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1889.—OTTAWA, SEPTEMBER—1889.

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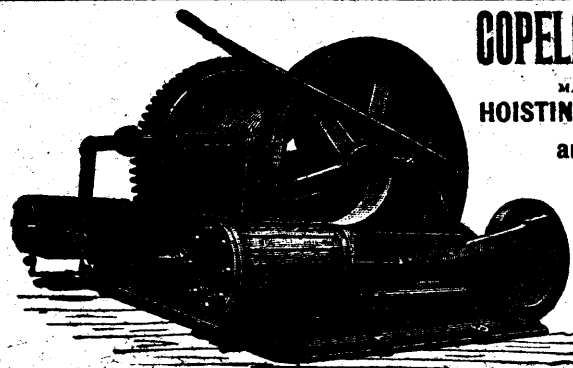
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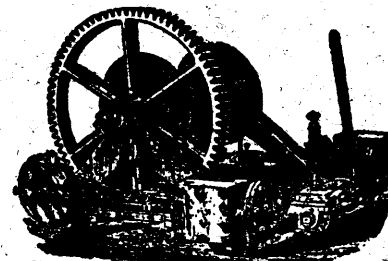
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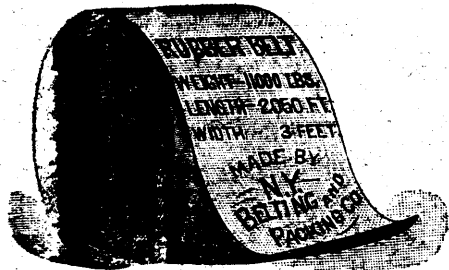
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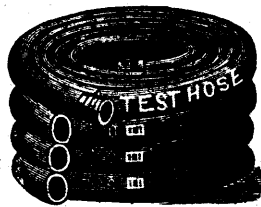


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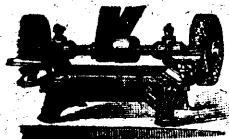
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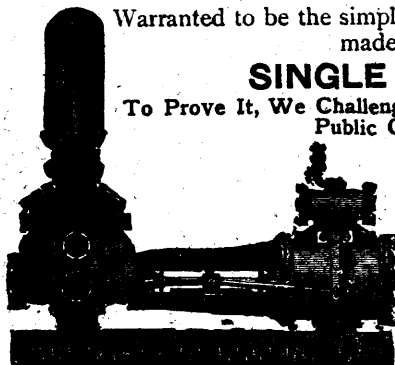
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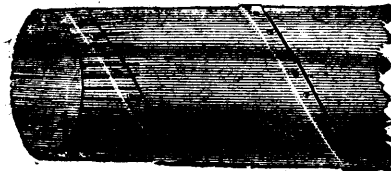
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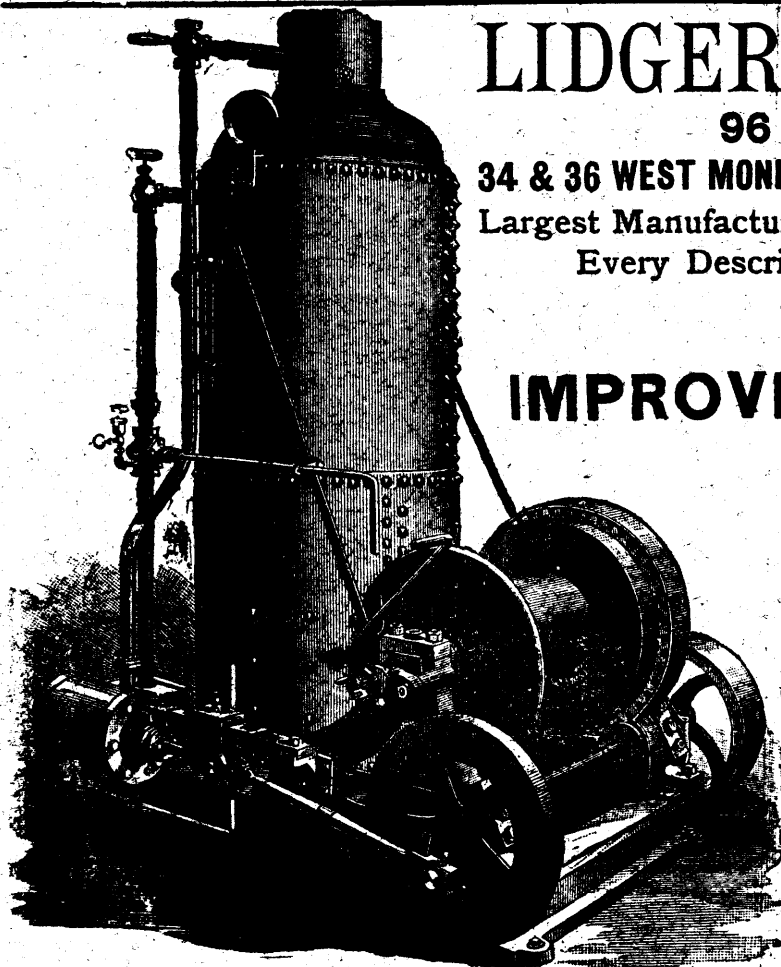
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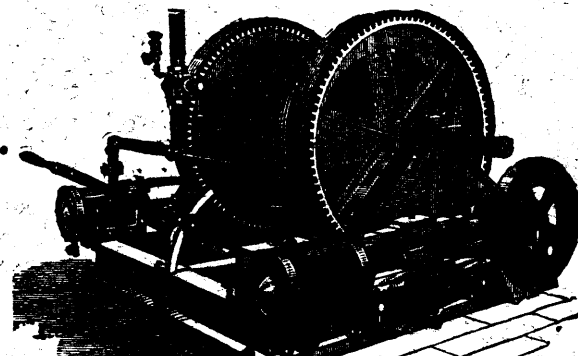
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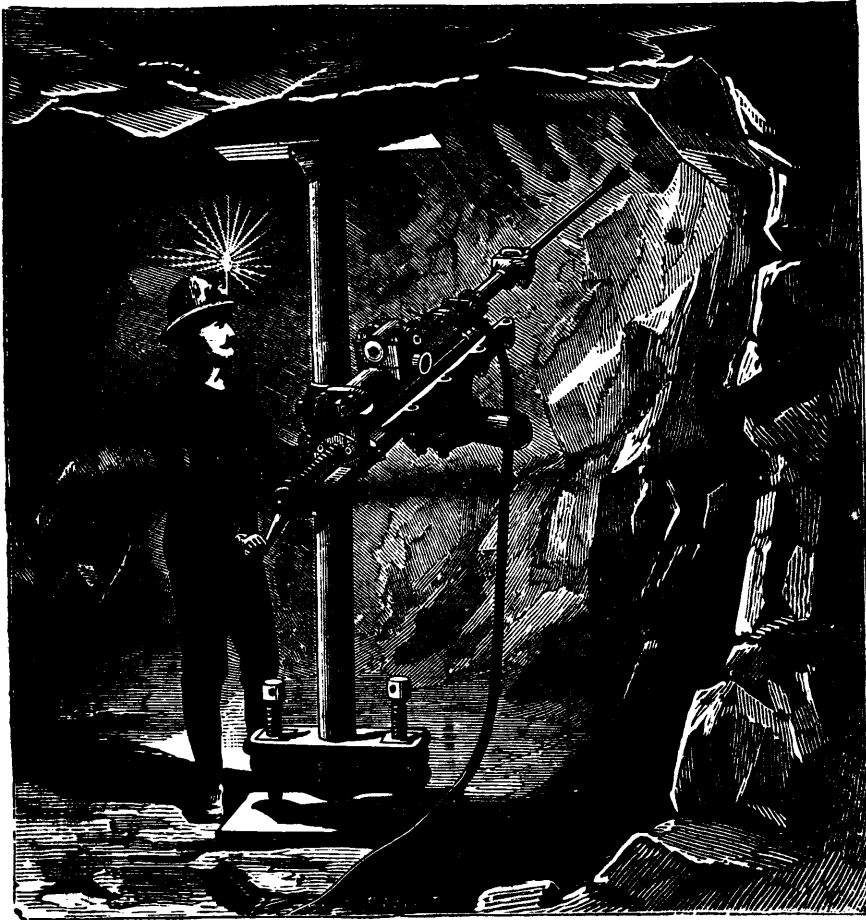
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ONTARIO

Mining Regulations.

The following summary of the principal provisions of the General Mining Act of the Province of Ontario is published for the information of those interested in mining matters in the Algoma District, and that part of the Nipissing District north of the Mattawan River, Lake Nipissing and French River.

Any person or persons may explore for mines or minerals on any Crown Lands surveyed or unsurveyed, not marked or staked out or occupied.

The price of all lands sold as mining locations or as lots in surveyed townships is two dollars per acre cash, the pine timber being reserved to the Crown. Patentees or those claiming under them may cut and use such trees as may be necessary for building, fencing or fuel, or for any other purpose essential to the working of mines.

Mining locations in unsurveyed territory shall be rectangular in shape, and the bearings of the outlines thereof shall be due north and south, and due east and west astronomically, and such locations shall be one of the following dimensions, viz: eighty chains in length by forty chains in width, containing 320 acres, or forty chains square, containing 160 acres, or forty chains in length by twenty chains in width, containing 80 acres.

All such locations must be surveyed by a Provincial Land Surveyor, and be connected with some known point or boundary at the cost of the applicant, who must file with application surveyor's plan, field notes and description of location applied for.

In all patents for mining locations a reservation of five per cent. of the acreage is made for roads.

Lands patented under the Mining Act are free from all royalties or duties in respect to any ores or minerals thereon, and no reservation or exception of any mineral is made in the patents.

Lands situated south of the Mattawan River, Lake Nipissing and French River are sold under the Mining Act at one dollar per acre cash.

Affidavits showing no adverse occupation, improvement or claim should accompany applications to purchase.

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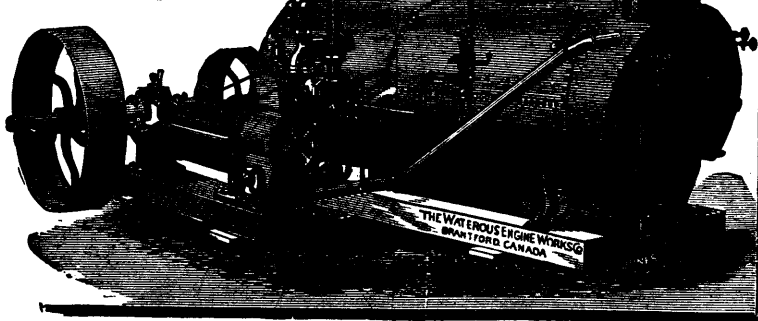
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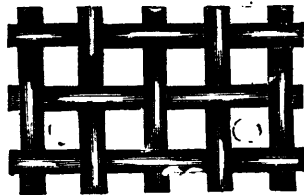
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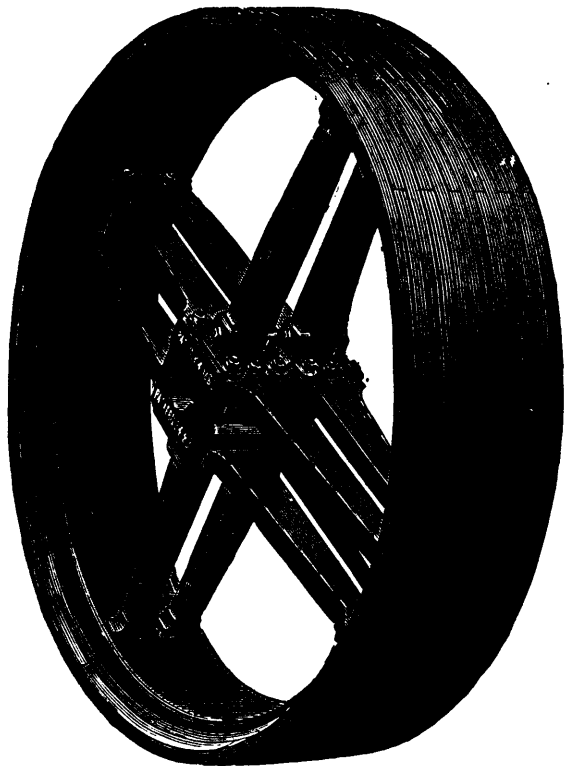
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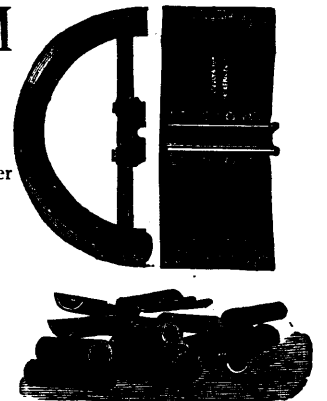
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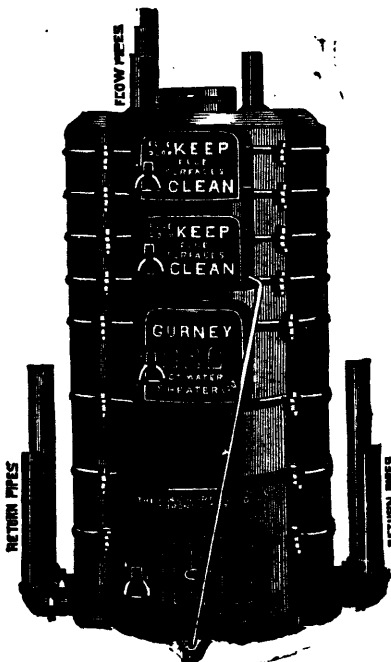
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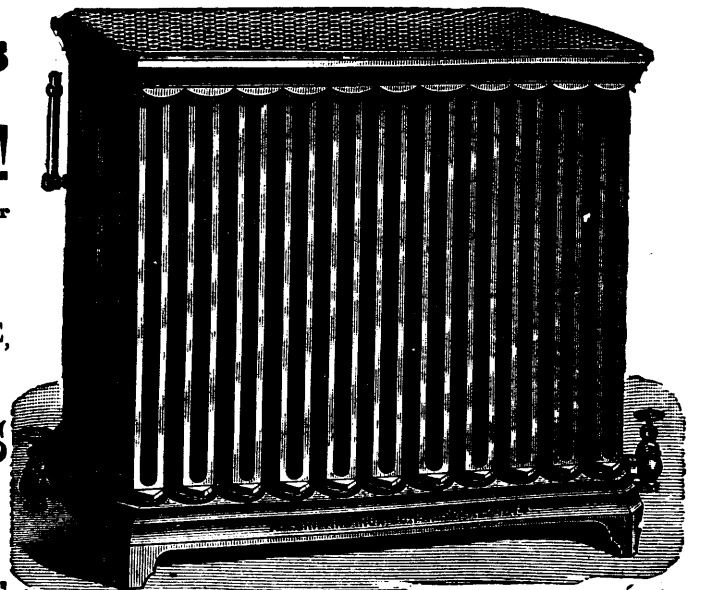
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A process has been patented in Germany for making fire-bricks by compressing in moulds an intimate mixture of 75 per cent. of asbestos and 25 per cent. of plastic refractory clay.

Rock Drills.—In a paper read by the Ritter von Rziha before the Austrian Society of Engineers and Architects, the various kinds of rock-drills are discussed. The author gives a detailed list of treatises in which descriptions of the various kinds of rock-drills have appeared. A number of the best known percussion machines are mentioned by the author, who observes that in Austria the Schram and the Ferroux drills are best known, whilst in Germany those of Frolich, Meyer, Jagar, and Schram are most frequently employed. The only important type of drills other than percussion ones is that of Brandt, which is just as frequently in use in Europe as is the percussion type, and hitherto both have been employed with almost equal success. In the Mansfeld district, both Brandt and Frolich drills have been employed for similar work, and for an equal amount of work done the cost has been about the same in both cases. The Brandt drills are preferable in cases where much water is met with, such as in sinking deep shafts and in cases where less power is available, since the power required for Brandt drills is only about 4-7 of that required for the Frolich percussion drill. Percussion drills are the most useful in long tunnels up to about 10,000 feet in length, where the compressed air escaping from the drill produces a sufficient ventilation. There are, the author states, four firms in Germany that undertake the driving of tunnels by rock-drills. They guarantee a progress of from 10 ft. to 11½ ft. a day in levels having a diameter of from 54 to 59 square feet, at a price of from £3 10s. to £4 12s. per foot, they providing the machinery; or at the rate of £1 10s. to £2 5s., if the necessary drills, etc., are found by the mine.

