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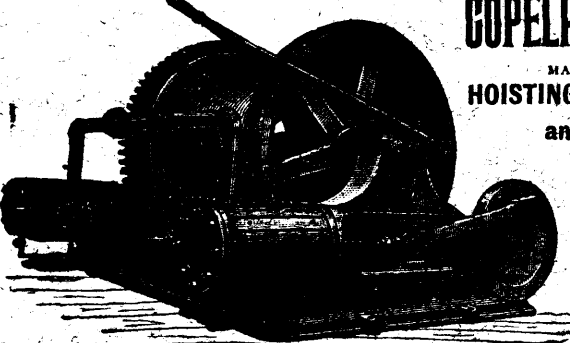
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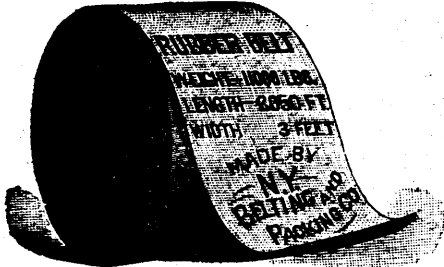
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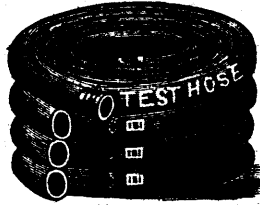


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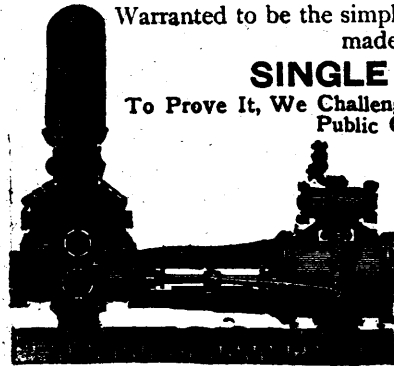
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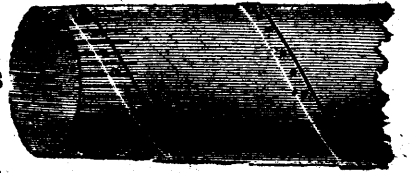
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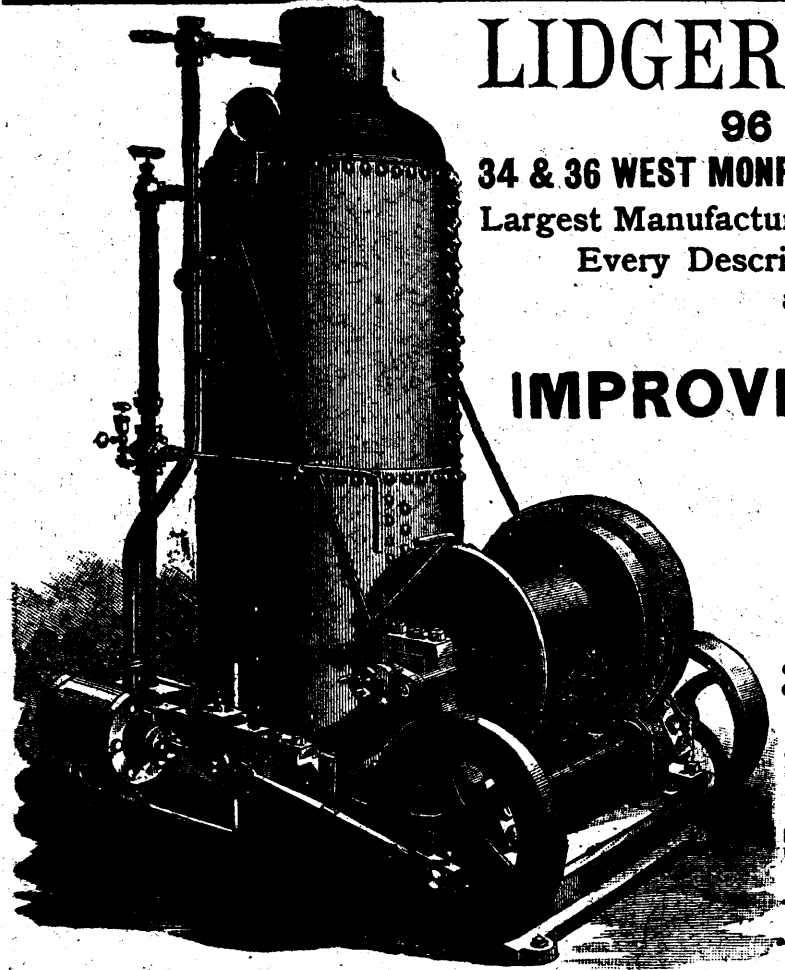
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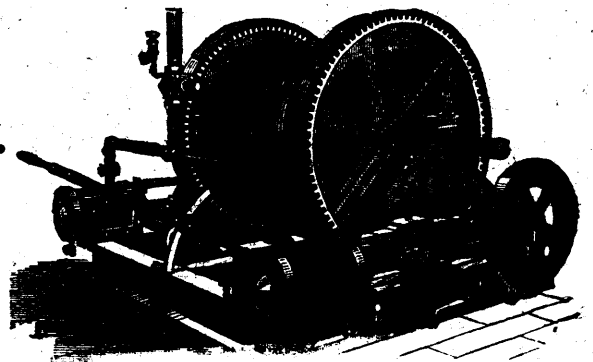
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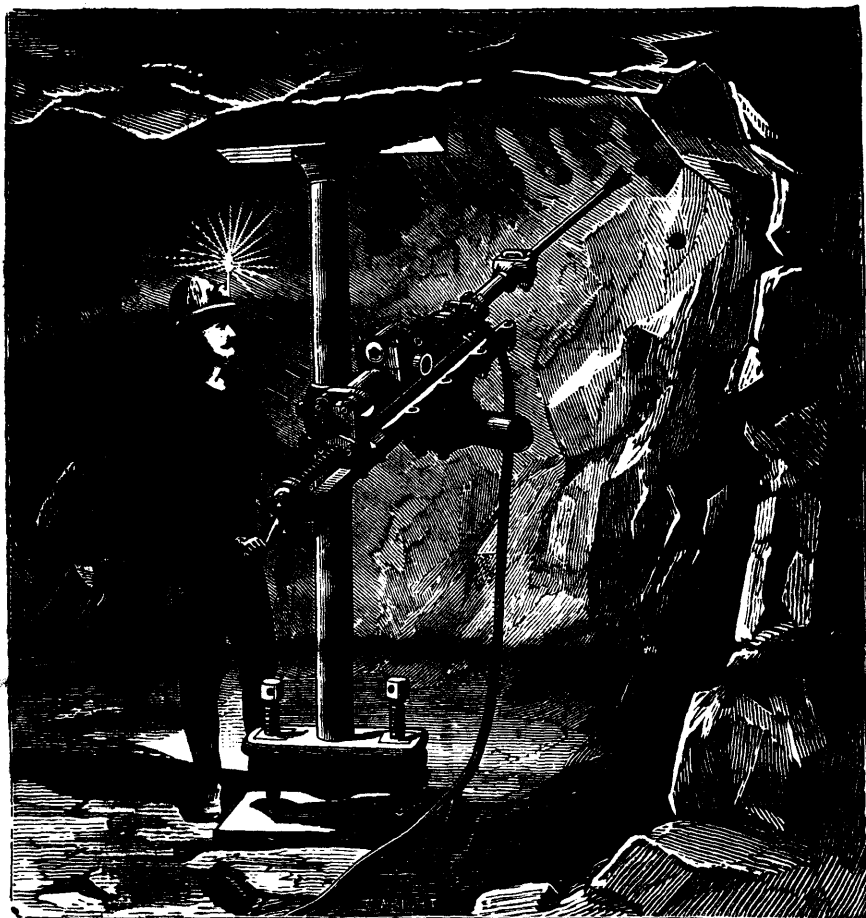
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Mining Regulations.

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 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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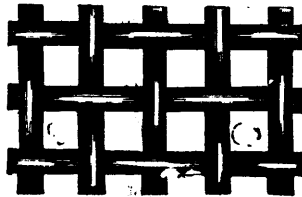
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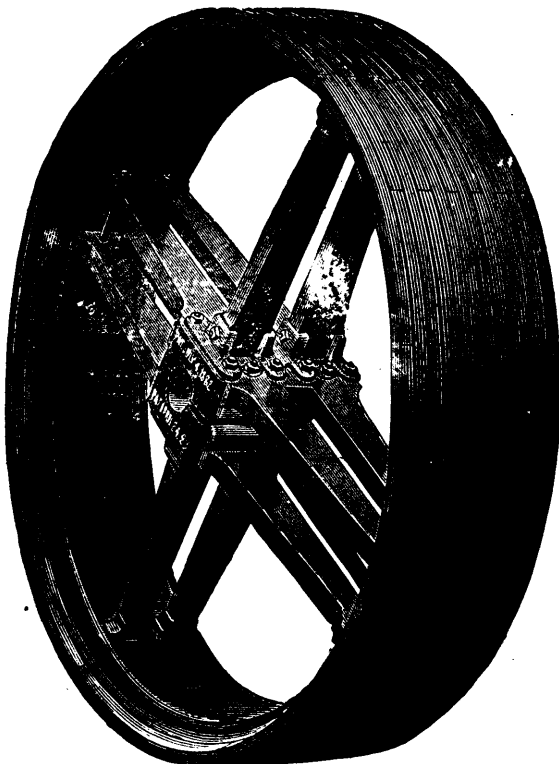
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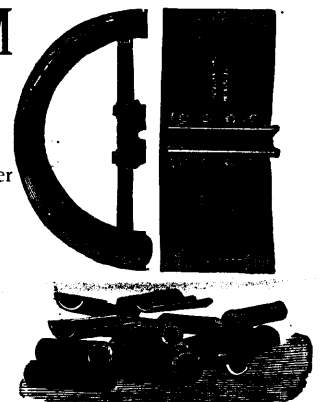
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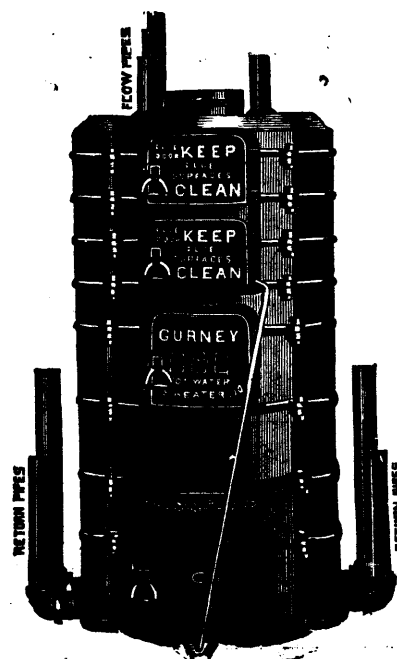
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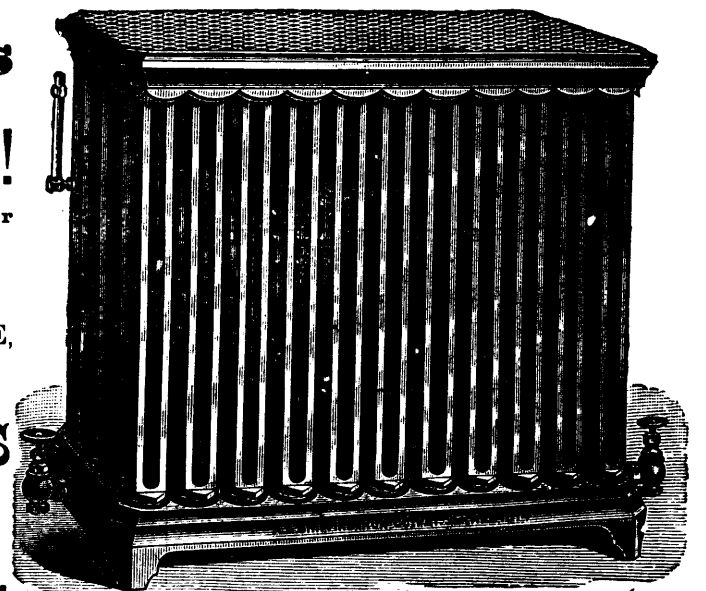
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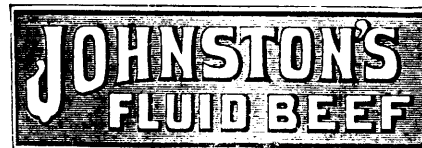
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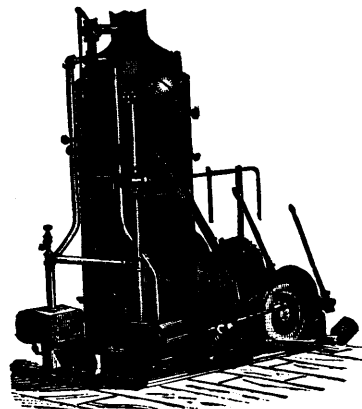
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Vol. VIII. NOVEMBER, 1889. No. 11.

Geological Survey of Nova Scotia.

It is rumored that the authorities of the Geological Survey will issue the geological map of Nova Scotia upon the reduced scale of four miles to the inch. It is difficult to see the object of the Survey in thus reducing the scale, for the field work and original plotting have been done upon a scale of one mile to the inch, and the proposed change means a great deal of labor for the draughtsmen of the department, and a consequent delay in the issuing of the map. Moreover the map of Cape Breton made by Mr. Hugh Fletcher, and already published is on the scale of one mile to the inch, and is as beautiful and admirable a piece of work as one could desire, and has done a great deal to keep up and sustain the reputation of the Survey. To publish the map of the rest of Nova Scotia upon a reduced scale would be a **great mistake in our judgment, and would mar the beauty and utility of the work already published.**

The utility of a geological survey depends largely upon its ability to help the instruction of the people in the application of science to the enlargement of their practical knowledge, and consequent increase of their material and national prosperity. Not a small part of the development of the natural resources of our neighbors across the line, particularly of the Eastern States, has come from the various State Geological Surveys which have been going on more or less for the past fifty years.

Nova Scotia has been, and is to-day, whatever the future may bring forth, the foremost province of the Dominion in the matter of mineral development, and no parsimonious spirit should actuate the Government in carrying forward upon the same liberal scale the work of the local staff of the Geological Survey. To stultify or embarrass in great measure the admirable work which has already been done and is doing by such a reduction as we have indicated would be a piece of penny wisdom and pound folly.

The Future of Phosphate.

In the inaugural address of the President of the Ottawa Literary and Scientific Society on the 14th instant, Mr. H. B. Small, whilst treating of development and progress alluded to the exhaustion of the soil by repeated cropping **without restoring artificially the mineral waste annually taken out in grain.** He quoted from a statement made by Mr. Gordon Brown in 1869 that the shipments of grain in that year from the port of Montreal contained 2,340 tons

of phosphoric acid, and that to have restored that to the surface of country represented in the shipments 5,850 tons of apatite would have been required. On this point Mr. Small said: "This again leads to development; our new phosphate industry, the product of which is not yet used at home, is in constantly increasing demand abroad, and when its necessity becomes apparent here, such a development will take place around the scene of production as will wake the echoes of the old Laurentian hills, and imagination would not be far astray in picturing at our Chaudière water-power large manufacturing establishments for grinding, treating and manipulating this necessary adjunct to wheat growth, long after the present lumber business is removed to points nearer its supply."

Government Aid to Mining.

Halifax, 20th Nov., 1889.

The Editor:

In countries where a royalty, duty or other tax is imposed by the Government upon the precious metals mined therein, it is usual to find governmental aid to such mining industries in some form or other. This aid is always in the direction of keeping alive, fostering, and building up such industries, not only on account of the intrinsic value of the production, but chiefly on account of their value in building up the country, and in increasing the aggregate of the national wealth. In Canada the chief mining province, Nova Scotia, is burdened in the matter of royalties, but, strange to say, has not recompense in the way of government aid. The contrast in this matter between the Governments of Victoria, New South Wales, New Zealand (and in fact all the Australian colonies) and that of Nova Scotia, is most striking.

For many years now it has been a well defined and well executed policy of the Australian Government to foster and stimulate the mining industries of the colonies by the granting of subsidies to deep mining; by the construction and maintenance of good roads to the various mining districts; by the building of water ways, sluices and tramroads, from which by tolls and rents an equitable rate of interest on the investment is secured; by the construction of test metallurgical establishments where lots up to ten tons in weight may be tested and the best metallurgical method of reduction secured under competent advice; by the establishment of "National Schools of Mines;" by the inauguration of a kind of peripatetic school, in which competent men travel from one mining district to another, to instruct, during six or eight weeks in each district, such workmen as desire, in the studies of assaying, mineralogy, geology and mining; and by sundry and various other ways give knowledge, aid and encouragement to that industry to which is due, more than to any other, the national prosperity and wealth. For these and kindred objects

over \$400,000 are annually spent by the colony of Victoria alone.

With natural mineral resources full as varied, and less only in degree, certainly not in kind, Nova Scotia presents the contrast of masterly inactivity, and miserly parsimony. Here, apparently all the energies of the Department of Mines are spent in eagerly taking in the rents and royalties which are yearly and constantly growing in amount. With the exception of the rule or order giving aid to gold district roads (by granting from the Provincial Treasury two dollars for every one dollar paid by the district), and the recent Act relating to "Schools of Instruction for Miners," absolutely nothing has been done to encourage and help the industry from which the Province draws its principal item of income. The Miners' School Act, moreover, is only tentative, and is limited and free only to such of the coal miners as desire to go up for examination as overmen or underground managers.

As the Department is at present organized, the only officer who is in a position to ascertain the needs, and to promulgate and carry forward any scheme for aid is the Inspector, who, by law (Chap. 7, Sec. 5, R.S., Nova Scotia), is supposed to be a professional mining engineer, and is required to see that mines under lease from the Crown "are being worked in a scientific, workmanlike and effective manner." The gentleman now holding the office of Inspector has the requisite qualifications and ability, but, unfortunately for the mining industry, the Government in a spasmodic attempt at economy, some two or three years ago, united the offices of Deputy Commissioner and one person is now supposed to perform the duties of the dual office. However able and conscientious the incumbent may be, it is simply impossible that any one man should perform the respective duties of Deputy and Inspector and do justice to both; the duties of the two offices are largely of a different character, and call for a different order of ability in administration.

