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THE

# Canadian

# Mining



# REVIEW

Vol. V.—No. 4

1887.—OTTAWA, JUNE—1887.

Vol. V.—No. 4

## Rock Drills, Air Compressors, Miller Bros. & Mitchell,

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## Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Superintendent's Residence at Experimental Farm; near Ottawa, Ont.," will be received until FRIDAY, 14th June next, for the several works required in the erection and completion of the

SUPERINTENDENT'S RESIDENCE AT EXPERIMENTAL FARM, NEAR OTTAWA, ONT.,

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after Friday, the 10th June next.

Intending contractors should personally visit the site and make themselves fully cognizant of the work to be done, according to the said plans and specifications, before putting in their tenders.

Persons tendering are further notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender

By order,  
A. GOBEL, Secretary.

Department of Public Works,  
Ottawa, June 2nd, 1887.



## MAIL CONTRACT.

SEALED TENDERS addressed to the Postmaster General will be received at Ottawa until noon on FRIDAY, 5th August, 1887, for the conveyance of Her Majesty's Mails, on a proposed Contract for four years, six times per week each way, between

METCALFE  
AND  
OTTAWA,

from the 1st September next.

Printed notices containing further information as to conditions of proposed contract may be seen and blank forms of tender may be obtained at the Post Offices of Greely, Leitrim, Billings Bridge, South Gloucester, Ottawa, and at this office,

T. P. FRENCH,  
Post Office Inspector.

Post Office Inspector's Office,  
Ottawa, June 2nd, 1887.

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## CAPE BRETON RAILWAY

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### TENDER FOR THE WORKS OF CONSTRUCTION.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Cape Breton Railway," will be received at this office up to noon on Wednesday, the 6th day of July, 1887, for certain works of construction.

Plans and profiles will be open for inspection at the Office of the Chief Engineer and General Manager of Government Railways at Ottawa, and also at the Office of the Cape Breton Railway, at Port Hawkesbury, C.B., on and after the 6th day of June, 1887, when the general specification and form of tender may be obtained upon application.

No tender will be entertained unless on one of the printed forms and all the conditions are complied with.

By order,  
A. P. BRADLEY,  
Secretary.

Department of Railways and Canals,  
Ottawa, 27th May, 1887.

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For list of lands and terms apply to the Company's Mining Inspector,

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## TIMBER AND LAND SALE.

CERTAIN lots and the timber thereon situate in the Townships of Allan, Assinick, Bidwell, Hulings, Carnarvon, Campbell, Howland, Sheguindah, Telkumnah and Mills on the Manitowlin Island, in the District of Algoma, in the Province of Ontario, will be offered for Sale by Public Auction in blocks of 200 acres, more or less, on the first day of September next, at 10 o'clock A.M., at the Indian Land Office in the Village of Manitowaning.

Terms of Sale.—Bonus for timber payable in cash, price of land payable in cash, a license fee also payable in cash and dues to be paid according to tariff upon the timber when cut.

The land on which the timber grows to be sold with the timber without conditions of settlement.

For full particulars please apply to James C. Phipps, Esq., Indian Supt. Manitowaning, or to the undersigned.

No other paper to insert this advertisement without authority through the Queen's Printer.

L. VANKOUGHNET,  
Deputy of the Supt. Gen'l  
of Indian Affairs.

Department of Indian Affairs,  
Ottawa, 2nd June, 1887.



## 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, and which 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 inspector, 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 percentage 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.

E. MIALL,  
Commissioner.



## NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,  
Under Secretary of State.  
OTTAWA, 19th Feb., 1886.

## GRAPHITE

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*The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.*

*Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.*

*Mining news and reports of new discoveries of mineral deposits are solicited.*

*All matter for publication in the REVIEW should be received at the office not later than the 17th of the month.*

*Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.*

## Advertising Space.

The circulation of the CANADIAN MINING REVIEW, which has steadily been going up since its first publication, more than five years ago, has now more than doubled the estimate upon which we had reckoned, and its value as an advertising medium to business men who wish to reach the best classes of mine owners and operators, and the mining centres and camps of every province in the Dominion, is consequently very greatly enhanced. The REVIEW is in the widest sense a Canadian journal belonging to all provinces alike; it is the only journal published in Canada wholly devoted to the interests of her mining industries and mineral resources. We would simply draw the attention of those who have hitherto overlooked it, to this matter, promising our best attention and most reasonable terms on any application for advertising space.

