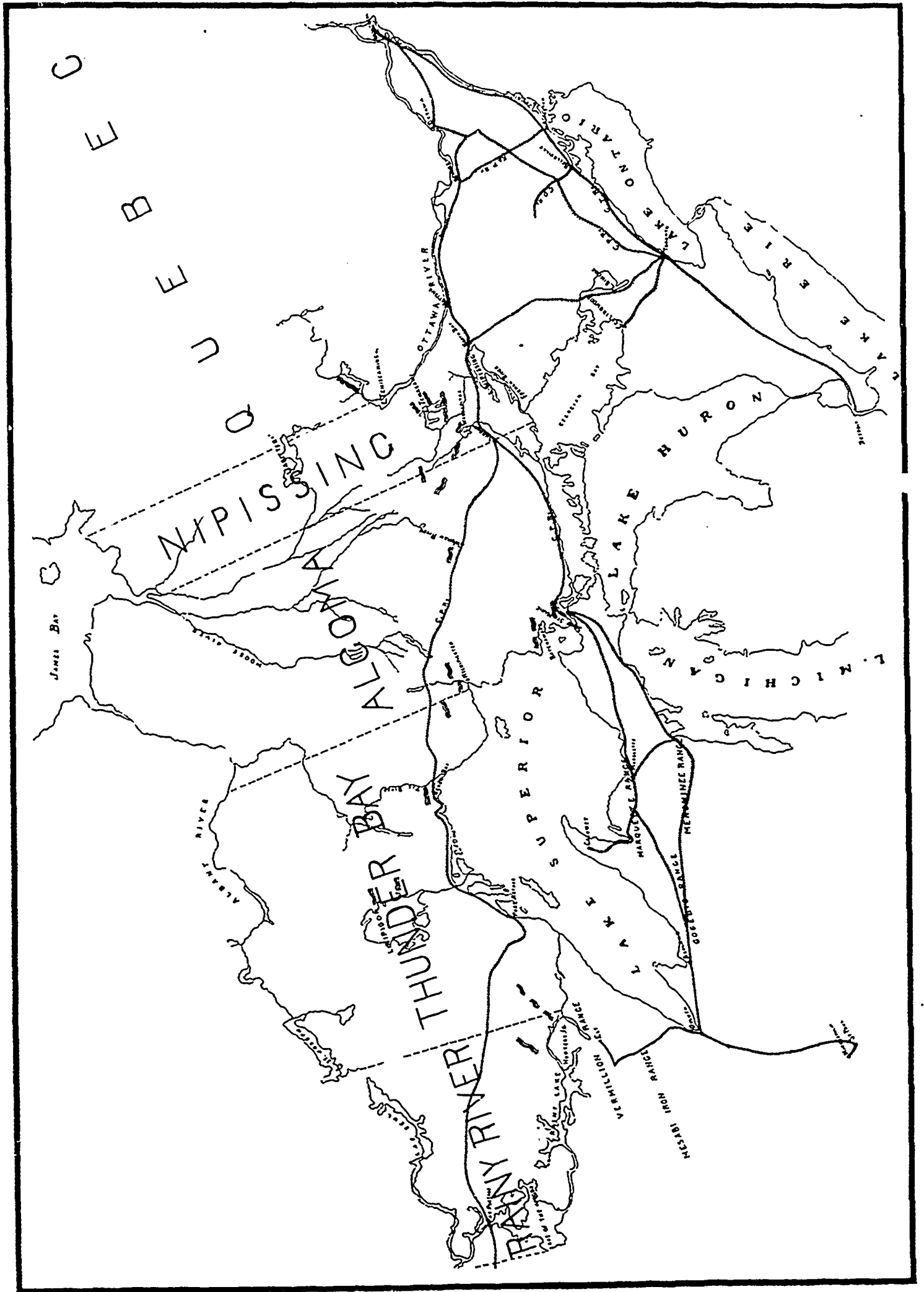
Along the first mentioned road the deposits which have been worked in recent years are found at different points for a distance of about 50 miles, beginning 30 miles north of Kingston. All the deposits recently worked here are composed of magnetic iron ore. Much of this is coarse in grain and thus differs in appearance from the characteristic fine grained and slaty magnetites of the north-western region. Outside of silicious material many of these ores are very pure but the ore from a few deposits contains enough sulphur to lower its grade.

Years ago some hematite deposits were worked in the district lying east of the K. & P. R., the most important being in Lanark county.

Along the C. O. R. the magnetite deposits which have attracted most attention are those of Belmont and Coe Hill although much has been done on a number of others. The deposit which has been worked most continuously along this line of railway is, however, composed of hematite and is known as the Wallbridge mine. Years ago this deposit was thought to have been worked out and was so described but during the last few years it has produced a considerable amount of good ore.

One of the chief reasons for the beginning of the construction of the Irondale R.R. was the transportation of iron ore from a number of deposits known to be situated in the district traversed by it. Some of these have been worked at different times. They are all magnetites.

Although high grade ore is obtainable from many of these deposits in south eastern Ontario, they are of smaller size than those of the Lake Superior region and are thus to some extent handicapped. No doubt, however, now that the Province is becoming an iron producing country of importance these deposits will be the scene of con-



siderable activity and the ores will always be in demand for special purposes. Only recently ores have been shipped from the Kingston district to Pennsylvania to be used in the production of high grade steel.

The smaller size of the deposits is partly compensated for by the fact that they are situated in districts in which labour and supplies are cheaper than in any other mining district in the Province. Moreover if methods were adopted in their handling such as were advocated by Dr. Douglas in his paper read before this Institute two years ago the output of merchantable ore could be greatly increased.

TITANIFEROUS MAGNETITES.

Before proceeding to a description of the newer ore fields I will refer briefly to the deposits of titaniferous magnetite which occur throughout the Province generally. These ores are of no economic importance at the present time although in the past material of this kind has been successfully smelted in other countries and the metal produced from it was of a high quality.

Numerous deposits of ore of this kind have been found in the Province from the area bordering the Rideau Canal, in the most eastern part, to the Rainy river district in the west, and they are often of large size. As is well known they are believed to be of a different origin from non-titaniferous ores and are classed among ore deposits of igneous origin. They are associated with basic rocks, gabbros, and are believed to represent basic secretions from molten magmas which were composed for the most part of material now making up the gabbros. The ore shades off gradually into the gabbro.

Some five or six years ago while investigating the composition of some of the dikes of eastern Ontario we found that they contained an unusually high percentage, for this kind of material, of nickel. As the dikes possess a similar chemical composition to gabbros and are found in the same district as some of the titaniferous ores, it occurred to me that these ores should also contain nickel, if as believed they were of igneous origin. I therefore suggested to Mr. F. J. Pope who was then a post-graduate student at the School of Mining that he should test samples from a number of deposits for the presence of nickel. Mr. Pope undertook the work and found all the magnetites of this class examined by him to contain a small percentage of nickel. Afterwards he proceeded to Columbia University and while associated with Prof. Kemp he analyzed a number of samples of titaniferous ores from various deposits in New York state, all of which were found to be nickeliferous. Mr. Pope also found that the element vanadium is universally present in ores of this class, a fact of considerable interest bearing on the distribution of the rarer elements.

During the last few years Prof. Kemp has given considerable attention to the study of the titaniferous iron ores of New York state while those of Scandinavia have been studied by Prof. Brögger.

Mr. Rossi of New York has carried on detailed experiments with these ores in the blast furnace and has achieved results which he claims prove that the ores are of economic value as a source of iron and ferro-titanium.

If any important commercial use were found for the element titanium whereby it could be utilized as a by-product the ores would be in demand. Two or three years ago such a use was thought to have been discovered in dyeing and numerous enquiries were received in Canada concerning our supply of titaniferous ores.

The occurrence of nickel in these ores is of interest for two reasons. Since our nickeliferous deposits of Sudbury are thought to be of igneous origin the belief is confirmed that the nickel-bearing titaniferous deposits are of similar origin. Moreover the occurrence of this metal in these ores may explain the fact why the iron produced from them was of a high quality as regards strength and toughness.

These titaniferous magnetites are generally, if they contain much titanium, of a darker and duller color than ordinary magnetites and one familiar with their appearance can recognize them in hand specimens and can thus avoid the expense of having them analysed. Moreover knowing their mode of occurrence with a certain class of igneous rocks the deposits can be distinguished in the field and can be thus put down as being of no present economic value and not worth any development work or expenditure for analysis.

THE NEWER ORE FIELDS.

The more recently discovered iron ore ranges in the northern and north-western parts of the Province occur widely extended in a region of great size.

The noted ranges of the United States practically surround the southern and western shores of Lake Superior, lying in the states adjacent. The ranges in Ontario which, so far as they have been examined, occur under similar geological conditions, have recently been found to occupy much of the territory bounding this great lake along its eastern and northern shores. The accompanying map shows that the Ontario ranges occupy a greater extent of territory than do those to the south and west of the lake and so far comparatively little systematic searching for iron ore ranges on this side of the line has been carried on. The location of these ranges has been discovered in most cases by accident, by prospectors and explorers who were engaged in other work.