Were the Inspector freed from the petty details and time exacting duties of the Deputy Commissionership, it would afford time and opportunity for the doing of much good and the giving of much help in a judicious and authoritative way; e.g. by condemning obsolete and extravagant devices and methods; by discouraging the expenditure of large sums upon improved properties; by encouraging and promulgating sound principles and systems of mining, and known and tested methods of milling and reduction; and in general, by frequent visits to the mining camps to unite the confidence and consultation of the men in charge of the mining industries. And in this connection it may be said that advice coming in such a way, from an authoritative source, is always well pondered over and considered, if not followed: but the practice which seemed to obtain last year, of sending to certain gold districts, an irresponsible

person, having no knowledge of the mining business, either by training or by practice, and who has not the confidence of the mining managers, but whom on the contrary they know to be a novice, should be condemned. Mining men are very receptive of ideas, and, as a rule, eager to learn: but they are very quick to detect incompetency, and to reject what they believe to be unreliable.

Among the few good ideas which have been advocated as government measures, none are so promising as the Assay Office scheme which was elaborated by the Gold Miner's Association of Nova Scotia, last winter. This was a first step and a most important one toward the beginning of a new era in the gold mining industry. Where else in the world can be found a country producing precious metals to the extent of Nova Scotia with not a single assay office in the Province? It will seem incredible to other gold producing countries. We sincerely hope that the Assay Office scheme will not be allowed to drop, but will be taken up again at the coming sessions of both the Dominion and Provincial assemblies.

The idea of the government subsidizing deep mining is also excellent, but is surrounded with many pit-falls, and will need great care in working out. Any aid of this nature must be applicable to any and all of the different gold mining districts of the Province, and it is worth considering whether the aid afforded by the government should not rather be of the nature of a bonus, say a bonus of a fixed sum for each shaft attaining a depth of 1000 feet, of another fixed sum for each shaft attaining a depth of 1500 feet, and for another fixed sum for 2000 feet or over. Another consideration may be whether a rebate of royalties, in a fixed ratio for the depths attained, would not be wider reaching in its benefits.

It is certainly time that Nova Scotia was aroused to a sense of its shortcomings in this matter, and that the mining industries of that Province should receive the encouragement and aid to which they are justly entitled.

I am, etc,
GOLD MINER.

Phosphate Analyses.

Montreal, Nov. 17, 1889.

The Editor:

SIR,—Some comment having been made upon my remarks, at the Meeting of the American Institute of Mining Engineers, at Ottawa, with reference to the system of selling Canadian phosphate abroad, I ask your kind permission to give some further facts bearing upon this subject, which is one of vital importance to the Canadian phosphate industry.

The encouragement of mining of course depends upon its financial results, and no work will be long carried on unless it is profitable. The nominal prices for phosphate in Europe have tempted many persons to undertake its

production, but the returns have been so much less than was expected that the effort, after one attempt, has in many cases been abandoned, and a number of properties that are capable of profitable working have been consigned to idleness.

The first disappointment in the account sales was the discovery that a discount of 2½ per cent. was taken off the nominal price. Nor it was observed that the weight of the phosphate as ascertained upon discharge from the ship, was reduced by a deduction of the moisture expelled by drying a sample of the ore at a temperature of 212°. This deduction often amounted to three or four per cent., and in many cases was taken, not from the weight, but from the percentage of phosphate of lime, thus occasioning a further loss of 2 or 3 per cent. a ton. Then the quality was found to be much lower than it had been estimated by Canadian analysts. The chemists had differed over three per cent., so a third one was called in who agreed with the lowest, and the average of all the tests brought the result perhaps one per cent. below the guaranteed quality. The phosphate having been delivered to the buyer, the seller was now completely at his mercy, and instead of a settlement at the usual market rate of one fifth of a penny a unit, the buyer gave the alternative of taking the phosphate away or accepting a reduction greatly in excess of the usual sliding scale. The net proceeds failed to cover the cost of production, and mining was discontinued.

Many of your readers in Ottawa County will say, "that was just my experience!" In fact, Mr. Editor, "we have all been there," and some of us have been there so often that we are at last determined to do something about it, and if possible put a stop to what is nothing less than a commercial scandal.

In addition to the objectionable system of guarantees and the absurd practice of delivering goods to the buyer before their value is determined, there is ground for suspicion that in some cases the sampling is not fairly done, and that the remark of an agent, "a five pound note will go a long way," is not wholly unwarranted. The fact also remains that the analysis of the buyer's chemist is in a majority of cases lower than that of the seller's chemist, and, as I have stated, was so in one season's shipments in seven cases out of eight, and the differences have been sometimes as high as 3½ per cent.

A few experiences that can be verified, if called in question, will show what has been suffered by Canadian sellers of phosphate in Europe. A cargo was forwarded by rail to Oldham, near Birmingham. It was sold at 1s 2d for 75 per cent., with ½d. per unit rise. Careful sampling and analysis in Canada made it 75 per cent. The result of the English sampling and analysis was 72 per cent. The trade reduction would have been ⅓ of a penny, making the price 1s 1½d per unit, or 80s 5d per ton. But the market having fallen, and the cost of removal being heavy, the buyers succeeded in forcing a settlement at 10½d per unit, or 63s per ton, taking an advantage of 17s 5d per ton beyond the usual allowance.

A cargo guaranteed 70 per cent., and analyzing over that in Canada, was transhipped to an outport from London. The seller's chemist made it 71, the buyer's made it 68, the referee made it 67. The lot was rejected, and rather than let the buyer have it at slaughter prices it was taken back to London and shipped to the Continent, the expenses entailing a heavy loss.

A cargo shipped to Stockholm went two per cent. below guarantee. Exorbitant demands being made, it was taken to Hamburg, and

freight and expenses nearly ate up the whole venture.

In one case this season where a cargo went only two per cent. below guarantee, a demand for a reduction of £1 10s per ton was made, though the trade allowance would have been 13s per ton. In another case, rather than yield to an exorbitant demand, where there was a falling short of only two per cent., the lot was taken away at a loss of £1 per ton to the seller.

Cases could be multiplied far beyond the limits of your space and the patience of your readers. These are enough to show the grievance; and now let us consider the remedy.

Methods of sampling that admit of no partiality must be insisted on. The chemists must be urged to adopt uniform methods of analysis. Sellers must resist the demand for deducting the moisture from the percentage of quality. Above all, the sale upon absolute guarantee must be refused, and the sliding scale of price must work equally up or down, or at most ½d up and ½d down. But it will be said that buyers must have some assurance as to what quality they are to receive. To meet this reasonable requirement a sample should be taken and an analysis made before shipment by some person recognized as an authority by the buyers and sellers, and this should determine the classification for shipping purposes, no further guarantee being given; but the settlement of value would be made as now upon the foreign sampling and analysis. The sampling should be done by one impartial person instead of making it a contest of wits between two parties, each bent upon taking advantage of the other.

Efforts have been made by sellers in the past to secure these concessions, but the volume of Canadian export has been too small, and there has been too little harmony among producers to permit the dictation of selling terms. Now that Canadian phosphate has won its way in the market, and the raisers, it is to be hoped, have learned the lesson of union and friendly combination that is being exemplified in all successful industries, the time has come to put an end to the remediable ills from which the phosphate trade has so long suffered with a patience that is not to its credit.

The first thing to be done is to refuse to sell on absolute guarantees of high quality with privilege of rejection. The Carolina phosphate is quite uniform in quality, and there is but little risk in a guarantee of 55 per cent. Put although the pure Canadian apatite always contains from 85 to 92 per cent. of phosphate of lime, the quality of a shipment depends upon the amount of other rock that has been allowed to mix with the apatite. This it is very difficult to determine, and the sampling of Canadian phosphate must be always something of a lottery until it is sold in a pulverized condition. It is this very uncertainty that has made the buyers strenuous for high guarantees, for they have learned that there is a chance that a good lot will go under test and may be rejected and brought in at a great reduction.

The remedy, then, for the chief evil of the trade, the rejection of goods after they are in the buyer's hands, is this—the united resolution of sellers to sell on the statement of quality by a recognized authority, but without guarantee. Union and conference will also determine means of obviating other disadvantages. Phosphate is constantly assuming increased importance as an article of commerce, and the future of its producers is a bright one if they will use their intelligence to secure fair play.

ROBERT C. ADAMS.

Possibilities of Iron Manufacture At Ottawa.

By John Birkinbine, Philadelphia, Pa.

The unsatisfactory results which have followed some of the attempts to produce and manufacture iron in the Dominion of Canada, and the failure of capitalists to take advantage of the bonus offered by Parliament, have combined to encourage a degree of distrust in Canadian ventures which seems scarcely warranted by existing conditions.

In a paper presented by Mr. J. H. Bartlett, of Montreal, at the Halifax meeting of the American Institute of Mining Engineers, the various attempts to manufacture iron in Canada were reviewed, and the possibility of achieving success strongly presented. Mr. Bartlett justly claims that much of the discredit which has come upon investments in the production or manufacture of iron in the Dominion is due to the facility with which money was placed in so-called "improved processes," heralded as short cuts to metallurgical success. He also asserts that "the only attempt ever made to manufacture coke pig-iron and refined bar-iron has proved the possibility of so doing."

The small output of Canadian pig iron, which has been mostly produced from bog-ores with charcoal as fuel, does not give promise of extension, for although these ores are abundant, they are lean and hydrated, requiring the mining of large quantities of ore and the rapid denudation of convenient timber on account of the consumption of ore and charcoal per ton of product. The future of the Canadian iron industry would appear to be dependent upon the magnetic and red hematite ores more than upon the leaner bog-ores, although the latter may form an important factor in mixtures. The abundance of timber promises a supply of charcoal for an industry of considerable dimensions, but wood is constantly appreciating in value for other purposes, and although there is a large field for the manufacture of iron with charcoal, the bulk of the iron produced will most probably be smelted with mineral fuel. Coal is found in the eastern provinces and also in the western section of the Dominion, there is no apparent supply of domestic mineral fuel within 700 miles of Ottawa.

A critical examination of a number of iron-ore deposits convenient to Ottawa, encouraged the presentation of a discussion upon the possibilities for producing pig-iron offered by the Capital or its vicinity, as a basis for determining the practicabilities offered by the Dominion for iron production and manufacture. At the outset it may be noted that within six miles of the parliament buildings, portions of a blast-furnace are now standing, the plant having been constructed to smelt the local magnetites with charcoal, and within eleven miles there are the ruins of a forge and charcoal kilns, part of a plant where blooms were produced from ore by the direct or Catalan process, neither of these have been active in late years.

In the production of iron the first desideratum is the ore supply, and omitting further notice of the bog-ore deposits in Quebec or the large exploitations which have attracted attention and capital in the vicinity of Hastings, Ontario; attention will be directed to some deposits which are more directly tributary to Ottawa and from which various mixtures could be made. Some of these were mentioned in a paper by Mr. Fred. P. Dewey,* Curator of the National Museum, at Washington, and all of

them are referred to in Prof. Harrington's monograph, upon the economic minerals of the Dominion of Canada.

These ore-deposits which have been personally examined are:

A. In the Province of Quebec at Hull, six miles, and at the Haycock Location, eleven miles north of Ottawa. As Hull mining has been prosecuted to a considerable extent and large quantities of ore removed, some of which was smelted in the blast-furnace above referred to prior to its partial destruction by fire, but most of it was shipped to the United States prior to the assessment of the customs duty of 75 cents per ton. This ore was carried by rail to the St. Lawrence River on Lake Ontario for 50 cents per ton, and from the Canadian ports to Cleveland the freight was 75 cents per ton. A royalty of \$1 per ton was also paid to the owners.

At the Haycock location and at adjacent properties the exposure is such as to offer impressive surface indications, but although some of the mineral was worked into blooms in the forge mentioned, the operations were not sufficiently extensive to develop the properties or to prove their commercial value. This ore is mostly specular; and may develop into an important deposit.

The following analyses were taken from the Canadian Geological Survey:

	Haycock.		Hull	
	1	2	Red Ore.	Black Ore.
Ferric oxide	88.08	85.45	66.20	73.90
Ferrous oxide	6.86	5.24	17.78	
Manganous oxide	0.24	0.15	trace.	none.
Alumina				0.61
Lime	0.55	0.41	1.85	
Magnesia	0.13	0.17	0.18	1.88
Phosphoric acid	0.16	0.13		
Phosphorus			0.015	0.027
Sulphur	0.03	0.07	0.28	0.085
Silica			11.11	20.27
Titanic acid	3.17	2.12	none.	none.
Carbon	0.35	0.28		
Carbonic acid			1.17	
Graphite			0.71	
Water				3.27
Insoluble	0.26	5.77		
	99.83	99.79	99.295	100.042
Iron	66.98	63.88	60.17	53.51

1 and 2 by Prof. E. J. Chapman.
3 and 4 by Dr. J. S. Hunt.

B. The Bristol mines in Pontiac County, Province of Quebec, are connected by railroad with Ottawa, 35 miles distant, and present very favorable evidences of a deposit of magnitude from which over 10,000 tons of ore have been won. Some 4,000 tons of this ore were shipped to and smelted in the Charlotte furnace in New York. The ore is a rich, dense magnetite, unusually low in phosphorus, but carrying sulphur in such quantity as to require roasting, for which the property is admirably equipped. There are now in place two Taylor Langdon roasters, and one Westman kiln, modified by Mr. Ernest Sjodstedt, resembling in many points what is known as the Davis Kolby kiln. These kilns are operated by gas generated in Langdon producers. The mine has been opened to a depth of 150 feet, with drifts along the strike of 150 feet and across the vein of 50 feet in one place and 30 feet and 60 feet in length in another locality, while test-pits and magnetic surveys indicate a deposit of considerable magnitude. The following analyses show the composition of this ore, both raw and calcined:

	RAW.		
	A.	B.	C.
Iron	58.37	62.15	61.987
Sulphur	1.46	0.97	2.406
Phosphorus	trace.	0.075	0.06
Silica	11.45	8.52	7.32
Lime	3.91		

	ROASTED.			
	D.	E.	F.	G.
Iron	62.5	62.525	62.87	63.24
Sulphur	0.521	1.1673	2.221	1.08
Phosphorus	0.004		0.014	
Silica				
Lime				

- A. Geological Survey of Canada.
- B. R. Richards, Boston,
- C. Rooth, Garrett & Blair.
- D. Lackawanna Iron and Coal Co.
- E. McGill, Ottawa.
- F. G. Troy Iron and Steel Co.

The latest experiments with the roasters show, according to Mr. McGill's analyses, that the sulphur was reduced to 0.279.

C. In Lanark and Renfrew counties, Ontario 30 miles west of Ottawa, there are some favorable exposures of hematite and magnetic ores, samples taken from exploration shafts or outcroppings analyzed as follows:

	Magnetite.	Hematite.
Iron	65.31	66.00
Phosphorus	0.017	0.06

The location of these ores, while convenient to Ottawa, is such as to facilitate their smelting with charcoal, for they occur in a well-timbered district, in which hard woods predominate.

D. Still further west in Ontario, on the line of the Kingston and Pembroke Railroad, are deposits of magnetite, which have been wrought considerably; such as those at Calabogie Lake and at Wilbur mine. The latter was operated by the Bethlehem Iron Company of Pennsylvania, and considerable ore was shipped to the furnaces of that company at Bethlehem. These ores could also be made accessible to a smelting plant at Ottawa, and lately considerable exploring work has been done in the vicinity of these operations by parties from the United States.

Analyses of some of these ores are presented by Mr. Dewey in the paper above referred to; they show iron 57 to 65 per cent. of iron, with phosphorus generally below the Bessemer limit, and none of the determinations give over 4 per cent. of sulphur. Titanium, when present at all, is, according to the analyses, not over 1 per cent.

There are some hematite ores in the vicinity of Ottawa, but most of the development has been in the deposits of magnetite, and those nearest the city are generally sulphurous; a characteristic which should not necessarily condemn them, in view of the facts that over 1,000,000 tons of sulphurous magnetites are annually smelted in the United States, and that some of the American furnaces which have been most successful financially have used entirely or largely such ores.

Blast-furnace practice has demonstrated that it is difficult to produce good foundry grades of pig-iron with dense magnetites, particularly if they carry considerable sulphur; but modern plants, improved method and chemical research have done much to remove these troubles, and it is not prophesy to state that with a well-equipped and properly managed plant, using thoroughly roasted magnetites instead of ore partially calcined, satisfactory work in this particular can be obtained.*

There seems, therefore, ample ground for relying upon the possibility of assembling a satisfactory supply of ores at or near Ottawa for the maintenance of a smelting-plant.

The limestone which abounds in the vicinity of Ottawa, and which forms the barrier through which the Ottawa River breaks in creating the Chaudiere Falls, furnishes ample flux. This stone is largely magnesian, but officers of the Geological Survey state that it can be obtained

*Vide JOURNAL OF CHARCOAL WORKERS U.S. Vol. VIII, p.21.

*Vide Transactions, American Institute Mining Engineers, Vol. XII., page 192.

as nearly pure carbonate of lime or with varying proportions of lime or magnesia, and the flux can therefore be readily supplied.

The key to the problem would appear to be that of fuel. The Canadian customs protect its domestic bituminous mines by imposing a duty of 60 cents per ton on bituminous coal or coke made from it, but anthracite coal is admitted free of duty. Notwithstanding the tariff levied on foreign bituminous coal, the supply for the Province of Ontario comes principally from the United States. Last year over 2,000,000 tons of anthracite coal from Pennsylvania were consumed in the Dominion, and in addition 1,250,000 of bituminous coal from the United States paid a duty of 60 cents per ton.

The consumption of anthracite is not surprising when we remember that Scranton, the centre of the Lackawanna coal district of Pennsylvania is no farther from Ottawa, in a direct line, than it is from Rouse's Point, N.Y.; Portsmouth, N.H., or Cleveland, Ohio.

Independently of the customs duty, Ottawa is as favorably located for obtaining a supply of Connellsville coke, as the blast-furnaces on Lake Champlain, or those at Chicago; and under favorable railroad rates the cost of coke furnished in large quantities from the Connellsville district at Ottawa should be practically the cost at Chicago plus the duty of 60 cents per ton. The distances from Ottawa to Connellsville, Pa., and to the boundary of the Province of New Brunswick, are practically equal.

If, however, coke made from coal obtained in some of the northern counties of Pennsylvania is brought to Ottawa, there would be a difference in distance of about 100 miles in favor of Ottawa, as compared with Chicago, to offset the duty.