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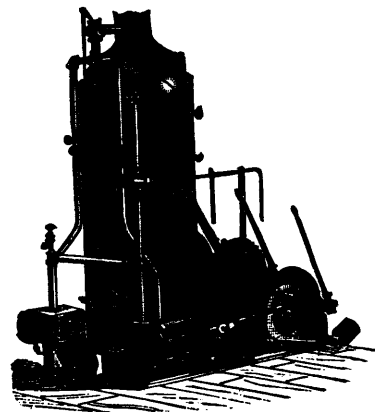
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The Canadian Mining Review

CONDUCTED BY **E. T. A. BELL**

OFFICES:

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OTTAWA.

Vol. VIII. SEPTEMBER, 1889. No. 9.

Tenure of Nova Scotia Mineral Lands.

II.

Under the Mines and Minerals Act provision was made for the surrender of any lease at the option of the lessee. The practical working of the system of forfeiture adopted by the Government of the Province, coupled with the permission to surrender, became a curious mixture of good and evil. There were many properties which had been worked, and abandoned through a dullness of trade, litigation, etc., and many had been acquired for speculative purposes. When forfeiture proceedings were initiated the owner generally surrendered his lease and took it up again. The result was that those properties only became released to parties desirous of working them when the original owners believed them valueless or were not aware of the initiation of the forfeiture process. In the case of a lessee who kept a watch over his property the applicant for forfeiture soon became tired of enriching the Provincial Treasury without being able to get possession of the coveted ground. However in many cases where capital had been expended, work, etc., performed, on a lease, and unavoidable causes had led to a more or less temporary suspension of mining operations, this power of surrender prevented unfair appropriations of valuable franchises.

Still it became evident that the best interests of the mining public were not served by this state of affairs, for it meant practically that in many districts large blocks of ground were retained by parties who could not afford the expense of an occasional surrender and release, and held their titles in the hope of benefiting by the discoveries of their working neighbours. The Government however for a number of years considered that as large amounts of capital had been invested and bona fide work performed, that it would not be equitable, even at the risk of encouraging a system of tenure for purely speculative purposes, to permit properties whose owners had been bona fide miners to have no protection from outsiders who desired to acquire at nominal rates more or less developed properties.

Finally, at the last session of the Provincial Legislature it was enacted that all future leases of gold mining areas should pay an annual rental in advance of fifty cents for each area of 150 by 250 feet contained in them, to be refunded if the labor required by law on the areas was performed. It was also settled that all future leases of minerals other than of gold and silver should pay an annual rental of thirty dollars for each square mile or part of a square

mile contained in them, to be refunded if the total amount of royalty paid in any year exceeded the rental. It was also agreed that the holders of any outstanding leases could come in and avail themselves of the provisions of the Act as respected rentals and their refund.

It must be admitted that the amount of rental charged is low, lower in all probability than would be conceded by a private individual, especially in the case of minerals other than of gold and silver, where it is, roughly speaking, about one half that charged in the other class of leases. The law, however it may work in practice, has been well received by the mining public, the investor being willing to pay a moderate rental, while it is no burden on the lessee who is working and paying his royalty. Under the former statute it has frequently happened that proposing investors were deterred by the possibility of forfeiture proceedings, and the interruption to title incident upon the surrender of a lease, while now the title becomes practically held under the safest of all conditions, an annual acknowledgement thereof on the part of the Crown.

In the absence of any discretionary power it becomes evident that the treatment of defaulting lessees is governed by fixed laws which inflict upon the legitimate miner who had done his best, and had worked faithfully but with ill-success, greater trouble than on the speculator who had risked only the fees necessary for acquiring title. The idea of a rental compromise was a happy endeavor to unite flexibility and tenacity of title. Under the United States law the acquisition of the absolute title by a fixed expenditure, has locked up many mines, and has deprived the mining industry of opportunities of benefiting by legislation; but there is an attraction about absolute ownership that is valuable in any attempt to secure title to mineral lands.

Under the conditions governing the revenue of the Province of Nova Scotia the problem of the best method of handling its mineral resources so as to benefit the miner and maintain the royalty returns is a difficult one. Practically speaking the mines royalty is the only elastic source of revenue, as the Dominion grant is virtually a fixed one. It therefore became necessary to retain the system of leasing in order that the source of revenue should not pass out of the hands of the Government, and to impose a rental to prevent speculative monopoly. The value of the royalty account may be learned from the following figures giving the gross revenue from 1880 to 1888:—

Year 1880.....	\$ 70,440.52
1881.....	101,705.35
1882.....	108,809.51
1883.....	121,970.64
1884.....	100,678.36
1885.....	119,229.37
1886.....	126,856.91
1887.....	148,773.79
1888.....	153,818.30

The cost of running the Department has been raised from \$6,000.00 to \$14,000.00, and in this expenditure is included large payments for schools of instruction for miners, begun under the auspices of the present administration.

The Province deserves commendation inasmuch that a steadily maintained policy has preserved to it most valuable mineral franchises yielding an important and increasing revenue, while at the same time all proper legislative assistance, security of title, and an impartial miner's court are conferred upon the lessees, instead of having to deplore the granting at nominal rates of mineral rights liable to any monopoly, and to the inevitable diminution of value arising from change of boundaries, unchecked and reckless working, and the interminable toils of land title.

Raw Phosphates.

The evidence for the use of the crude Canadian Apatite, finely pulverized, is constantly accumulating. Many cases are reported where its application as a fertilizer has produced marked results.

Its effect upon flowers is clearly established. The enterprising foreman of the Emerald mine, Capt. Henwood, has been accustomed to take the fine dust obtained in drilling holes in the phosphate and apply it to his flower beds, and he vouches for its benefit. Capt. Adams, of Montreal, has taken a great interest in this question and has widely distributed samples for tests. He states that in four different cases where raw phosphates was applied to pansy seeds in competition with some in identical soil without phosphate, the plants and flowers of the former were double the size of the latter and survived a winter out of doors while all the other plants perished. A similar advantage as to growth was obtained with carrot seeds. In an interview with him this week he informs us that he has seen great results this summer upon a farm in Maine, and has eaten string beans raised by Canadian phosphate three weeks ahead of the season. He allows us to publish the following testimonial:—

Blue Hill, Maine, July 27, 1889.

Capt. Robt. C. Adams,
Managing Director,
Anglo-Canadian Phosphate Co., Ltd., Montreal.

Dear Sir,—I have used the crude ground phosphate from your Battle Lake Mines upon portions of various crops, and in every case the benefit is apparent. Two adjoining plots were planted with beans, one with stable manure and one with raw phosphate and manure. The latter came up a week earlier and is now a fortnight ahead of the other. The visible difference is very marked.

Oats were planted in three sections:—1, without manure; 2, with Bradley's superphosphate; 3, with raw phosphate. No. 3 has yielded the tallest crop and heaviest grain, and is more developed every way. No. 2 was better than No. 1, but the improvement was not so great as between No. 2 and No. 3.

Potatoes were tried with raw phosphate and without any manure. In one field there was not much difference to be seen, but in another the raw phosphate produced the largest potatoes.

With peas the results were decidedly good. The rows treated with raw phosphate are more forward than those that received no dressing.

Experiments have been made upon grass, but the effect of the raw phosphate cannot yet be determined.

The results obtained are such as to satisfy my mind as to the fact that crude mineral phosphate is an effective and quick acting fertilizer, and in these cases has proved superior to the other substances tried.

I am, yours very truly,
(Signed), ERNEST R. DODGE.

We consider this topic of vast importance, as it means a reduction of from one-half to two-thirds in the cost of fertilizers to the farmer. It also permits the utilization of low grade phosphates heretofore valueless. The establishment of this theory, namely, that phosphate does not need to be treated with sulphuric acid in order to be made available for plant food, will be an inestimable boon to the agriculture of the world and will give a marvellous impulse to the phosphate industry of Canada. We shall welcome further evidence tending to the establishment of these ideas.

The Visit of the American Institute of Mining Engineers to Ottawa.

As already intimated in these columns, Canada is to be honored this year with the Autumn Meeting of the American Institute of Mining Engineers, which will be held at Ottawa during the week commencing Tuesday, 1st October, next. No better description of the growth and progress of this admirable institution can be given than that of Mr. Wm. B. Potter, E.M., St. Louis, who, in his Presidential address at the New York meeting, held in the beginning of the present year, said:—"The Institute is now fast approaching the year of its majority. More than eighteen years ago it came into existence in the town of Wilkesbarre Pa., and was welcomed as a long-desired heir, who should, in time, gather together and organize the scattered and neglected interests of the great estate of the profession, and be the means of adding new riches of knowledge to the store and new honor to the name, as well as benefitting mankind. The achievements of all these years have proved that the expectations were not in vain. The twenty-two who first assembled at Wilkesbarre to organize the Institute are, many of them, still with us; but their number has increased, until there are eighteen hundred and more. All parts of this continent are represented in the membership, as are the chief countries of Europe and South America and parts of Asia, Africa and Australia; and the list embraces the names of many who have been foremost in the achievements of all branches of the profession. The fifty-two meetings that have been held in the leading industrial and commercial centres of the land have been the means of extending the influence and reputation of our calling and promoting the influence of true science and sound practice. Not far from a thousand papers have been contributed upon subjects relating to the constitution and occurrence of nature's varied stores, as well as their exploitation, preparation and treatment to adapt them to the use and benefit of mankind. The sixteen volumes of published *Transactions* containing this lib-

eral contribution form a rich and useful store and furnish abundant proof of ability and zeal as well as faithfulness of members to the cause the Institute upholds."

A suggestion from the Canadian members to hold the Autumn meeting of the Institute at Ottawa having been very warmly received at the New York meeting, steps were at once taken to accomplish this end. A meeting was held in the office of the REVIEW early in March, which eventuated in a large and influential gathering of the citizens in the City Hall. Delegations to the Federal, Ontario and Quebec Governments were still further encouraged by grants of one thousand dollars from each to a fund for their reception. A formal invitation to the Council was sent and at once accepted. The following may briefly be stated to be the programme prepared by the committee for the occasion:—

Tuesday, (1st October)—Evening session.

Wednesday morning—Drive to the Chaudiere Lumber Mills and Factories, Experimental Farm, &c. Afternoon and evening sessions.

Thursday morning—Drive to Parliament and other public buildings, Geological Survey, Museum, &c. Afternoon and evening sessions.

Friday—Excursion by rail and river to the Lievres Phosphate mines.

Saturday—Excursion to the Canada Copper Co's mines and works, Sudbury, and on to the silver mines at Port Arthur.

Excursion to the Eastern Townships, visiting the Asbestos mines at Black Lake and Thetford, the Rockland Slate Quarries, the Dudswell Lime and Marble Works, &c.

The Buckingham excursion will leave Ottawa about 8.30 in the morning. At Buckingham village, steamers and scows sufficient to accommodate several hundred will be provided by the mine owners to convey the party up the Lievres. At the Little Rapids lunch will be served in a large marquee, and an opportunity given to visit the mines. As it will be impossible to see the larger mines, further up the river in time to return to the city on the same day, accommodation will be furnished at any of the mines to any of the engineers who may wish to remain over night.

At 1.50 Saturday afternoon a section of the Institute will leave for Sudbury and Port Arthur. Sunday and a part of Monday will be spent at Sudbury, where the mines and works of the Canadian Copper Co., the Dominion Mining Company etc., will be visited. At Port Arthur, the Mayor and Corporation will tender the distinguished visitors a public reception. Arrangements will also be made to allow them to visit and inspect the Beaver, Silver Mountain and other well known mines in the neighborhood. The whole trip will occupy a week or ten days, and will fully absorb the amount voted by the Ontario Government, *ie.*, one thousand dollars.

The excursion to the Eastern Townships will also leave Ottawa on Saturday, 5th October. The train is timed to reach Sherbrooke early on Monday where a Special will convey the party to the Asbestos mines at Black Lake and Thetford. At the latter point the mine owners and

managers will tender the visitors a lunch. At Sherbrooke, the Mayor and Corporation will give a reception in their honor on Tuesday. The new Rockland Slate Quarries, the Harvey Hill Copper Mines and other places of interest will in all likelihood be visited.

In all of these excursions transportation and Pullman facilities will be furnished without expense to the visitors.

The Sessions will be held in the large suite of rooms in the House of Commons, known as the Railway Committee Rooms. These all adjoin one another, and in one at least there is ample accommodation for two or three hundred at a sitting.

We are in a position to announce the following among other papers to be presented at the meeting:—

- "The Geological Relations of the Nova Scotia Minerals" E. Gilpin jr., Deputy Comr. of Mines, Halifax.
- "Notes on the Gold Mining Interests of Nova Scotia." John E. Hardman, M.E., Oldman, N.S.
- "The Canadian Phosphate Deposits." Dr. Robert Bell, Asst. Director, Geo. Survey.
- "The Silver Veins of the Port Arthur District." E. D. Ingall, M.E., A.R. S.M.
- "The Mining Interests of Eastern Quebec." Dr. R. W. Ells, Geological Survey of Canada.
- "A Reminiscence of Frieberg." Thos. Macfarlane, F.R.S.C., Ottawa.
- "The Possibilities of the Iron Manufacture at Ottawa." John Birkinbine, Editor *Iron Age.*, Philadelphia.
- "The Sudbury Copper Mines and Works." Dr. E. D. Peters, Jr., Sudbury.
- "Notes on Some Coals in Western Canada." W. Hamilton Merritt, M.E., Toronto.
- "Gold Quartz." W. M. Courtis, Detroit, Mich.
- "Remarks on the Metallurgy of Tellurides." Frank C. Smith, Ann Harbor, Mich.
- "Ventilation, Progress and Cost of the New Croton Aqueduct." J. P. Carson, Dobb's Ferry, N.Y.
- "Stamp Mills." John Hays Hammond, San Francisco, Cal.
- "The Wear of Rails as Related to Their Sections." P. H. Dudley, New York.
- "The Columbia Iron and Steel Works, Pittsburg, Pa." G. W. Maynard, New York.
- "The Huantla Mining District, State of Moralos, Mexico." G. W. Maynard, New York.
- "The Physical Properties of Aluminum, and a Comparison of it with Other Metals." W. J. Keep, Detroit, Mich.
- "Phosphorus in Cast Iron." W. J. Keep, Detroit, Mich.
- "The Davis-Colby Roasting-Kiln." S. G. Valentine, Lebanon, Pa.
- "Commercial Economy." Dr. R. W. Raymond, New York City.
- "Biographical Notice of William W. Scranton." Dr. R. W. Raymond, New York.
- "Canada's Great Geologist, Sir William Logan." Dr. Robert Bell, Ottawa.
- "Biographical Notice of George H. Cook." J. C. Smock, Albany, N. Y.

The date of the Meeting will, unfortunately, preclude the attendance of many of the professors of the American Mining Schools, since the opening of the school term requires them to be at their posts. A large number of members have just returned from a European trip of several months; some are still abroad; another considerable number attended the Colorado meeting in July, and these, with those who have just returned from the Toronto meeting of the American Association for the Advancement of

Science cannot get away again this year; and finally, Dr. Raymond informs us, there is a decided revival in business, blast furnaces are being blown in, contracts are under negotiation, and engagements are more important and imperative than usual. In spite of all these drawbacks it is gratifying to know that the attendance at the Ottawa meeting will still be large. Their coming to the Capital of the Dominion will increase the importance of Canada and Ottawa, not only to our neighbours but to the world generally. The reading and discussion of papers of practical interest to the profession cannot fail to be interesting and profitable to our mining men; the excursions will bring our mines and immense areas of undeveloped wealth into the prominent notice of those likely to invest or to influence the investment of money in them; to say nothing of the direct and immediate advantage to our city and the Country generally to be gained from the visit of such a large number of strangers with money to spend.

We join with the Canadian members—and we are sure with all in any way connected with our mining interests, in bidding a cordial welcome to Ottawa to the members of the Institute.