The most striking characteristic of these ranges is the occurrence in them of bands of jasper or other closely related silicious material. This material usually occurs in the form of layers a few inches in breadth interbanded with iron ore which is in some cases hematite, in others magnetite.* When the jasper has a red color the interbanded material presents a remarkable and unique appearance.

The width of the belts of this interbanded material stretching across the country is often 600 feet or more. Some of the belts have been known to prospectors in Algoma and other parts of north-western Ontario for years but few of these men were acquainted with the iron ore districts to the south of Lake Superior and hence attached little economic importance to the outcrops, the iron being so intimately mixed with the silicious material as to be of too low a grade for mining. Some of the more silicious material when first found, during the gold excitements, was assayed for the precious metal but this being found to be absent no further attention was paid to the deposits. The fact was not known that under certain conditions, determined by the geological structure, ranges in which only lean ores are exposed at the surface are worthy of careful investigation.

In the states lying immediately to the south and west of Lake Superior the conditions of occurrence of workable deposits associated with leaner ores are now well understood. On some of the ranges in these states no ore deposits of value were found during the early explorations and the ranges were condemned. This is especially true in the history of the Mesabi range which has been proved to contain ore bodies of larger size than possibly any other part of the world. Although considerable work had been done on this range of a prospecting nature it was not till 25 years after it had first attracted attention as being possibly an ore area of value that workable deposits were discovered. Ore bodies were first opened up on this range in the early nineties and now the output of iron ore reaches an enormous number of tons annually.

The geological structure of the Mesabi range is somewhat different from that of most of our jasper-iron ranges. Those in this country appear to be more like the Marquette, Vermillion and others of the states adjacent to Lake Superior.

* Figs 1 and 2.

FIG. I.



Photo by W. G. Miller, 1900.

Interbanded Jasper and Magnetite, Iron Lake, vicinity of Lake Temegami.

FIG. II.



Photo by W. G. Miller, 1900.

Interbanded Jasper and Magnetite, west side of Snake Lake, Nipissing District, Ont.

The history of some of these ranges has been, however, much like that of the Mesabi and it was only after a great deal of dead work was done on some of them that ore bodies of importance were found.

On the ranges last referred to it has been found that the ore bodies should be looked for in parts of the belt which have been disturbed by igneous intrusions. The most favourable structure seems to be where the jaspilyte, as it is called, or the interbanded jasper and hematite or magnetite, has been cut through by dikes of basic rocks.* In such cases ore bodies of great size are sometimes found resting upon the upper surface or hanging wall of the dikes. The theory is that the iron has been leached from the overlying rocks and carried in solution down to the impervious layer formed by the dike matter and there deposited, replacing the silicious material. Detailed descriptions of the supposed origin of these ore bodies are given in the splendid monographs which have been published on the ranges of Michigan and Minnesota. The diagrams which I show are copied from some of these publications and give a good idea of the relations of the ore bodies to their associated rocks†. From these it will be seen that numerous ore deposits may underlie an area over the surface of which no ore of economic value is found among the rocks exposed. Great use is made of diamond drilling in determining these hidden deposits.

DISTRICT OF NIPISSING.

During the past season I spent some time on work for the Bureau of Mines in an examination of outcrops of jaspilyte which had been reported a few months before my visit as occurring in that part of the district of Nipissing lying west of Lake Temiscaming and stretching to the Algoma boundary.

As this is the only jaspilyte area that I have examined in any detail I shall give a brief description of it. The description will serve in a general way for the other known newer Ontario ranges all of which are of similar origin and character, and will apply in a general way to some of those to the south and west of Lake Superior.

Part of the district occupied by these iron ranges of Nipissing has been geologically surveyed by Dr. A. E. Barlow and I shall use his classification of the members of the Huronian system.

According to Dr. Barlow there are three series of fragmental rocks belonging to the Huronian of this district. The lowest of the three is composed of coarse fragments and is known as the breccia-conglomerate. Above this is a series mapped as graywacké and slate. Overlying this again is quartzite. Associated with this fragmental series are igneous rocks of various characters some of which cut through the different series while others are of older age.

The fragmental rocks appear to have at one time covered the most of the surface of this part of the district. They have however been worn down and are now found occupying more or less disconnected areas in depressions of the underlying igneous masses. Hence the outcrops of jaspilyte although they form at times continuous bands some miles in length are disconnected and the jaspilyte range which we traced across Nipissing, between Lake Temiscaming and the Algoma boundary, is not continuous. Breaks occur in the range at places some miles in length. This is compensated for however by the fact that in some places there are two or more roughly parallel belts of jaspilyte. This is owing apparently to the series in which the jaspilyte occurs having originally been in a horizontal position. Afterwards it was folded. Since then the tops of the folds have been worn off and the jaspilyte bands as we now find them represent the legs of denuded anticlines and hence run in parallel positions.

Much of the jaspilyte is greatly bent and fractured and the cracks in it are filled in with quartz.

The jaspilyte is associated with the middle member of the

Huronian, the graywacké and slate. This fact is of course of importance to prospectors; knowing in what member of the Huronian the jaspilyte occurs they will not waste time in searching for iron ore bodies among other members of the series.

A rather striking feature of the field is that a belt highly impregnated with pyrite and sometimes with pyrrhotite is found running parallel to the jaspilyte belt in almost every instance. Sometimes the pyritous belt is almost in contact with the jaspilyte, at other times it is a half mile or more distant.

The association of these two belts was of considerable assistance to us in our work of prospecting. This part of the district has received considerable attention from prospectors during the last few years as it appeared to be a continuation of the Sudbury nickel belt which lies to the south-west. Consequently almost every rusty outcrop in the field examined by us had attracted the notice of nickel hunters and many of the outcrops had been stripped and had some blasting done on them. After we learned the relation which these rusty zones bear to the jaspilyte we had a key to the occurrence of the iron formation and by working off at right angles to the pyrite belt we were able to discover outcrops of jaspilyte.

It would appear as if some of the bodies of pyrite are of considerable size and they will be of economic importance as soon as a railroad is built into the district. Pyrite is now much in demand as a source of sulphur. In addition to sulphur, analyses which I had made show that the pyrite often contains other materials which will be of value as by-products. Gold values were found running from traces to \$3.40 per ton, copper from 0.28 to 0.91 per cent., nickel from traces to 0.36 per cent. as well as traces of cobalt and in the cases of specimens from two outcrops traces of platinum were also found.

The map shows the position in a general way of the outcrops of jaspilyte we examined in the stretch of country running from a little west of Lake Temiscaming by way of Lake Temagami south-westward to the Algoma boundary. No bodies of soft ore or hematite were found associated with these outcrops but bodies of magnetite of considerable promise occur at some points. The discoveries of soft ore bodies outcropping at the surface are not numerous in other districts and this is not to be wondered at when we consider that they are much more easily worn down by agents of denudation than the harder magnetite and outcrops containing a higher percentage of rock matter.

If a number of ore bodies are not found in association with some of this jaspilyte the range will have to be considered to possess a unique character as no such great length of belts of similar character, in which no ore bodies of importance occur, are known in other districts. Of course considerable work may have to be done before the ore bodies are brought to light, just such work on has been done on some of the ranges of Michigan and Minnesota.

On beginning our work in the field we thought that the outcrops occurring in the vicinity of Lake Temagami were likely part of a belt running in a north-west direction as a jaspilyte band was found some years ago, during the survey of the boundary between the districts of Nipissing and Algoma, a little north of Shining Tree lake near the 61st mile post. As our work proceeded, however, we found that these Temagami outcrops form part of a belt which runs somewhat south of west and shows exposures of jaspilyte a short distance north of Lake Wahnapiatae and in the township of Hutton on the boundary line. Properly the outcrops in the neighborhood of Temagami should be said to form two or three roughly parallel bands. The nearest outcrop of jaspilyte to Lake Temiscaming, which here forms the boundary between Ontario and Quebec, so far discovered is situated on McDonald creek. It is described as being of small size and I did not examine it.

Farther west numerous outcrops are found near the north shore of the north-east arm of Lake Temagami. A few miles north of this,

* Figs 10 and 11.

† Fig 2.

exposures are found south-west of Net lake and along the shores of Vermillion and other lakes westward to the shores of Kokoko lake, a distance of about 10 miles. Some of these outcrops have a breadth of 600 feet or more and, from the relations which they bear to certain igneous intrusions, give promise of being of economic value.

A band of jaspilyte also runs in a direction somewhat south of east from Austin Bay the southern extremity of the south arm of Lake Temagami to Cross Lake. Westward this band extends to the islands lying along the eastern shore of the south-west arm of Temagami.

On Emerald lake 8 or 10 miles west of the last mentioned exposures jaspilyte is also found.

Further west again, as already stated, outcrops are found a short distance north of Lake Wahnapiatae and in the township of Hutton which lies along the western boundary of the district of Nipissing.

Most of the exposures so far discovered are in the vicinity of easily accessible water courses. It seems likely therefore that other outcrops will be found in the intervening areas.