Whether a supply of coke would come from the Connellsville district, or from some of the more northern Pennsylvania plants which now produce very satisfactory coke for iron smelting, or whether it would be brought from the eastern provinces of the Dominion, would be determined by a full consideration of the subject from a commercial basis when contracts were to be let; but to place the problem on a perfectly equitable footing, we may take the price of coke at Connellsville at \$1.50 per ton; add transportation equivalent to the freight from Connellsville to Chicago, \$2.75 per ton, add for duty 60 cents per ton, making a total of \$4.85 per ton. Allow for less favorable freight rates to Ottawa than given to Chicago, we may add 25 cents per ton; making coke at Ottawa cost \$5.10. Therefore, if Connellsville coke costs this amount at Ottawa, a comparison can be made with the cost of that produced in the eastern provinces, or obtained from points in Pennsylvania 100 miles nearer Ottawa than Connellsville.

Anthracite coal can now be delivered at the furnaces on Lake Champlain for \$1.25 per gross ton, and an allowance of \$5.00 per ton at Ottawa would therefore appear to be sufficient. Whether a mixture of anthracite coal and coke would be most advantageous, or what that mixture would be, can only be decided upon actual contract quotations, but from the above figures an allowance of \$6.50 for the fuel to produce a ton of pig-iron at Ottawa would appear to be conservative.

To obtain an estimate of the cost of material used in the production of the metal, we may assume that the ore from the Bristol mines is used, as the development of this property, its roasting equipment and the indications of a large deposit existing, offer the most satisfactory conditions for immediate utilization, while its

distance from Ottawa (35 miles) is such as will embrace other ore deposits, which have been referred to, some of which will not require roasting to eliminate sulphur, and others may be used as mixtures. To allow liberally, the cost may be taken of the

	Per ton.
Raw ore at the mines at	\$1.40
Add roasting and loss60
Freight to Ottawa55

Cost of 1 ton of ore..... \$2.55

As this roasted ore will yield 60 per cent. of iron, or more, the cost of ore for a ton of pig-iron will be: $1\frac{2}{3}$ tons at \$2.55 equals \$4.25. The convenience of fluxing material will make this item small, and an allowance of 50 cents per ton of iron made should be ample. The materials for producing a ton of pig-iron may therefore be summarized as:

Fuel.....	\$6.50
Ore.....	4.25
Flux.....	.50
	\$11.25

To which may be added for labor, repairs, office expenses, supplies, incidentals, depreciation, etc., say..... 2.75

Making a ton of pig-iron cost..... \$14.00

A figure possibly above what practical operation may demonstrate as the actual outlay, but still sufficiently low to encourage operations which will displace at least a part of the 50,000 tons of pig-iron annually imported into the Dominion, or furnish material which may be utilized to produce a portion of the 250,000 tons of manufactured cast- and wrought-iron which enter Canada each year.

That a possible market for the product of a number of furnaces exists in the Dominion needs no exemplification to those who are at all familiar with its territory and its people. But the question naturally arises, can pig-iron be produced in the Dominion to compete with foreign metal?

In this estimate the locality for the smelting of the ores is near the vicinity of Ottawa. There may be other points apparently even more favorably situated, and in that case comparative figures can be readily made. Similarly the ore from the Bristol mines is used as a basis for estimating, because of its convenience to Ottawa, its condition for immediate utilization and the known composition of its product. If ores from other localities are preferable, or if they are to be used as mixtures, proper allowances can be made. We may therefore use the figures of estimated cost herein given as a basis for determining what chances Canadian pig-iron has in competition with foreign iron.

The Canadian duty is now \$4.00 per net ton on pig-iron—the estimated cost above is per gross ton. In addition, the government offer a bonus of \$1.00 per net ton on all pig-iron made in Canada from Canadian ores, therefore the domestic metal would be protected, at least until the expiration of the bounty period, to the extent of \$5.00 per net ton, or about \$5.60 per gross ton.

If now, pig-iron made at Ottawa costs \$14.00 per ton, foreign metal would have to be delivered there at \$8.40 per ton to meet this cost. But an allowance for profit must be made; including this, as well as the percentage of loss from bad debts, and also adding liberally for possible discrepancies in the estimate, say \$2.60, the domestic product could meet foreign iron delivered at Ottawa at \$11.00 per ton. As the iron is shipped away from Ottawa freights must be added, but there still seems to be ample margin to encourage the production of domestic pig-iron in Canada.

The estimates offered are for the production of pig-iron, using anthracite coal, coke, or a mixture of these two fuels, but the subject should not be dismissed without considering the possibility of employing charcoal as fuel, and considerable discussion has, from time to time, been had upon the utilization of the enormous waste from the mills at Ottawa, by converting it into charcoal. The slabs and larger refuse could be charred in kilns, but most of the timber now used in the mills is of a character producing charcoal of inferior quality for blast-furnace use. Improvements in manufacture are also utilizing much of the waste for special products, which reduce the chances of a permanent supply for this purpose.

There seems to be more encouragement to convert the saw-mill refuse and saw-dust into gaseous fuel, as in Sweden, and use it for manufacturing iron and other metallurgical purposes. Gas producers for this purpose would have to be equipped with condensers, for the refuse material supplied to the producers would carry 40 per cent. or more of water.

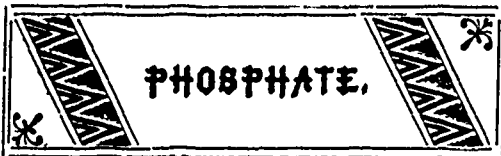
If pig-iron is produced in the vicinity of Ottawa, there would seem to be good encouragement for investigating the economical employment of this waste material, and also the possible utilization of some of the water-power available in the vicinity.

As noted before, the production of charcoal pig iron apparently offers greater advantages at some of the localities where the ores and hardwood timber are contiguous. The charcoal required for smelting a ton of pig iron would probably cost from \$7 to \$8 at Ottawa, from \$1 to \$2 in excess of the cost at the other points indicated. As this charcoal-iron would be used for special purposes, it should command a corresponding price in the market.

Record of a Charcoal Blast Furnace.—

While 85 tons of pig iron in 24 hours has been the greatest outturn of a charcoal furnace yet recorded, the Hinkle blast furnace, at Ashland, Wisconsin, has made as much as 112 tons in the same time. The furnace stack is 60 feet high and 12 feet in diameter at the boshes. Four casts are made daily, and each cast covers considerably more than half the floor of the casting-house. The outturn of the furnace during the month of March, 1889, amounted to 3,004 tons of pig iron. It is thus evident that at least one charcoal furnace, in point of improvement, is keeping pace with the coke furnaces.

The Gaspé Oil Wells.—Considerable excitement is reported from Gaspé, on the south shore of the Gulf of St. Lawrence, in consequence of the extensive preparations now going on for the development of the oil deposits there. Indications of petroleum were found there eighteen years ago, it is stated, and a company was in process of formation for the purpose of boring, when the men interested in the scheme were attracted to Pennsylvania by the immense yield of oil there reported. Col. James Foley, of Boston, representing a company of American capitalists, has now arrived at Gaspé with extensive machinery and a strong force of engineers, derrick builders, etc., and is hurrying forward preparations for sinking a couple of wells to a depth of 2,500 feet each. The company represented by the Colonel, it is reported, has acquired a large area of the land covering the Gaspé deposits.



PHOSPHATE.

In General.

A strong company, with a capital of \$1,200,000, has been formed to work an extensive deposit of phosphatic marl, containing, it is said, 75 per cent. of phosphate of lime in Florida. The property consists of 13,000 acres along the Withlacoochee River, near Dunellan in Marion and Cibiris Counties.

In round figures Great Britain annually consumes:—phosphates imported 270,000 tons; coprolites (home production) 20,000 tons; bone, animal charcoal, bone ash, imported 50,000; bones; home production say 60,000 tons, in all about 400,000 tons of fertilizing material.

Great Britain, it is estimated, has imported during a period of nine years ending 1887, about 1,030,842 tons of South Carolina phosphates. The demand for these phosphates in the United States increases rapidly from year to year thus reducing their exportation abroad, and English manufacturers are now looking to other sources for their future supplies. In this connection it is very gratifying to find that the extensive areas of Canadian phosphate are now rapidly gaining in favor.

Mons. Graudeau recently estimated that one year's crop in France represents 298,700 tons of phosphoric acid, of which only 151,200 tons of phosphoric acid were recovered in the stable dung, thus leaving a deficit of 147,000 tons of phosphoric acid, equal to over one million tons of superphosphate, to be made good by other means. The same authority also estimated that the entire number of farm animals in France in 1882, representing a live weight of 6,240,430 tons, had accumulated from their food 193,453 tons of mineral matter, containing 76,820 tons of phosphoric acid. These figures give some idea of the enormous quantities of phosphoric acid required to restore to the soil what is continually being carried away by the crops sold off the farm.

Markets.

Latest advices quote a good market in Britain for Canadian phosphate @ 1 3/4d. for 80% and 10 1/4d for 75%. A prominent exporter has shewn us a letter in which it was stated that contracts for next season are now being made at a still greater advance on current quotations.

Shipments.

A prominent shipper writes: "Owing to the scarcity of freight room, and the London Strike which retained some of our steamships on the other side for six weeks and subsequently blocked the railways with freight so that we could not even obtain cars at Buckingham, a great deal of Canadian phosphate has been left over that should have gone forward this year. We have over 40 carloads here in Montreal which should have gone forward; all our bins at Buckingham are full, while large quantities are lying at East Templeton, Perth and Kingston. All the other miners and shippers are in the same position."

It is estimated that all the phosphate held over until next year will exceed 5,000 tons.

Great Britain is estimated to have imported during the nine years ending 1887 about 1,030,

842 tons of South Carolina phosphates. The home consumption of these phosphates is, however, increasing yearly, and British manufacturers are now looking to other sources for their future supplies. Canadian phosphates, we are glad to say, are steadily gaining in confidence on the other side, and there is every indication at present, that considerable capital will soon be forthcoming for their further development.

Shipments, 1889.

The following is a statement of the shipments of Canadian phosphate from the Port of Montreal, to date:

Date.	Vessel.	Destination.	Shipper.	Tons.
April 30	S.S. Lake Nepigon	Liverpool	Lomer, Rohr & Co	240
May 13	Toronto	"	Anglo-Can. Ph Co	350
" 13	Lake Winnipeg	"	Lomer, Rohr & Co	95
" 15	Colina	Glasgow	Wilson & Green	22
" 17	Loch Lomond	London	Lomer, Rohr & Co	557
" 20	Oxenholme	Liverpool	Wilson & Green	350
" 20	Fremona	London	Millar & Co.	375
" 22	Alcides	Glasgow	Lomer, Rohr & Co	400
" 22	Montreal	Liverpool	"	338
" 23	Castellano	"	"	600
" 27	Lake Ontario	"	"	300
" 27	Henri IV	"	"	150
June 1	Canopus	"	Wilson & Green	300
" 1	"	"	Lomer, Rohr & Co	100
" 1	Kehrweider	Hamburg	Wilson & Green	251
" 5	Circe	Glasgow	Lomer, Rohr & Co	400
" 5	Michigan	London	"	180
" 10	Lake Superior	Liverpool	"	180
" 10	Ripon City	Hull	Millar & Co.	260
" 11	Oregon	Liverpool	Lomer, Rohr & Co	100
" 18	Satumine	"	Wilson & Green	401
" 18	"	"	Lomer, Rohr & Co	150
" 21	Zambesi	"	Millar & Co.	300
" 21	"	"	Lomer, Rohr & Co	100
" 25	Montreal	"	"	270
" 29	Lake Ontario	"	"	200
July 5	Fremona	London	"	600
" 5	Colina	Glasgow	Wilson & Green	134
" 5	Vesta	Liverpool	Lomer, Rohr & Co	160
" 5	"	"	Wilson & Green	1,6
" 11	Etna	Hamburg	Can. Pac. R. Co.	1
" 11	"	"	Wilson & Green	244
" 12	Erl King	London	Millar & Co.	235
" 16	Canadian	"	Wilson & Green	444
" 16	Lauderdale	W. Hartlepl.	Lomer, Rohr & Co	200
" 18	Circe	Glasgow	Wilson & Green	212
" 19	Fort William	Bowling	Lomer, Rohr & Co	225
" 23	Blk. Paregio	Glasgow	Wilson & Green	150
" 23	S.S. British Prince	"	Lomer, Rohr & Co	305
" 23	Canopus	Liverpool	"	190
" 23	"	"	Millar & Co.	185
" 26	Michigan	London	Lomer, Rohr & Co	220
" 26	Lake Huron	Liverpool	"	375
" 31	Montreal	"	"	325
Aug. 2	Grecian	London	Millar & Co.	200
" 2	"	"	Wilson & Green	187
" 2	"	"	Lomer, Rohr & Co	380
" 3	Bonington	Liverpool	"	300
" 6	Kehrweider	Hamburg	Wilson & Green	256
" 6	Merch's Prince	London	Lomer, Rohr & Co	300
" 6	Vancouver	Liverpool	Millar & Co.	130
" 14	Stenhoft	Hamburg	Lomer, Rohr & Co	240
" 16	Gordon Castle	London	"	385
" 17	Glenfleur	Liverpool	Millar & Co.	250
" 17	Ocean King	London	Lomer, Rohr & Co	50
" 17	Assyrian	Liverpool	Wilson & Green	258
" 20	Circe	Glasgow	"	185
" 21	Earl of Zealand	Liverpool	Lomer, Rohr & Co	350
" 22	Blk. Skjald	W. Hartlepl.	"	100
" 23	S.S. Hitava	Liverpool	"	493
" 26	Acuba	London	"	100
" 28	Toronto	Liverpool	Millar & Co.	425
" 30	Gerona	London	Lomer, Rohr & Co	392
" 30	Ostris	Grimsby	"	210
" 30	Blk. Eldsiva	Cardiff	"	100
" 31	S.S. Concordia	Glasgow	Wilson & Green	400
Sept. 1	Canopus	Liverpool	"	354
" 14	Alcides	Glasgow	Lomer, Rohr & Co	250
" 14	Angers	London	"	151
" 7	Harbinger	Glasgow	"	200
" 10	Vancouver	Liverpool	Millar & Co.	100
" 18	Sarnia	"	"	200
" 19	Eri King	London	"	200
" 19	"	"	Lomer, Rohr & Co	150
" 21	Smart'n Tower	"	Wilson & Green	200
" 21	Haverton	"	Lomer, Rohr & Co	163
" 24	Circe	Glasgow	"	220
Oct. 2	Toronto	Hamburg	"	120
" 2	"	Liverpool	"	210
" 4	Aberdie	London	"	240
" 14	Lake Ontario	Liverpool	Millar & Co.	200
" 15	Fremon	Hamburg	"	180
" 17	Michigan	London	Lomer, Rohr & Co	240
" 18	Blk. Lake Ontario	Liverpool	Wilson & Green	320
" 19	S.S. Alcides	Glasgow	Lomer, Rohr & Co	200
" 23	Stenhoft	Hamburg	Wilson & Green	200
" 23	Sarnia	Liverpool	Millar & Co.	200
" 25	Colina	Glasgow	Wilson & Green	170
" 25	Horton	London	Lomer, Rohr & Co	147
" 31	Circe	Glasgow	Wilson & Green	307
Nov. 6	Toronto	Liverpool	Lomer, Rohr & Co	203
" 6	Dominion	Bristol	Wilson & Green	200
" 8	Concordia	Glasgow	Lomer, Rohr & Co	150
" 9	European	London	"	210
" 14	Gordon Castle	Glasgow	"	370
" 16	Lake Ontario	Liverpool	"	250
" 16	Ontario	Bristol	Wilson & Green	100
Total				23,540

* 134 bags. † 2 bbls. ‡ Via Aberdeen.

RECAPITULATION.

Shipper.	Tons.	Bags.	Bbls.
Lomer, Rohr & Co.	13,633		
Wilson & Green	6,017	134	
Millar & Co	3,549		
Can. Pacific R'y Co			2
Anglo-Can. Phosphate Co.	350		
Total shipments to Europe	23,540	134	2

DISTRIBUTION OF QUANTITY EXPORTED.			
	Tons.	Bags.	Bbls.
Liverpool	10,453		
London	6,420		
Glasgow	3,891	134	
Hamburg	1,491		2
Bristol	200		
W. Hartlepool	300		
Hull	260		
Bowling	225		
Grimsby	200		
Cardiff	100		
Total exported to Europe.	23,540	134	2

Exported to United States from Ottawa Valley.

Month.	Value.
January	\$2,441 02
February	1,519 50
March	700 00
April	1,949 85
May	1,660 00
June	1,320 00
July	2,760 00
August	3,000 00
September	4,000 00
October	4,000 00
To November 22nd	2,300 00
Total value	\$25,650 37

Or, at \$10 per ton, 2,565 tons of ground phosphate, shipped entirely by Millar & Co. and Lomer, Rohr & Co.

DISTRIBUTION OF SHIPMENTS TO UNITED STATES.

Point.	Value.	Tons.
Chicago	\$11,441 02	say, 1,142
Buffalo	13,599 50	" 1,362
Detroit	599 85	" 60
Philadelphia	10 00	" 1
Total	\$25,650 37	2,565

From Kingston mines, as per Customs returns... 361

Total tons to United States... 3,926

Summary of Output from Canadian Mines for 1889.

	Tons.	Bags.	Bblr.
Shipped to Europe	23,540	134	2
United States	3,926		
Estimated quantity held over at mines	5,000		
Total output	32,466	134	2

Du Lievre District.

From returns received, the North Star Mines have been unquestionably the largest producers this year, quite 10,000 tons having gone forward, while a large quantity has been held over until next season. Capt. Williams has from 50 to 60 hands employed, and a steady output is maintained. All the pits looked well. Copeland and Facon, New York, have lately furnished a new hoisting engine, and we believe other plant will shortly be added.

The shipments from the High Rock Mines will, we believe, be somewhat less than former years. We should judge that a little over 6,000 tons have been shipped to date. A good deal of dead work had to be done early in the season, which will account for the falling off from former years. About 150 men and boys are now employed, and all the pits, particularly the Cap Rock, are showing up well. Like the other mines, the High Rock has been compelled by the scarcity of freight to hold over a large quantity until next year.