Practical Economy in Gold Mining.*

B. C. Wilson, President Gold Miners' Ass'n. of Nova Scotia

In working for coal, iron, or any of the baser metals it is understood that the operations must be carried on with system and economy, because they are subject to so much competition; but gold has no competitor in the market, does not vary in price, and being the monarch among metals "Feels not the wants that pinch the poor," and yet, perhaps, there is no branch of the mining industry where economy is so essential to success, and yet so neglected in practice as in gold mining, and this is applicable the world over, though here in Nova Scotia, where we are pronounced behind the age in so many things, I think in this particular of neglected economy we are quite to the fore. Not that I insinuate by any means that as a community we are exceptionally extravagant or wasteful, but it is the remark of visiting mining engineers that there has been work enough done on the mines in Nova Scotia, if properly and carefully applied, to have efficiently and profitably developed every mine in it, while in effect but little more has been done than merely prospect them, and demonstrate their remunerative character under the most expensive and unsystematic methods. But ages ago the Jewish sage placed it on record that "the destruction of the poor was his poverty," and to this cause the poverty of the early investors, and the apathy of the local capitalists, is to be attributed the very expensive yet inefficient working of our mines in the past; and yet it is also the strongest evidence which can be adduced of the remunerative character of the Nova Scotia gold mines, that in spite of the lack of means among the pioneers in the business, and the consequently enhanced expense of "the hand to mouth" operations where hand labor had to do what steam and mechanism should have been harnessed to, that yet the Government records from 1864 to 1884 show an average yearly return of \$660 to each man employed.

Of course they worked near the surface and creamed it, or more properly skimmed it, but

*Read at the September meeting of the Gold Miners' Association of Nova Scotia.

when seventy men at a cost of \$100 a day were employed to do the work of a ten horse power engine, as I have seen in actual practice for months, aye for years, at a time, I think the value of the mine and absence of economy are fully demonstrated.

Of course the day of such exceptional extravagance has passed, but there is much room for improvement the province over in the methods of working, in the concentration of interests, in the systemizing and division of labor, and in the introduction of improved labor-saving machinery all supplemented by experienced, intelligent management.

As capitalists and combinations of owners absorb the small holdings of the original owners, and works of greater magnitude are inaugurated, it follows that the field for economy or extravagance is proportionally enlarged. And foremost among the difficulties, the competent and progressive manager will be confronted with, will be the prejudices of the operative miner to any innovation in the method of working the mine or reducing the ores as compared with what they have been accustomed to, for though our Nova Scotia miners compare very favorably in intelligence and ability with any in the world, yet they do not take kindly to what departs from their heretofore practice, or to any system which reduces the number of workmen, or increases the results of their labor, considering it inimical to their interests, forgetting that reduced cost of production or increased results from the ore, proportionally enlarges the field and demand for labor. But to their credit, I must testify they are open to conviction and accept the situation if it is fully demonstrated and illustrated, but the manager has got to take the initiative and do this. The men will never do it.

The concentration of machinery and power about a central shaft, or distributing point, instead of independent powers at a number of shafts on one lode or to a series of lodes, as compared with the early practice of separate hoisting and pumping from a number of shafts on one lode, or from an adjoining, perhaps not twenty feet away is a long step towards economy, and once established, there is no danger of retrogression.

OVERHAND STOPPING.

This system also tends to inaugurate a different method of working: notably from underhand to overhand stopping. I am far from advocating overhand work in every instance, but unquestionably it is the proper and by far the most economical in a great many cases. Of course it involves the original outlay for shafts and levels in advance of any return, and this is why it has never been popular with our miners; they had to get returns every month and so the underhand system became established.

Under the tribute system which prevailed in our mines for so many years, (and a most pernicious system it was) the larger lodes of low grade ore were avoided owing to the fact that the crusher in taking toll of three to four dollars per ton left but little for the miner. He preferred a narrower lode of richer ore and did not mind working a month for a ton of ore if it gave a return of two ounces. It is only within the last year or two that the larger veins have attracted attention or been considered valuable. These larger veins offer facilities for economy in mining by the introduction of power drills actuated by steam, compressed air, or electricity. There has been some prejudice against those drills, but once introduced I have every confidence they will retain their foothold. An important drawback at the present time is the limited number of men in the country who are

familiar with their use, but time and demand will remedy this. The schoolmaster is abroad in mining and we need not fear for the results.

Many of our lodes can be worked to advantage with power drills, but there are many others where the local conditions are not favorable, particularly where the vein is very thin or the lines of cleavage admit but very narrow working space, or a soft gouge admits removal with very little explosive. In such places there are chances for a revelation in economy in the one man process, that is, each man to hold and strike his own drill. I know there is a decided prejudice among our miners to this method. They are not educated to it and have an idea that it imposes more labor, which however is a fallacy.

In the early days of mining here, when the only experienced miners were from Cornwall, they all preferred to work that way, and when under contract always would do so, but "cousin John" when hired by the day was not slow to adapt himself to "the Yankee ways," and a "soft thing" as he termed it. I have in mind several lodes, now idle, some of which have been profitably worked in this way in the old powder days, and could be made more remunerative by the same method now with dynamite, and I confidently look to a revival of this process with satisfactory results. Given a vein when the conditions apply, and an importation of half a dozen Cornish miners accustomed to this mode of working and the whole lump will soon be leavened. It only requires some one to take the initiative.

BLASTING.

Associated with drilling comes blasting. It has always been the custom, is largely so yet, for each man or set of men to drill and blast their own holes; the latter at such time as suited their own convenience regardless of how many men were driven from their work, nor did the men care either, the mine paid for it all. That such a system is a relic of the past, is expensive, unsystematic, and should become obsolete goes without argument.

If as some argue the operations are so limited that this is the best way of doing, I can only say in reply, "Sell out to some one who can work it on broader principles." That many cases will occur, notably in the preliminary work incident to properly fitting up a mine, where it will be necessary to blast at unreasonable hours, I admit, but it does not follow that nearly all the blasting may not be done at times when the men are out of the mine as at change of shifts and meal hours, and that all the holes be loaded and fired by one man specially detailed for that purpose, and where practicable that simultaneous firing by battery be adopted. I have paid for knowing that there is a grand chance for economy in this operation of blasting. And just here I have been met with the assertion that men under contract cannot afford to be placed under such restrictions, and also if the contractor sees fit to use more explosive than necessary or to hustle his men out as he pleases whose business is it? he pays for it. Just so, but the mine has to pay it all in the end. And this brings up the contract question, whether it is the proper method at all or not. That depends.

In many cases contracts can be given with advantage to both mine and men, but I believe not generally so. To come to the pith of the question: Is it not a fact patent to all that a man or a number of men will not take a contract, at least not continue it, unless they can make more than day's pay, and is it not equally patent that they do not work harder under contract than by days' work, and does not every experienced manager know of the trimming and

combining, and nursing of a good contract so as not to make it pay *too well*? And the mine pays for it all.

And again brain is an important element to successful mining as well as brawn. It is fully conceded that many contractors bring more brain to the work than their employers,—sometimes. But contracts are given out indiscriminately, and likely as not to a man who has not sufficient executive ability to run a wheelbarrow. Their short-comings have to be paid for, and paid at both ends too. First to make good their discrepancies, and next, in the enhanced prices which it is necessary to pay their shrewder competitors, who are not slow to take advantage of these opportunities thrown in their way. And the mine pays for it all! I believe in general principles there is no better system than efficient working managers over men, and operatives hired by the day, and paid in cash every month, or, better still, every week.

I know that the contract system has the *prestige* of government precedent, and the glamour of competition to soothe the owner and satisfy criticism, and also affords opportunity for much more elegant leisure on the part of the manager, foreman, and other non-combatants, to use a military term.

CRUSHING.

That there is ample room for economy in crushing the ore I think no one will dispute. During the "tribute" days the price charged for crushing, three to five dollars per ton, acted as an incubus upon mining interests and development. And yet I have known mills charging \$2.75 per ton which did not make enough at that price to meet their bills. And it was considered a marvel of success when another mill made an average of \$1.08 on six months' running, but this made no provision for cost or depreciation. But in the light of the fact that there are mills running in America to day on ore which yields less than \$1.00 per ton, the cost for crushing alone in Nova Scotia does not look encouraging.

The ore-breaker is beginning to supplant the process of hand breaking with hammers, and the automatic feeder is also coming to the front. But if every mill owner in the Province who has these improvements would hold up his hand, would there be a show of half a score?

Of course the cost of crushing is materially enhanced by the limited capacity of the mills, and the further fact that the small lots crushed necessitates cleaning up very frequently. And an initiatory step towards reducing the cost, be the mill large or small, is to keep the mill continuously supplied with ore. Taking things as we now find them. For instance with steam power it usually takes three men to run a ten stamp mill. Now if fifty stamps were used the three men could run it still; while the concentration of power and fuel would be quite a saving. And I have no doubt that a properly equipped and operated mill could crush quartz for 50 cents a ton, presuming, of course, that fifty to one hundred tons a day are treated. And there are plenty of properties here capable of furnishing that amount and keeping it up for years; but I have yet to learn of one mine producing fifty tons per day. However I have confidence that in the very near future we shall have mines producing that, or double it.

Artificial light has to be used in a mine. What electricity will do for us is a problem the future will solve for us. It is being introduced and may become the light of the future; in the meantime candles and oil have to fill the demand. Which of these is the best is a matter of opinion among the respective advocates.

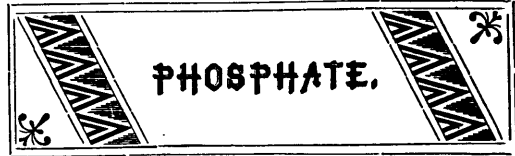
Lighting is one of the little expenses which combine to swell the bills, and sometimes very considerably. I can call to mind an instance where a miner with an eye to economy fattened two fine porkers from the ends and broken candles bailed up with the water, and picked out of the quartz! Neglect on the part of the overseers, you will say, and very truly; but the mine paid for it all. It only goes to prove what an omnipresent individual the manager of a mine needs to be to stop those thousand and one leaks.

The economizing of fuel in mines worked by steam is a matter generally receiving special attention and affords the best guarantee of improvement in the future.

In short, while it is not advisable to economize a dollar at the expense of two to save it, it certainly is consistent to make economy an important element of the management, and to bear in mind that the matter is one over which the mine manager holds sovereign control. On him devolves the duty and authority of so systemizing the work that the greatest remunerative results are obtainable; to see that the mechanical appliances are efficient; that the workmen are prompt to duty; that the drilling, blasting, and in fact all work is managed by the department, and not by the men; that shifting of rock and other unskilled labor is apportioned to the rank and file of the pay roll and not to the skilled operative, whose duties are of a higher order, and consequently involve higher wages; that there is no intentional or unintentional neglect or carelessness of the men as regards care of tools, lighting, fuel or any property of the mine; to see that there is no piling back on scaffolds, or dumping ore under foot because it is easier to do so than pass it to the surface (an outcome of the contract system); that the transport of ore from mine to mill is done with due regard to expense as well as security against pilfering or even unintentional loss; that the ore-breaker and automatic feeder are substituted for the pernicious and expensive hand process.

To keep a sharp eye upon the use of cyanide or acids either in the mortars, upon the plates, or in cleaning the gold, and prohibit the throwing away of any resultant liquors, and to restrict, or better still, abolish the use of the magnet in cleaning up or panning out, and see that no accumulations of iron from the stamps, heavy pyrites, old crucibles, slags, etc., are allowed to be thrown away or carried away; and particularly that the floor of the mill is either perfectly water tight or of sand which can be taken up occasionally and passed through the mill. For gold and quicksilver will elude the most careful manipulator. And need I mention it? To see that his men are paid promptly *whether the mill is cleaned up or not*, for the moment men find their pay is behind the specified time they take alarm and set back in harness, work with a half-hearted energy which the foreman is powerless to overcome. It is an important economy to keep your men paid promptly.

The purloining of gold by persons around the mine hardly comes under the head of economies but is none the less important to success, and one which the manager will find it necessary in practice, if he doesn't consider it judicious to establish, in principle. To reverse the time-honored English precedent and in a measure, at least, believe every man guilty until he has proved innocent. If this expression may seem to reflect too severely on the moral standard of mining humanity I have only to remark that it is not every mine which can afford to lose \$25,000 to \$50,000 a year in this way, and I can name more than one in the Province which has suffered to that extent.



In General.

Mr. Hutcheson, of the Anglo-Continental Guano Company (late Ohlendorffs) accompanied by Mr. P. Würzemberger, M.E., Antwerp, are now visiting the mines, and making a full investigation into our phosphates with a view to securing supplies for the immense requirements of their large fertilizing business. The visit of capitalists of such high status is a very hopeful sign of the commercial future for our Canadian phosphate trade.

Ocean Shipments.

The following is a statement of the phosphate shipments from the Port of Montreal to date, unreported since our last issue.

Date.	Vessel.	Destination.	Shipper.	Tons.
Aug. 17	S.S. Gleniffer	Liverpool	Millar & Co.	250
" 17	" Ocean King	London	Lomer, Rohr & Co.	50
" 28	" Toronto	Liverpool	Millar & Co.	425
" 30	" Gerona	London	Lomer, Rohr & Co.	392
" 30	" Osiris	Grimsby	" "	200
" 31	Bk. Eidsiva	Cardiff	" "	100
" 31	S.S. Concordia	Glasgow	Wilson & Green.	407
Sept. 7	" Angers	London	Lomer, Rohr & Co.	150
" 7	" Harbinger	Glasgow	" "	200
" 12	" Haverton	London	" "	168
" 14	" Canopus	Liverpool	Wilson & Green.	384
" 15	" Erl King	London	Lomer, Rohr & Co.	150
" 17	" Smeaton Tower	" "	Wilson & Green.	200
" 20	" Alcides	Glasgow	Lomer, Rohr & Co.	250
Total				3326

Lomer, Rohr & Co. 1660 Tons.
Wilson & Green. 991 "
Millar & Co. 675 "

Total 3326

RECAPITULATION.

London 1110 Tons.
Liverpool 1059 "
Glasgow 857 "
Grimsby 200 "
Cardiff 100 "

Total 3326

Shipments.

Notwithstanding the scarcity of ocean freights and the difficulties of transportation on the Lievres, it is confidently expected that the shipments for the present year will be fully up to 25,000 tons.

Through the courtesy of Col. Lay, the new U. S. Consul-General at Ottawa, we are in a position to state that the shipments of ground phosphate from the Ottawa Valley to points in the United States, for the fiscal year ended 31st June last, were of a value of \$24,584.62—or 2,458½ tons at \$10 per ton.

The value of ground phosphate exported from Ottawa County mines to the United States for quarter ended this month is \$7,760, or 776 tons at \$10 per ton. These are the largest shipments from Ottawa County reported for any quarter during recent years.

Markets.

Markets are firm with an upward tendency. Sales have been made lately at the following quotations: 500 tons 75 to 80% at 1/ per unit, rising; and 10½d for 70% rising. The outlook for Canadian phosphate is certainly encouraging.

Ocean Freights.

Freights continue to be scarce. The following may be quoted: Liverpool, scarce @ 7/6, London from 9 to 10/, Hamburg about 14/ to 15/, Glasgow 6/6.

Kingston District.

The output from the Foxton mine from 1st May to 1st September figures 900 tons, averaging 82 per cent., together with a considerable quantity of uncobbed phosphates. The vein is now reported to be 64 feet in length by 8 feet in width, consisting of pure phosphate unmixed with rock. The above mentioned 900 tons were mined and cobbled by about 18 men. The mine is improving as the work progresses. Five hundred tons have already been shipped from Kingston.

Perth District.

Very cheering reports continue to be received from the pits of the Anglo-Canadian Phosphate Company at Bobbs Lake. Particular mention is made of one of the pits which shows a vein 50 feet long, and from 3 to 4 feet wide, of solid phosphate. From this pit, four men have taken out 73 tons in four weeks. The company were unlucky enough to have 325 tons on the unfortunate s.s. Montreal which stranded lately off Belle Isle.

Templeton District.

Dr. Robert Bell, Assistant Director of the Geological Survey, paid a visit this month at the Blackburn mines. He reports that a great deal of prospecting has lately been done on the virgin lots adjoining the main workings, and that all the openings show large bodies of rich ore that will amply repay further development. More powerful machinery has been put in at the old pits and many improvements all round are being carried out. These operations have naturally interfered with the output, but hauling has lately been resumed.

Du Lievre District.

At the North Star mines new machinery is being put in place and a large output continues to be maintained. It is thought that the total product for the year will be close upon 8,000 tons.

Operations at High Rock go on much as usual. All the pits are now looking exceedingly well. 384 tons from this mine were on the S.S. Canopus which took fire on her outward voyage on 22nd inst. At time of writing it is not known how much, if any, of the cargo is damaged.

Mr. C. C. Hoyer Millar, of Messrs. Couper, Millar & Co., London, is at present on a visit to the mines of the Canadian Phosphate Company in which he is very largely interested. Mr. Millar states that all the pits look exceedingly well, and that a large quantity of phosphate is being mined and shipped.

The Squaw Hill property adjoining the Emerald, and owned by Mr. A. F. McIntyre, is reported to be looking better than ever. All the shows give abundant evidence of pay ore.