A sufficient number of outcrops has however been found along this strip of country between Lake Temiscaming and the Algoma boundary to form what may be called a more or less broken belt across the whole extent of this part of the district of Nipissing. It appears moreover that there is a belt of similar character across the district some 40 miles to the north. The reason for believing that a belt of jaspilyte occurs in that part of the district is owing to the fact that in addition to the outcrop near Shining Tree lake, on the western boundary, there are also outcrops on the Quinze river which lies in the Province of Quebec, some miles east of the eastern boundary of the district of Nipissing and about 80 miles almost directly east of the Shining Tree outcrops. The area intervening between these two widely separated outcrops has not all been geologically mapped. The geology of the greater part of it is known however and the most of it is underlain by that member of the Huronian in which the jaspilyte is to be looked for.

Before turning from the description of the jaspilyte belts of Nipissing I may refer to the fact that the proposal has recently been made that the Ontario Government should construct a railway in the near future from North Bay station on the C. P. R. to the head of Lake Temiscaming. This proposal seems to have met with practically universal approval among financial and business men. Judging from the unanimity with which the proposal has been received it would appear that the district is assured of an outlet for its mineral and other products.

If this road is built by the Government as proposed its construction will inaugurate a new era of railroading in Ontario and I have no doubt that every mining man will welcome the change.

I have also understood that the building of a canal from the Georgian Bay, by way of the French river to North Bay is a live issue. If both the railway and canal are built these iron ranges of Nipissing will be better situated, so far as shipping facilities are concerned, than any of the great ranges whose outlet is Lake Superior. The ores from Nipissing after a comparatively short rail haul can be loaded on boats and reach Lake Huron without having to pass through the congested Sault canals.

ALGOMA DISTRICT.

I am not familiar from personal examination with the jaspilyte outcrops which have been found at numerous places in the district of Algoma but from the descriptions which have been published of them they seem to be similar in origin and in character generally to those of Nipissing. Some of these, those of Batchawana Bay and Michipicoton harbour, have been known for years but like many of our other mineral fields little attention has been paid to them till quite recently and systematic and careful work is now only beginning to be done on them.

Already one ore body, described as being of great size, has been opened up not far inland from Michipicoton harbour and I have not the least doubt that other great iron deposits exist in other parts of Algoma.

I am indebted to Dr. A. P. Coleman for an account of the general distribution of outcrops of jaspilyte and material of similar origin in Algoma so far as at present known.

The map which accompanies this paper shows the relations which these outcrops in Algoma bear to each other and to those of the district of Nipissing.

I take the following outline descriptions of the belts in Algoma from a letter of Dr. Coleman. Referring in the beginning of his letter to those of Nipissing he states: "Similar bands have been found crossing Niven's line just north of Shining Tree lake, traced for about $3\frac{1}{2}$ miles; and between Onaping and Meteor lakes, running somewhat east of south for a similar distance. One has been reported north of Woman river but was not visited by my party last summer, so we have nothing of it in detail. Then there is a Laurentian area and a wide gap. The next band of the sort is about 9 miles northeast of the "Soo" where cherty or quartzitic rock interbanded with magnetite is found but only in small amounts.

"North of Batchawana bay there are two bands each from 3 to 5 miles long, the southern one, 7 miles from the bay, of jasper with hematite running east and west; the northern one, 9 miles from the bay, is of cherty or quartzitic character with magnetite bands and runs north-easterly.

"The next point to the north is Gros Cap near Michipicoton harbor, where sandy and cherty rock is interbanded with hematite. Twelve miles inland is the Helen mine, mainly of red hematite but mixed with "blue," brown and yellow ores, said to average about 58 per cent. of iron of fair quality though containing too much phosphorous to be of Bessemer grade. The deposit is stated to be 1,000 feet long from east to west and 400 feet wide with a proved thickness at one point of 288 feet. To the west of this rises a hill 450 feet high through which runs a belt of rather impure siderite perhaps 100 feet thick, probably the source of the ore.

"Then follows a gap to Eleanor lake where banded sandy layers and iron ore occur. A few miles northeast probably the same belt crops out near Parks lake where a red hematite deposit said to be promising, is being explored. Some miles north of this a band of cherty and jaspery rock with magnetite occurs near Magpie river. The next important extensions of the range are near the head waters of Dog river at Paint lake where sandy magnetite occurs and a belt of similar rock parallel to it a few miles north, where a promising ore deposit is said to have been found by Prof. Willmott. These are east of Dog river, but the range extends to the west as jaspery iron ore for several miles, Iron lake being on the way."

THUNDER BAY AND RAINY RIVER DISTRICTS.

"The next point is near Pic river, north of Heron bay, where large masses of banded sandy rock and magnetite occur.

"Finally jasper banded with iron ore has been found east of Nipigon lake at two points some miles apart.

"Though these various stretches of silicious rock interbanded with iron ore differ a good deal in appearance they probably represent the same horizon. Up to the present the only large deposit proved to exist is the Helen mine, but two others, in the hands of the Clergues, are of promise and are being explored. So far as I am aware no other parts of the scattered iron ranges are being worked at seriously."

Dr. Coleman kindly placed this information at my disposal in answer to an inquiry made by me concerning the location more particularly of the recently discovered outcrops in Algoma and Thunder Bay districts. Hence he did not consider it necessary to refer to

occurrences known to exist for a number of years in another part of the latter district. The deposits to which I refer form a belt which strikes from the Minnesota boundary north-eastward into the Thunder Bay district for a considerable distance. The deposits on this range which have attracted most attention include those situated in the vicinity of Hunter's island on the international boundary and others lying 30 or 40 miles to the north-eastward in the vicinity of Greenwater and Shebandowan lakes and farther eastward on what is known as the Mattawin iron range.

A part of the Canada Northern Railroad now being built from Port Arthur to Winnipeg passes within a few miles of these more northern outcrops and thus encourages the opening up of the deposits. Up to the present little work has been done on this range on account of the lack of shipping facilities. During the past year, however the government diamond drill has been at work on the Mattawin and this and adjoining parts of the range are considered by those who have reported on them to be of a promising character.

This belt stretching from the international boundary is undoubtedly a continuation of the celebrated Minnesota ranges and it may be of interest to quote the opinions of United States geologists on the character of that part of the range lying in Canadian territory. The Messrs. Winchell in their Report on the Iron Ores of Minnesota make the following statement.* "Outside of Minnesota the belt of chloritic schist which carries ore passes into Canadian territory by entering Hunter's island. There is great probability of the existence of valuable deposits of iron ore on Hunter's island, and also further northeast in the direction of their strike."

There is also the Atikokan range which is now I believe being opened up on quite an extensive scale. The ore is said to be a rather coarse grained magnetite. This range lies in the Rainy River district near the line of the Canada Northern Railway.

SHIPPING FACILITIES.

It will be seen from the map that most of the Ontario ranges are as well situated as regards shipping via Lake Superior as are those which have already been developed on such a large scale to the south and west of this great lake. As regards the shipping facilities of the ranges of the district of Nipissing it is likely that in the future, as already pointed out, they will have an outlet via Lake Huron direct and will then be better situated than the Lake Superior ranges.

It may be well for comparative purposes to give the distances traversed and the rates charged per gross ton (2,240 pounds) from mines of the various United States ranges to ports of Lake Superior.

The following statement is taken from Vol. IV. of the final report of the Minnesota Geological Survey, p. 597.

	Rate.
From Marquette range east of Republic and Michigamme to Escanaba, distance not over 65 miles.	\$0.52
From Marquette range at Republic and Michigamme.....	0.67
From Marquette range to Marquette, 15 miles.....	0.32
" " " to Gladstone, 60 to 130 miles.	0.52
From Menominee range east of Mastodon to Escanaba, maximum distance 52 miles.....	0.40
From Menominee range west of Mastodon (Crystal Falls), distance 82 miles.....	0.43
From Gogebic range to Ashland, distance about 45 miles.....	0.40
From Gogebic range to Escanaba, distance about 184 miles.....	0.85
From Vermillion range to Two Harbors, distance 65 to 90 miles.....	1.00
From Mesabi range to Duluth and Superior, about 75 miles.....	0.80

* Bull. No. VI. Geol. and Nat. Hist. of Minn.

The sailing distances and average ton rates for 10 years (1886 to 1895) are as follows:

	Miles.	Contract Rate.	Wild Rate.
Marquette to Cleveland.....	583	\$1.09	\$1.12
Escanaba to ".....	523	0.91	0.915
Duluth to ".....	823	1.19	1.30
Ashland to ".....	774	1.19	1.30
Escanaba to Chicago.....	192

The average contract rates for 1895 and 1896 were:—

	1895.	1896.
Escanaba to lake Erie ports.....	\$0.55	\$0.70
Marquette to lake Erie ports.....	0.75	0.95
Ashland and Duluth to lake Erie ports...	0.80	1.05

From the outline map which accompanies this paper it will be seen that the ranges of jaspilite and related material are found over a greater extent of territory in Ontario than in the great iron producing States to the west and south of Lake Superior where the ore deposits, the largest known, are of similar origin and occur under the same conditions.

In conclusion, I may say, from what we now know of the iron ore fields of the Province we may feel that Ontario is assured of a great future as an iron ore producing country. Judging from the extent of territory over which the more newly discovered ranges have been found, Ontario should in the not far distant future take her place as one of the chief iron ore producers of the world.

BRITISH COLUMBIA NOTES.