Among the new companies lately registered in London is the Dominion Phosphate Company (Limited), registered by Johnson, Budd & Johnson, 24 Austin Friars, E.C., with a capital of £40,000 in £5 shares. The property acquired (Lot 7 Second Range, Portland East) is situated on the left bank of the river, within easy distance of the Little Rapids Landing, and was formerly owned by Angus McMillan. The price paid, we understand, was \$15,000 cash. Mr. Pielsticker, the superintendent, with a good force, is now actively opening up the property, and producing a good output of excellent quality. A little over 200 tons have been raised since operations were begun.

Messrs. Hutchinson and Wurzbarger, who have been spending the last few weeks in a close and minute inspection of our sources of phosphate supplies in the interests of the Anglo-Continental Guano Co. (formerly Ohlendorffs), have returned to England, thoroughly well pleased with their trip and with their investigations. Before leaving, we understand, they completed, on behalf of their company, the purchase of the property of Mr. A. F. McIntyre, consisting of 200 acres, and located immediately adjacent to the Emerald mines, in the township of Buckingham. The price is not stated, but we have heard \$60,000 mentioned as the amount probably paid. The necessary plant, and an efficient force will at once be set to work the property on an extensive scale. A small gang is now engaged in preliminary working. The appointment of a manager is not yet announced.

There has recently been uncovered on the Aetna Lot (part and parcel of the property acquired by the Anglo-Continental Guano Co.) a monster crystal of green apatite, weighing several tons, and probably the largest in the world. Its dimensions are seven feet long by four feet wide. It is perfectly formed. An endeavour will be made to excavate this enormous crystal in its entirety.

We have nothing to report from the Emerald mines. The shipments are thought to have been below the average of previous years.

Mr. W. A. Allan continues to carry out his plan of the systematic development of his Little Rapids mine. At present the men are employed on several excellent shows, in which, at our last visit, large masses of rich phosphate were exposed.

Recent advices from the district state that all the pits of the Canadian Phosphate Company are doing fairly well. It is estimated that quite 3000 tons of cobbled phosphate have been held over at the mines. As will be seen from a reference to the table of shipments, the quantity exported by the company to Europe was 3540 tons, while a large quantity of lower grade was sent in a ground state to the United States.

Templeton District.

The shipments from the Blackburn mine aggregate about 1,200 tons. This is much less than in former years, and is altogether due to the amount of improvement work done on the property during the season.

Perth District.

At the Bob's Lake Phosphate Mines, the Anglo-Canadian Phosphate Co. continues to secure a large output for the number of men employed. From one pit 53 tons were mined, cobbled and piled in three weeks by 5 men and 2 boys, the hoisting being done by horses. A seam 200 feet in length and four feet wide has been opened in the past month. The surface ore in this vein is mixed with iron, but is likely to improve at a depth.

Mr. Wurzbarger, a Belgian engineer, has visited the Otty Lake and Bob's Lake Phosphate mines lately in company with Mr. Richardson of Kingston. He has been taking notes of all the principal properties in the country.

Mr. Wm. Davies of Perth is having contract work done on a lot near Otty Lake, belonging to Mr. Morris. Some good seams have been

opened, one of which is said to be seven feet in width. One of the oldest miners paid \$50 for a half interest in the working of it on contract at \$6 per ton.

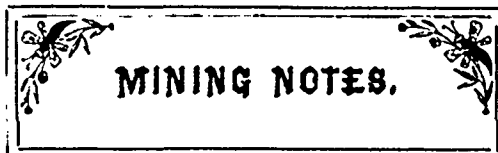
A surveying party is now locating the route for the extension of the Brockville & Westport Railway to Sharbot Lake. They have located the line across the narrows of Bob's Lake at Kilpatrick's, and through the lots on which the Bob's Lake Phosphate mines are situated. This will give the best possible facilities to the phosphate industry of that region. American capital has been secured and the line will be built next summer.

Kingston District.

We are advised that the old Board of Directors of the Foxton Mining Company has been reinstated, and that the first allotment of shares has been ratified. The mine continues to turn out about 300 tons per month of high grade ore. Since 1st of May to close of navigation some \$50 tons have been shipped from the mines.

The value of the phosphates exported from this district to Great Britain and the United States since 1st January to date, is officially stated at \$11,944.

Capt. Boyd Smith has resumed operations at the Blessington mines.



Nova Scotia.

Miscellaneous.

At the Albion Colliery, the further sinking of the "English" slope has been suspended. How long this suspension may last is uncertain. The machinery, so far employed in sinking, is not heavy enough for more extended operations, and the company may not be in a position at present to procure the machinery to the full equipment of another colliery. The work done is satisfactory, and has demonstrated that a large area of good coal in the Cage pit seam is readily procurable. The further the sinking went the better the coal became. The bottom bench contains three feet to three feet six, and the fall two feet of excellent coal, with a thickness of two feet between of harder coal. This stone bench, as it is called, disappears towards the deep, and at a further distance of 100 feet it is believed the seam is of a uniform, superior quality. Before the slope, which has been sunk some 1,700 feet, can be successfully operated, a new hoisting engine is necessary, and also a branch railway connecting with the main line.

The following are the successful candidates for certificates of competency at the recent meeting of the Nova Scotia Examining Board:

UNDERGROUND MANAGER'S CERTIFICATES.—A. McDonald, Cow Bay; John Carey, Sydney Mines; D. H. Ferguson, Victoria; Isaac Greenwell, Victoria; S. F. Lee, Victoria; Bart Connors, Victoria; G. W. Greenwell, Victoria; E. McPhee, Victoria; A. Ferguson, Victoria; H. McKinnon, Stellarton; A. D. McKenzie, Stellarton; H. McCarter, Stellarton; A. McDonald, Stellarton; W. Lorimer, Maccan; T.

Blackwood, Maccan; C. Hargreaves, Spring Hill. **OVERMEN'S CERTIFICATES.**—Murd. Morrison, Cow Bay; R. B. Crosby, Cow Bay; Chas. Young, Sydney Mines; Ed. Lockman, Sydney Mines; M. Sullivan, Sydney Mines; John Dorsay, Sydney Mines; David Brown, Sydney Mines; Thos. Johnstone, Bridgeport; John Caddigan, Bridgeport; Alex. Cameron, Victoria; D. Ferguson, Victoria; A. McAskill, Victoria; M. H. Nicholson, Stellarton; A. Babine, Maccan; Charles Rennie, Springhill; Arch'd. Ferguson, Spring Hill; W. Matthews, Spring Hill; George Yarrow, Spring Hill; Alex. B. Wilson, Spring Hill.

Rockingham.

There has been a newspaper excitement for some time past over the discovery of lodes near the "Prince's Lodge," supposed to be gold bearing, but a close examination of the lodes as yet stripped fails to discover any gold in them. Rumor has it that a mill is to be built there at once; it is to be hoped that such is not the case, for very much development work is needed upon the lodes already found before there can be the least foundation for such an expenditure of money.

Ardoise Hill.

The property of the St John, N. B., Company, formerly operating here, was sold by the Sheriff on Thursday, October 10th. It is understood that the property was bought in for the shareholders, and that the old company will be re-organized.

Central Rawdon.

Manager Willis has ordered from I. Matheson & Co., New Glasgow, two new boilers for the Northup Mine, each is 4½ by 14 feet, and is nominally 60 horsepower. New pumping and winding gear will be added shortly.

North Brookfield.

The new mill of the Philadelphia Gold Mining Co. is nearly completed, and will be turned over to the company by the contractor before the end of October. The mill has 20 stamps.

Fifteen Mile Stream.

The Egerton Company has encountered a richer streak of ore towards the eastern end of their workings. Returns for September show 131 ozs. from 183 tons crushed.

Killag District.

Late advices from this district show that the lode referred to in September issue has been cut. Owing to the protracted drought of this summer the large swamp was dried to a greater extent than was ever known before, and Mr. Stuart put some men at work sixty feet north of his main shaft in line with his rock crosscut. To his surprise but six feet of surface were encountered, and the shaft came down nearly upon the lode. The lode thus exposed is about 10 inches wide, and judged worth \$30 per ton. The steam hoisting and pumping gear is being moved to the shaft on the new lode, and work will continue all winter.

New Brunswick.

The Markhamville mines are now owned and operated by The Pope Manganese Company, of 62 Franklin street, Boston. W. C. Pope, Esq., is general manager, and Major Markham is the manager at the mines, as he has been for upwards of 23 years. The new company have added to their plant a Diamond drill from the Bullock Manufacturing Co., of Chicago, for prospecting purposes, and a cyclone mill from the Canada Pulverizing Company, of Montreal, for grinding Manganese; both machines have been in operation some weeks. About fifty

hands are constantly employed in and about the mines and mills. High class manganese milled and prepared for consumers is being constantly shipped to headquarters in Boston for distribution to customers all over the United States and Canada, and several cargoes of blast-furnace ore have been shipped to steel furnaces in Pennsylvania during the summer.

While very little work has been done at the Stockton mine, during the summer, a number of speculators and so-called experts have visited the property, and it is reported that offers have been made for its purchase, but the owners still have a fancy price on it.

The Quac mine is being operated again by a Boston company, and one shipment of about 40 tons of blast-furnace ore has been made to the United States. Mr. Morrison is the foreman at the mines. He reports about 150 tons now ready for shipment to Carnegie Bros., Bessemer, Pa.

Application for incorporation is made by the Welsford Red Granite Co., for the purpose of quarrying red granite at Welsford, Queen's Co. The capital is \$50,000 in 1,000 shares, and \$10,000 has already been subscribed. The following are the first directors of the new concern: B. Sancton, banker, New York; A. J. Trueman, barrister, St. John, N. B.; J. A. Chesley, manufacturer, St. John; R. Wisely, St. John; John O'Connor, St. John, N. B.

Mining matters here are comparatively quiet at present, but there is a possibility of considerable capital being expended in the near future. The manganese deposits of New Brunswick attract considerable attention. The chief deposits are in King's County, near Sussex, where are located the well known Markhamville mines, which have been worked continuously for thirty years or more, and show no signs of exhaustion. This property is managed by Major A. Markham, of Markhamville, and affords employment to a large number of employees. The ore is exported to Nova Scotia and Great Britain.

Two other manganese mines are in this locality—one, known as the Jordon Mountain mine, on which exists a large body of ore suitable for steel purposes. It is rumored at the present time that American capitalists are negotiating for the purchase of this property. This mine is about six miles from Sussex station, on the Intercolonial Railway.

In the Dutch Valley district, in same direction as the Markhamville mines, is a property known as the "Glebe," owned by Bar Harbour and local parties. It has had considerable development and bids fair to be a productive property. The ore is of a high grade and very pure indeed.

Manganese is also reported in the vicinity of Golden Mountain, in Albert County, in paying quantities. Near Hopewell or Hillsboro, in Albert County, are deposits of manganese, and it is said a property of wad or bog manganese has recently been sold to American capitalists. Manganese is also reported to occur in the northern part of New Brunswick, but enough work has not been done to establish the paying capabilities of the same.

Near Bathurst, in Gloucester Co., a valuable vein of magnetic iron ore has been recently disposed of to New York parties at a fair price,

and work of development is now in course of progress. The ore belt is fully 30 to 40 ft. in width, and assays have shown fully 66 per cent. metallic iron with great freedom from silver, phosphorous, etc. Running parallel with the ore vein is a load of yellow sulphate of copper fully 6 ft. in width, giving about 13 per cent. copper. This bids fair to be a very valuable property.

Lead and silver ore in good paying quantities exist in Gloucester Co., on the Mackadoo and Elm Tree rivers, and would repay the expenditure of capital. Specimens of galena from the Elm Tree mine have assayed as high as \$300 per ton, and in some instances associated with it as high as 22 dwts. of gold.

Recently a galena vein of good paying character has been discovered at Jacksonville, a few miles from Woodstock, and work of exploration is being vigorously carried on. A shaft has been sunk 50 ft. up to present date, and prospects look exceedingly bright.

Lead and silver or galena ores occur at several other points in New Brunswick. On the Hammond River, in Kings County; at Musquass, in St. Johns County, and in several other localities, very little has been done to develop them.

The iron deposits of Woodstock which were worked some years are extensive, and in these days of scientific treatment, iron ores should be profitably worked by capitalists.

The gypsum or plaster mines of Hillsboro are being vigorously worked, and with the completion of the Tobique railway now under contract, the immense plaster deposits of this locality will no doubt be extensively worked. Plaster deposits also occur in paying quantities in lower portion of Kings County, in the vicinity of Upham.

In St. George and along this peninsula large deposits of yellow sulphuret of copper exist, and beyond doubt could be profitably worked. Along the Bay of Fundy shore, near Point Wolfe, other ores exist in paying quantities.

In King's County, brine springs are quite numerous, and at or near Penobscus small works are in operation. The salt manufactured here is beyond doubt superior to any in Canada, and with the application of capital to run them on a large scale, could beyond doubt be made to pay handsomely.

Finally, in this somewhat rambling description, it may be safe to say that those who have given the subject considerable thought have a firm and abiding faith that gold will be found yet in paying quantities. Geological reports on the Province show gold at several points, and it is currently said it exists beyond doubt on the Tobique. Gold has been found in the drift or sand in some of the streams of Albert County, and evidences of it have also been found in the St. George District. No regular or systematic search has been made for it, but the time is not far distant when it will be, and with a modification of our mining laws, which are somewhat crude, and which it is proposed to amend this coming session of the Local Legislature, we may hope for a vigorous research for this much coveted article.

It is reported that the somewhat singular deposit of bog manure in Albert County has been sold to New York people.

Mr. Fenwick Fraser, of Rothesay, and others, are doing some prospecting in Albert County, on a lead of galena and silver, a shaft has been sunk upwards of 50 ft. with very encouraging results.

Mr. James Martin, of St. Martins, and Mr. N. Shaw, of St. John, have made some trial pits on a lead of silver and galena at Musquash, in St. John County, with like cheerful prospects.

Quebec.

Notwithstanding the unfavorable weather, operations are going on briskly at all the mines, and large shipments of asbestos continue to be made.

Mr. William King has had the debris from the recent land slide cleared out of his main pit and mining is now being conducted on some excellent veins. The explorations on Lot 28, 5th Range, Thetford, and on the property in the Township of Ireland have proved eminently successful. These reserves give promise of excellent returns.

Shipping from the Bell's Company pits continues to be brisk. We observe that the shares of company put on the market last year at £5 are now quoted at £20.

Great activity is also noticeable at the pits of the American Asbestos Co., the Johnston-Irvine Co., and other concerns.

The United Asbestos Company (Ltd.), London, Eng., has recently acquired the interests of the Frechette Mining Company, at Black Lake, Megantic County. The property consists of 75 acres fairly developed, and the price paid was \$70,000. This concern has hitherto been one of the largest users of Italian asbestos. Mr. John J. Penhale, formerly of the Scottish Canadian Company, has been engaged as mining superintendent. Orders have been given for a complete plant, and as soon as this is in place, operations will be carried on in a large scale.

The production of Canadian asbestos for the fiscal year ended 30th June last, is estimated to have been close upon 5,000 tons.

A fair output of copper is maintained at the Harvey-Hill mines. The smelter gives satisfaction.

The British North American Mining Co. has issued a call of thirty cents per share to meet municipal taxes.

Dr. Jas. Reed, will, we understand, commence work shortly on his property, Lots 27, 28 and 29, Range A, Coleraine. A plant similar to that in use at the American Asbestos Co., will be used.

Messrs. Thompson & Sheridan, of Toronto, have purchased 300 acres of land lying in St. Sophie parish, Que., in which it is said, are large and valuable deposits of marble, equal to the finest found in Italy.

The Plumbago mines and mills near Buckingham are now working full time. Shipments to the States give great satisfaction.

Messrs G. H. Nicholls & Co. of New York, have commenced operations at their New Smelting Works at Capelton. The demand for this Company's superphosphate is, we are glad to say, steadily increasing.

The Bristol Iron Company having made a large sale of ore to the Crane Iron Company, of Catasqua, Pennsylvania, have commenced shipping. 1,500 tons have already gone forward, and the output is being daily increased as experienced miners arrive from other mining districts. The Bristol ore being a strictly Bessemer ore, high in iron and low in phosphorus, is being sought after by the large steel companies, especially by those making a specialty of low phosphorus steel, such as the Crane Company. The ore is loaded in cars at the mine, as the short line built by the owners of the mine to connect with the P. P. J. Ry. at Wyman's station is in operation. The C. P. R. takes it from Aylmer to Prescott, the Rome, Watertown & Ogdensburg takes it to Sterling Junction, where the Lehigh Valley Ry. connects and takes it to the furnace. We shall watch the development of the business of this mine with much interest.

Ontario.

We understand that a delegation from the Town Council of Lindsay has waited upon some members of the Ontario Government to urge upon their attention a scheme which aims at developing the iron mines near Kinmount and the extension of the Irondale and Bancroft railway. A public meeting was held in Lindsay last week to discuss the same project, the mayor in the chair, members of the Board of Trade and a number of citizens being present. The project was explained by Mr. Pussey, who said they had the written guarantee of Mr. Dodge, of New York, to provide funds for the extension of the railway. Mr. Witherow, of Pittsburgh, an extensive builder of smelting furnaces, said he had carefully examined the mines and pronounced the ores richer than those of Northern Michigan. He proposed to erect a furnace that would cost \$125,000, that would require 200 cords of wood per day for charcoal, and that would turn out 100 tons a day of charcoal pig iron. The location had no superior in the United States for charcoal iron. He had confidence in the project, and might take \$20,000 in stock in January. Mr. Pussey said they desired a bonus of \$10,000 each from the counties of Haliburton, Peterborough, and Victoria, as these sections would experience direct practical benefit from the opening up, settlement, and development of the mining district. Also they desired to obtain from the Ontario Government a bonus of \$2,000 a mile for the railway, and the right to purchase 30,000 acres of wild land for the iron mines. Mr. Witherow also gave an interesting practical address, in which he referred to the feasibility of establishing iron furnaces in the locality. A resolution was finally moved by Mr. John Dobson, seconded by Mr. Richd. Sylvester, and carried, recommending that the Ontario Government be urged to assist the enterprise.

Surely it is time that the Report of the Mining Commission was in the hands of the public. The Report was promised for the last session of the local legislature, but was not

forthcoming when the House prorogued. We were assured it would be ready for distribution at the recent Meeting of the American Institute, and again we were disappointed. When the Report does come out, its value will be very much depreciated on account of this inexcusable dilatoriness on the part of the Commissioners.

The small stamp mill at Flinton was destroyed by fire on Thanksgiving day. Loss estimated at \$2,000. A new mill is to be built immediately.