The crushing plant at Lomer's Mill is running full time. The management have in hand permanent orders for the whole production right through the winter. To date about 800 tons of ground phosphate from the mill have been exported this season to United States.

Measurement of Earth-Pressure in Mines.—In the mine at Stasfurt, belonging to the Pruvian Government, the following contrivance has been adopted to measure the vertical change caused by the thrust of the strata. Wooden plugs, each a yard in length, are driven into the floor and roof. On to these plugs two

iron tubes are screwed. The tubes do not meet, but a guide-pin attached to the lower one slides up and down within the upper one. At the side of the tubes a vertical board is fixed in such a way as not to touch the roof or floor. Two metal frames are fixed to the board, so that their ends are in close proximity to the tubes. At the back of these frames is the centre of a lever, the shorter arm of which is connected with one of the tubes, whilst the longer arm serves as a pointer that is free to move over a scale divided into centimetres on the board. The pointer is adjusted to zero, and the depression of the roof and the rise in the floor are indicated by the movements of the pointer.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

The Londonderry Iron Company, whose works are near Londonderry, N. S., will pay out in wages to their workmen this season \$252,000. They will also pay the Intercolonial railway \$100,000 for freight charges.

The Steel Works, New Glasgow, are credited with making one of the largest castings ever made in Canada. It weighs 35 tons.

Killag.

Work in this district has been steadily pushed this summer by Mr. Geo. W. Stuart. The difficulties of prospecting here, owing to the swampy character of the surface, are unusually great. The surface is 31 feet deep, the first six feet consisting of black turf and mud, and the remaining twenty five of large boulders and quicksand. Early in the summer a pumping and hoisting gear was set up near the centre of the swamp, and a shaft has been pushed down fifteen feet into solid rock. From the bottom of this shaft a cross-cut to the north is driving. The tunnel is now in over forty feet, and the management expect to cut the rich lode, so long looked for, in about sixty feet more. It is interesting to note that the black turf cut through in the surface, when piled up and dried, proved to be a peat of excellent quality. Mr. Stuart has tried some of it under the boiler and reports that one fire, with closed doors, sufficed to keep up the steam whilst pumping and hoisting for two hours. Killag is blessed with plenty of good fuel in the shape of big hardwood, but this experience of Mr. Stuart's may prove of far more value than appears at first sight.

Gold Mining Supplies.

The principal depot in Nova Scotia, carrying the most complete assortment of first class goods, is

H. H. FULLER & CO'S,

41 to 45 Upper Water St., Halifax, N.S.

Our line comprises Explosives, Fuse, American and English Mill and Hammer Steel, Bar and Bolt Iron, Steel Wire Hoisting Rope, Hemp and Manilla Rope, Rubber and Leather Belting, Miners' Candles, Oils and Lamps, Miners' Tools, Machinists' Tools, Blacksmiths' Tools, and every requisite for the gold miner.

H. H. FULLER & CO.,
Halifax, N.S.

Rawdon District.

Mr. Eugene Conrady has been appointed to the management of the Rawdon United Mines, and the British and Colonial Land Association Limited, of Mt. Uniacke, taking the place of Mr. John Nicholls.

Westfield.

The big swell of quartz, locally known as the "Jumbo" lode is not being worked now. Several reasons therefor are mentioned, but the principal one seems to be a lack of free gold.

Chezsetcook.

The drainage of Lake Catcha by the Oxford Gold Mining Co. has opened to prospecting a large territory hitherto inaccessible. The management has already cut thirty different lodes, and are now working on two lodes, each said to be about twelve inches thick. One lode shows gold freely, and is estimated good for thirty dollars per ton.

Beaver Dam.

The new owners of this property are working quietly, but steadily. The shaft is now down fifty six feet and is to be sunk to a depth of 120 feet. The belt is said to be forty feet in width, of which thirty feet, at least, is crushing material.

The ore obtained from the shaft in sinking, averaged nine dollars per ton. It is the intention of the management to have ten stamps running before Christmas, and to add more stamps as fast as the development warrants.

Malaga.

The Parker Douglas Co. is working steadily and keeping five stamps running. The Malaga Co. keep an average of about eight stamps running. But little information is accessible regarding this district, the returns to the Mines Office for the first six months of the year show an average yield of sixteen dwts. to the ton.

Cochrane Hill.

Mr. Ferd. Dietzsch, representative of the English syndicate, working at this mine for a year past, left on the 30th August. The mine is idle and has reverted to the hands of its former owners. The history of this property for the past twelve months has been illustrative of the folly of sending out English experts to manage small gold mining enterprises in this country. Unfamiliarity with the metallurgy of gold and extravagant business habits would ruin many richer mines than this.

Montague.

Quite a force of men are at work in this district. During the past six months of the year the average yield was \$33 per ton. Many very handsome and rich pockets have been found during the summer.

Central Rawdon.

The sale of the Gould-Northup mine at this place to a Pennsylvania syndicate has been announced. The property embraces nearly 45 acres. Mr. Chas. E. Willis, Manager of the Neptune Gold Mining Co., has also assumed the management of this company.

Sherbrooke.

This district reports a rich find on property lately owned by Mr. Hattie, now owned by Robt. McNaughton. The rumour is not denied by Mr. McNaughton. In other respects the district is very quiet, not more than half a dozen men being at work.

Caribou.

The Heatherington property in this district has recently been purchased by a new corporation known as the Truro Gold Mining Co. Amongst the names of the syndicate are those of some of the solid men of Truro. Work has already been started and will be vigorously pushed.

Wine Harbour.

The property here, under management of Mr. H. T. Harding, is doing well. 160 ozs. of gold were obtained last month. Some changes are to be made in the machinery plant which will increase the hoisting capacity.

Isaacs Harbour.

The output of the Palgrave Co. was considerably reduced last month owing to a breakage in the pumping gear, which occasioned a loss of eight days in the pit.

A valuable discovery of anthracite coal has been made at Cheticamp, Cape Breton, and on trial is said to have proved of excellent quality. One hundred barrels have been sent to England for analysis, and if it turns out as expected the mine will be at once developed to its fullest extent.

Quebec.

Very encouraging reports come from the New Rockland Slate Quarries. A very good quality of slate is being quarried from a productive bench at a depth of some 200 feet. A little over 16,000 squares have been taken out and made marketable since the beginning of the present year. About 200 men are now employed under Superintendent Williams. A heavy cave-in occurred recently which will delay operations for a few weeks.

The Anglo-Canadian Asbestos Company at Black Lake are quarrying an excellent quality of asbestos. During August, 103 tons were taken out, with an average of 40 men and boys. Mr. R. T. Hopper contemplates putting in an improved plant at an early date.

At the property of the American Asbestos Company, in the same district, work is going ahead very satisfactorily. There are between 100 and 120 men at work. Mr. Ed. Wertheim is working very systematically, and all openings look well.

Appropos of the scarcity of labor in the asbestos districts, a prominent mine owner writes: "Help has been very scarce in this district lately, many of the men having left the quarries for the farming districts, where, for the time being, they can earn a little more money. This is a common complaint at all the mines, and the output of asbestos is being very much hindered thereby. 150 to 200 men at least would find ready employment at the mines in this district alone. Perhaps you can do something to induce good strong men and boys to move to Megantic county. Living is cheap; comfortable houses are provided by the various companies at very reasonable terms; work is continuous summer and winter; and the place is contiguous to railway and post office. We should all prefer to have men who would stick to their places, and not wish to do farming and mining at the same time. This moving about does not pay them, for they lose time and money travelling, and very often their work at the mine, when otherwise they would have constant work at advancing wages. No skilled miners are required, as with us, nearly all drilling and hoisting is done with machinery, and the work consists in simply picking up the asbestos after the blasts, and in shifting the refuse rock on the derrick, boxes and lorries, while the boys do cobbing and cleaning." We gladly give space to the above in the hope that any of our miners who may suffer from irregular employment may be induced to make a change for the better.

The demand for Canadian asbestos continues to be strong. We are informed that sales have lately been made at the following advance on former quotations: 1st quality, \$125 to \$130; 2nd quality, \$75 to \$80; 3rd quality, \$35 to \$40; waste at \$15 per ton, 2,000 lbs, at mines.

The Thetford mines were lately visited by Mr. John Bell, his son Mr. Herbert Bell, and others very heavily interested in the Bell's Asbestos Co. (Ld.) The party were greatly pleased with the appearance, output, and systematic management of the properties. A strong endeavor this year is being made to produce 2,000 tons. With a view to doubling the capacity of the pits, and in order to meet the enormous requirements of their business, it is understood that additional machinery will shortly be added to the extensive plant now in operation. The Bell's Company have, we hear, been awarded a large contract for asbestos supplies to the British navy.

A rather bad land-slide occurred, a few days ago, at the King property, which will seriously interfere with their operations for some time at least. Fortunately the cave-in occurred during the night, when no one was at work, otherwise a deplorable calamity, involving the loss of many valuable lives, must surely have taken place. Vigorous measures were at once taken to clear away the debris, and it is hoped that the output from the big pit will be resumed at an early date. The very nature of the ground in these Serpentine areas renders it liable to these accidents, particularly during the rainy season, and great care should be taken in the workings to avoid the possibility of their occurrence. Eagerness to produce large outputs should on no account be permitted to involve any possible risk to the safety of the men.

Mr. Wm. King continues to meet with encouraging results in the prospecting of his areas in the S. E. corner of the Township of Ireland. A number of very promising veins have been uncovered.

Work continues as usual at the Ross-Ward pits.

About 300 tons, of good quality, have been taken from the Frechette mine, to 31st August.

During the month a vein of unusually good length of fibre was uncovered at the Johnstone pit.

Complaints continue to be received regarding the non-appearance of the new government map recently prepared by Dr. R. W. Ells. It seems a great pity that a work of so much value and importance to the mining interests of the Eastern townships, should be so dilatory in publication and distribution. Much of the usefulness of the work of the Survey is often marred by the inexplicable delays which occur in the production of its Reports and Maps. Mining men are greatly disappointed that this map has not been placed in their hands before now.

We have noticed in one or two of the local papers a statement to the effect that the Harvey Hill mines had been closed down; this is not so. It is true that after the collapse in the copper market the mines were closed down until a decision was arrived at in England with regard to the treatment of the ore which had previously

been shipped in its crude state. Owing to the drop in the price of copper it was not deemed advisable to ship the ore in that condition until the smelting works had been put up, and work was consequently suspended. The mines are now working with a complement of from 50 to 60 hands, and the smelter is expected to be turning out matte in a few days. We are pleased to learn that recent openings have brought to light some new veins which promise to yield good returns. A visitor, who has just returned from the mines, informs us that there are very good prospects of this old and somewhat unfortunate property turning out a paying concern after all.

The owner of the South Ham antimony mine has commenced development work. The openings made are reported to look well.

The Graphite City Plumbago Mill, near Buckingham is now working. The new machinery and substantial buildings recently erected are very highly spoken of.

Through the courtesy of Mr. S. P. Franchot we have been favored with some beautiful samples of pottery ware, manufactured from the Villeneuve felspar, by Messrs. Oliphant & Co., Delaware Pottery Works, Trenton, N.J. About 52 per cent. of the Villeneuve spar is utilised in these manufactures. Mr. Franchot contradicts the rumour that the Villeneuve mine has changed hands.

Notice of application for incorporation is given by the Coleraine Mining Company. The capital stock of the concern will be \$600,000 in 6000 shares of one hundred dollars. The names in full and address and calling of each of the applicants are, the Hon. J. Chapleau, Ottawa, A. DeJardins, banker, L. DeMartigny, banker, Hon. A. Lacoste, advocate and Queen's Counsel, Dame Delphine Justine Dansereau, widow of the late the Honourable Louis Adelard Senecal, in his lifetime one of Her Majesty's Senators for Canada, all of the City of Montreal; the first four of whom are to be the provisional directors.

Ontario.**Sudbury District.**

Our special correspondent, writing from Sudbury under date of 20th Sept., says:—

A traveller passing our quiet town by the C.P.R. would have no idea of the extent of the mining and smelting operations going on in various directions within a few miles of Sudbury. Notwithstanding this want of bustle at the town itself, the fact is that there is great activity in bona fide mining, and a large amount of money is being spent in the vicinity. The Canadian Copper Company is employing more men than ever on the three mines it is working at present, namely, the Stobie, the Copper Cliff and the Evans. It has other rich mines ready to work as soon as the demands of its furnaces require the ore. The new smelter went into operation on the 4th inst., and, like the first, it gives the utmost satisfaction. The two furnaces smelt about 300 tons of roasted ore daily. At the beginning of the month some ten train loads or about 750 tons of rich matte awaited shipment, and about 300 tons have been added since. The matte now averages 50 per cent. of metal—30 per cent. copper and 20 per cent. silver. The earlier shipments averaged only about 25 and 15 per cent. respectively.

One of the most promising features in connection with mining in this part of the country is the interest which is being taken in it by the Vivians, the great copper and nickel men of Swansea, Wales. They have had a large force of men under Mr. Merry of their own establishment at work all summer on the Murray mine, 3½ miles north-west of this place on the main line of the C.P.R. The developments so far made appear to be satisfactory, and there is every probability that this extensive and influential firm, who were the first to prove the commercial value of the metal nickel many years ago, will establish a branch near Sudbury.

Work has been renewed on the rich copper deposit in Denison, about twenty miles from here, belonging to the Vermilion Mining Company, and it is said the Harwood mine will be reopened also. The C. P. R. Co. is extending the Stobie branch to the Dominion Mineral Company's mine and employing over 300 men on the work.

All these operations, in spite of the very low price of copper, speak volumes for the richness and other advantages of our mines, and furnish the best answer to the scientific croakers in your city who encouraged (?) us with predictions of failure at every step from the beginning.

We were lately honored by a visit from the Geological Section of the American Association for the Advancement of Science, who came here at the close of the Toronto meeting. The party included Professors Hitchcock, Hovey, Wright, Broadhead, Alexander, Winchell, Claypole, Morley, Drs. Lawson and Green, Messrs. H. Winchell, State Geologist of Minnesota, and other eminent geologists. A correspondent of the New York Tribune accompanied the excursionists. On arriving at Sudbury they were met and welcomed by Dr. E. D. Peters, the celebrated metallurgist, who is at present general manager for the C. C. Co., and taken by rail to the various mines, the roast yards and smelters. While at the Stobie mine, a blast consisting of eight 10-foot holes charged with dynamite was fired by electricity and threw down a splendid mass of pure ore which was variously estimated to contain the enormous amount of from 300 to 500 tons. Some of your Ottawa men, who might at one time have acquired this mine for a song, would have been ready to "kick themselves" at the sight. One of the objects of the party was to visit our Huronian rocks, and the following day they were conducted to the most interesting exposures along the main line of the C.P.R. under the guidance of Dr. Bell, Assistant Director of the Geological Survey, who has been working in this district for the last two years.

Besides the C. C. Co., other companies are operating extensively. The Dominion Mineral Company, largely composed of Canadian Pacific Railway men, is developing one of its properties 4½ miles north-east of the town. This mine was bought from Messrs. Pinard & Ducharme, and is turning out well. Some 300 men are employed. Mr. George Attwood, from England, is manager, and Mr. Ferguson assistant manager of this company.

Port Arthur District.

The chief event of late has been the visit of the Governor-General to the silver mines. Accompanied by Lady Stanley and suite he made a careful inspection of the various levels of the Beaver mine and noted the workings of the im-

proved machinery for extracting silver from the ore at the Badger mine. And from each of these mines the party were given magnificent specimens of the bronzed ore obtained. His Excellency expressed his delight at the great success attending the working of the mines and promised his hearty co-operation in any measures calculated to assist in developing a region more valuable than were it entirely of the richest agricultural character.

The advent of the American Institute of Mining Engineers to this district is hailed with pleasure. An inspection of the resources of this country by such an eminent and influential body who will see practically for themselves the mines, mills, developments, deposits, etc., will probably do more to bring us before the favourable notice of the public than all the cheap advertisements of people either directly interested in the mines themselves or who have raved about matters they imperfectly understood.

An engine, train of cars, and about twenty miles of rails for the new railway into the mining region is now on its way here, and the details of location, construction, etc., are being rapidly got into shape.

The silver mines are steadily and satisfactorily producing ore, some of which at great cost is still being shipped to England, Denver, New York, etc.

Large quantities of iron lands are still being sought after, chiefly by Americans and some of the low priced discoveries in silver are also changing hands at advanced figures.

In General.