The Ben d'Or Mines situated on Cadwallader Creek, about 70 miles from Lillooet, in the Lillooet Mining Division, are reported sold to a New York syndicate for \$750,000. The property is being taken over on an eighteen months working bond; the first payment of \$125,000 is to be made on the 25th of June. The Ben d'Or is a producing mine, having shipped bullion almost continually since the completion of their ten stamp mill which is in operation on the property. Recent development work on the property has opened up large bodies of free milling gold ore. Active development work will be commenced on the property at once by the New York people.

The Bannison group of claims, on the eastern slope of the Duncan, on the boundary between East and West Kootenay, will be developed this season by the Kootenay Consolidated Company. The property is managed by Major Clohecy.

The Old Gold property, in the Lardeau, is to be opened up by J. W. Westfall of Trout Lake. Development work will be continued on adjoining properties which are owned by the same company. On the Primrose property, one of the Old Gold groups, there was a new find made late last fall: this property will be thoroughly prospected this season and much is expected from this new discovery.

Rich free milling gold ore is being found at various points in the Lardeau mining division. On Fish Creek, west from Lexington mountain, there has been a discovery of rich free gold ore, while numerous new discoveries have been made on Lexington mountain. Several good discoveries have been made further up Pool Creek in the same belt, while a discovery of very rich gold ore has just been made almost in the town site of Ferguson.

The famous Eva group is located in this free gold belt, and until the Eva property was proven there was little prospecting done for free gold. Prospectors and mining men contended that the country was a silver-lead belt and that there could be no free milling gold properties. Prospectors are now beginning to realize that gold is where you find it, and are just beginning to prospect for gold. There is much excitement in the Lardeau division over the recent discoveries and many prospectors and mining men are going into that country to examine the new finds.

The long tunnel which has been driven on the Highlander mine at Ainsworth has encountered the lead at a depth of 900 feet. The vein is claimed to be of high grade galena ore and more than 27 feet in width, as no hanging wall has been encountered. The values contained in the ore are not known, but it is asserted that the whole vein carries high grade ore.

The Congo group on Red Mountain, in the Slocan district, is to be developed this season by the owners. The Congo is said to be one of the most promising properties in that section of the camp. The lack of transportation has greatly retarded the development of this as well as other properties in the neighbourhood.

Work has been suspended on the Last Chance mine in the Slocan, the reason given for cessation of operation being that the stopes are too wet to carry on mining. Consequently no ore will be taken out until the seepage subsides.

The well known Payne mine of the Slocan has been closed down, the whole force being laid off. It is rumoured that a complete change of management is to occur soon.

The New Denver *Ldg.* of the 30th ult. gives the ore shipments of the Slocan and Slocan City mining division from January 1st to May 25th, 1901, as follows:—

	Week.	Total.
Payne.....		1,486
Last Chance.....	40	918
Slocan Star.....	123	594
Ruth.....		264
Bosum.....	20	260
Hewett.....	24	570
American Boy.....	20	708
Ivanhoe.....		396
Trade Dollar.....		140
Sunset (Jackson Basin).....		370
Sovereign.....		117
Wonderful.....		4
Arlington.....	100	1,455
Two Friends.....		40
Enterprise.....		180
Hartney.....		140
Black Prince.....		100
Goodenough.....		145
Miller Creek.....		20
Reco.....		165
Sunset (Can. Cold Fields).....		53
Silver King.....		14
Red Fox.....		64
Antoine.....		16
Queen Bess.....		526
Monitor.....		345
Corinth.....		66
Bondholder.....		23
Rambler.....		518
Surprise.....		20
Kaslo Group.....		10
Chapleau.....		15
Speculator.....		10
Ajax.....		10
Scho.....		39
Emily Edith.....		40
Phoenix.....		20
Alpha.....		40
V & M.....		20
Colonial.....		20
Total tons.....	327	10,391

The tunnel on the Estella and Rover, in the East Kootenay, is now in between 600 and 700 feet. At 260 feet a crosscut was driven which shows 12 feet of ore, another crosscut has 11 feet of ore, while still another has about 7 feet. Stopping has commenced on the Estella tunnel and there is about 100 tons of ore on the dump.

The Whitewater mine in the Slocan district has closed down, with no immediate prospects of re-opening. The reason given for the shut down is that there is no market for their ore.

Several well-known properties in the Trout Lake mining division are to be developed this season. The Miner-Graves syndicate have secured two fine properties, the Virginia and the Cromwell, and will expend not less than \$10,000 in development work. A six ton shipment was sent to the smelter last fall from the Cromwell, giving returns of \$100 per ton in gold. On the Virginia there has been 100 feet of work done.

The Triune, in the Lardeau, is shortly to start work again. This is one of the richest silver-lead properties in the Kootenay. Shipments up to date have brought returns of over \$23,000.00 in all values.

The Metropolitan and Sunset, a couple of North Fork properties, will be worked extensively this season.

The Lorne Mine, in the Lillooet mining district, has closed down. The reason given is that the ore in the lower levels has turned base and can not be treated with the present milling plant.

James McKay Anderson, western manager of the Gold Hill Exploration Company, of Toronto, is in the Lardeau looking after the interests of his company. He intends putting a force of men to work on the Copper Queen group and other properties owned by the company.

The total amount in dividends paid by the Payne Mining and Milling Company is \$1,438,000, the largest paid by any mine in British Columbia. The company have on hand \$180,000 to construct a concentrator and compressor and do development work. The concentrator is soon to be built, after which a larger force of men will be employed and a larger output expected.

The main shaft house at Bruce Mines, Ontario, was burned. The loss is estimated to be \$35,000, with insurance at \$20,000.

The International and Happy Medium claims, situated about a mile north of the mouth of Twelve Mile Creek, were bonded by R. E. Fishburn for \$12,000. A contract to run a tunnel 100 feet has been let by Mr. Fishburn.

The Silver King Mine, of Nelson, is sinking a shaft 1,000 feet and expect to have it completed within 30 days. This, when completed, will be the deepest shaft in British Columbia.

The Poorman Mine, Nelson, has closed down temporarily owing to an accident to the compressor.

A new discovery of free gold ore has just been made in the Nelson mining division on Six Mile Creek, about six miles from Nelson. The property has just been located, and assays across a 25 foot vein carry values of \$24.00 in gold, there being no other values whatever in the ore.

E. Mansfield, the well-known mining man of London, England, returned to Nelson a few days ago. He will resume work on properties in Camp Mansfield.

The Lardeau mining division of the West Kootenay district is coming to the front as a free gold district. Within the last week a number of discoveries of very rich free gold ore has been made. One property has just been located on which there is a .40 foot vein, from which average samples assay \$38.00 per ton. New discoveries are being made almost daily, and prospectors from all over the Province are rushing to the district.

C. H. Stillwell, of Montreal, has just bonded the Walrus group of claims, in the Lardeau mining division, from McKay and McKenzie for \$80,000. The first free gold property in this district developed to any extent was taken up by A. F. Rosenberger, of the Prospectors' Exchange of Nelson, about a year ago. This property has since developed into a most promising free gold property and has just been sold to an English syndicate for \$250,000.

The Noble Five Mining and Milling Company have let a contract to run a 320 foot tunnel to cut the Last Chance vein.

The Hampton group, located at the head of Springer Creek, in the Slocan City mining division, has resumed operations. N. F. McNaut, of Silverton, is the owner and is operating the property. Last year's operations opened up a phenomenally rich shute of ore on the surface, from which two small shipments were made, the smelter returns being 690 ozs. silver to the ton.

Mike O'Brien, of Nelson, has just made a discovery of very rich free gold quartz on Bird Creek, about 12 miles from Nelson. This creek has been thoroughly prospected for a number of years for the ledge from which a very rich float has been found. No particulars of O'Brien's find have been made public, but it is reported that the quartz from the vein is the richest seen in the district.

The Imperial Development Syndicate, of Nelson, have sold the Eva group, in the Lardeau mining division, on which extensive development work has been carried on during the past winter, for something over a quarter of a million of dollars. No details of the deal have been given out, but it is pretty well understood that a local representative of an English company has taken over the property.

LAKE OF THE WOODS.

Sultana.—Active development is opening up good ground on the Crown Reef, and a recent bore hole from the old workings on the main vein has intersected the Crown Reef, showing a width of ten feet of first-class ore. A broken cam shaft is responsible for the shutting down of a portion of the mill.

Mikado.—The mill at this mine has been shut down but development is proceeding vigorously, the incline being sunk at about 2 feet per day. This shaft is now over a thousand feet deep. The cyanide plant is busy on the old tailings.

Black Eagle.—At this mine, formerly known as the "Regina," the shaft is being enlarged and straightened preparatory to putting in a new hoisting plant. The new management has purchased the steamer Squaw and keeps her busy taking out supplies to the mine. A policy of vigorous development of the mine is to be pursued and it is expected that a new mill of 20 stamps will take the place of the present unique collection of scrap iron before Fall.

Sakase.—Regular shipments to the mill at Keewatin are being made from this mine and it is expected that the mine will be able hereafter to keep the mill supplied to its full capacity. Mr. Craig, the former manager, has returned to take charge of the mill and Mr. Guess will confine his attention to the management of the mine.

Golden Horn.—A contract to sink a new shaft 100 feet has been let to Ed Hannil. This will be some distance from the old workings, to which it will be connected by drifts.