Port Arthur District.

A steady output from the Beaver, Badger, Elgin, Shumiah Weachw, Crown Point and West End mines continues satisfactory.

Iron lands are still eagerly sought after and no little interest is taken in the nickel and gold deposits—splendid specimens of the former being obtained on the north shore of Lake Superior, along the C. P. R. line, not far east of Port Arthur.

Promoters of reduction works are looking after the splendid water power in this neighborhood, as much of this class of work can be cheapest done by electrical appliances. The water powers are both magnificent and numerous.

The Beaver has now attained a depth of 530 feet. Nothing but development work has been carried on at this mine for the past 18 months. They are now about to commence stoping and shipping. They have sufficient mill rock on the dump and in sight in the mine to run their mill for two years, but it is not proposed to start it up until about the 1st of May next. Their first shipment of high grade ore, consisting of 40 barrels, is now ready and will be made within a few days. They have just placed in position at the bottom of the mine an improved diamond drill capable of boring 1,200 feet in depth.

Mr. Oliver Dounais still continues work on his Lake of the Woods properties. Six assays made from the whole vein average nearly \$22 per ton and as these assays are not made from picked specimens, but from the whole vein, and as the ore can be mined and milled for from \$8 to \$10 per ton, there is a handsome profit in prospect.

North-West Territories.

A special general meeting of shareholders of Alberta Railway & Coal Co., will be held at London, England, on 2nd December next. The objects of the meeting are: To ratify an agreement with the Great Falls and Canada Railway Company; to ratify an agreement with the North Western Coal and Navigation Company, limited; To authorize the issue of bonds and shares required under said agreements.

British Columbia.

A recent shipment from the Rock Creek mines of 60 tons to San Francisco averages \$1,100 ounces of silver and \$700 gold per ton. As it cost the company \$100 per ton to pack this shipment to the railway, no further evidence is needed to show that the construction of good roads is an urgent necessity.

The shipments of Texada iron ore were: September, 675; October, 750; Total, 1,425 tons.

The following is a summary of the shipments of coal from the port of Nanaimo for the months of September and October:

Name of Company.	Sept.	October.	Total.
	Tons.	Tons.	Tons
Vancouver Coal Co	7,744	12,702	20,446
Dunsmuir & Sons	19,941	17,933	37,874
East Wellington Coal Co	4,774	1,858	6,632
Union Colliery Co	2,450	7,044	9,494
Total	34,909	39,537	74,446

We understand that negotiations have been completed by Mr. S. M. Robins and Mr. J. Rosenfeld on behalf of the New Vancouver Coal Company, for the bonding and purchase of the extensive coal lands in Cedar District, about five miles distant from this city and nearly contiguous to the present South Field property of the company. The amount of land purchased will aggregate 3,260 acres, and is the same land which the famous Dr. Griffin secured a bonding right thereon, which he so ingloriously allowed to lapse by effluxion of time. The new Vancouver Coal Company is to be congratulated on the successful acquisition of this valuable coal property. Among those who have bonded their land are Mayor Bate, E. Quennell, Charles York, T. D. Jones and T. Wall.

The completion of the sampling works in connection with the Revelstoke Smelter and the announcement that the company owning the same is now prepared to purchase all ores that may be offered for sale, are matters of satisfaction to every one interested in the welfare of the province. Although the works are not yet in a condition for actual smelting, the company are prepared to sample and buy ores, so that the miners are now assured of a market. Great credit is due to the company and its management for the progress made, and it is to be hoped that the financial results will be all that the energetic promoters expect.

Quantity of Steel in the Forth Bridge

—The Firth of Forth bridge at Queensberry, Scotland, will use 50,000 tons of the finest steel, and one of its cantilevers, if placed on end, would be nearly as high as the Eiffel tower. The latter contains 7,500 tons of iron.

A Large Cable Hoisting Machine.—

The Trenton Iron Co., of Trenton, N. J., has completed a tramway in the Blackington Farm quarry, of Rockland, Conn., which has one of the longest stretches of cable and is one of the biggest plants of its kind in this country. The cable is 1½ inches thick, of cast steel with a steel centre, and is 1,255 feet long. The weight of the wire on its reel was 10,000 pounds. The anchorage weight, at the lower end, is 75 tons, while the weight of the wire, with its pulleys, cars, etc., is 36 tons. The breaking strain of the wire is 110 tons. The cable is passed over towers 42 feet high, and the wire in the sag is 125 feet above the quarry floor. The hoisting apparatus consists of a travelling car, which goes back and forth on the wire, never leaving it, and 19 trolley blocks which support the wire that controls the fall block, which lowers the drag or bucket into the quarry. The apparatus allows the drag or bucket to be lowered and hoisted from any point on the quarry floor the entire length of the wire.

The Sudbury Mines and Works.

(Continued from last issue.)

Dr. PETERS—Pyrrhotite does not contain cobalt. I have made some experiments with phosphorous and nickel but they have been very unsatisfactory. Grenier in Germany has made some announcements of finding very valuable alloys with nickel and phosphorous, and is going to make them public. What Dr. Raymond said about sweeping away the cobwebs around the metallurgy of a few years ago, is one of the truest remarks I have heard, and he has put it in the happy way that is characteristic of most of his remarks. I could name half a dozen different things, if I had time, but one thing is the steep, the mixture that the furnace bottom is made of. I have sat for hours listening to the proper proportion of charcoal. I think there were three lectures at Freiberg on the steep; but I got rid of steep very quickly when I got into smelting. At Ely they used it, but we smelt right against the water jackets of the furnace. Another matter was the length and shape of the nose of the furnace. I mean the prolongation of the inside or tuyer holes. In our ancient metallurgy it had to be just so, but now all we do is that once an hour a man goes around and knocks the little acretia off. As regards salamanders, which were the bane of metallurgy, they made me once swear I would never start a blast furnace. I have not seen a pound of wrought iron in a furnace for ten years—never since we have used these wells in front. I will tell you a short story which I gave once in Boston. The audience sat so gloomy that I wrought in this story, not to enliven them altogether, but as a matter of instruction to some member to whom it might prove useful as a warning. It was when I first began smelting in Colorado, and it was while running that furnace I first met Dr. Raymond. I was just starting out and was very young—just twenty years old—and it was the first opportunity I had of showing what I was worth. In those days failure was so common in all those smelting enterprises that nobody expected anything else in my case—except perhaps the people immediately concerned with the enterprise. Every smelting operation had failed, except Prof. Hill's, and that was the one star that relieved the darkness which enshrouded Colorado for a good many years. Just as soon as our company started putting up furnaces everyone felt it would fail. That was a foregone conclusion. We started putting up this furnace in South Park, and as I felt my whole future depended on how it should run, I took more pains with it than I have ever taken since. I fairly made myself sick over the work. I got the furnace built and spent hundreds of dollars in sampling ores. I had a chemist there. I took the greatest pains to get every kind of flux down to sulphate of soda—which was not needed however. I made all arrangements to start up, for the ladies were beginning to come over there and nearly all our directors came out. It was the Moose Mountain Smelting Company, and our directors nearly all came out with their wives, and sisters, and cousins, and aunts to see the furnace start (laughter). It would be the making of the district if it should run, because it would afford a market for custom ore. No person, however, had any confidence in my success, except those perhaps around me. Some of them felt uncertain. To make a long story short, we started up with charcoal—miserable soft stuff—and I took the greatest pains to have the most fusible ores with plenty of lead in them, and everything as nice as could be. I felt nervous about it, as it was my first attempt. We started by putting in a small charge of slag and gradually increasing it, replacing one shovelful of slag by one of ore, and so on until it was time to leave the feeding floor and look in at the tuyeres, in order to see how my noses were getting on. Instead of seeing what I expected, I saw long ropes hanging down like icicles. I thought the fire brick lining was beginning to melt. In about ten or fifteen minutes these tuyeres were stuck up completely and in about an hour the furnace was stuck up too. I tore it out and my directors looked a little long in the face when I started up again. I could not vary my charge much. I had figured it out exactly, but I made it still more basic than before, but by midnight it was frozen solid and worse than before. If there was ever a desperate man it was me. The directors, however, treated me kindly. They said:—"Here you are played out; go up to the house and lie down, you will feel better to-morrow." I went up with the feeling that my whole professional career was blasted. I had lost my faith in natural laws. I knew some such combination of iron slag and limestone must melt; but it would not (laughter). You can imagine how I felt at the time. I looked down the muzzle of my Colchester for ten or fifteen minutes at a time, but did not have nerve enough to use it. Finally I fell asleep. In the morning the secretary of the company came to my door and entered with a smiling face, holding in his hand a cocktail, which Mrs. Dudley had the faculty for making. I said:—"You look pretty happy for a director whose furnace has come to grief" and

took the cocktail—as a medicine (laughter). He said:—"Oh, come down and see it. It has run out half a car-load of bullion since midnight. It is running all right." I put on my clothes and went down and found what he said to be true. They had taken out \$6,000 or \$7,000 worth during the night. The truth of the matter was this:—I had with me an old Mexican metallurgist, an old smelter with a practical knowledge of the business. He knew my charge must have been correct, and could rely on that. He went up to investigate, and found the charcoal was full of gravel and stones. The burners had been covering their charcoal with gravel, and the result was that the more charcoal I was using the more infusible a charge I was getting. That was no secret. (Applause).

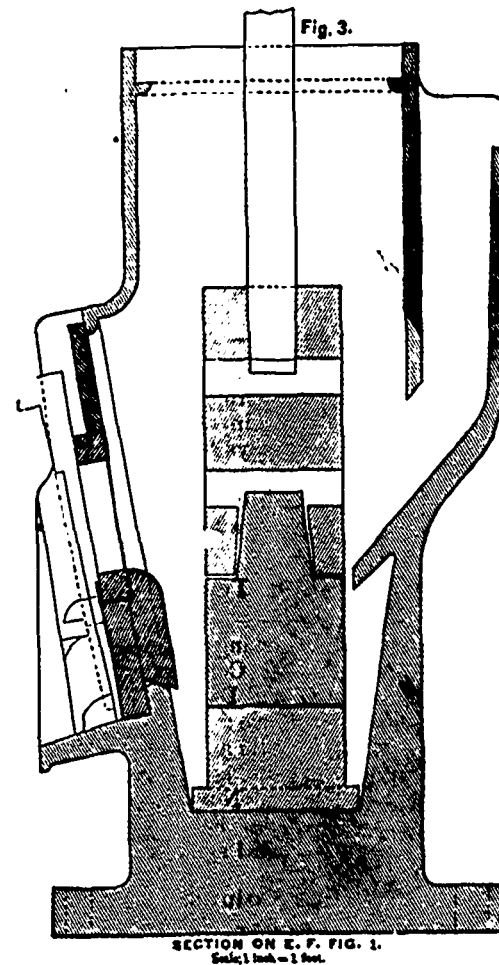
Gold Milling in the Black Hills.

(H. O. Hoffman, Rapid City, Dakot.)

(Continued from September issue.)

2. In the Golden Star mill, the power is transferred from a small main shaft to two line-shafts on the cam floor, the main shaft being nearly on the same level. This arrangement is favoured by builders on the Pacific coast. It is shown in Providence mill, Nevada City, Cal., for description and drawing of which, see the paper of Mr. F. D. Browning on "Gold Chlorination in California, in the *School of Mines Quarterly* for 1884, also printed in the *Scientific American Supplement*, No. 445, July 12, 1884.

3. In the Highland mill, (see Plate), the small main shaft is placed between cam-floor and battery-floor, and is connected with two line-shafts, placed on the battery sills, behind the mortars.



THE HOMESTAKE MORTAR AND STAMP

Both of these mills have two line-shafts, which is probably necessary considering the power that is required for a 120-stamp mill. The disadvantage is that the pull of the belt, on one side only of the shaft, has a tendency to draw it off the line, and also causes great wear and tear. As to placing the line-shafts in front of the batteries on the cam-floor, or behind

them on the battery-floor, there is a diversity of opinion. The former arrangement, as at the Golden Star mill, gives the best light in the mill and makes the shafts easily accessible. The power from the engine-shaft is transmitted to the line-shafts, and from these to the cam-shafts, by long belts, which are nearly horizontal. They require no tighteners, and last longer than those of either the Homestake or Highland mills. On the other hand, the boxes of the line shafts rest on transverse sills on the cam-floor, which, although braced and strengthened in various ways, cannot furnish the same sure foundation as that at the Homestake and Highland mills. Experience has shown, however, that this disadvantage is more than counterbalanced by the smaller consumption of belts and the easy accessibility of the line shafts. The Highland mill has the line-shafts on the sure foundation of the battery-sills; but the darkness and the exposure of the line-shafts, thus placed just behind the mortars, to the trickling of water and fine ore, are serious disadvantages. Again, the belts from the main shaft down to the line-shafts, and from these up to the cam-shafts, are short and steeply inclined, requiring powerful tighteners, which cause an increased consumption of belts. The mill, however, like the Homestake, is so arranged as to leave the battery, with the apron and sluice plates, free from any superstructure.

The relation of the horse-power of the engine to each stamp averages for the seven mills about 1.7:1. This low figure is due to the large number of stamps in each mill (80 to 120), which is much higher than the common average in gold-mills.

Supply of Water and Fuel.—A regular supply of water is a prime necessity in milling. In this district it is chiefly furnished by two companies, at prices varying from 50 to 57 cents per stamp per day, the supply being brought in ditches. In winter water becomes scarce, and then the mills of the Homestake management are supplied in part by pumping from the Homestake and Deadwood-Terra mines. This water otherwise runs to waste. The big Highland mill would be obliged to stop four months each winter if the tailings of the Homestake; Golden Star and Highland Mills were not settled, and the clear water pumped back into the supply-tank. The method by which this is done is simple and effective. The tailings of the three mills are discharged together into the creek, called Gold Run. A little way further down, this broadens, and is closed by two dams, one below the other, forming two reservoirs. The upper overflows into the lower, which is four times its size, and this, in turn, has its overflow in the bed of the creek. The dams consist of cribbing, filled up solidly with waste rock. On their upper sides they are lined with water-tight planking. Down the middle of this, runs a wooden box, three sides of which are made of solid plank, the fourth being left open. When the reservoir is to be filled, this box is closed by pieces of heavy plank placed transversely. As far as the mere filling of the reservoir is concerned, the box might as well be closed by one solid piece, but the object of a number of pieces is to discharge the water gradually. This is done by removing the pieces, one after another, as the water is lowered, that the sands may be kept in suspension and carried through the culvert. Were the box opened at the bottom or to its full height at once, the sands would be carried into the culvert in such a quantity as to clog it. This culvert, in which the box ends, passes through the dam and under the lower reservoir and lower dam to the bed of the creek below. The

lower dam is arranged in the same way. When the reservoirs are not in use, the water of the creek passes off through the culvert. When they are to be filled, the boxes are closed. The water accumulates in the upper reservoir, until, after six hours, it overflows, leaving all the coarse sands in the upper reservoir, and carrying with it only the finer slimes, which settle in the lower one. From this the clarified water is pumped, at the rate of 60 cubic feet per minute, into the Highland tank, 200 feet above. The coarse sands are removed from the upper reservoir every twenty-four hours. In order to do this, the transverse planks closing the discharge are removed, one after another, and the water passes off, carrying the sands with it. As this process takes four hours, and the filling six, there are fourteen hours of overflow into the lower reservoir, where the slimes settle. These are removed once in two months, in the same way.

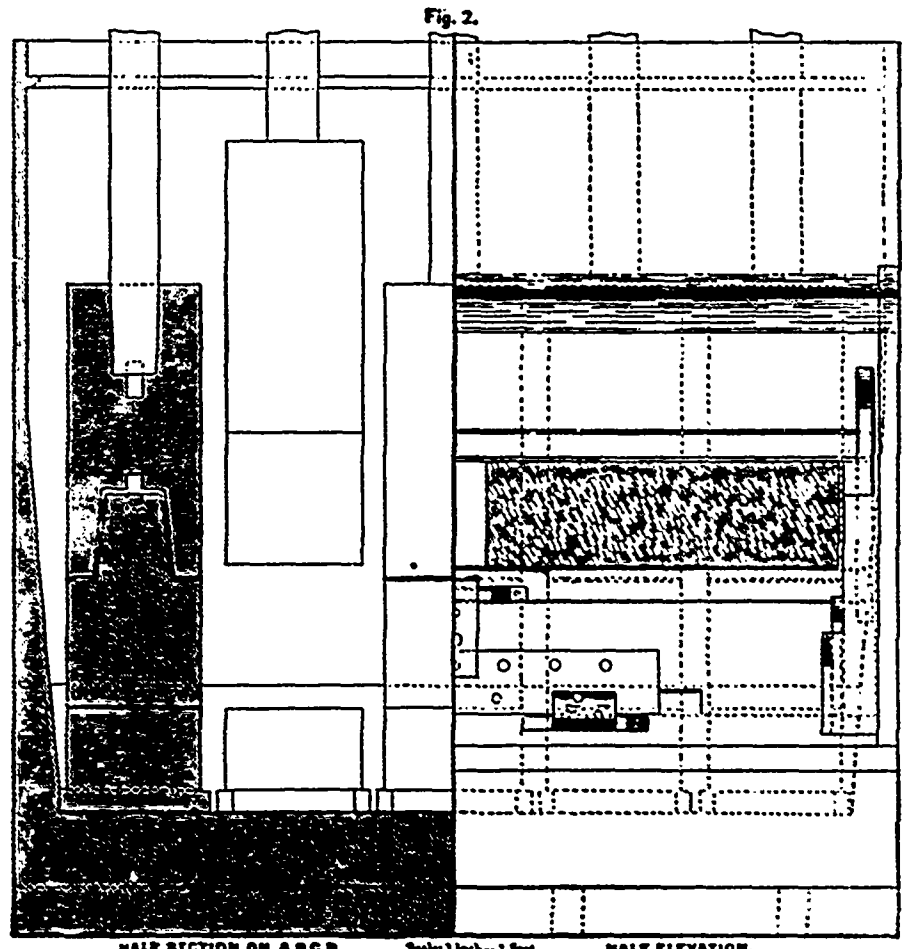
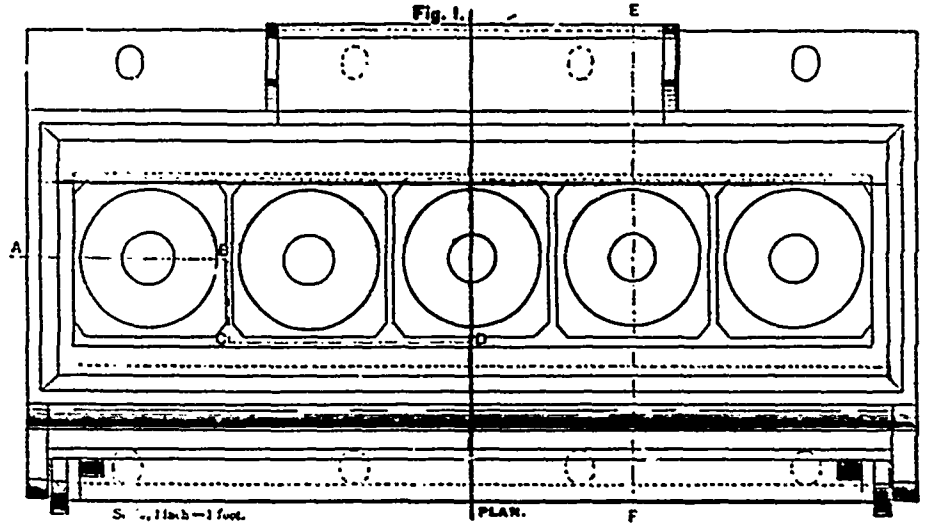
TABLE III.—Shafting, Breakers and Belts.