The Sarnia Oil Company's pipe line is now at work conveying crude oil from the Petrolea district to the works in Sarnia, Ont. With the facilities of bringing in their supply of crude, the Sarnia Company is now in a position to go on steadily and regularly with the manufacture of their Northern Light brand of oil, claimed to be the best Canadian product on the market.

Statement of Silver Exported to United States from Port Arthur for six months ended 30th June last.

1889.	SILVER ORE.		BULLION.		TOTAL.
	Tons	\$	Oz. Tr'y	\$	
January.....	1	1,050	.....	.....	\$1,050
February.....	18	25,200	3,900	3,900	29,100
March.....	.....	.....	.....	.....	.....
April.....	.....	.....	1,293	1,293	1,293
May.....	.....	.....	.....	.....	.....
June.....	12	15,000	.....	.....	15,000
Total.....	31	41,250	5,193	5,193	\$46,443

The World's Consumption of Charcoal.—According to Professor Winkler, the world's production of charcoal amounts to 360,000,000 tons annually, a quantity of charcoal equal in heating power to 1,640,000,000 cubic yards of newly felled pine wood. For this 2,600,000,000 pine trees, eighty years old, must have been cut, and must have occupied an area of 10,400 square miles. In a forest worked systematically, for this an area of 812,000 square miles would be necessary, an area four times that of the German empire.

Notes on the Ore Deposit of the Treadwell Mine.

(By Geo. M. Dawson, D.S., F.G.S.)

The Treadwell mine, situated on Douglas island, Alaska, is a somewhat remarkable ore-deposit, and has of late years become prominent as a producer of gold. I am not aware that any systematic description of the character of this deposit has yet been published, and this circumstance may render the following notes on its mode of occurrence of interest, while the microscopical examination of the gold-producing rock by Mr. F. D. Areams, throws further light on the character of the deposit. My examination of the mine itself was made, by the kind permission of Mr. Treadwell, while I was on my way back from the Yukon district in the autumn of 1887.

Attention was first drawn to this deposit by the discovery of gold-placers, which were worked for several years previous to the finding of the ore, and in a few cases were found to pay well. The gold of the placers was fine, but rough and unworn in character. The placers occurred on the surface of the ore mass itself and on the rather steep slopes running down from its outcrop to the shore, and must have been produced by the natural decay of the ore subsequent to the glacial period, as they were found to lie above the boulder-clay, which fills many of the hollows and rests directly on the rock wherever it occurs. It may be noted here in passing, that Mr. Treadwell informed me that barnacles and various marine shells had been found still adhering to the surface of the rock, in places from which the clay had been excavated, up to a height of 150 feet above the present sea-level.

The ore-mass, which has been extensively exposed by stripping and proved as well by several drifts, has a thickness of about 400 feet. Its length, or at least the length of that part of it which will pay for working, is not accurately ascertained but must be considerable. It runs in a general northwesterly direction parallel to the shore of the eastern side of Douglas island and is bounded to the northeast and southwest by dark, rather than slaty argillites, which, from analogy with similar rocks which I have examined on the coast of British Columbia, to the southward, may very probably be of Triassic age and referable to the Vancouver series of the reports of the geological survey of Canada.* On the northeast side, in the immediate vicinity of the Treadwell mine, the ore-mass is bounded by a zone about seventy feet in thickness of greenish schistose slate, but it is uncertain whether this zone owes its character to peculiar alteration, or to a difference in original composition, as the slaty rock as a whole do not show any marked degree of alteration in the vicinity of the ore. A 'slate' horse more or less completely silicified is passed through in one place in the main working drift, but its character as a portion of the country rock is still clearly apparent. The argillites or slaty rock are often found to be flexed and tinted at high angles along this part of the coast, and it is probable that the main period of elevation of the coast ranges has been subsequent to that of their deposition.

The ore itself presents none of the characters of that of an ordinary lode or vein, being without any parallel banding or arrangement of its constituent minerals, and showing no such coarse crystalline structure as a lode of larger dimensions might be expected to exhibit. It is, on the contrary, a nearly homogenous crystalline mass, of medium grain, and pale grey in

*See Annual Report Geo. Sur., Can., 1886, p. 10 B.

colour, evidently consisting principally of quartz and white feldspar with a little calcite, and specked throughout with small cubical crystals of iron pyrites. The quartz, however, as well as the calcite and pyrites, may occasionally be found traversing the mass in small irregular veinlets and stringers, and the pyrites in some instances forms little distinct aggregations or luncches.

A clue to the true nature and origin of this deposit (otherwise of a somewhat similar enigmatical character), appears to be afforded by the existence in it, in some places, of kernels of a distinctly granitoid appearance. Some of these were observed to be six inches in diameter, and portions of others were found which may have had a diameter of several feet. The material of these kernels—which around their edges blend imperceptibly with the main mass,—is similar in size of grain to that of the ore-mass itself, but includes little or no pyrites. It is harder and less evidently decomposed, often greenish in tint from the development in it of chloritic minerals or reddish, and microscopically examined, shows two feldspars with some quartz. In general aspect it in fact resembles the varieties of fine grained granite which are frequently met with near the junction of an ordinary granite with other older rocks through which it has broken.

The impression formed from such examination of this remarkable deposit as I was able to make is, in fact, that it represents the upper portion, or "feather edge" of a granite intrusion, probably contemporaneous and connected with the characteristic granites of the neighboring Coast Ranges, but which, owing to peculiar conditions, has become decomposed and silicified by solfataric or hydrothermal action, to which the concentration of gold in it and the deposition of pyrites, are also due. To what extent the presence of gold may depend on the occurrence of the adjacent slaty argillites, (elsewhere known to contain auriferous quartz-veins) it is impossible to say, but it appears not improbable that the deeper portions of these rocks may, under the action of such heated solvent waters, have afforded both the gold and the pyrites. It is conceivable that the hydrothermal action which has affected this part of the original granitic magna may have been due to the water included by the mass itself while in a state of "acqueo-igneous" or "granitic" fusion, the escape of such water through the substance of the upper part of the upper part of the intrusive mass being rendered possible by the relief from pressure consequent on the approach of the intrusion to the actual surface. It may, however, perhaps with greater probability, be supposed that the water included in the adjacent sedimentary deposits, became vaporized by the heat of the intrusive mass, and found its way to the surface in the form of steam through the substance of that mass. It will be noticed that Mr. Adams finds evidence in the microscopical character of the rock of much crushing and fracture, so that in any case it must have afforded a convenient channel for the passage of heated waters or steam, and this appears to have been one of the more important circumstances leading to its mineralization.

The slaty rocks themselves in the vicinity of the ore-deposit are traversed by numerous small veins of quartz; and at the distance of a few miles (on the mainland opposite Douglas island in "Silver Bow Basin") similar rocks are found to be cut by quartz-veins of greater width, which holds visible gold. The association of metalliferous quartz-veins with masses of granite or other intrusive rocks traversing sedimen-

tary deposits is a fact of general observation. Had the higher portions of the rocks, which may at one time have completely covered this particular granitoid intrusion, remained, it might be anticipated that it would be found to pass upward into one or more ordinary auriferous quartz-veins, these filling fissures through which the heated waters ultimately reached the then surface. In depth the present ore mass should be found, on the other hand, to pass gradually into ordinary unaltered granite. Many cases of course occur in which intrusive masses have led to the formation of metalliferous deposits of an intermediate character, such as the one here naturally exposed by subsequent processes of denudation appears to be. This deposit therefore affords an interesting example of the manner in which intrusive masses may directly give rise to ordinary metalliferous veins.

The quantity of gold contained in the ore of the Treadwell mine is small. Though not informed as to the actual yield, I believe it to be on the average less than \$10 to the ton. The ore is, however, easily and cheaply obtained by work resembling quarrying rather than mining, and can in consequence be profitably worked on a large scale. It is not intended here to enter into particulars as to the mode of working, but it may be stated that at the time of my visit 120 stamps were constantly employed, and that since that date this has been increased to 240, the quantity of ore milled daily being now reported at from 500 to 600 tons. A considerable proportion of the gold is "free" and this is saved on amalgamated plates. The remainder is contained in the iron pyrites, which is separated by Frue Vanners. The pyrites was then formerly roasted in revolving cylinders, but these were being replaced at the time of my visit by continuous automatic furnaces similar to those employed in sulphuric acid works. The gold is dissolved from the roasted product by chlorine gas, and precipitated by sulphate of iron.

As the geological conditions are very similar along the west coast all the way from Lynn canal to the strait of Fuca, it appears highly probable that other deposits of a similar character to that here described remain to be discovered. With the facts developed in connection with this mine in view it would appear to be well worth while to subject to examination and assay all pyritous and granitoid rocks in contact with or penetrating the sedimentary formations, and in particular those which may be found to traverse the slaty argillites of the formation above referred to as the Vancouver series.

Meeting of the British Columbia Smelting Company.

An extraordinary general meeting of the shareholders of the British Columbia Smelting Company was held during the month in London, Mr. W. J. Steele in the chair, to consider the present position of the company.

The chairman, after regretting the unavoidable absence of Mr. Birkin (one of their directors) and Mr. Tullis (the secretary), said it devolved upon him to read the notice convening the meeting, which he proceeded to do. Continuing, he said it would, no doubt, be in their recollection that on March 20th they held a private meeting of the principal shareholders, to lay before them the state of the company's affairs up to that date. At that meeting the directors gave them all the information in their power, and the shareholders unanimously resolved on the dismissal from the service of the company of Mr. George de Woolf, Mr. Dowling

and Mr. Davis. On the same day the board telegraphed to Vancouver to shut down the works and mine and discharge the men, except the local secretary, appointing only caretakers; and that was what was done as the result of the meeting of shareholders. Since that date every care had been taken of their property and machinery, which was thoroughly protected from the weather. It was also at the time considered necessary to obtain without delay an expert's report on the position of affairs; and on the recommendation of one of the large shareholders of the company, to whom he was personally known, the board authorised Mr. Judkins, of Leadville, Colorado, to proceed to Vancouver to report on the smelter and the mine and the prospects of the company, and desiring him to give any recommendations or suggestions he thought fit. Mr. Judkin's report was a very lengthy document and very exhaustive. The chairman then read a summary of the report, which referred to the general condition of the property, and pointed out that some £40,000 to £60,000 more capital was required to fully develop the mine and place the smelting operations on a sound footing. The directors had many anxious consultations on this report, and they thought it useless to try to raise the amount by a reconstruction of the company. They had had accounts made up, including the accounts from Vancouver, as far as that could be done. The figures were made up to about the end of May, since when very little had been done. The total amount of capital paid up was £23,580, and the amount they had on overdraft at Vancouver no doubt amounted to £7,400. That showed £30,980 funds entrusted to the company, which, he might tell them, had all, or nearly all, been spent. He then referred to the expenditure, pointing out that under the general charges were £358 for London expenses. Salaries and wages in British Columbia amounted to £6,496. Under the head of general charges was £1,000 paid to Mr. George de Woolf under an agreement between himself and Mr. Vautin, by which he received £1,000 when he left to take up the management of the property. Mr. Judkins' report had cost them about £250. The smelter had cost them £3,455, and other items made up the balance. They had 31½ acres of land which had a water frontage, and went back to the south of the Canadian Pacific Railway; five acres were on the north side of the line, and 38½ on the south side. This land was becoming very valuable. That on the north side of the railway was valued at 2,000 dols. per acre. The corporation of Vancouver were to make a street through a part of the land south of the line, which would make the land very much more valuable. Believing implicitly in the rapid and wonderful prosperity of Vancouver, he should say that almost any land in the city or adjoining it would become of very great value. A letter was read from Mr. Birkin, one of the directors, expressed the opinion that the failure of the company was due to Mr. Vautin having been entirely misled as to the value of the mines, and to his appointing Mr. G. de Woolf as manager while the local board had no control. Mr. Birkin thought there were only two courses open to them—to raise the money *pro rata* to pay off the mortgage, and then to wind up the company or sell it, or to take Mr. Judkins' advice and raise £60,000 capital; but he did not recommend this course. The chairman then went on to refer to an action brought by Mr. G. de Woolf for wrongful dismissal and money due, which action was now *sub judice*.

A long discussion ensued, in the course of

which the chairman stated that the mortgage to the Bank of British Columbia falls due on the 10th inst. Ultimately it was decided to request the bank to extend the date, and the meeting was adjourned until the end of October. The report of Mr. Judkins and the statement of accounts in the meantime to be printed and circulated.

On the Microscopical Character of the Ore of the Treadwell Mine, Alaska.

(By Frank D. Adams, late of the Geological Survey of Canada.)

The material employed in this examination consisted of several small specimens kindly placed at my disposal by Dr. Geo. M. Dawson, who collected them at the Treadwell mine in 1887, together with two collected by R. G. McConnell, of this survey, who visited the mine when returning from the Yukon country last autumn. The ore is more or less altered granite, rather coarse in grain and of a light grey color. As mentioned by Dr. Dawson in the previous paper it encloses "kernels" often greenish in color and distinctly granitoid in appearance, having a diameter of from six inches to several feet. These are of the same grain as the rest of the mass, but are harder and less evidently decomposed, and pass rather sharply but imperceptibly into the ordinary grey granite. As these represent the granite in its least altered form they will be described first.

The Kernels.—One of the hand specimens shows a portion of one of these "kernels" which is seen to differ from the ordinary granite in two particulars: 1st, in being light reddish color instead of grey; 2nd, in being free from quartz veins and holding but little pyrite. When a thin section is held up against a dark background it is seen to be made up of numerous rather large translucent crystals or individuals closely packed together, but separated by narrow, transparent, intermediate lines. Under the microscope these translucent crystals are seen to be feldspar a good deal decomposed (which accounts for the opacity) while the intervening spaces are found to be in part grains of quartz or of broken feldspar and in part the edges of feldspar crystals, which are often much freer from decomposition products than their central portions.

Most of the feldspar is untwinned, and is referred to orthoclase. A much smaller amount, however, shows polysynthetic twinning, in a few cases two sets crossing at right angles, and is therefore plagioclase. In one of the sections a few large grains showing perthitic intergrowths were seen. Both feldspars often possess a marked zonal structure, caused or accentuated by the accumulation of decomposition products along certain concentric lines. Although many of the feldspar individuals extinguish simultaneously over their whole extent many others show the peculiar mottled extinction produced by pressure, while others again are distinctly seen to be in the act of breaking up into a mass of small grains. Both feldspars also, although having more or less perfect crystalline forms, are almost invariably broken into little grains around their edges, which gives them a somewhat rounded contour, the edges being often highly serrated. In addition to these feldspars the rock contains quartz, hornblende, epidote, ilmenite, sphene (?), apatite, hematite, calcite, chlorite and pyrite.

The quartz is present in rather small amount, and lies chiefly in corners or between the large feldspar individuals. It is uniaxial and positive, and shows an uneven extinction. Judging from its mode of occurrence, it is in great part

composed and show mechanical deformation, the at least a primary constituent of the rock. The hornblende occurs only in very small amount, and is not seen in all sections. It is pleochroic in light green and yellowish green tints, and is without good crystalline form, being somewhat fibrous in character, the extinction making an angle with the cleavage, for which the highest value observed was 17° . The epidote is present in small quantity, in irregularly shaped grains, or aggregates of grains, often associated with the hornblende. It shows the characteristic pleochroism, and is probably secondary in every case. Primary epidote does however occur in a similar, but unaltered mass of biotite granite, which is erupted through rocks of the same series as those cut by this granite on Wrangell Island, Alaska. (See appendix 5 B, Annual Report of the Geological Survey of Canada, 1887). A small amount of ilmenite or titaniferous iron ore is also found in the sections. It is opaque and black, sometimes having a slight reddish tinge by reflected light. In one case a few small grains were seen imbedded in broken feldspar. Each grain had been broken into several pieces, which lay close to one another, and were cemented together with a greyish material resembling leucoxene, which is frequently observed associated with the iron ore in this rock. A few little flecks of hematite are seen as inclusions in the feldspar. The sphene and apatite are present in small amount, the latter being in rather short and stout crystals.

In addition to these minerals the rock contains remains of some mineral now replaced by aggregates of decomposition products which frequently present rather perfect oblong outlines, as if the original mineral had possessed a pretty good crystalline form. The principal constituent in these aggregates is calcite, which occurs in grains having the peculiar silvery white color usually exhibited by this mineral between crossed Nicols. Associated with it is chlorite, epidote, and often very small amounts of quartz, pyrite, and ilmenite or magnetite. In one of these masses a grain of light green somewhat fibrous hornblende was found filled with calcite grains and associated with epidote, chlorite and hematite. The mass appears originally to have been all hornblende, of which these other minerals are decomposition products, in fact all these aggregates probably represent original hornblende grains, chlorite, quartz, calcite and epidote being the minerals into which the hornblende of granites usually splits up in decomposing.