Grey Eagle.—This property, about 5 miles east of Rat Portage, is being re-opened.

Hornstake.—A new hoist and boiler are being installed on this property and sinking will be resumed as soon as possible. Mr. Breidenbach, former manager of the Mikado, is acting as consulting engineer to the company.

The Gold Bullion.—Work has been resumed on this property by Buffalo capitalists.

Manhattan Co.—This company, under the management of J. E. Stanton, of New York, is opening up a fine prospect on Eagle Lake. A fine body of ore has been exposed.

Golden Eagle.—A mill run from this mine is being made at the El Derado mill, on Eagle Lake. If the results prove satisfactory a hoist and compressor will be at once installed and a policy of vigorous development begun.

Big Master.—Drifting on No. 1 vein at the hundred foot level is opening up a good body of ore and the "freezing" process mentioned in our last issue being completed, the mine will be developed as fast as possible and the erection of the 10 stamp mill, which is on the ground, will be proceeded with at once. G. F. Bartlett, late of the Corundum Mining Co., of Combermere, will have charge of the erection of the mill. J. H. Webber, M.E., of Oroville, Cal., recently reported on the property.

Twentieth Century.—Recent developments on the property being operated by this company on the Upper Maintou indicate that more dividends will be forthcoming at an early date.

Reliance Co.—This company, operating the Independence Mine, Lower Maintou, will erect the 10 stamp mill now on the ground, at once, and it is expected that the stamp will be dropping by Sept. 1st.

NEW COMPANIES.

BRITISH COLUMBIA.

Columbia Hydraulic Mining Co.—Registered as an extra provincial company, 8th June, 1901. Authorized capital, \$1,000,000, in shares of \$1.00. Head Office, A. A. Johnson, Atlin, B.C.

Cedar Canyon Gold Mines, Ltd.—Incorporated 8th June, 1901. Authorized capital, \$100,000, in shares of five cents each.

Cherry Creek Copper King Mines, Ltd.—Incorporated 10th June, 1901. Authorized capital, \$500,000, in shares of \$1.00.

Nicola Coal Company, Ltd.—Incorporated 11th June, 1901. Authorized capital \$100,000 in shares of \$1.00 each.

Mount Sicker and Brenton Mines, Limited.—This company has been incorporated under the laws of British Columbia, with an authorized capital of \$1,000,000, divided into 4,000,000 shares of a par value of 25 cents each, to acquire and work the Susan, Copper Canyon, Victoria, Yankee, Anoka, May and Star mineral claims, situated on Mounts Sicker and Brenton, British Columbia. The Directors are: W. A. Dier, A. St. G. Hammersley, E. E. Smith, Elmore D. Dier, F. D. Conway, P. J. Pearson.

ONTARIO.

Gold Mountain Mining Co.—Licensed 13th June, 1901. Working capital in Ontario, \$500,000. Head Office, T. A. Gorham, Attorney, Port Arthur, Ont.

Taylor Copper Mines Co., Ltd.—Incorporated 13th June, 1901. Authorized capital, 2,000,000. Head Office, Sault Ste. Marie, Ont.

Manxman Gold Mining Company, Ltd.—Incorporated 20th June, 1901. Authorized capital, \$1,500,000, in shares of \$1.00 each. Head Office, Sault Ste. Marie, Ont.

Homestake Gold Mining Co. of Ontario, Ltd.—Licensed 13th June, 1901, to carry on operations of a mining, milling, reduction and development company, in Ontario, with a working capital not to exceed \$100,000. Head Office, G. H. Draper, Attorney, Rat Portage, Ont.

Black Eagle Gold Mining Company, Limited.—This is the name of the reconstruction of the Regina (Canada) Gold Mine, Limited, which worked the Regina Mine, Lake of the Woods, for a number of years. The authorized capital of the new concern is £100,000, in shares of £1. Mr. F. Peterson, the manager, is busy overhauling the old plant of Tremaine mills, which are to be superseded by gravity stamps.

NOVA SCOTIA.

Dolliver Mountain Mining and Milling Company, Ltd.—One of the most promising of gold mining ventures for the Province of Nova Scotia has recently been completed in the organization of this company of Boston capitalists. The property acquired comprises 387 gold areas at Upper Seal Harbour, Stormount District. Vigorous development of the property has been begun and in due course a mill of ample capacity will be installed, utilizing a fine water power on the company's property. The authorized capital of the new company, which has been incorporated under the statutes of Nova Scotia, is \$1,000,000, in shares of \$10.00. Ample capital has, we understand, been subscribed for this enterprise. The Directors are: Ernest S. Williams, Geo. T. Cunningham, Chas. F. Crocker, G. J. Partington and Kendall F. Crocker. The company's operations are being directed by Mr. G. J. Partington, a gentleman who has been associated with the gold mining industry of Nova Scotia for a great many years and who thoroughly understands its requirements.

COMPANY NOTES.

Bell's Asbestos Company, Limited.—The Directors beg to submit to the Shareholders the report and audited accounts for the year ended 31st December, 1900. The result of the year's operations is a net profit of £6,994 1s. 10d., to which has to be added the amount brought forward, £1,419 12s. 4d., leaving for appropriation, £8,413 14s. 2d. The Directors recommend:—(1) The payment on the 5th June, of a dividend at the rate of 2½ per cent. per annum, free of income tax; (2) To place to reserve fund, £3,500; (3) To carry forward, £1,913 14s. 2d.

Le Roi Mining Co.—Once more the hopes entertained by the shareholders in "the celebrated Le Roi Mine" have been disappointed by the "passing" of the quarterly interim dividend promised them at the close of last year. The shareholders, like those involved in nearly all the London and Globe progeny, have by this time had plenty of opportunities to appreciate the meaning of the oft-repeated phrase: "Man never is, but always to be, blest." When at the close of 1898, the London and Globe and British America Corporations were able to float the Le Roi Mine as a separate company, with a capital of £1,000,000, of which all but £50,000 represented the expanded purchase consideration, the smallness of the working capital was accounted for by the statement that the property had been taken over as a going concern, and that from the ore in sight profits of £360,000 per

annum, or over 33 per cent. on the issue, were assured, apparently from the start. That was the promise; but the performance has constituted a "shocking example" of the reckless anticipations upon which so many mining ventures are launched. The accounts for the two years to the end of June last, which were presented to the meeting on December 28th last, showed a total profit of £93,369, or, say £47,000 per annum, instead of £360,000, while the dividend of 5 per cent. paid in November, 1899, is the only return to the shareholders, many of whom acquired their interests at from 20 per cent. to nearly 80 per cent. premium, have yet received upon their investment in the company. At the meeting in December Mr. Whitaker Wright said: "It is a great pleasure to me to be able to state that for several months past, and at the present time, after deducting all costs of mining, transportation, smelting, &c., you are earning profits at the rate of 33½ per cent." and he also stated that all the capital expenditure, which had proved much larger than the original estimate, would be completed within a couple of months, and that in the then current quarter the directors would be able to pay "their first quarterly dividend of a substantial character, and continue to pay dividends afterwards regularly every three months." This week, however, in place of the expected dividend warrant, the shareholders have received a circular from the board expressing regret that owing to the non-delivery of machinery, due to the severity of the weather, the Northport smelter has not been completed, while a breakdown in the old shaft has cut off, for the time being, that portion of the mine from which the ore was principally being stopped. "In view of these facts," it is added, "the company has not been able to liquidate its indebtedness to the Bank of Montreal, and the directors, therefore, feel that they have no alternative but to postpone for the present the declaration of any dividend." It is, of course utterly discreditable that this "going concern," with its promised profits of £360,000 and its capital of £1,000,000 should be in debt to a local bank, and the only wonder is that Le Roi shares are still kept up at a premium on their nominal value, for their intrinsic value remains an entirely unknown quantity.—*Economist*.

Le Roi No. II.—Shipments to the smelter for the month ended 31st May, 4,290 tons, yielding 1,551 ozs. gold, 5,416 ozs. silver, 94 tons copper. Estimated value, £13,517. The directors have declared an interim dividend of 5s. per share, payable on 29th instant.

Le Roi.—Cable:—"Returns for the month ended 31st May. Tons shipped, 22,793, yielding 7,668 ozs. gold, 15,169 ozs. silver, 305 tons copper. Gross value, £54,470."

Hastings (B.C.) Exploration.—Cablegram from the consulting engineer, dated June 13th:—Arlington group of mines.—Trial test mill June 6th. Mill running steadily now.

Bruce Copper Mines, Limited.—On June 12th the main shaft building at the Bruce mines was destroyed by fire. The loss is upward of \$35,000, insurance \$20,000. The Bruce mines were from 1846 to 1876 very famous as a copper producer. The plant destroyed was just erected and a good example of modern mining equipment. The boilers, warehouse and other buildings adjacent were saved. The company recently completed a large concentrating mill, which started on May 1st, and shipments of copper concentrates had started, 250 tons of ore per day being treated. About 250 men were employed, a number of whom will be thrown out of work temporarily. The plant will be immediately reconstructed. The origin of the fire is unknown. No lives were lost.