MILL.	LINE SHAFTS.		ROCK-BREAKERS.		Main-to Line Shafts.			Line-to Cam-Shafts.			Line-to Crusher Counter-Shafts.			Crusher Counter-to Crusher-Shafts.		
	Number.	Diameter in inches.	At Opp. End.	Number.	Type.	Type.	Type.	Type.	Type.	Type.	Type.	Type.	Type.	Type.	Type.	Type.
Homestake.....	1	7	4½	5	E	G	G	H	G	G	G	G	G	G	G	G
Golden Star.....	2	9	4½	6	E	G	G	G	G	G	G	G	G	G	G	G
Highland.....	2	7	4	6	E	G	G	G	G	G	G	G	G	G	G	G
Deadwood.....	1	7	4	4	E	H	H	H	G	G	G	G	G	G	G	G
Golden Terra.....	1	7	4	4	E	H	H	H	G	G	G	G	G	G	G	G
Father de Smet.....	2	5	3½	5	F	G	G	G	G	G	G	G	G	G	G	G
Caledonia.....	2	5	4½	1	F	G	G	G	G	G	G	G	G	G	G	G

E = No. 5 flake Rock Crusher. F = No. 6 Gates' Jack Crusher. G = Rubber. H = Leather.

road, with about thirty miles of 3-ft. gauge track, runs along the divide between Gold Run and City creek, terminating at a point about fourteen miles south of Lead City. The whole section was originally heavily wooded, but has been quite denuded by the constant demands made upon it. The railroad is very winding and is quite a feat of engineering. It runs down the slope into Whitewood Creek, and up the opposite height, until it finally reaches the point where timber is still to be obtained. This

down the slope of the mountain. The chutes, 25 in. broad by 12 in. deep, are made of 4-in. plank. The bottom and 9 inches of the sides are lined with ½-in. iron. The fall of the chute is 6 in. to the foot until the curve begins, when it is 4½ in. This continues to the nozzle which is elliptical. When the chute is in use, a small current of water is passed through it to prevent the iron from becoming too hot, and also to act as a lubricator. The cord wood, unloaded into the top of the chute, passes down the incline

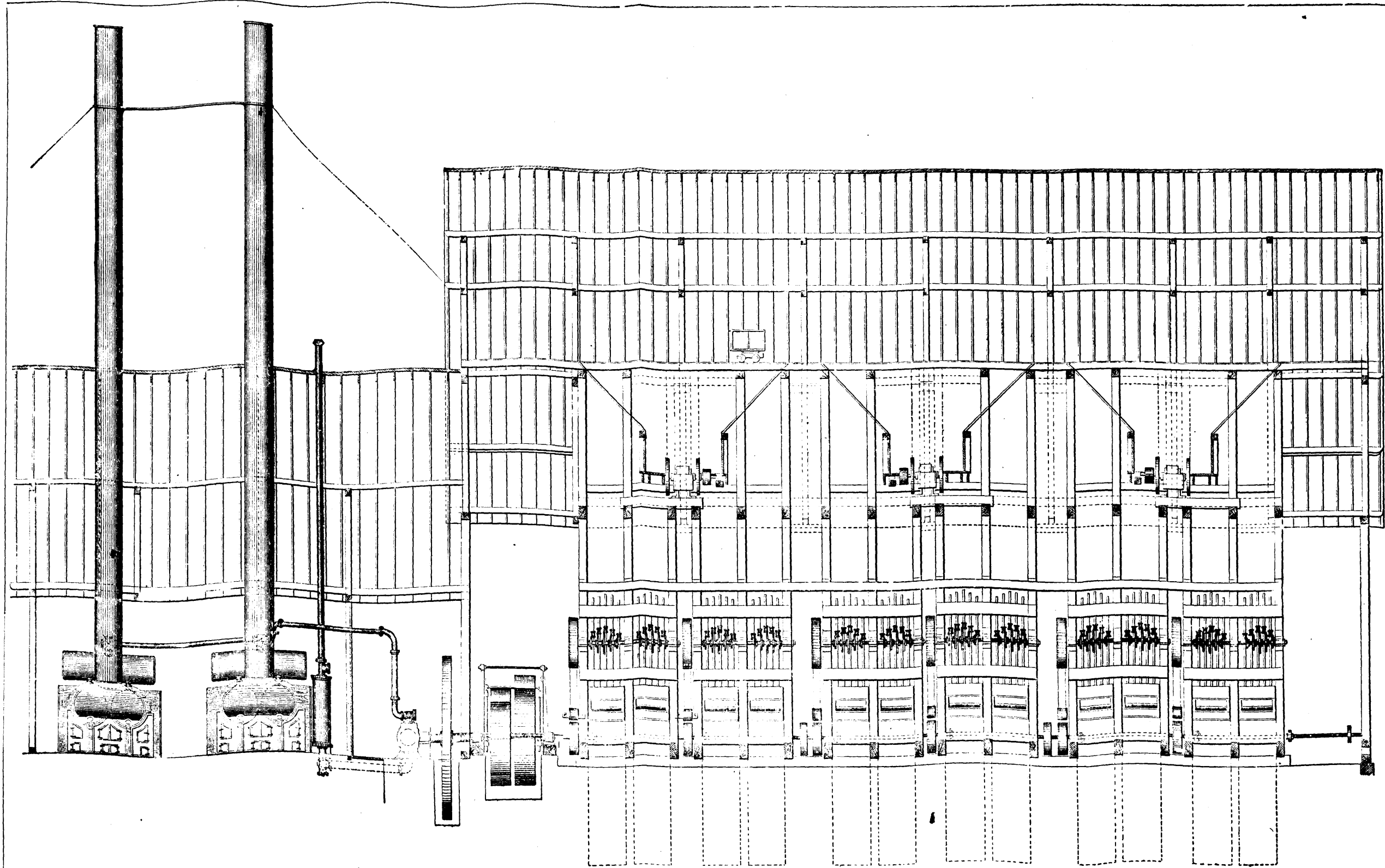


THE HOMESTAKE MORTAR AND STAMP.

road, as soon as spring opens, is employed in transporting the wood and timber which have been cut and stored along its line, and is in constant use until the heavy snows block it for the winter, generally from January till April. It has three branches, towards the three towns where the mills are situated, and communicates directly with these by means of long wooden chutes, down which the wood is discharged. These are from 700 to 1500 ft. long, running

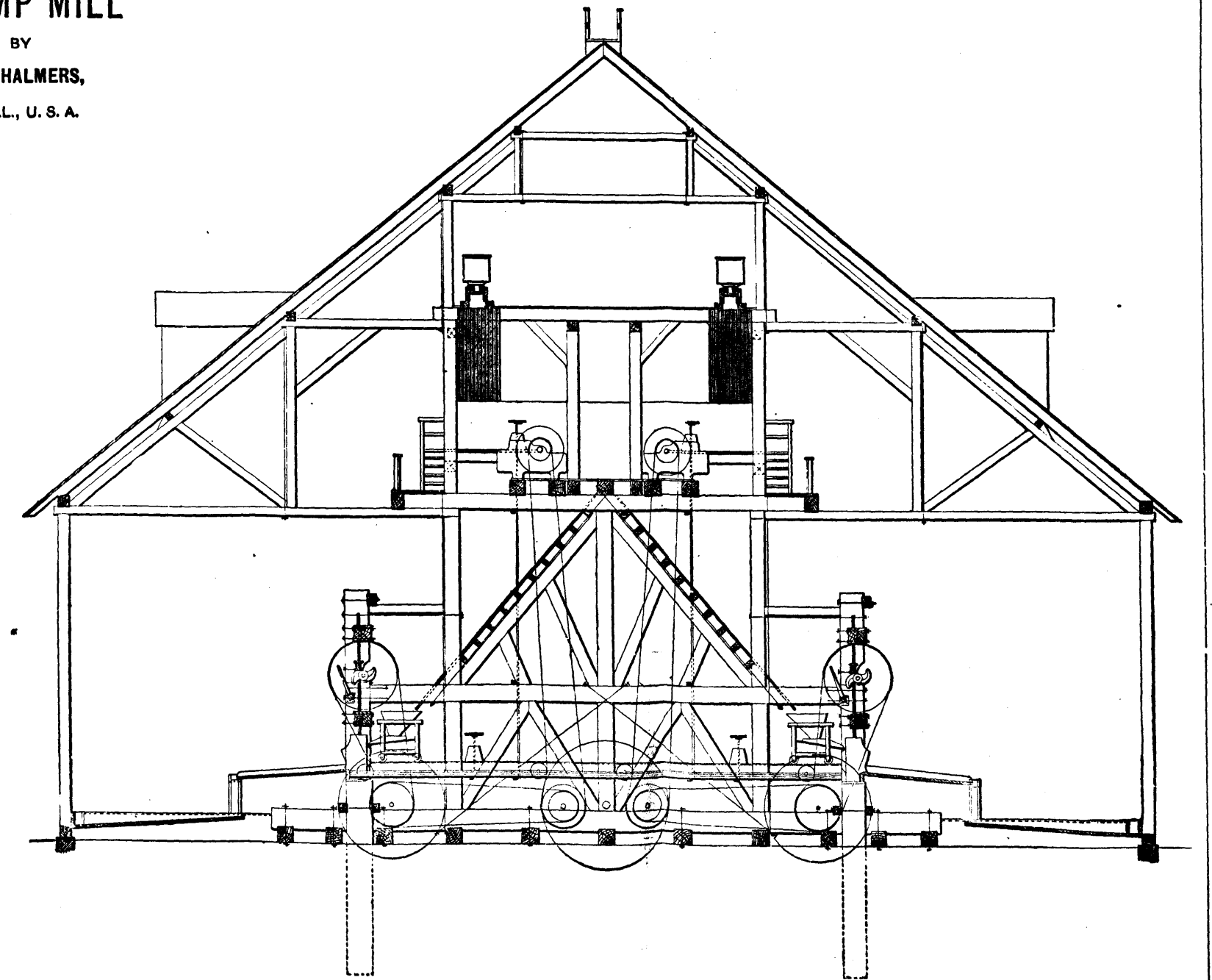
with great velocity. At the nozzle it is deflected from its course, and, through the momentum obtained in its downward passage, shoots up into the air and drops some distance off on the wood pile. In order to discharge the wood on a somewhat large area, the nozzle is made movable. The Caledonia mill has its wood hauled by teams, but is making experiments with soft coal, as the price of a cord of wood in the district is six dollars.

The fuel for the mills under the Homestake management is supplied by the "Black Hills and Forte Pierre Railroad Company." This



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CHICAGO, ILL., U. S. A.



SECTIONS SHOWING CONSTRUCTION AND ARRANGEMENTS OF THE HIGHLAND MILL, LEAD CITY, DAKOTA.

Auxiliary Arrangements.—As the thermometer often sinks to forty and fifty degrees below zero (Fahrenheit), the mills and the water used in them have to be warmed. This is generally done by the use of steam. Along the ground-floor, in front of the apron plates, there runs a sheet-iron drum, 18 inches in diameter, through which the waste steam of the engine is conducted. The battery-water is prevented from freezing by steam coils passing through the supply-tanks.

Fire-plugs, with the necessary hose attachments, are placed at regular intervals, to be used in case of accident.

To reduce the cost of repairs and renewals, which is so large a part of the expenses of gold-milling, the Homestake company has a foundry, where the rock-breaker shoes and dies, pitmans and toggle-plates, mortars and dies, boss-heads, tappets, thimbles for props, cams and hubs of cam-shaft pulleys, and all shaft-boxes, are cast, from No. 1 and No. 3 foundry iron and worn-castings. These are also sometimes bought at one cent a pound. The casting is all done in sand, with the exception of the rock-breaker shoes and dies and the faces of the battery-dies, which are chilled.

In the machine shop, which is a very complete establishment, all the necessary repairs are made. This is the only good shop in the district, and does the necessary work for outside companies also.

V. THE MILLS IN DETAIL.

The six mills under the Homestake management (that is, all the mills here described, except the Caledonia) have the same patterns for all parts needing frequent renewal. This greatly reduces the amount of material kept on hand and the labor and cost of repairs.

Grizzlies.—These are coarse screens, upon which the ore, arriving from the mine, is dumped and separated, the screened fines dropping directly into the bins. This relieves the breaker of ore that does not need to be crushed, and only the coarse ore has to be shovelled into it. They are 3 to 4½ feet wide, 10 to 14 feet long, and set at an angle of about 40 degrees, representing a rise of ¾ inches per foot. They are made generally of wrought iron bars, 1 inch wide and 2 to 4 inches deep, held in place, 1½ to 2 inches apart, by three or four, sometimes five, 1-inch iron rods, provided with washers at the proper intervals. Mr. Bowie gives 2,040 pounds as the weight of a grizzly at the Father de Smet mill, 4½x12 feet in size, with 24 bars, 1 inch wide by 2 inches deep, and 1½ inches apart. The grates last about four years. In some instances old wrought-iron rails, with base turned up, take the place of the standard rectangular bars; but they do not last much over one year.

Rock-Breakers.—All the Homestake mills use the Blake. The coarse ore, rolling down from the grizzlies, collects on the crusher-floor, and is fed by hand into the mouth of the breaker on the same level. From the crusher, it passes into the bins which have already received the fine ore from the grizzlies. The No. 5 breaker used (the largest pattern in the market) has a receiving capacity of 9 by 15 inch, is set to crush from 1½ to 1¾ inches, and is run twenty hours out of the twenty-four, each crusher being calculated to serve twenty stamps. The amount crushed per day is not known, as there is no easy way of determining how much of the ore in the bins has passed through the crusher. If one-fourth of the ore (a probable proportion in view of the slaty character of the ore) passes through the screens, escaping the breaker, and if 20 stamps crush 90 tons of Homestake ore in

24 hours, the amount crushed in 20 hours by one crusher is 67½ tons, or 3.4 tons per hour. This small figure, as compared with the capacity of the crusher, which is given at 7 tons, is due to the smallness of the mouth of the crusher, which necessitates the breaking up of the ore—a serious matter occasioning much delay. No part of the mill-work is so laborious as this breaking and feeding of the ore, which has to be done by hand.

The wear and tear of material in a crusher is comparatively small, a shoe lasting two months, a die four months.

The small receiving capacity of the No. 5 Blake is a marked disadvantage to it, in comparison with the Gates crusher, lately introduced at the Caledonia. The ore of the Caledonia mine breaks rather coarse (that is, it does not show much of the slaty character of the Homestake ore), and is dumped immediately into the hopper of the crusher without use of the grizzly. With about the same horse-power as three No. 5 Blakes, and set to the same size, one No. 6 Gates crusher (with three receiving openings, each 12 by 18 inches), attended by one man only, crushes 200 tons in ten hours. When the three Blakes were in use, it required 20 hours and 5 men to produce the same result. Mr. T. L. Skinner, the superintendent, says in his last report that this new crusher saves him \$27 a day. In order to make the iron head last longer, he uses three sets of concaves of graduated thickness, the thinnest first, and so on. When, after some time, the head and first set of concaves have become so worn away as to increase the width of the discharge above 1½ in., the second set is introduced; and, when they in turn wear thin, the third. By the time these are worn down (after about five months), it becomes necessary to replace the head. The disadvantage of the Gates crusher is its enormous weight (No. 6 weighs 30,000 lbs.), and the consequent difficulty of transporting it, especially in some mining regions.

The best arrangement for a large mill seems to be to use a still larger Gates crusher (No. 8, with receiving openings 18 by 48 in.), set to crush coarse, and discharging into two No. 6 crushers, set to crush fine. Thus the largest pieces of rock any man could handle would pass directly into the crusher, and the breaking by hand in mine and mill would be reduced to a minimum.

The smaller Gates crushers, with correspondingly small mouths, are not to be preferred to the Blake crushers.

Ore-Bins.—These receive the ore from the grizzlies and crushers, directly over them, and discharge it through chutes into the hoppers of the feeders. They are triangular, with one vertical side, facing the battery and reaching down to the cam-floor. Just above the latter, are the openings (one for each feeder) through which the ore passes downward into the chutes, terminating in the hoppers of the feeders. The quantity of the discharge is regulated by a sliding door. In a double mill, the inclined bottoms of the two bins diverge, leaving an open space between them which has the shape of an inverted V. This arrangement of bins is common to all the mills except the Father de Smet.

The bottoms of the bins, 3 inch thick, are made of 1 inch board, running lengthwise, with 2 inch plank, placed at right angle, upon it crosswise. The bottom and sides are carefully braced with strong beams. There are no separate compartments or special arrangements for directing the ore towards the discharge openings. The descending ore soon wears out such contrivances. It is advisable to line with

iron the upper part of the bottom, on which the ore drops from the grizzlies and crushers. Otherwise, it wears out much faster than the middle and lower parts, which lasts five to six years.

It is best to make ore-bins as large as practicable, so that, in case of accident in mine or at rock-breakers, the mill need not stop. The capacity ought never to be less than one full day's supply. By multiplying in each of the three double mills, the horizontal distance between the two sets of batteries into the vertical distance between crusher-floor and cam-floor, the comparative size of their ore-bins can be approximately estimated. The following table shows the result. It is assumed that the distance between front of bin and battery, as well as the incline of the bin, is about the same in all.