The examination of the "kernels" therefore shows that they are composed of a considerably crushed and altered granite, probably belonging to the class of hornblende granites.

The Ordinary Granite.—The grey granite which constitutes the mass of the rock and encloses the "kernel," in the hand specimen shows no perceptible foliation and is impregnated with pyrite and quartz, the latter occurring also in the form of little veins traversing the rock in various directions. The quantity of these minerals present however varies considerably in the different specimens. When examined under the microscope the rock is found to be composed of orthoclase, plagioclase, quartz, calcite, pyrite, with in some cases a very small amount of titaniferous iron ore and of some zeolite. Hornblende, chlorite, epidote and the other accessory minerals above mentioned were not found in any of the sections.

As in the case of the "kernels" the rock exhibits a very distinct cataclastic structure, induced apparently by crushing, but the crushing has gone much further in some cases than in others. Both feldspars are more or less de-

twin lines of the plagioclase being often bent and the crystals fractured and faulted transversely, and often presenting an appearance of having been shoved into one another. The individuals of both feldspars are usually surrounded by borders of broken grains from which arms of similar broken material frequently extend into the unbroken grains. In many other cases when the feldspars are examined between crossed Nicols they can be seen to be in the act of falling apart into a number of grains similar to those constituting the above mentioned borders. The orthoclase is present in larger amount than the plagioclase, but as in the case of the "kernels" the latter mineral is as a general rule rather better crystallized than the former.

Whether any of the quartz was an original constituent is a question which it is impossible to determine. A large amount of this mineral however is always present and most of it is of secondary origin, occurring in the rock in veins or in irregularly shaped masses. Small veins are found in all the specimens and are often seen sending off lateral arms into the rock. The quartz is clear and colorless and often contains lines of minute cavities. It is usually in large individuals, which although occasionally, especially in the narrow portions of the veins, show an uneven extinction, generally extinguish simultaneously over their whole extent. A considerable length of the vein is often composed of a single individual. The edges of the veins against the rock are well defined and the component grains come together along sharp lines without any of the interstitial broken material. Calcite often occurs associated with the quartz sometimes filling a portion of the same vein. In some cases it even preponderates over the quartz, forming the principal constituent of the vein. The quartz with its associated calcite is also seen in some sections in irregularly shaped masses, which, though pretty sharply defined against the more or less decomposed rock, at other times occur so that it is impossible to determine their exact limits owing to an impregnation of the rock about their edges, with the minerals of the vein. In these veins and masses both minerals occur in large grains. Very irregular-shaped masses of the calcite, also clearly secondary and often associated with pyrite are also found, especially in the crushed and broken portions of the rock. As before it occurs in large grains, frequently enclosing little bunches of a black, rod like mineral. Little isolated crystals of calcite also occur in a similar manner. The calcite does not occupy cavities into which the other minerals have crystallized but seems to have eaten its way into the feldspar, in some cases showing crystalline boundaries in the substance of the latter. Pyrite is present in considerable amount and is generally found well crystallized in little cubes. It occurs almost invariably in the crushed and broken portions of the rock and is very frequently associated with the calcite. In one slide, reproduced in figure 1, a mass of pyrite was observed enclosing a fragment of orthoclase, evidently a corner broken off from a large individual adjacent to it and with which its orientation was identical. In the figure the clear spaces show unbroken fragments of orthoclase separated by broken material, the result of crushing. A number of these small grains near the top of the cut, which are bounded by a somewhat heavier line, show one of the large fragments in the act of falling to pieces, a phenomenon which can be observed in most of the slides, when they are revolved between crossed Nicols. A number of the little cubes of pyrite are seen in the broken portion. After the corner of the large orthoclase individual had been

broken off, the pyrite was evidently deposited in the crack and around the detached fragment. The other little white spaces in the same pyrite mass represent little inclosures of quartz. These facts together with the occurrence of the pyrite almost exclusively in the crushing portions of the rock clearly prove the secondary character of this mineral.



FIGURE 1.

Section of the granite showing cataclastic structure with deposition of secondary pyrite. Magnified 32 diameters.

As it was a point of much interest to ascertain if possible the manner in which the gold occurred in the rock, the sections, twelve in number, representing five hand specimens very carefully examined by reflected light. In ten of them no trace of gold could be detected, but in the other two both from the same hand specimen, a few little bright yellow spots having exactly the color of gold could be distinctly seen in three of the pyrite grains. These spots were quite different in color from the pyrite, and easily distinguished from it. Figures 2 and 3 represent two of these grains of pyrite with their inclusions of gold. In order to make

certain of the character of the yellow spots, the cover was removed from one of the sections and a portion of the section containing the grain of pyrite seen in figure 3 was

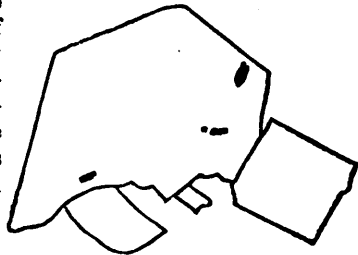
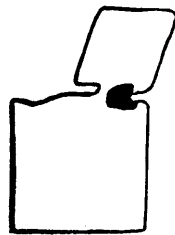


FIGURE 2.

Grain of pyrite holding inclusions of native gold, magnified 43 diameters.

removed to a clean glass slide and treated with hot concentrated nitric acid. The acid was found to dissolve away the pyrite with effervescence, leaving the bright yellow spangles of gold behind. The gold therefore occurs in part at least, in a free state and imbedded in the pyrite; no gold could be detected except in the pyrite. The zeolite mentioned as occurring in the rock is present in small amounts, and is not

FIGURE 3.
Grain of pyrite with inclusion of native gold.

seen in every section. It is evidently secondary, occurring in small irregular-shaped masses as a microcrystalline aggregate. The individual grains were too small to allow its optical character to be determined. The cover was however removed from one section containing it, and the rock was treated with concentrated hydrochloric acid in

the cold for half an hour. On treating with fuchsine the aggregate was found to take up the coloring matter readily, showing that it had been decomposed by the acid, and is probably one of the zeolites.

It is a matter of difficulty to determine whether any cases of secondary enlargement are to be found in the sections. I believe however that in some cases the broken fragments have commenced to grow again by secondary deposition of material around their edges, although on account of the ragged character of the latter due to breaking away of fragments by crushing, it is very difficult in some cases to determine whether an irregular boundary is the result of crushing or of a secondary growth. The outline of some grains is very similar to that of a feldspar crystal showing secondary enlargement which is figured (Fig. 1, b.) in the preliminary notice of a paper on the Archean Geology of Missouri by Erasmus Haworth, (John Hopkins University Circulars, No. 65, April 1888). The feldspar of the rock is generally much clearer and more transparent along the borders of the veins and irregular masses of secondary quartz. In one case an individual of decomposed plagioclase was observed which was very clear and fresh where it approached a quartz grain. Both fresh and decomposed portions had the same orientation, and it is possible that the clear portion may have been an enlargement of the original grain.

In order to ascertain the character of the rock around the edge of the "kernels" where a transition between the two varieties might be looked for, two sections were cut from a small hand specimen one-half of which consisted of a portion of a "kernel" and the other of the usual grey granite. The granite near the "kernel" was found to resemble the ordinary granite in containing a considerable amount of pyrite though less than the more altered granite usually holds, as well as in the fact that all the hornblende and epidote, and practically all the chlorite has disappeared. A number of oblong forms were also to be seen, being of the same shape as those described in the sections of the "kernels" as probably decomposition products of hornblende. This rock however shows these in a still further stage of alteration, being now composed of an aggregate of calcite grains, often with a little pyrite and iron ore. The rock also contains some quartz, a portion of which occupies corners and is more or less broken and probably a primary constituent, while the rest occurs in a few irregular-shaped aggregations associated with calcite and pyrite in crushed portions of the rock and is secondary. The rock near the edge of the "kernels" therefore may be said to be intermediate in character between that of the "kernels" and the ordinary granite, but to resemble the latter more closely than that of the former. It is probable that some of the calcite masses found in the ordinary granite may be remains of the hornblende originally present but which have now to a certain extent lost their original shape owing to movements in the rock. It may therefore be stated that the ore of the Treadwell mine is a granite, probably belonging to the class of the hornblende granites, much crushed, altered and impregnated with secondary quartz, calcite and pyrite; that the "kernels" are portions of the rock in which alteration is less complete than in the mass of the granite and that at least a considerable portion of the gold present in the ore is contained in the pyrite as free gold.

A New Machine, designed by the Western Machine Works, Ottawa, is reported to be light, easily adjusted, and bore coal any thickness.

Gold-Milling in the Black Hills.†

(By H. O. Hofman, Rapid City, Dakota.)

With the exception of the exhaustive paper on the Father de Smet mill, by its designer, Mr. A. J. Bowie, Jr. (*Trans. x.*, 87), nothing, so far as the writer is aware, has as yet appeared on the stamp-mills of the Black Hills of Dakota, although they have been steady producers for the last ten years. Within the small area of about 6,000 by 1,600 feet, \$2,271,341.14 was produced in 1887 from rock averaging \$4.00 per ton in free gold.

I. THE ORES.

Character of the Ores.—The gold of the district is found in quartz and pyrites finely distributed through vast bodies of mica—and amphibole-schists, argillites and phyllites, and also impregnating the schists themselves. The "Belt," embracing the section of Lead City, Terraville and Central City, is the only part-worked at present.

The principal associated mineral is iron pyrite, with some arsenopyrite and chalcopyrite, garnet and asbestos.

The ores from open cuts and upper levels are more free-milling than those from underground workings below water-line. Hence the mills running on oxidized ore have tailings as low as \$0.25 per ton, while tailings from unaltered ore run sometimes up to \$2.25 per ton. By watching the pulp when it flows down the plates it can be readily determined whether the ore comes from higher or lower levels. In the former case it will generally have a brownish red color, in the latter a bluish gray. The amount of free gold in the ores varies, therefore, with the depth at which they are mined. It is difficult to give a correct average figure of its value, but \$4 per ton will be near it.

The total value of the ore is not definitely known, as its weight is not actually determined, but only estimated, and regular dry assays are not made at all.

To determine the amount of free gold in the ore, the following method is in practice: Samples are taken daily from the different workings in the mine and sent to the "sampler," who crushes them, pans them and estimates the gold in the pan. Every valuation thus made is booked, and at the end of the month the average is taken and compared with the output of the mill, and the amount of gold recovered thus approximately determined. The mode of operation practiced by the "sampler" is simple: The sample, weighing, say ten pounds, is emptied into a 4-gallon bell-shaped mortar (13½ by 12½ inches) and crushed to nut-size with a heavy pestle, swung from a spring-pole. From it two pounds are then transferred into a second mortar of the same size, with a wooden lid, and there pulverized wet to a fine pulp, by means of a small steam-stamp, which is in reality an old power-drill, fitted up for this purpose. When sufficiently fine (as judged by the ring of the pounding stamp), the pulp is panned until all pyrites and other heavy sands are washed off with the tailings, and only the free gold remains. The "sampler" of the Homestake company pans from fifty to fifty-five samples per day. Great skill is acquired in thus estimating the value of the ore, the sampler being able to make from eight to ten valuations an hour.

As these are the only determinations made, it can be readily seen that the amount of the non-free-milling gold which enters the mill is not known. The percentage of sulphurets has been determined in several instances, and varies

† Amer. Ins. M.E., New York Meeting, February, 1889.

from 2½ and 3 per cent. to 6 and even 10 per cent. The assay-value of pure concentrates, freed from rusty gold or gold that is still enclosed in quartz (the ore being not sufficiently crushed), has lately been shown to vary from \$4 to \$90 per ton, the average for the district being about \$25 per ton.

Sorting of the Ore.—As the gold is finely disseminated throughout the entire vein-matter, comparatively little sorting in the mine can be expected. There occur, however, in many parts of the veins, igneous intrusions, locally called "porphyry," which form "barren horses." When the Nevada system of timbering in square sets was exclusively in use, no distinction was made between mill-rock and waste, but it was considered that the cheapest way to get rid of the latter was to run it through the mill. Lately, however, it has become the custom to fill the chambers formed by this timbering with waste rock and to hoist any excess of it to the dump, thus sending less waste through the mill; but large quantities are still got rid of in the old way, by running through the mill; but large quantities are still got rid of in the old way, by running the mill.

II. ENUMERATION OF MILLS.

When in 1876 the auriferous gravels and lodes were discovered, there was a "rush" to the Black Hills, and in a very short time a large number of mills sprang up. Of these the seven named in the following tables are still running with 640 stamps.

TABLE I.—LIST OF STAMP-MILLS.

Name of Mill.	Year of Erection.	Location.	Name of Company.	No. of Stamps.
Homestake.....	1878	Lead City,	Homestake Mining Co.,	80
Golden Star.....	1879	"	"	120
Highland.....	1880	"	"	120
Deadwood.....	1879	Terraville,	Deadwood-Terra Min'g Co.	80
Golden Terra.....	1880	"	"	80
Father de Smet.....	1878	Central City,	Father de Smet	100
Caledonia.....	1879	Terraville,	Caledonia	60

The 25-stamp custom mill, the "Cassel" mill, which was built at Central City, about the same time as these, is running principally on cement gravel and will not be discussed here.

Although the mills given in the foregoing table are owned by five separate companies, they are all, except the last, under the management of the Homestake superintendent. Thus it follows that the working details of the six mills are all, as far as practicable, after one model—the Homestake. The Caledonia mill stands alone, and works on a very different rock. Therefore the details of its plant differ considerably from those of the others.

III. OUTLINE OF PLANT AND PROCESS.

The crushing is done by means of rock breakers and stamps. The breakers reduce the coarse ore to a size suitable for the stamps. The ore, arriving at the highest level of the mill (the ore-floor) in mine cars, is discharged from the side or bottom of the car (dumping and bottom-discharge cars being both in use) over grizzlies to the crusher-floor; or it goes directly to the crusher-hopper. The small ore-particles, passing through the grate of the sizing screen, and the coarse ore (which has been reduced in size by the crushers), both drop into the same ore-bin, which reaches down to the cam-floor. Here a number of chutes deliver it to the automatic feeders, each of which discharges its contents continuously into the mortar to which it belongs. Here the ore is pulverized by stamps (five in each mortar) lifted at regular intervals by corresponding cams, which are keyed to a cam-shaft, placed in front of the battery on the cam-floor. Water is fed continuously into the mortars, and forms, with the ore, a liquid pulp, which passes through a screen at the front on to and over the apron-plates on the lower floor of the building. The Caledonia mill has blankets on the lower end of these plates to catch any coarse heavy particles; in the other mills the pulp passes directly from the apron-plates to the mercury-traps and through them on to sluice plates. From the traps, placed at the end of these, the pulp runs into one main sluice which may again have one or more traps before the pulp is finally allowed to run to waste.

Thus the entire process of passing the auriferous coarse rock from the ore floor to the final discharge, at the end of the main sluice, is an automatic one.

Battery amalgamation is used to extract the gold. It begins in the mortar, where mercury is added at intervals (while the continuous fine crushing with the stamps is taking place) and ends on the apron-plates, where nearly all the amalgam not retained by the inside amalgamated copper plates is collected daily, any deficiency in the collecting mercury and amalgam on the plates being supplemented by the various traps.

As the mills on the "Belt" have to treat low-grade ores, it is necessary to their profitable operation that large amounts should be put through as rapidly as may be, and that, at the same time, as much gold as possible should be saved by simple means. To effect this, a compromise is made between the two extreme methods of gold-milling. One of these aims at extracting as much gold as possible in the battery at the expense of capacity; the other, by amalgamating outside of the battery, increases the crushing capacity, but requires a number of expensive operations to recover the gold. In the Black Hills, amalgamation is carried on both inside and outside the battery, thus combining the simple way of recovering the gold from the first method with the large capacity of the second. The aim is to crush rapidly to the desired fineness and arrange the amalgamation so that it shall be adapted to the large amount of pulp produced.