British Columbia Copper Company.—Ore shipments from the Mother Lode Mine for May were 9,210 tons, making 28,230 tons for the 5 months of this year. Total shipments to end of May were 33,794 tons. The stopes at both 200 and 300 feet. levels are now in good-grade ore and from these and 2 of the surface openings the daily output ranges from 300 to 350 tons. The lately installed machinery and plant continues to run smoothly and matters about the mine have settled down to a steady producing basis.

B. C. Chartered Company.—From this Montreal Company's Mine at Eholt, B.C., 5,035 tons of ore were sent to the smelter during May, making 20,579 tons for the current year. Adding last year's shipments, the aggregate output is 40,073 tons. The average copper values obtained run to nearly 7 per cent., while silver was nearly 3 oz. to the ton, with small gold values. Development work continues and the diamond drill is kept at work prospecting both laterally and vertically.

DOMINION COAL.

The following is excerpted from the Directors' Report for the year ended 28th February. Submitted at the annual meeting held in Montreal this month:—

The sales of the company have increased during the past year to the extent of 200,000 tons. Owing to the very satisfactory demand which existed during the greater part of the year, a larger amount could have been disposed of, but the delay in receiving machinery ordered for delivery in time to be of service during the busy season of last year, as well as the increased cost of supplies and the advance in wages not only interfered with supplying the increased demand, but lessened the profits on the quantity shipped.

The business of the company, as will be seen from the subjoined statement, has increased at an exceedingly rapid rate during the last few years, and it was found necessary to increase the plant very materially to provide the required output.

During the last year the company has expended a large amount of

money in these improvements and extensions. Six large air compressors of an aggregate capacity of 3,000 h.p. have been installed. This additional air compressing plant will enable the company to mine a very large portion of its coal by machinery, thus increasing the output per man. This latter consideration is of the utmost importance, as it would be impossible to supply the present demand with the number of skilled miners available in Nova Scotia.

Besides increasing the output from the older collieries, two new collieries have been opened, one of which is now producing 1,000 tons per day. A large amount of work has been done on Dominion No. 2 Colliery, which when completed will be the largest colliery of the company.

At Louisburg a coal-loading apparatus has been installed, which reduces the time required for loading a steamer to about one-third of that required by the old methods.

A large amount of new work has been done on the railway, in the way of sidings, additional yards, etc. To provide for the additional labour, a large number of houses have been constructed.

It was hoped that the foregoing improvements and extensions would be completed in season to give the output desired in the summer of 1900, but they were not so far completed as to be of much benefit during the summer season; and as a result of this, the company was unable to mine the coal to fill its contracts, and was obliged to cancel some of them, and also to send a large quantity by rail to Montreal in the winter season, at very largely increased expense over the cost of shipping by water.

The company is now in position to supply all present demands, and will make large savings in transportation expenses.

OUTPUT IN TONS.

Years ending February 28th.

1895—	884,000.	1899—	1,295,543.
1896—	1,169,785.	1900—	1,739,374.
1897—	1,221,471.	1901—	2,044,877.
1898—	1,061,669.	1902—	2,600,000. (estimated).

Mr. Donkin, the resident manager, having resigned after five years of faithful service, Mr. C. Shields has been appointed General Manager, and has recently entered upon the duties of this position.

Ten thousand shares of preferred stock have been sold at \$110 per share.

Since the close of the fiscal year the sum of \$95,743.30 has been deposited in the sinking fund. This, together with interest on \$125,000, Reserve Sinking Fund, is sufficient to retire \$90,500 of the Bonds of the Company. Adding to this \$6,500 Bonds drawn last year, which had not been presented for payment at the close of the fiscal year, reduces the bonded indebtedness to \$2,704,500.

FINANCIAL STATEMENT.

FOR THE YEAR ENDING FEBRUARY 28TH, 1901.

Net proceeds from sale of Coal and net income from Steamships, Barges, Railroads, Stores & Real Estate, deducting renewals and extensions at mines during the year....		\$687,294 88
Less		
Interest on Bonds.....	\$167,670 00	
Dividend on preferred Stock.....	213,333 33	
Miscellaneous interest and premium on Bonds retired.....	47,348 16	
		<u>428,351 49</u>
Surplus of net income.....	\$258,943 39	
Add		
Preferred Stock Premium.....	100,000 00	
		<u>\$358,943 39</u>
Less		
Sinking Fund for 1900-1901.....	95,743 30	
Balance.....	\$263,200 09	
Disposed of as follows:		
Charged off:		
Wharves and Piers.....	\$21,296 35	
Sundry Improvements.....	5,162 06	
International Improvement, 1900.....	18,762 67	
S & L. Ry. Equipment.....	25,623 13	
Coal Cutting Machinery.....	17,002 56	
Machine Shop Equipment.....	16,172 13	
		<u>\$104,018 90</u>
Balance to General Surplus.....	159,181 19	
		<u>\$263,200 09</u>

BALANCE FEBRUARY 28TH, 1901.

Assets:		
Property account as follows:		
Amount as per last report.....	\$20,249,721 99	
Less credits during year.....	51,930 06	
		<u>\$20,197,791 93</u>
Add		
Real Estate purchased.....	\$ 35,958 52	
New dwellings erected.....	197,967 16	
New pier at Louisburg.....	25,268 61	
Opening new mines:		
Dominion No. 2.....	\$213,358 05	
" No. 3.....	55,401 13	
" No. 4.....	179,327 51	
		<u>448,086 69</u>
New conveyor at Louisburg.....	70,771 77	
New coal washing plant No. 2.....	\$22,048 72	
" " No. 3.....	40,032 91	
		<u>62,081 63</u>
New construction:		
Dominion No. 1.....	\$63,293 55	
Caledonia.....	49,302 25	
Reserve.....	40,673 92	
		<u>\$153,269 72</u>
New construction,		
S. & L. Ry.....	\$91,967 83	
New equipment,		
S. & L. Ry.....	50,000 00	
		<u>141,967 83</u>
		<u>1,135,371 93</u>
Cash in banks and offices.....	\$140,324 65	21,333,163 86
Accounts receivable.....	71,345 86	
Balance due from agents and coal on hand..	555,250 07	
New supplies in warehouses and stores.....	445,327 15	
Insurance suspense.....	4,498 73	
Interest suspense.....	11,511 34	
Steamship hire paid in advance.....	7,895 21	
Cash in New England Trust Co. for sinking fund.....	136,402 08	
		<u>1,372,555 09</u>
Total.....		<u>\$22,705,718 95</u>
Liabilities:		
Capital stock, common.....	\$15,000,000 00	
" " preferred.....	3,000,000 00	
First mortgage bonds.....	2,801,500 00	
		<u>\$20,801,500 00</u>
Accrued dividend, January and February.....	\$ 40,000 00	
Unpaid royalty, Jan. and Feb.....	87,616 62	
Accounts payable.....	78,758 59	
Notes payable.....	1,105,000 00	
		<u>1,311,375 21</u>
Surplus:		
Balance Feb. 28, 1900.....	\$433,662 55	
For year ending Feb. 28, 1901.....	159,181 19	
		<u>592,843 74</u>
Total.....		<u>22,705,718 95</u>

SINKING FUND MAY 1, 1901.

\$111,800 United States 4s, costing.....	\$124,817 62
Cash for retirement of Bonds.....	104,318 70
Cash under Article IV.....	1,012 35
	<u>230,148 67</u>
For	
Reserve Sinking Fund.....	\$125,000 00
Retirement of Bonds, etc.....	105,148 67
	<u>230,148 67</u>
Balance Reserve Sinking Fund.....	\$125,000 00

Boulder Mine.—The Ash Rapids Co., which is operating this mine, has decided to sink a further distance of 300 feet and to connect 400 feet to the "Stable" vein. The properties of this company have recently been examined by Prof. Chas. E. Van Barneveld, of the State University of Minnesota, consulting engineer of the company. Work will shortly be commenced on the Ash Rapids claim.

LEGAL.

The Sultana Ophir Litigation.

The Supreme Court of Canada at its last sittings gave judgment in a case which has attracted wide attention not only because of its special interest to those concerned in mining ventures, but as well on account of the important constitutional questions involved. We refer to the action brought by the Ontario Mining Company, Limited against Edward Seybold of Ottawa, E. B. Osler, M.P. of Toronto, J. W. Moyes, Manager of the Metropolitan Company, E. Johnston of Duluth, E. H. Ambrose of Hamilton, J. W. Brown and John S. Ewart, K.C. of Winnipeg.

The property in dispute consists of the greater portion of Sultana Island and is situate in what was formerly known as the disputed territory. The dispute between the Dominion Government and the Government of Ontario regarding the western boundary of the Province was decided by the Arbitrators in favor of the Province. The Dominion repudiated their award but the Judicial Committee of the Privy Council decided in favor of the boundaries determined by the arbitrators in 1884, and five years afterwards the Imperial Parliament passed an Act declaring the boundaries in accordance with the decision of the Privy Council.

While the territory was in dispute the Dominion authorities assuming that it belonged to them entered into a treaty with the Indians in 1873 by which the Indians ceded to the Dominion a large tract of territory including Sultana Island and the Dominion Officials in accordance with the provisions of the treaty proceeded to set apart a portion of the ceded lands as a reserve for the Indians and known as Indian Reserve 38 B. which was intended to include Sultana Island but this action was not formally approved by Order-in-Council.