TABLE IV.—Comparative Capacity of Ore Bins.

Name of Mill.	Horizontal distance.	Height.	Product.
	feet.	feet.	square feet.
Homestake	44.5	14.25	634
Golden Star.....	36.0	23.75	855
Highland.....	46.0	22.75	1046

This would show that, of these three double mills in which the batteries are arranged back to back, the Highland has the largest bin-capacity. In the Father de Smet, where the batteries discharge towards the centre, the bins, built entirely above the batteries, and extending to the side-walls of the building, have a still larger capacity, the figures, corresponding to the dimensions given above, being 57 feet by 30 feet, or 1,710 square feet. There are, however, decisive objections on other grounds to this arrangement. The apron-plates are so overshadowed by the inclined bottoms of the ore-bins above that the facility of supervision, claimed as one advantage of this plan, is largely neutralized by the prevailing darkness, even at noonday.

Feeders.—The working capacity of a battery, and its exemption from unnecessary wear and tear, depend greatly on regular and equal feeding of ore. This used to be done by hand, but is now generally accomplished by automatic feeders, placed at the back of the batteries, and discharging either directly into the feed-opening of the mortar (the lip of the feeder reaching into the mortar-feed), or, as at the Caledonia, upon a small inclined iron-lined apron which leads to the mortar. By the latter arrangement a little more room is left between feeder and mortar, and the feed-opening can be narrower and longer, and the ore more uniformly distributed under the stamps. Thus, the Homestake mortar feed-opening is 24 in. long and 4½ in. wide, while that of the Caledonia, occupying the entire length of the mortar, is 52 in. long and only 3 in. broad.

The two ore-feeders, used in the district, are the "Heady Challenge" and the "Tulloch Automatic." Each has a well-earned good name, the Challenge being, perhaps, more desirable for wet ores. Both right-hand and left-hand feeders are used, the bumper-rod standing between stamps 1 and 2 or 4 and 5. The Challenge feeders, introduced with the new 20 stamps of the Caledonia mill, are central feeders, the bumper-rod being placed next to the central stamp. The rod is guided from the cam-floor,

to which a piece of board, with suitable hole for the rod to pass through, is fastened.

The comparative advantages of the two feeders may be summed up by saying that, while the sheet-iron plate below the hopper of the Tulloch wears out quickly (with Homestake ore in two years), it is cheap and can be patched or renewed by any blacksmith, while the circular cast-iron carrier table of the Challenge lasts seven years with the same ore, but is costly, and, if anything is out of order with the gearing, it requires a shop and a machinist.

Battery-Foundations, Frames and Guides.—The essential importance of a good foundation is well known. In preparing it, a rectangular pit, from 11 to 14 ft. deep, is first dug to receive the mortar-block. It is made sufficiently long and wide (4 by 6½ ft.) to leave a space of about 24 inches all around the block. The bottom is then carefully levelled and some sand tamped down. On this are placed two layers of 2-inch plank, spiked crosswise to each other, and then the planks which form the mortar-block. The latter used to be placed directly on the bottom of the pit, the uneven tops being sawed off afterward. Now, care is taken that this 4-inch wooden floor shall be accurately horizontal, and that the distance between it and the bottom of the mortar shall have the length of the mortar-block. The top of the block is only planed off, which saves time. By the use of this flooring, the time required for replacing a mortar-block is reduced from six or seven days to five. The mortar-block consists of planks, from 11 to 14 ft. long (according to the depth of the pit), of varying breadth, and not more than 2 or 3 in. thick, as it is difficult to find wood of greater thickness which is sound throughout. They are spiked together, and are fastened above and below with binders, bolted to each other by transverse rods, the upper binders (8 by 12 in.) being even with the top of the mortar-block, and the lower binders (12 by 12 in.) 3 ft. lower down. The space around the mortar-block is then carefully filled and tamped with rock tailings up to the level of the mud sills, which are about 4 ft. below the bottom of the mortar. When the top of the mortar-block has been planed off and levelled, a sheet of rubber cloth, ¼ in. thick, is placed over it, and the mortar put in place. Through the four holes in the flanges on each side pass eight bolts, from 3 ft. to 4 ft. 6 in. long, and from 1½ to 1½ in. in diameter, with which the mortar is fastened to the block.

In placing the planks forming the mortar-blocks, and in adjusting the bolts that hold down the mortar, a decided improvement has lately been made at the Homestake mills. The planks which always stand upon end were formerly so spiked that their width was parallel to the short side of the mortar. The holes for the eight bolts were then bored into the mortar-block from above, at a suitable distance below, recesses were chipped out to receive the nuts which secure the lower ends of the bolts. Now the planks are so placed that their width is parallel to the long side of the mortar. The bolts have only at their upper end a thread, and end in a loop at the bottom. Through these loops and through the mortar-block, pass horizontally 2-inch iron rods. The planks, on the two sides of the block, where the bolts pass down, are cut out to receive them. The advantages of this arrangement are apparent. In addition to the mortar being more securely and evenly tied to the block, it is easier to renew the mortar-block if necessary. The pit need only be dug in front of the mortar, and when the front binders have been removed, it is easy to tear out the planks, one after another, with

pick and adze. In putting in the new block, the two outside rows of planks, with places cut to receive bolts, are kept ready, so that only four horizontal 2½-inch holes for the rods need be bored when the planks have been spiked together. With the old method, two trenches had to be dug, instead of one, if a mortar-block was to be exchanged. Then the planks had to be chipped out in pieces until room enough had been made for them to be torn off. This cost much labor and time.

Battery Frames.—These are generally 12 by 24 inches in size, with recesses for the boxes of the cam-shaft. They are placed on the short sides of the mortar, and are independent of the mortar-block, standing on the cross-sills (which are placed on top of, and at right angles to, the mud-sills), and tied by the upper and lower guide-timbers, and, at the foot, by two longitudinal beams, bolted to them, and let into the cross-sills. The frames are braced either from the back or the front of the battery, according to the way in which the power is transmitted to the cam-shaft. In the Homestake, Highland, Golden Terra and Father de Smet mills, where the line-shafts are at the back of the battery, the frames are braced by posts, generally placed on an incline between frame and cross-sill, leaving the entire front of the battery unobstructed. In the Golden Star and Caledonia mills, the cam-shafts receive their motion from line-shafts placed on the cam floor, and the frames are braced against the cross-beams to which the boxes of the line-shafts are bolted.

Guides.—The stamps are held upright by two sets of guides, fastened to the guide-timbers which tie the battery-frames. The upper guides are above the tappets, the lower ones between the cam-shaft and the top of the mortar. At the Homestake mill, the center of the lower guides is 17½ inches above the top of the mortar, and the cam-shaft, revolving between the two sets of guides, is 3 ft. 10½ in. below the center of the upper, and 4 ft. above the center of the lower guides, making the total distance between the two sets 7 ft. 10½ in. At the Caledonia mill, the distance from top of mortar to center of lower guides is 16½ in.; from these to center of cam shaft, 3 ft. 4½ in.; from this to center of upper guides, 4 ft. 2½ in.; total, 7 ft. 6½ in.

Each set of guides consists of two pieces of 4-in. pine plank, 16 in. deep, having semi-circular grooves, through which the stems of the stamps pass. Between the two parts of the guides, when new, are inserted small pieces of wood to hold them slightly apart. When the grooves are somewhat worn, these slats are removed, and the guides brought nearer each other. Later on, the faces are planed off to diminish the size of the grooves, so that the stamps may not be held too loosely. Each set of guides is secured to the guide-timber with eight ½-in. bolts. The grooves in the guides are lubricated with a preparation of black lead and linseed oil, mixed warm in such proportions as to form a soft paste. Oak guides last eighteen months; pine, only four months.

Mortars.—Two kinds of single discharge mortars are used in the district. Each consists of one solid casting. The bottom and sides are so thick as not to need any lining, this thickness decreasing very considerably as the feed is approached. The outside walls are vertical, with the exception of the discharge, which projects somewhat. The top is closed by two pieces of 2-in. plank, which rests on logs, ¾ in. wide, cast in the mortar, 2-in. below the top. These planks have each five semi-circular recesses which, when placed together, form holes

for the passage of the stems. In addition to these five large holes, two smaller ones are bored for the two 1-in. water-supply pipes, placed between stamps 1 and 2 and 4 and 5. Two mortars are placed close together as the stamps of both are set in motion by one cam-shaft. In order to reach the mortars, etc., a passage-way is left between every two pairs of batteries. The water-supply is derived from a 3 in. main, running along the front of the batteries. From it passes upward a 2-in. pipe between each pair of batteries. With this is connected a 2-in. horizontal pipe, from which four 1-in. pipes branch off at right angles, two for each mortar. In addition to this water-supply, there is a 1-in. pipe at each passage-way, close to the mortar, coming from the 3 in. main. A hose is attached to clean the apron-plates and for other purposes.

The points of difference between the two mortars lie in the inside dimensions of the lower part of the mortar and in the arrangement and number of the inside amalgamated copper plates.

1. The Homestake mortar (Figs. 1, 2 and 3), weighing 5400 pounds, is 54½ in. high and 54½ in. long. The feed-opening, beginning 6½ in. below the top, is 24 in. long, 4½ in. wide and 7 in. deep. On entering the mortar it remains 24 in. long and 7 in. deep. At the bottom of the feed, forming the continuation of the incline over which the ore passes into the mortar, is a lip, 4½ in. wide and 1½ in. thick, designed to discharge the ore against the upper half of the stamp-head. The lower edge of the lip is 14 in. above the inside bottom of the mortar. As the lip wears out fast it might be well to cast it thicker, as has been done in the Caledonia mortar. Taking the front view of the mortar, we find, 15½ in. from the bottom, the discharge-opening 48½ in. long and 21½ in. high. The frame is inclined outward about 10 degrees from the vertical. On the short side of the discharge-opening, are grooves to receive the chuck-block, screen-frame and curtain, which are held in place by keys and sockets. The chuck-block is also fastened at the bottom by two horizontal keys, supported by lugs on the outside lip of the mortar below the discharge. Viewing the mortar in cross-section, we first have the two bottom flanges, 3 in. high and 5 in. broad. The bottom of the mortar (the mortar-bed) is 7½ in. thick, the sides, at the foot of the dies, 3½ in. The inside dimensions are: Width at the bottom, 10½ in.; length, 50 in.; height to issue of mortar (not of pulp), 8½ in.; width at this point, 13½ in.; at the top of discharge opening, 20 in.; at the top of mortar, 16 in.; total inside height, 47 in. The casting is ¾ in. thick, from the top down to the feed-opening, on three sides, the back being a little thicker.

A mortar lasts four years, wearing pretty uniformly at the sides and back.

2. The Caledonia mortar weighs 5,700 pounds, is 57½ inches high and 54 inches long. The feed-opening, beginning 15½ inches from the top, is 3 inches wide, 11 inches deep and extends the entire length of the mortar, having a strengthening rib in the centre. At entering the mortar, it is 50½ inches long and 7½ inches deep. Here the lip, 2½ inches thick and 8 inches wide, measured on the incline, begins. The bottom of the lip is 15 inches from the foot of the dies. As in the Homestake mortar, the ore is discharged towards the head of the stamp. The lip serves also as a protector to the amalgamated copper plate below it. The discharge-opening in front, 50 inches long by 17 inches high, begins 20 inches above the bottom of the flange.

* Formerly the width was 14 inches, but in order to increase the crushing capacity, it was reduced.

Its frame is also inclined outward about 10 degrees from the vertical. The grooves on the sides, receiving only the screen-frames and the curtain, are simpler in construction than those of the Homestake mortar. The lugs for the horizontal keys are the same. Taking the cross section, we find the flanges 3 inches thick and 4½ inches wide. The mortar-bed is 7 inches thick, the sides, at the foot of the dies, 4½ in. The inside dimensions are: Width at the bottom, 10 in.; length, 50½ in.; height, 14 in. to the issue of mortar and pulp, where the width is 16 inches. This increases to 19 inches at the top of the discharge. The top of the mortar is 13½ inches wide, and the total inside height 50½ inches. The casting, from the top down to the feed-opening, is ¾ inch thick.

A mortar lasts six years, and wears out more on the short sides than at the back.

In comparing the two types, we see that they differ in the feed-opening, as already discussed. The feeding-lip also differs, that of the Caledonia mortar being thicker and wider than the other. The increase of width is necessitated by the presence of the amalgamated copper-plate below the lip; the mortar itself is also wider at the issue for the same reason. The depth of the Homestake mortar is 8¾ inches, and that of the Caledonia mortar 14 inches.

(To be Continued.)

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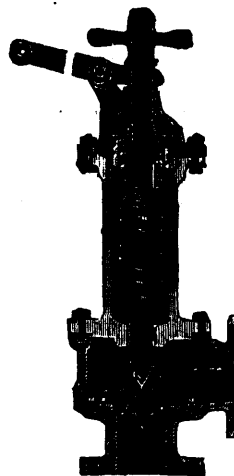
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PUMPING MACHINERY, IRON PIPES, FITTINGS, &c., FOR MINERS' USE.

Call or Write us for Prices.

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SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Vault," will be received until Thursday, the 5th day of December, inclusively, for the construction of an Iron and Steel Vault in the Eastern Departmental Building, Ottawa, according to a specification to be seen at the Department of Public Works, Ottawa.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to *five per cent. of amount of tender* must accompany each tender. This cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

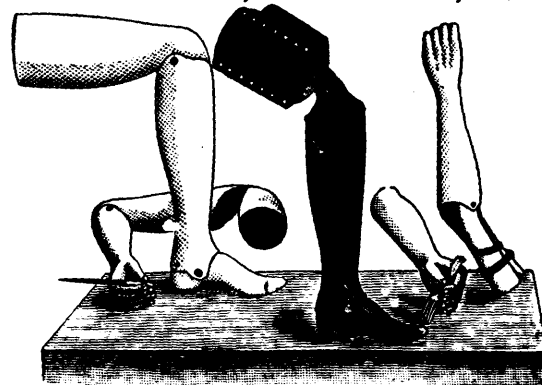
A. GOBIEL,
Secretary.

Department of Public Works,
Ottawa, 14th Nov., 1889.

PROPERTIES FOR SALE.

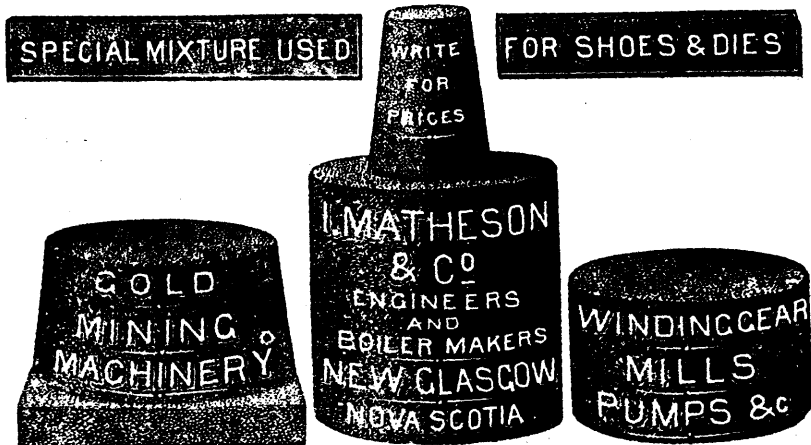
Parties having developed or undeveloped mineral lands for sale will find the REVIEW an admirable medium for bringing them before the notice of CAPITALISTS and INVESTORS in GREAT BRITAIN and the UNITED STATES.

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Rawhide, Artificial Limbs & Splints
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D. McDONALD,
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S. R. TUPPER,
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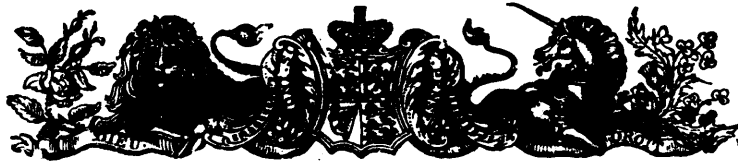
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PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

— AND —

PRECIOUS STONES.

Titles given direct from the Crown, Royalties & Rentals moderate

GOLD AND SILVER.

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 a 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

THE HON. C. E. CHURCH,

Commissioner Public Works and Mines,

HALIFAX,

NOVA SCOTIA.



**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. MIALL,
Commissioner.**

January, 1889.

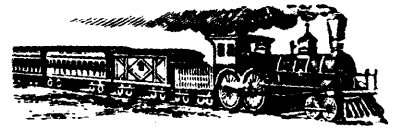


NOTICE

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. }



**Intercolonial Railway
OF CANADA.**

The direct route between the West and all points on the Lower St. Lawrence and Baie des Chaleur, Province of Quebec; also for New Brunswick, Nova Scotia, Prince Edward and Cape Breton Islands, Newfoundland and St. Pierre.

EXPRESS TRAINS leave Montreal and Halifax daily (Sunday excepted) and run through without change between these points in 30 hours.

The Through Express Train cars of the Intercolonial Railway are brilliantly lighted by electricity and heated by steam from the locomotive, thus greatly increasing the comfort and safety of travellers.

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Passengers for Great Britain or the Continent by leaving Montreal on Friday morning will join Outward Mail Steamer at Halifax the same evening.

The attention of shippers is directed to the superior facilities offered by this route for the transport of flour and general merchandise intended for the Eastern Provinces and Newfoundland; also for shipments of grain and produce intended for the European market.

Tickets may be obtained and all information about the route, also Freight and Passenger rates, on application to

G. W. ROBINSON,
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E. KING,
Ticket Agent,
27 Sparks Street,
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D. POTTINGER,
Chief Superintendent.