IV. GENERAL FEATURES OF THE MILLS.

Table 2 gives a comparative view of the dimensions, power, batteries, and product of the mills. The following is an explanation of the letters employed in this table:

A, Horizontal 155 H.P. engine, with Meyers cut-off. B, 300 H.P. Harris-Corliss engine. C, 350 H.P. Corliss engine, Fraser and Chalmers pattern. D, two 60 H.P. horizontal engines, with automatic cut-off; one driving forty

stamps, the other now driving twenty, but soon to drive twenty more now erecting.

a. Length and width are always of mill proper, excluding engine-room.

b. The boilers in this table are all horizontal, tubular, 54 in. diameter, 16 feet long, with 46 tubes of 3½ in. diameter. Steam pressure is kept at 90 lbs. per sq. in.

c. Made up as follows: Wrought iron stem (length 14 ft., diameter 3½ in.) 340 lbs.; cast-iron head (height 18 in., diameter at top 9 in., at bottom 8 in.) 240 lbs.; cast-iron shoe (cylindrical but 8 in. high and 9¼ in. diameter, tapering shank 4½ in. diameter at base, 3½ in. at top, 5 inch high—the shoe being made of white iron, chilled for 6½ in. from base, the next 1½ in., and the shank being cast in sand and cooled slowly), 140 pounds; cast-iron gib-tappet diameter at ends 9¼ in., in middle cylindrical part 6 in., wearing faces 2½ in. thick, middle part 7 inches long, total length 12 in.), 130 lbs. Total, 850 lbs., stem, head, shoe, and tappet being proportioned as 34 : 24 : 14 : 13.

d. Batteries in two rows, back to back, leaving this space between the rows for ore-bins and feeders.

e. From June 1, 1887 to May 30, 1888, inclusive.

f. Estimated from report of Homestake Co. June, 1888, where product of 200 stamps in Homestake and Golden Star mills (under same management and similar conditions) is given as 243,355 tons for the year ending May 30, or 1,216,775 per stamp.

g. See Report of the Director of the Mint for 1887.

h. Will be increased to 20 in., as 18 in., which was large enough for 60 stamps, is not enough for 80.

i. Formerly 12, the mill having been originally built for 60 stamps.

k. Batteries in single line.

l. Batteries in two rows, but face to face, with this space between them.

m. Intentionally slower crushing on harder rock than the other mills.

n. For year ending April 30, 1883.

o. Excluding some concentrates from preceding year.

Distribution of Power—The methods employed in transmitting power from the engine to the different parts of the mill may be classed under three types, represented respectively by the Homestake, Golden Star and Highland mills. The Caledonia may be placed with the Golden Star, and the Deadwood, Golden Terra, and Father de Smet, with the Highland, notwithstanding local variations, especially such as are necessitated in the Father de Smet by the peculiar arrangement of its batteries.

1. In the Homestake mill, the continuation of the engine-shaft forms the line-shaft of the mill and is placed on the battery sills. This is a cheap construction and gives a solid foundation for the boxes, in which the line shaft rests. The shaft is kept in line by the even pull of the long belts placed on each side at an angle of about 30 degrees. The supposed disadvantage at being obliged to stop the entire mill, if anything happens to the line-shaft, is insignificant. When the mill was built in 1878, the line-shaft was not made of sufficient thickness, in consequence of which it became twisted and broke within two years. The new shaft, having the requisite strength, has been steadily in use ever since. For minor repairs, the position of the shaft is a disadvantage. It is in an obscure place where it escapes attention, particularly as everything has to be done by artificial light.

(To be Continued.)

Canadian Mines on the English Market.

	Price Per Share
General Mining, Limited £219,752 fully-paid shares of £8	4¼ 4¾
Low Point, Barrasois and Lingan. \$309,100 fully-paid shares of \$100.....	¾ ¾
Ditto, \$200,000 vendors fully-paid shares of \$100.....	— —
NorthWestern Coal and Navigation, Limited, £160,500 6 per cent. debentures; coupons June 30 and Dec. 31; principal 1904.....	— —
Ditto £149,500 fully-paid ordinary shares of £10.....	— —
Ditto £900 fully-paid deferred shares of £100.....	— —
Sydney and Louisburg Coal and Railway, Limited, £50,000 cumulative 10 per cent. first preference shares of £10, £6 paid.....	7½ 8½
Ditto, £14,560 fully-paid non cumulative 6 per cent. second pref. of £10.....	3 —
Ditto, £250,000 fully-paid ordinary shares of £10.....	1 —
New Vancouver Coal Mining and Land Co., Limited, £185,000 fully-paid shares of £1.....	¾ ¾
Excelsior Copper, Limited, fully-paid shares of £1.....	— —
Ditto, shares of £1, 17s. 6d. paid.....	— —
Shuniah Weachu, Limited, £39,888 fully-paid shares of £1	¾ ¾
Silver Wolverine, Ltd., £68,465 fully-paid shares of £1...	— —
Anglo-Canadian Asbestos, Limited, £39,132 fully-paid shares of £2.....	— —
Anglo-Canadian Phosphate, Limited, £46,340 fully-paid pref. shares of £10.....	— —
Ditto, £15,050 fully-paid deferred shares of £10.....	— —
British Columbia Smelting, Ltd., £25,000 preference shares of £1, 10s. pd.....	— —
Ditto £40,000 fully paid ordinary shares of £1.....	— —
Canadian Phosphate, Ltd., £100,000 fully paid shares of £1.....	¾ ¾
Bell's Asbestos, Limited, £100,000 fully paid shares of £5.....	18¾ 19
White's Asbestos, Limited, £20,000 fully paid shares of £1.....	— —
Ditto shares £1 paid.....	— —
Jackson Rae Phosphate Co., Limited, \$25,000 fully paid shares of £1.....	— —
Western of Canada Oil, Limited, £200,000 fully-paid shares of £100.....	— —
Ditto £99,850 fully-paid shares of £50.....	— —
Ditto £199,700 12 per cent. debentures of £100.....	— —

General Mining.—Accounts to December 31 submitted in April, but an interim meeting is held in November. Dividend for 1884, 5 per cent; for 1885 and 1886, 3½ each year; and for 1887, £4 13s. 9d. per cent. Reserve fund, £29,850.

Low Point.—The vendors' shares, up to the end of 1888, do not rank for dividend until 7 per cent. per annum dividends have been paid on ordinary. Accounts to Dec. 31. For 1887, 5 per cent. was paid on the ordinary shares other than those held by the General Mining Assoc., that Company foregoing their dividend rights.

North-Western Coal.—The deferred shares receive on dividend until 15 per cent. per annum (cumulative) has been paid on the ordinary. Accounts to June 30. Dividend for 1887-8, 5 per cent.

Sydney and Louisburg Coal.—Accounts to Dec. 31 submitted about May. Out of the profits of 1884 one half-year's dividend on the first preference shares was paid. No dividend since. Debit to Dec. 31, 1887, £1,574.

Vancouver Coal.—Accounts to June 30 and December 31 submitted in November and May. In the half-year to June, 1888, there was a net profit of nearly £11,000. Debentures, £57,200. Reconstruction has been decided on.

Excelsior Copper.—Registered September 26, 1888. Authorized capital, £450,000; purchase consideration, £400,000, in cash or shares. Fully-paid shares issued to the vendor; partly paid to the public.

Shuniah Weachu.—Accounts to Nov. 20 submitted in February. No dividend yet.

Silver Wolverine.—Registered October 19, 1888, with a capital of £100,000, of which £80,000 was the first issue. Most of the shares were issued to the vendor.

Anglo-Canadian Asbestos.—The Company was registered in November, 1885. Accounts to October 31 submitted in March. No dividend yet. Debentures, £3,450. Reports are not obtainable, being reconstructed.

Anglo-Canadian Phosphate.—The preference shares rank first for 7 per cent., and after a like rate has been paid on the deferred shares, both classes rank equally.

British Columbia Smelting.—The company was registered May 9, 1888. The ordinary shares were issued to the vendor, and they do not rank for dividend until the preference shares have received dividends amounting to 100 per cent.

Canadian Phosphate.—Accounts to November 30 submitted in February. Eleven months to Nov. 30, 1888, resulted in a profit of £2,576, which was carried forward.

White's Asbestos.—Registered April 9th, 1889. the authorised capital is £100,000; first issue, £60,000, of which £20,000, fully paid, was issued to the vendor.

Jackson Rae Phosphate.—Registered May 9, 1889.

Western of Canada Oil.—Accounts to March 31 submitted in May. Debenture interest is not paid. In 1886-7 there was a profit on working of £256; in 1887-8 of £690; and in 1888-9 of £1,279. Debit balance on March 31, 1889, £900. A loan of £8,400 has been obtained on the security of £30,000 B debentures.

Rapid Driving of a Cross-Cut.—A Tschebull, in a paper read before the Austrian Society of Engineers and Architects, describes the method which was employed in lignite mining near Gran in Hungary, in a case in which it was necessary to open up some lignite beds as rapidly as possible. Hand-boring was alone possible, and the question was how to proceed with the greatest rapidity in the driving, the formation being Eocene slaty sandstones and shale, and Triassic limestone. A shaft had been sunk to a depth of about 330 feet, and this had afterwards filled with water for about half its depth. A cross cut was then made, which commenced just above the water level, the progress made in Eocene rocks during the first month having been 159 feet. The author describes the arrangements made with a view to expedite the cross-cutting, the division of labour and the method of payment for work done. To enable the material brought down by the shots to be cleared away with greater rapidity, one or two flat pieces, of stout sheet-iron, about 6½ ft. x 3½ ft., were placed before the bore-holes previous to firing. Most of the rock brought down by the shots remained on these sheets, and was much more readily removed from them than would have been possible if the bed had consisted of the rough floor of the level. In the eight hours' shift the division of time was as follows:

Putting in the bore-holes.....	5-5½ hours.
Charging and firing.....	1 " "
Allowing smoke to clear away.....	½-¾ " "
Clearing the level, &c.....	¾-1½ " "

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Over \$4, not exceeding \$10.....	5c.
" 10, " " " 20.....	10c.
" 20, " " " 40.....	20c.
" 40, " " " 60.....	30c.
" 60, " " " 80.....	40c.
" 80, " " " 100.....	50c.

On Money Orders payable abroad the commission is:

If not exceeding \$10.....	10c.
Over \$10, not exceeding \$20.....	20c.
" 20, " " " 30.....	30c.
" 30, " " " 40.....	40c.
" 40, " " " 50.....	50c.

For further information see OFFICIAL POSTAL GUIDE.

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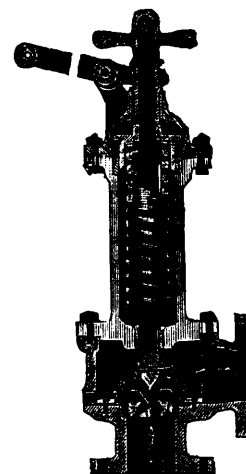
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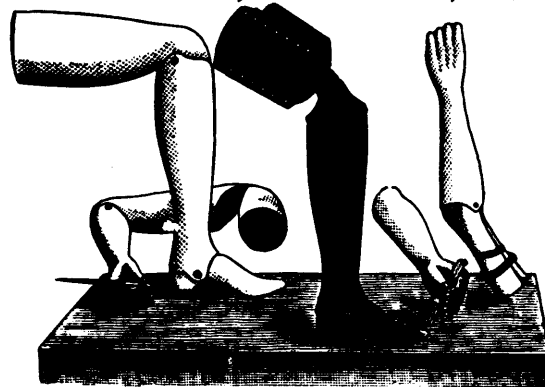
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Under the provisions of chap. 7, Revised Statutes, of Mines and Minerals Licenses are issued for prospecting Gold and Silver for a term of six months, which can be extended by renewal for another six months. Mines of Gold and Silver are laid off in 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. Up to five areas the cost is 50 cents per area, for every area in addition 25 cents. Cost of renewal one half the original fees. Leases of any number of areas are granted for a term of 21 years. 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 \$19.00 an ounce, and in smelted Gold valued at \$18.00 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 area 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 twelve months are issued, at a cost of twenty dollars, for Minerals other than Gold and Silver, out of which one square mile 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 free of charge, 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, 7½ 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

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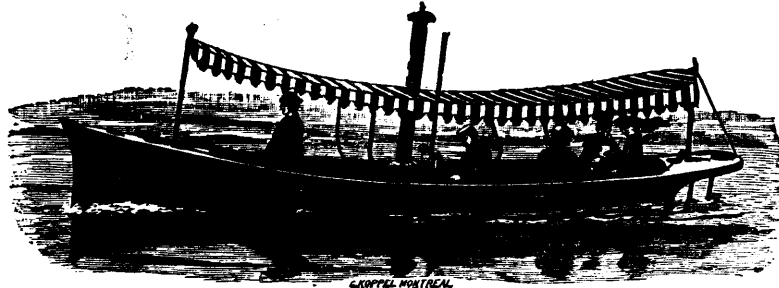
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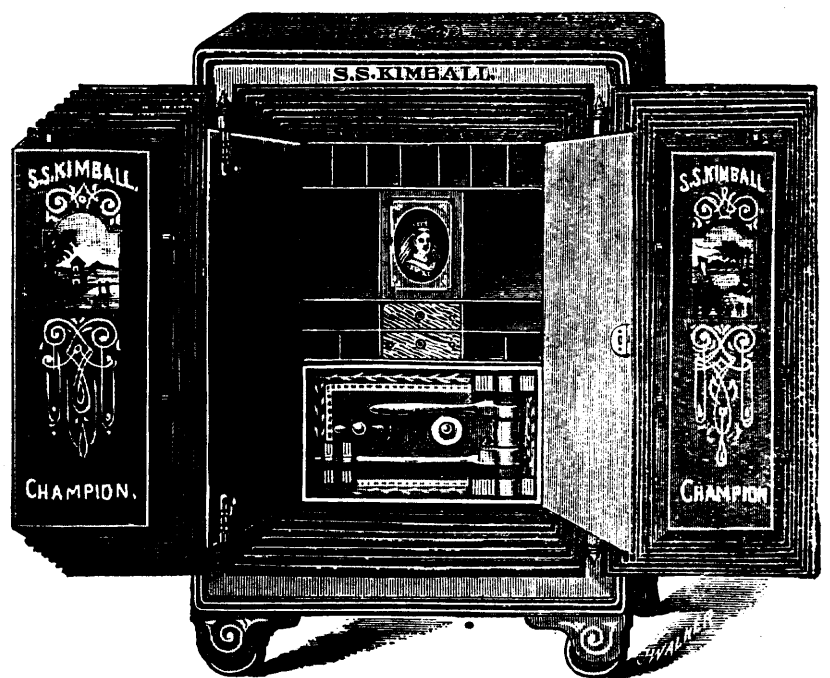
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**DEPARTMENT
OF
Inland Revenue.**

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the

Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the per-

centage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

**E. MIALI,
Commissioner.**

January, 1889.



NOTICE

Is hereby given that all communications in respect to matters affecting the Department of Indian Affairs should be addressed to the Honorable E. Dewdney as Superintendent General of Indian Affairs, and not as Minister of the Interior, or to the undersigned. All Officers of the Department should address their official letters to the undersigned.

**L. VANKOUGHNET,
Deputy Superintendent-General
of Indian Affairs.**

Department of Indian Affairs,
Ottawa, 11th May, 1889.