In 1886 the Indians surrendered Sultana Island to the Dominion in trust for sale. In the face of the protest of Ontario that the territory in question belonged to her, the Dominion issued, in September, 1888, three different patents of mining locations on the Island to different parties, including the right to the minerals, precious and base, which patents were acquired by the Ontario Mining Company which was incorporated for the purpose of acquiring the whole of Sultana Island except that part belonging to the Sultana mine.

The Privy Council having decided in the St. Catharines Milling case that the territory in question belonged to Ontario these three patents were the only ones issued by the Dominion. The defendants made several prior applications to the Ontario Government for patents of the land in dispute and the Mining Company also subsequently made application to the Provincial authorities to confirm their Dominion patents. The matter was fully argued before the Hon. J. M. Gibson, Commissioner of Crown Lands, by the Hon. S. H. Blake, K.C. for the Ontario Mining Company, J. M. Clark, K.C. for Seybold, and by various other Counsel for the different claimants. The Commissioner decided that a two-thirds interest should be patented to the applicants other than the mining company and that the remaining one-third should go to the company on condition that they would accept it in satisfaction of all their claims. The company refused to accept the conditions or to abide by the decision of the Commissioner and upon patents being issued by the Province to the defendants of the interest awarded to them, the company in February, 1899, commenced an action to have it declared that under the Dominion Letters Patent they are entitled in fee simple to the lands comprised in such patents including the minerals and asking to have the Ontario Letters Patent to the defendants set aside. The Minister of Justice on account of the constitutional questions raised decided to intervene on behalf of the Dominion. The action was tried at Toronto before Sir John Boyd the Chancellor of Ontario.

Eminent Counsel were engaged on both sides. Mr. Christopher Robinson, K.C. led for the plaintiffs and Mr. J. M. Clark, K.C. for the defendants. Mr. G. F. Shepley, K. C. represented the Dominion.

On behalf of the plaintiffs it was argued that the Dominion had exclusive jurisdiction over Indians and lands reserved for them, and that under this authority and under the authority of the Indian Act, the treaty had been negotiated the reserves set apart, the territory in question surrendered and the patents issued and that therefore the Dominion patents were valid and effectual and the Ontario patents void. In support of this evidence was given to show that the Commissioners representing the Dominion at the time the treaty was negotiated, promised the Indians that

they would have the benefit of the minerals and that these were expressly granted to the plaintiffs by the Dominion patents.

On the other hand the defendants contended that the lands in question were the property of Ontario as was clearly established by the St. Catharines Milling Case, that the Commissioners had no authority to oust the vested rights of the Province, that their actions and promises to the Indians were ineffectual, that Indian reserves could not be set apart in Ontario without the consent of the Province, that the Province had never acquiesced in the creation of the reserve and that this land had never been validly included in the reserve, that even if this had been part of the reserve the surrender by the Indians enured to the benefit of Ontario and disencumbered the land of the Indian title so that the administrative jurisdiction and the right to grant patents were in the Province alone. They further contended that in any case the precious metals, the gold and silver, were always vested in the Province free from any claim on the part of the Indians. The Chancellor gave effect to the contentions of the defendants holding that the Dominion had no title whatever to the lands or the minerals, but that both were the property of Ontario. He declared the Dominion patents to be void and the Provincial Patents valid, having arrived at the conclusion that the legal effect of the surrender by the Indians was to leave the sole proprietary ownership of these lands in the Crown as represented by the Province of Ontario.

From this judgment the company appealed to the Divisional Court, which affirmed the Chancellor's judgment, but the Dominion Government acquiesced in the judgment of the Chancellor and did not join in the appeal.

The Ontario Mining Company again appealed to the Supreme Court of Canada which again affirmed the Chancellor's judgment.

North Star.

SHIPMENTS TO BE CURTAILED PENDING BETTER MARKET CONDITIONS.

The following is the text of the Directors' Report submitted at the second annual meeting of the North Star Mining Company held at Montreal on 26th instant, and covering the year ended 31st May last.

"The Directors are glad to be able to submit such a favorable statement of the company's operation during the past year. The property is in excellent running order, and the report of the company's manager (to which your attention is invited on the next page) makes it evident that the development work establishes the existence of large additional ore deposits, the contents of which are from their nature difficult to estimate. From the report of the manager your Directors feel confident that as there are large areas yet to explore, additional ore bodies will be discovered.

Although conditions in the mine are, as stated above, most satisfactory, yet your Directors deplore the extremely unsatisfactory conditions existing at the present time for the reduction and marketing of the company's ores. These have lately been aggravated by the low price of lead, but they are primarily due to the excessive charges for smelting, and the high rates of transportation, as a result of which 50 per cent. of the value of the ore is taken for freight and treatment. Owing to these conditions, and in view of the strong financial position of the company, it has been thought wise to curtail shipments, as the Directors believe that better markets can ultimately be obtained.

In conclusion, your Directors beg to ask your careful attention to the report of your manager, Mr. Frank Robbins, and to the financial statements of the company, both annexed hereto."

MANAGER'S REPORT.

During the year 2,141 feet of prospecting and development work have been driven. By means of this work we have discovered the extension of the original ore channel to the south. This is so recent a discovery that, at this time, it is impossible to estimate its extent or its importance. It is not my desire to raise your expectations with reference to this too high; but in justice to the shareholders, to whom I understand this report will be submitted, I cannot let its discovery go unannounced. As I continually have expressed in my weekly reports, I have always felt sanguine that the continuation of the ore deposits was to be found, and I regard this as a confirmation of my belief.

The only other development resulting from the prospecting (I may say that the major part of which has been in connection with this and the preceding) has been in Pit No. 16—500 feet (cir.) south-south-east (S.S.E.) of

the main, or 60 feet tunnel. Here we almost immediately encountered a new and separate channel or deposit of low grade mineral which we have been exploiting in anticipation of finding in connection therewith a body of shipping ore. So far this has not been accomplished, but the conditions are most promising. This, as I have said, being a new channel, the finding of shipping ore therein would be of the highest importance. It may be well to state that practically all the work done here is in mineralized rock. In places there are small quantities of really first-class shipping product, while in others there is a larger quantity of low grade ore easily susceptible of concentration into a good shipping product.

The average value of the ore, from the mine run of the past year, has been 22 oz. silver and 52 per cent. lead.

Before concluding this subject let me say that I have every confidence in the future of the mine; I firmly believe that not only will the present ore channels be found to yield a large quantity of ore in their extensions, but that the development work will disclose others quite as important and valuable.

The only surface improvement which was found necessary during the year was the erection of an ore bin at the upper terminal of the tramway. This has lessened the cost of loading the ore.

The tramway has been a perfect success and has required few if any repairs, beyond the ordinary care of keeping it in order. The most expensive part, the standing cable, shows practically no signs of wear, and the running cable has many months of life in it before it requires renewal.

The machinery and buildings are all in first-class condition, and the mine is in good working shape.

FINANCIAL STATEMENT.

For twelve months ending 31st May, 1901

ASSETS.

Mines, Mineral Claims and Assets.....	\$1,129,400 20	
Permanent Equipment.....	63,636 91	
Office Furniture.....	870 47	
Mine Supplies and Stores on hand, as per inventory.....	10,790 62	
Accounts Receivable.....	7,449 17	
Ore in Transit.....	\$ 13,206 25	
Cash on hand and in Banks.....	262,407 37	
" Deposited with Canadian Pacific Railway.....	9,345 04	
	<u>254,958 66</u>	
		<u>\$1,497,106 03</u>

LIABILITIES.

Capital Stock.....	\$1,500,000 00	
Less in Treasury.....	200,000 00	
	<u>\$1,300,000 00</u>	
Accounts Payable.....	1,309 52	
Dividend No. 5. Payable 15th June.....	39,000 00	
Profit and Loss.....	156,796 51	
		<u>\$1,497,106 03</u>

WORKING ACCOUNT.