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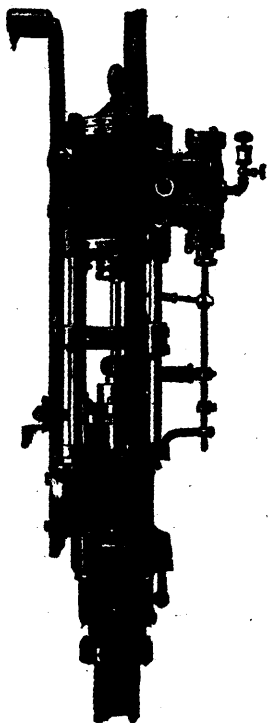
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Mining Regulations

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,

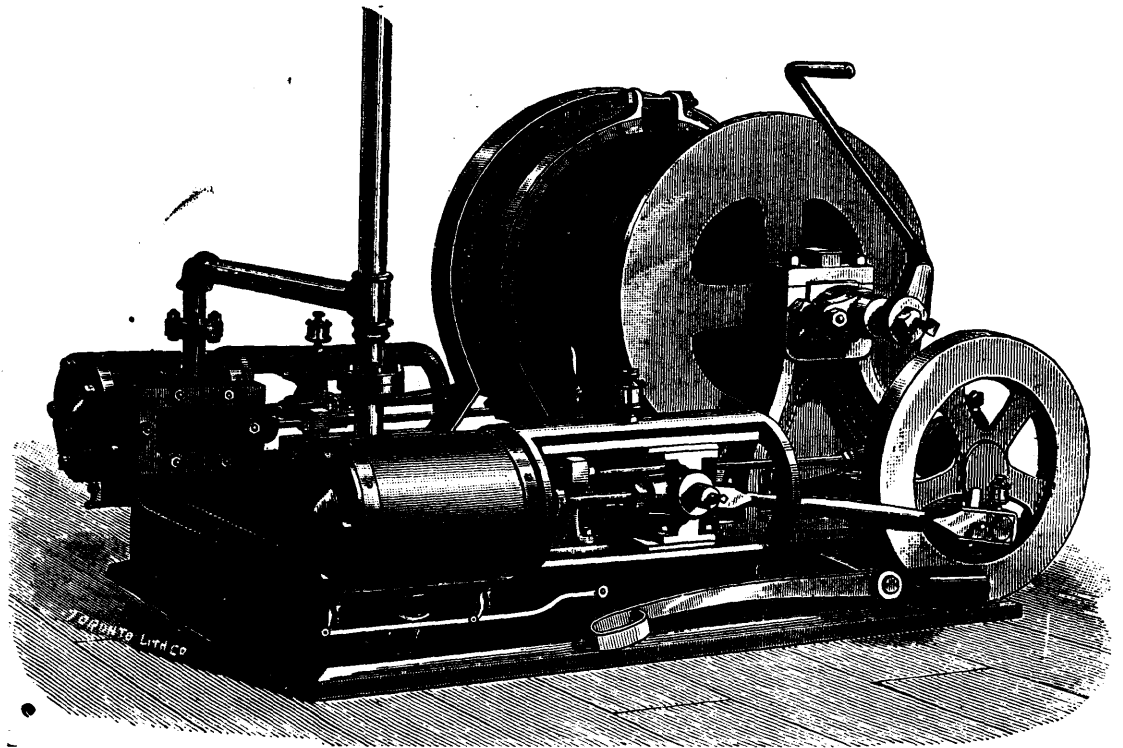
Deputy Minister of the Interior.

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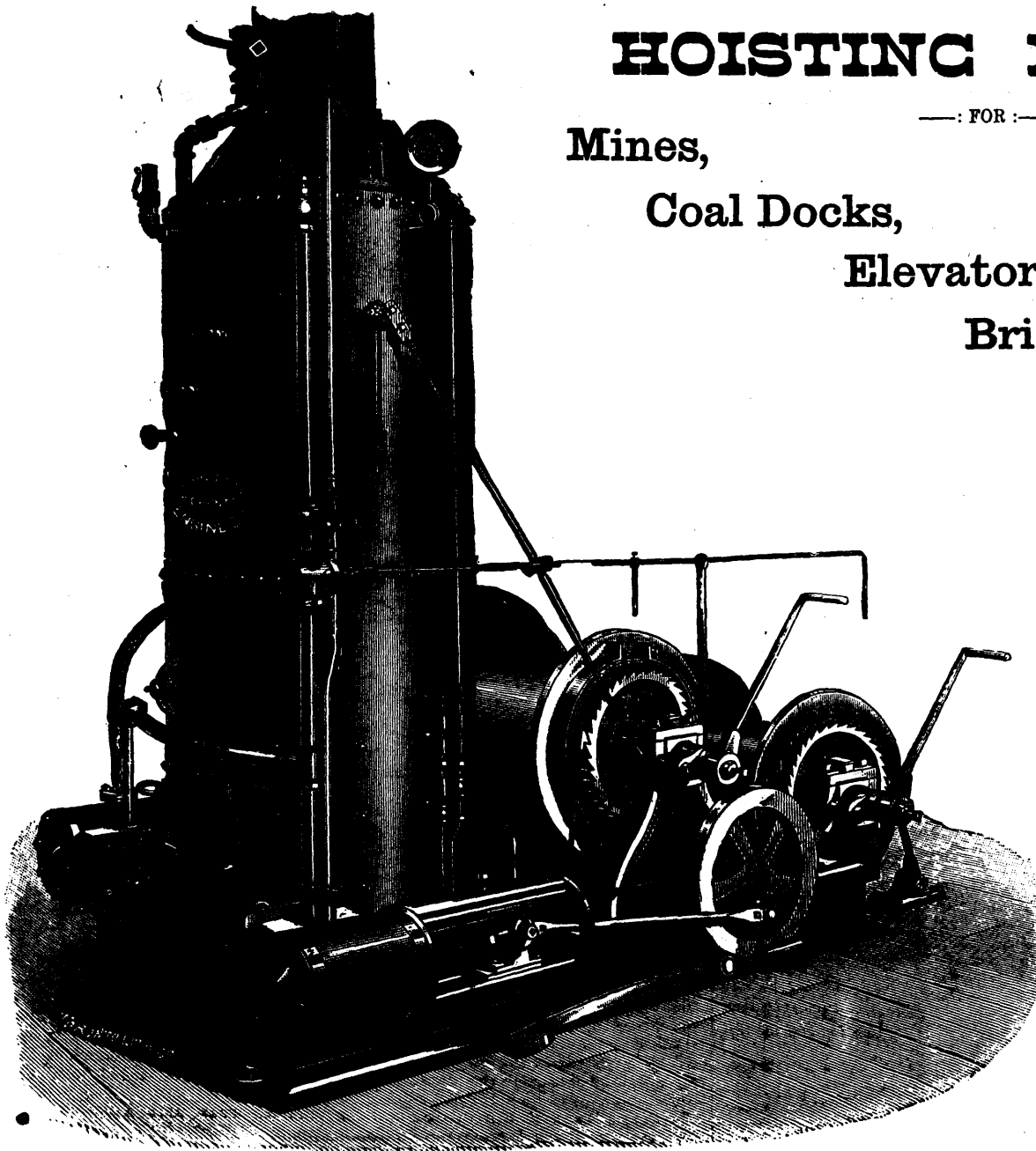
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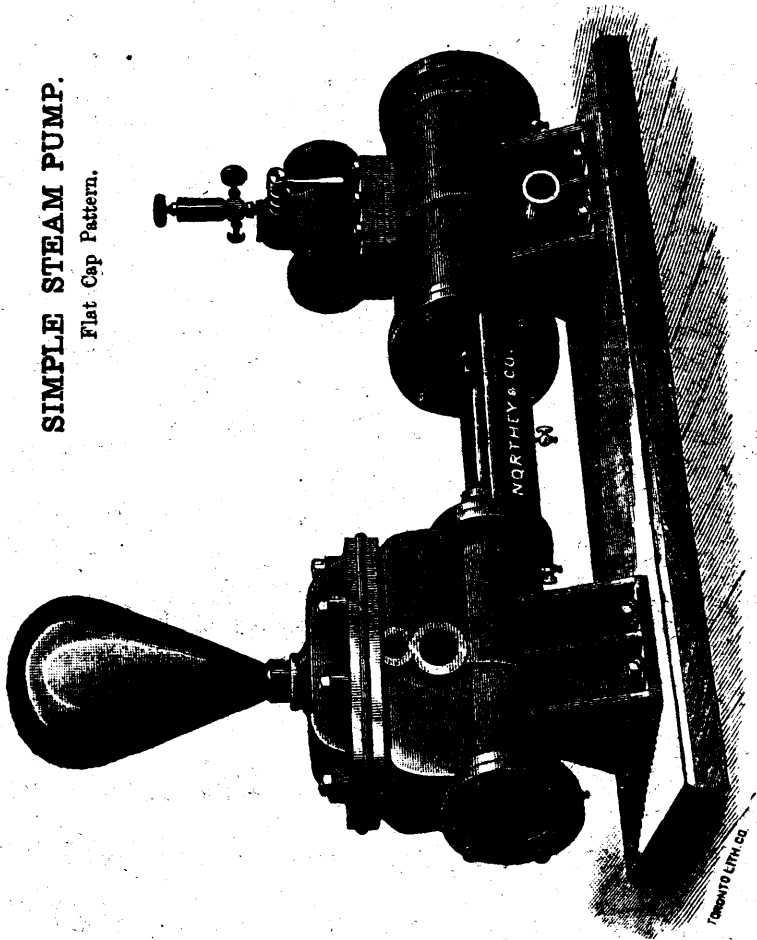
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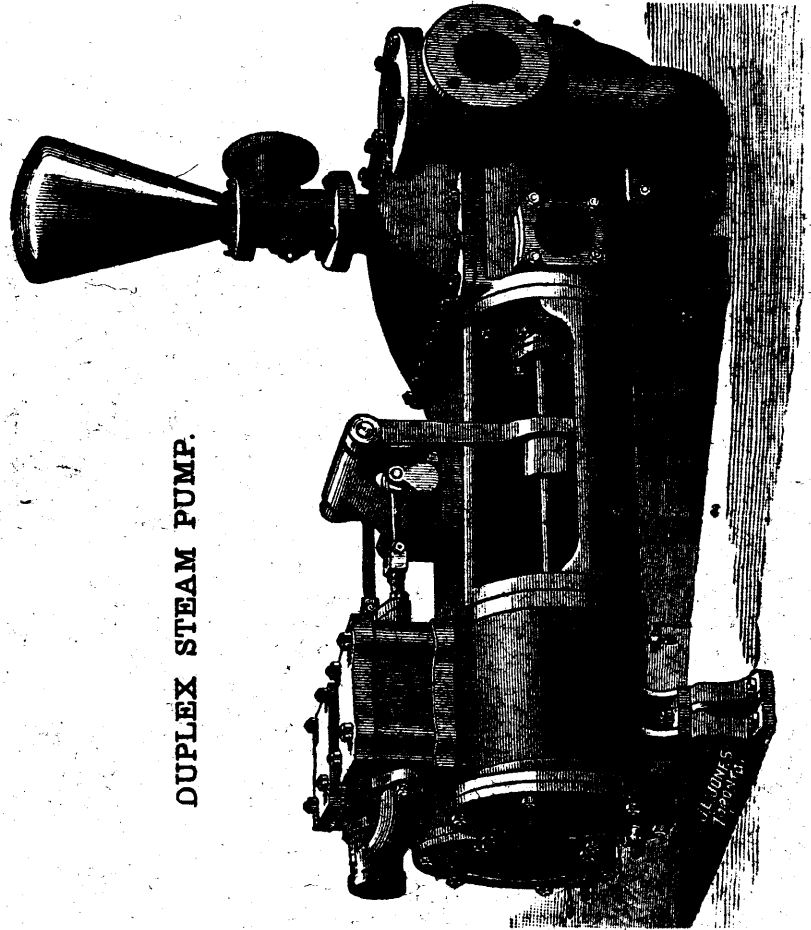
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SIMPLE STEAM PUMP.

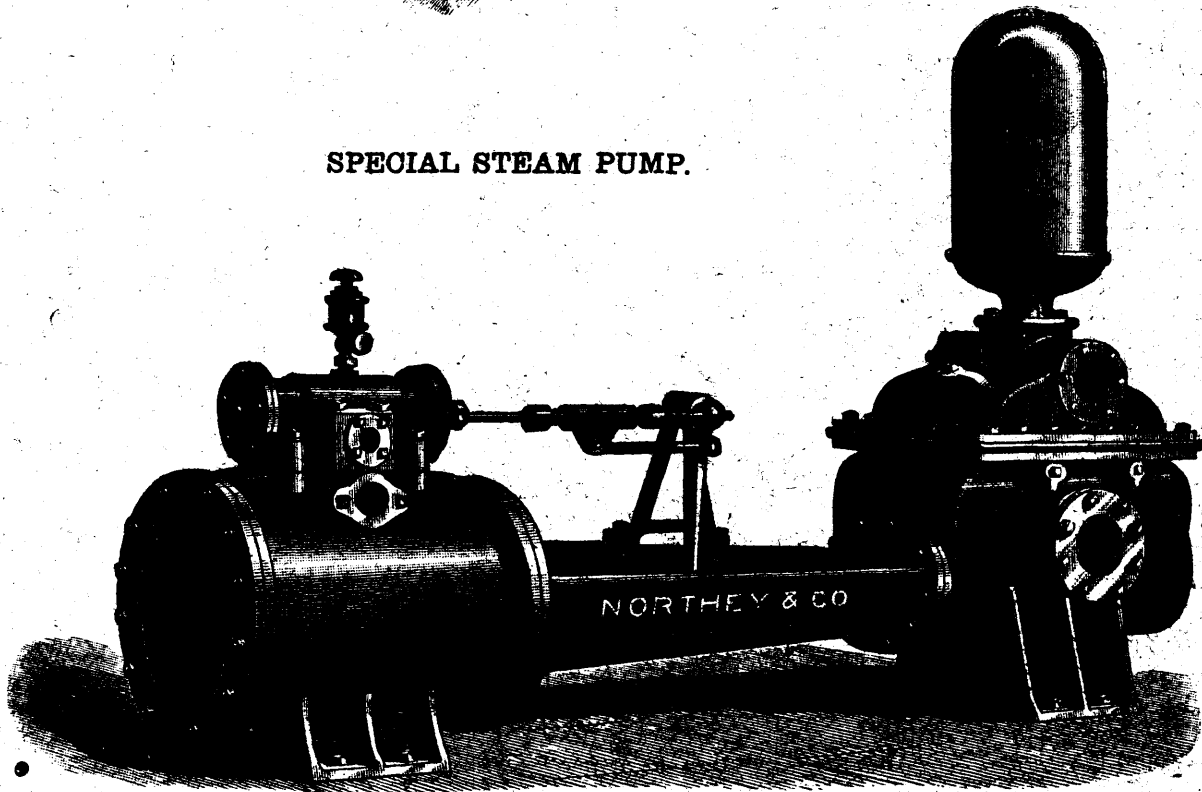
Flat Cap Pattern.







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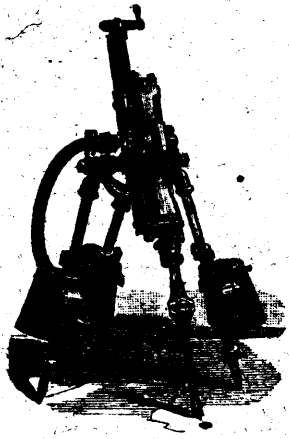


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Steam Pumps of the best and latest designs for mining purposes, Boiler Feeding, Fire Protection, and General Water Supply, etc.

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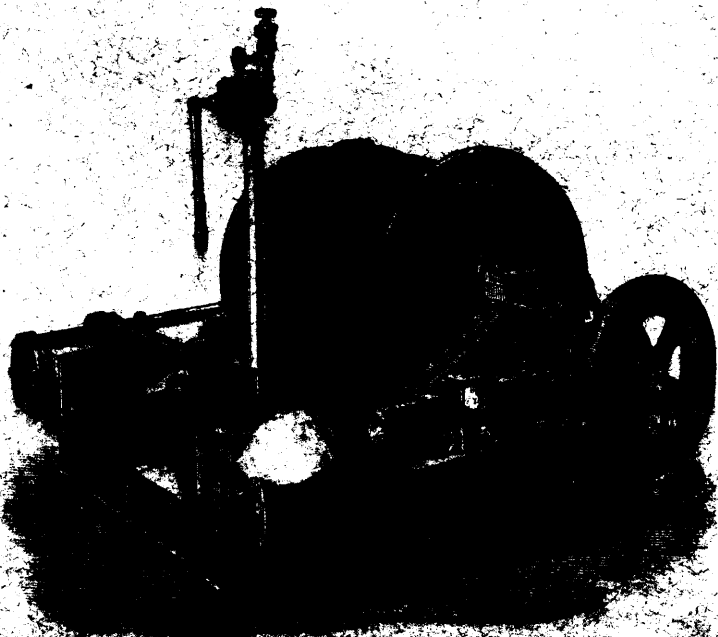
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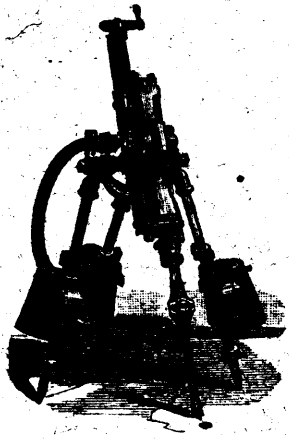
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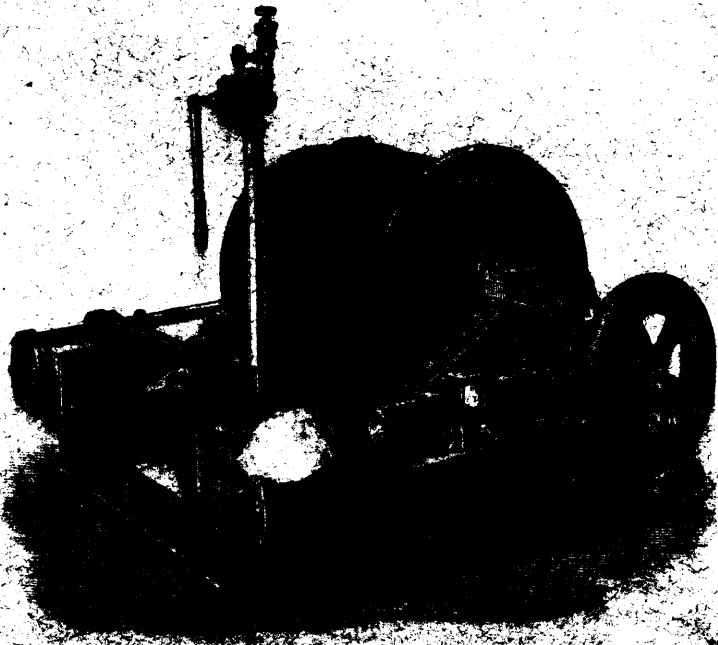
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