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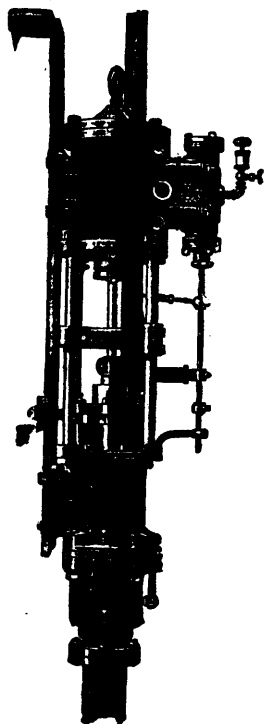
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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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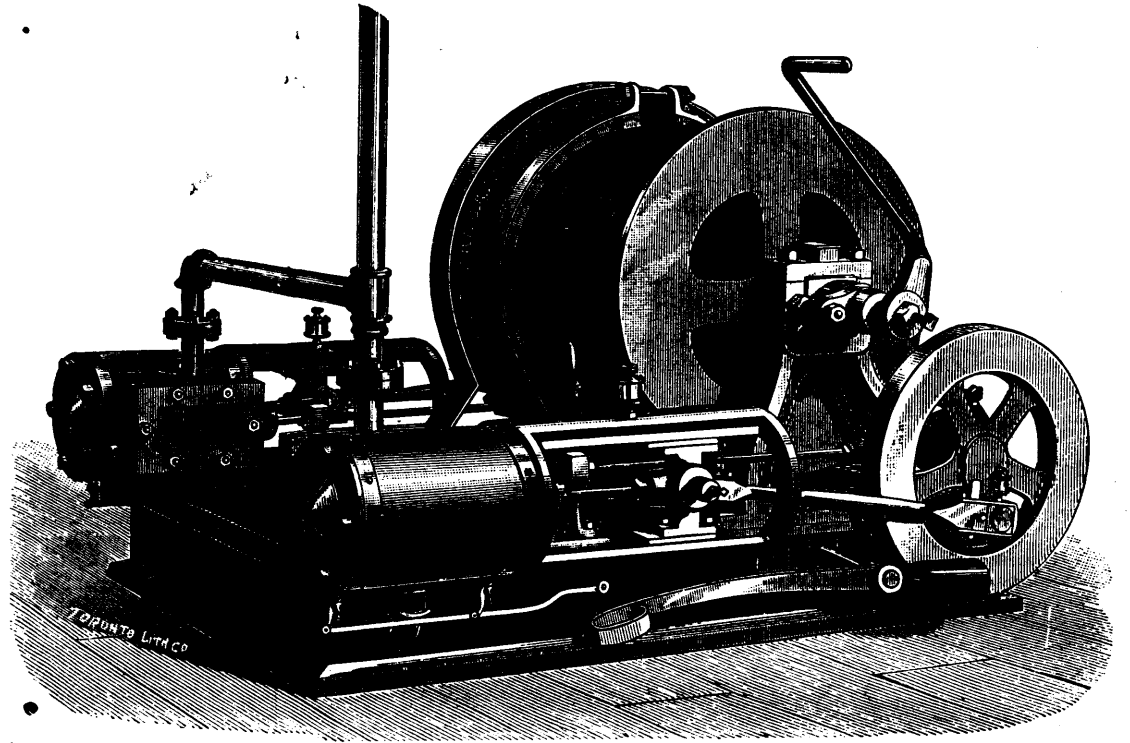
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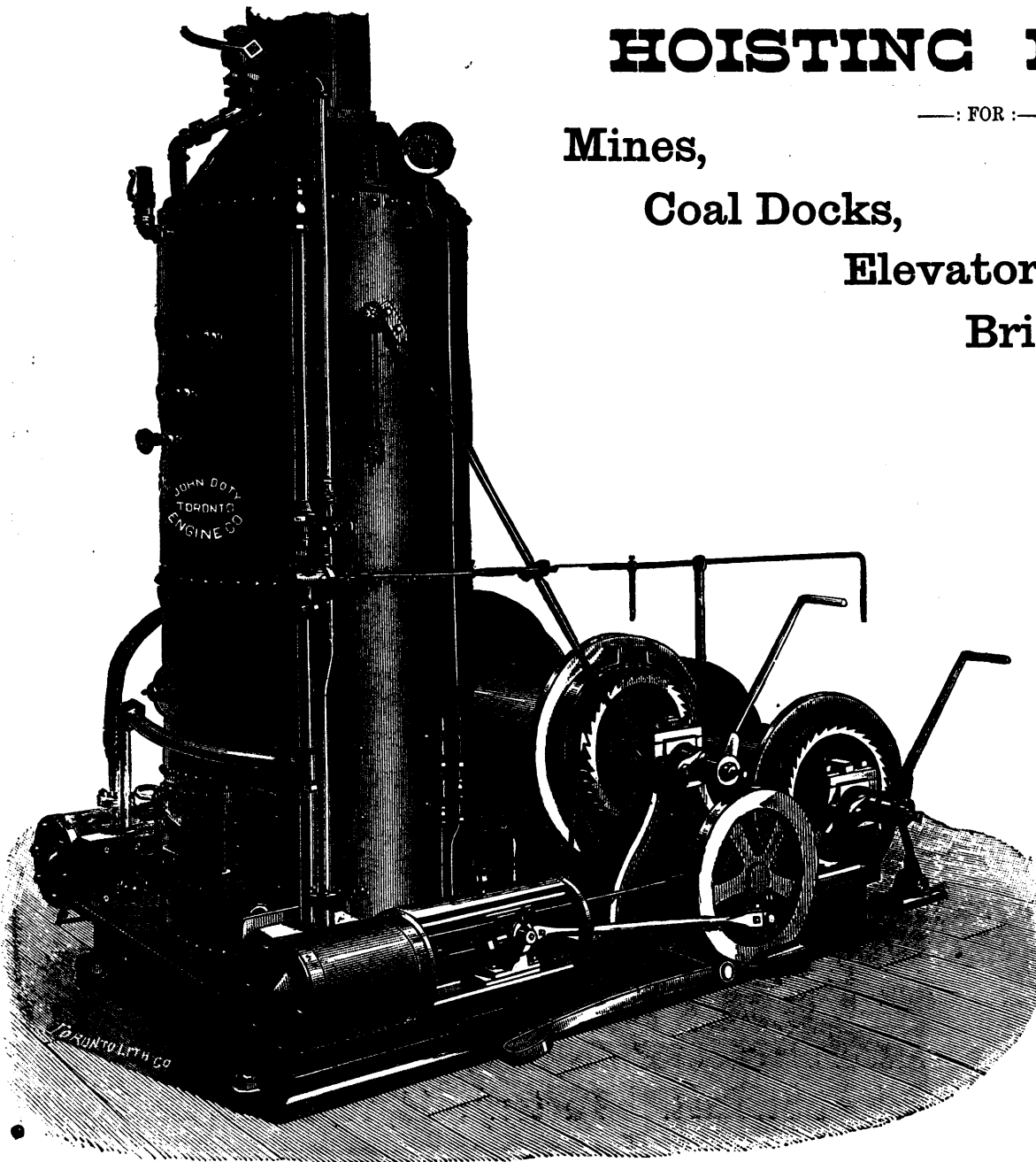
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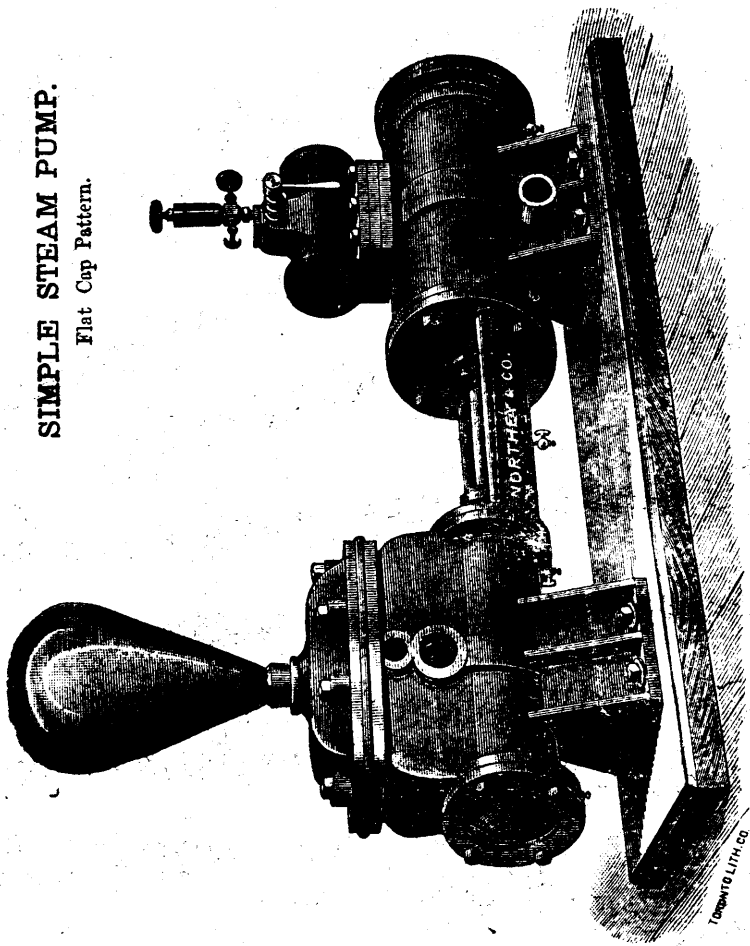
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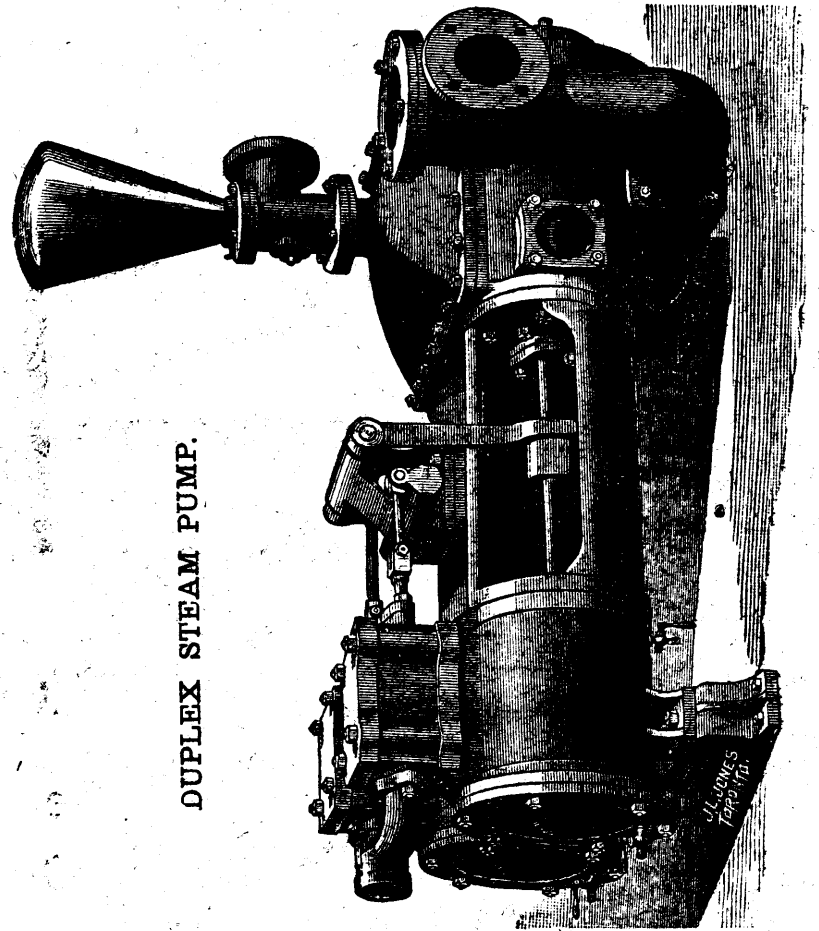
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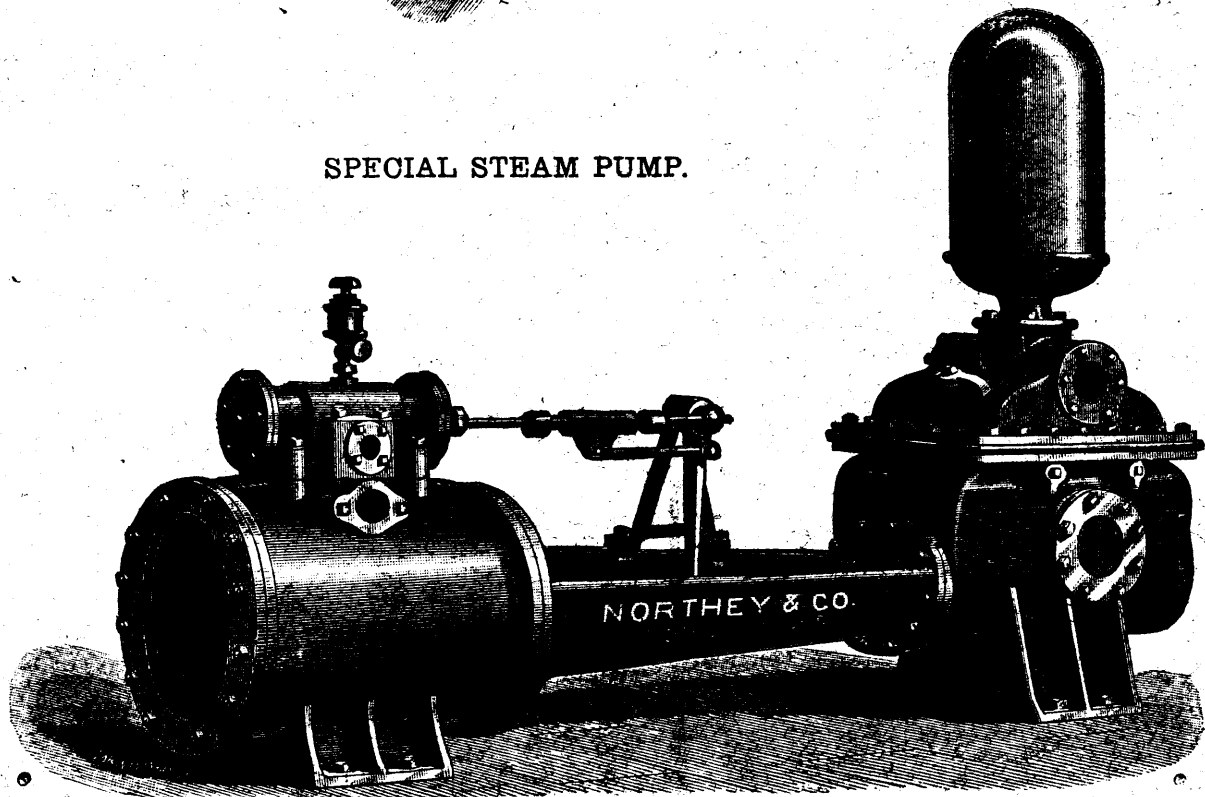


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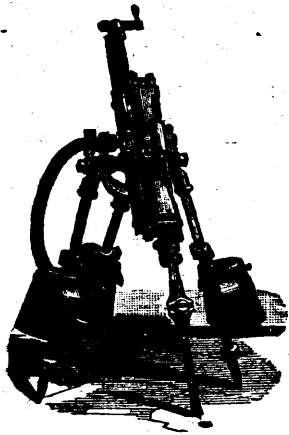
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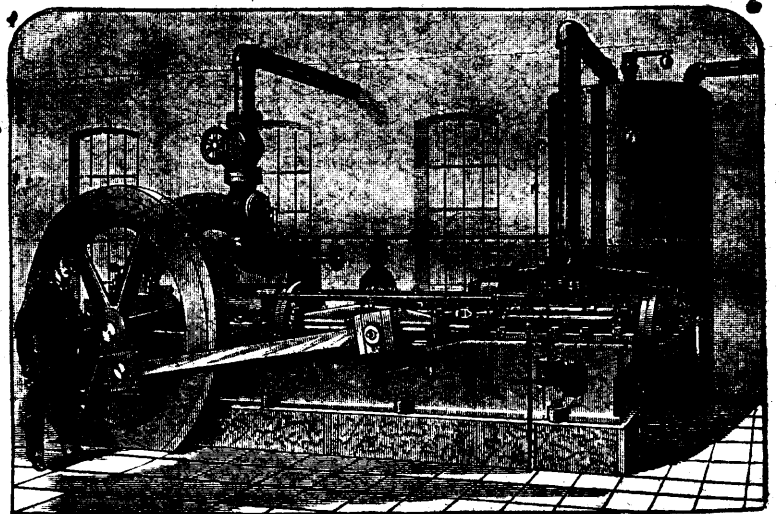
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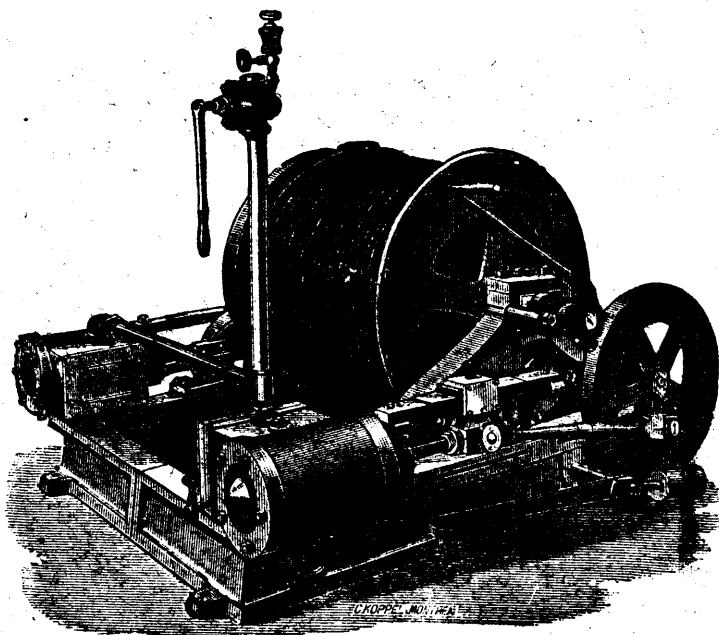


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