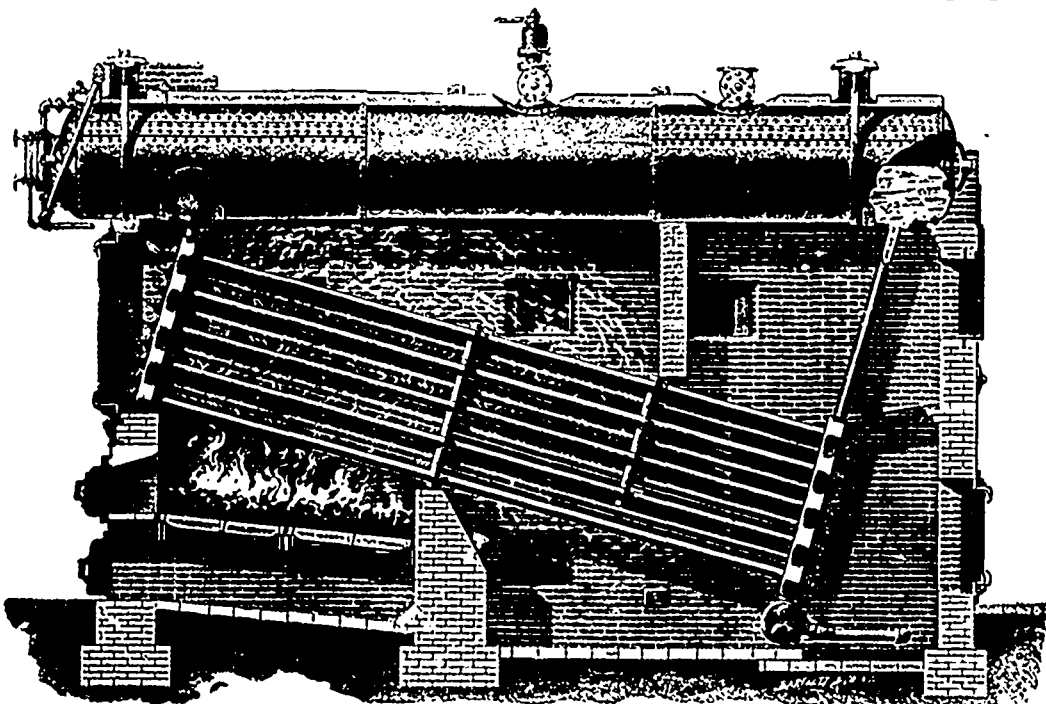
To Cost of Mining, Development and Prospecting.....	\$ 75,431 83	
" Freight and Treatment.....	354,324 27	
" Ore Tax.....	6,950 33	
" Tools and Appliances.....	221 32	
" General Expenses.....	726 05	
" Montreal Office Expenses.....	1,308 75	
" Directors' Fees.....	4,000 00	
	<u>\$442,962 53</u>	
" Balance Transferred to Profit and Loss.....	282,550 19	
		<u>\$ 725,512 74</u>
By Proceeds of Ore Sales.....	\$ 719,195 51	
" Miscellaneous Receipts.....	6,317 23	
		<u>\$ 725,512 74</u>

PROFIT AND LOSS.

To Dividends 2 to 5 inclusive.....	\$ 156,000 00	
" Balance.....	156,796 51	
		<u>\$ 312,796 51</u>
By Balance at Credit of Profit and Loss.....	\$ 30,216 32	
" " from Working Account.....	282,550 19	
		<u>\$ 312,796 51</u>

DREDGING FINE GOLD—A short description of the "mixing tank" system as operated successfully on a dredge is given in a recent issue of the *New Zealand Mining Record*. This method has been in use for many years with the best of results in Australia. It is used at Barrytown. The plant consists of a tank under a screen, about 20 feet long with two partitions commencing at both ends and inclined towards the centre forming a chute which carries the water, sand and coal. Having passed the screen from each end to the centre the material drops into the well or tank. The sides of the tank, near the bottom, being oval shaped causes a boiling and whirling motion in the water which mixes the water, sand and gold. At a given distance from the bottom, an overflow is arranged to draw off the mixture on to the tables. The paper closes with a discussion of the merits of some of the new dredges being built in Australia.

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These inventions have been the subject of a great number of patents and may now be looked upon as complete and well developed machines.

As a proof of the utility of this invention, 8,500 have been fitted up in England.

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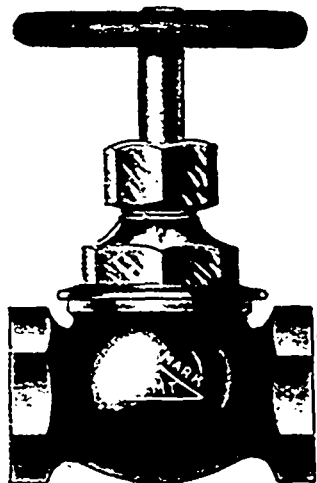
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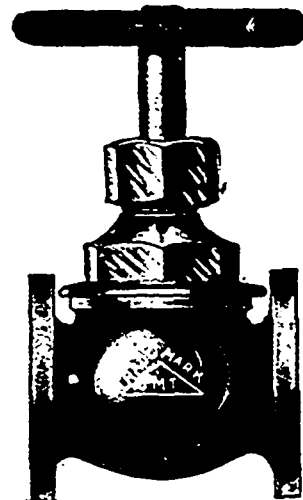
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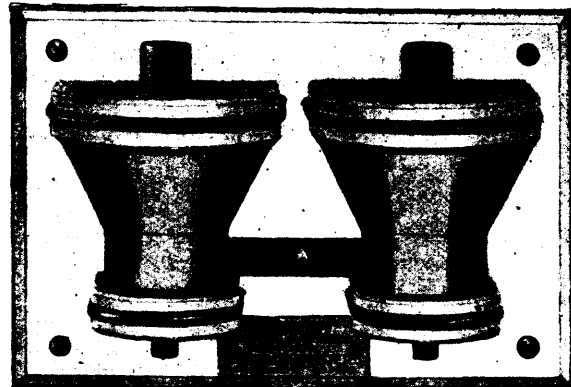
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THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the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

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe. The Canadian Pacific Railway runs through the entire mineral belt.

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

HONORABLE E. J. DAVIS,
Commissioner of Crown Lands,

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

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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 surveyed 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,
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GOLD AND SILVER.

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

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

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

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

MINES OTHER THAN GOLD AND SILVER.

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

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

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

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

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

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

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

THE HON. C. E. CHURCH,

Commissioner Public Works and Mines,

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Mr. S. M. ROBINS, Supt., New Vancouver Coal
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I take this opportunity of again expressing my appreciation of your carefully prepared and valuable work. I really do not know what we should do without it now, for one at once turns instinctively to it when seeking mining information of all kinds. In addition to the four copies ordered on enclosed slip, please forward one copy to the Secretary of the Company in London.

Dr. C. M. PERCY,
Wigan, England.

With this valuable book my readers are well in touch, and I need only repeat here what I have more than once written in this Journal, that for interesting and valuable information on Canadian mineral industries and resources, it could hardly be excelled. No person can know Industrial Canada without it; any one may understand Industrial Canada with it.

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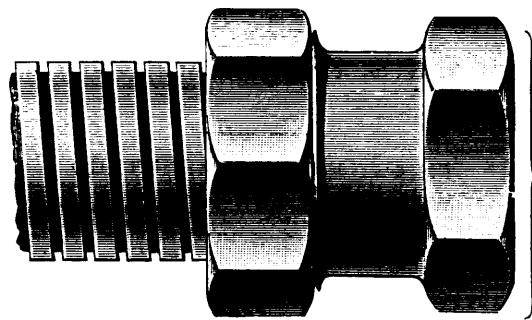
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THIS Hose is made entirely of metal; there is NO rubber in connection with it. It will therefore stand ANY pressure of steam. It is at the same time as flexible as rubber steam hose, and with proper care it will last many years.

This Hose is made in sizes from $\frac{1}{4}$ inch to 8 inches inclusive, and can be made to stand 2,000 (two thousand) pounds pressure to the square inch.

This Hose can be readily connected to Iron Pipe.



**Screwed for Standard
Iron Pipe Thread.**

We supply for this Hose the usual Rock Drill Hose Connections, or any other special connections which may be required.

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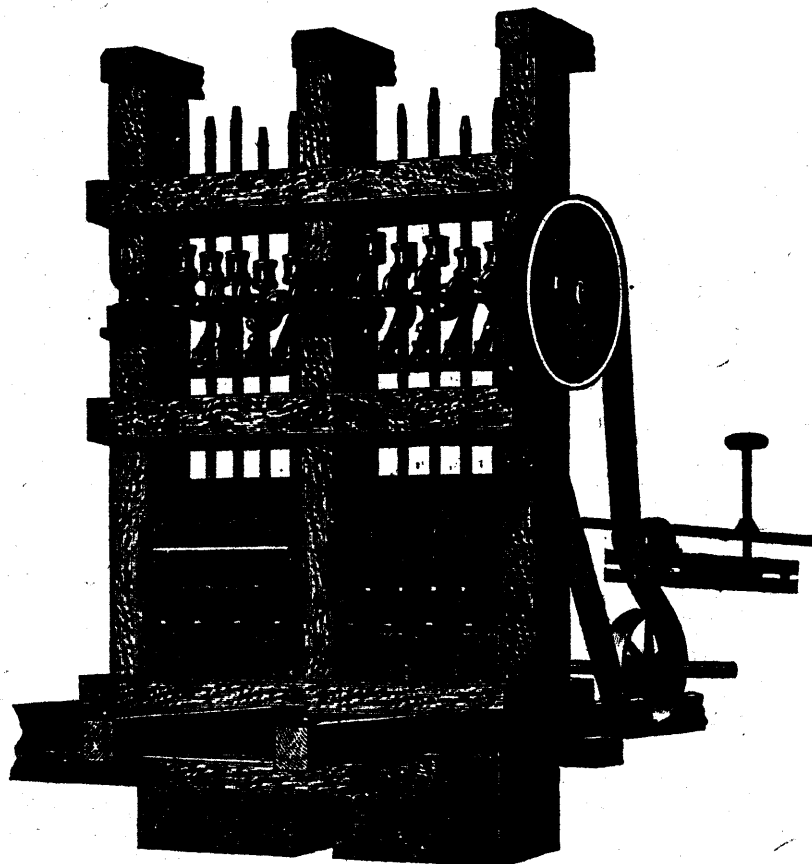
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