## Iron and Phosphates.

At the recent meeting of the Royal Society of Canada we had the pleasure of listening to the address delivered to the mathematical, physical and chemical section by its President (Mr. Thomas Macfarlane). Some of the points touched upon seem to us to be of considerable practical interest.

After referring to the death of Dr. Baynes, a member of the section, and announcing as his subject the utilisation of waste in Chemical Technology, Mr. Macfarlane gave a description of the progress which had been made in this respect at the lead furnaces of Freiberg, in Saxony, and at the iron furnaces of Gartsherrie, in Scotland. At the latter place it seems that the furnace gases are made use of on a stupendous scale for the production of sulphate of ammonia, and for other purposes. In another department of the metallurgy of iron waste,

utilisations of a most important character have been accomplished, and to these Mr. Macfarlane referred in the following terms:

"Fifty-six years have elapsed since Karsten plainly pointed out the influence which certain small percentages of phosphorus exercise upon the quality of malleable iron. The presence of 0.3 up to 0.8 per cent. has the effect of making it "cold short," that is of lessening its strength at ordinary temperatures. This element is often present in iron ores in the shape of small quantities of apatite and other minerals, and when this is the case, as in 1840, the smelter has no means at his command for preventing the reduction of the phosphorus and its passage into his pig iron. In the original Bessemer process it was found utterly impossible to remove the phosphorus. All of that element present in the pig-iron stuck to the metal, while boiling white hot in the converter, passed into the steel ingots without the slightest diminution, and into the rails, axles and tyres, into which they were manufactured. It was found that for our modern purposes a much greater freedom from the weakening element was demanded than in Karsten's time. For rails 0.1 to 0.2 per cent. phosphorus was permitted, but for steel of a higher quality the pressure of one tenth of these quantities became the limit. As the demand for steel to replace iron increased, so also did the efforts of iron masters to apply cheap and inferior (because phosphoric) pig-irons in the production of Bessemer steel. The ores free from phosphorus were scarce, and, if we except the Cumberland hematites, had to be brought to England from Spain, Algiers and Sweden.

"At last in May, 1879, the problem was solved by Bolckow Vaughan & Co., at Middlesborough, who were the first to carry out the invention of Thomas & Gilchrist, since become famous as the "Basic process." By making use of a basic lining of bricks in the converter, containing not more than 10 per cent. silica, manufactured from dolomite with silicate of soda as a binder, and employing a basic slag containing not more than 20 per cent. silica, and continuing the "blow" 2 or 3 minutes after the removal of the silicium and carbon, those inventors were able to reduce the phosphorus in common pig iron 1.5 to 0.4 per cent. and drive it as phosphoric acid into the basic cinder. The consequences were far reaching. Inferior ores and pig irons became available for making Bessemer steel, and great reductions have taken place in the price of rails, of which our new railways have had the advantage.

"But these were not the only consequences of this invention. Chemical manufacturers began to face the question as to how the phosphoric acid thus separated could be made use of. Large quantities of Thomas & Gilchrist slag were accumulating at the steel works in England and elsewhere, and it was found to contain from 16 to 20 per cent. of phosphoric acid. Compared with our Canadian apatite it seems to be a meagre raw material for fertilizers:

Nevertheless it was used for making these, and an article called Thomas' Precipitate was put upon the market by German manufacturers. But before this business had time to develop, it was found that by applying the slag itself as a manure, without any preparation beyond grinding to a very fine powder, the most satisfactory results could be obtained. The problem of utilising it has, therefore, been attacked and solved, and the phosphorus which, for fifty years, was the dread of the iron-master, has now no terrors for him, and has reached at last a sphere of widely extended usefulness in agriculture.

"It would be rather an undesirable result if this saving of waste should have the effect of reducing the value of our apatite deposits. Yet the most recent investigations point in this direction. In the *Chemiker Zeitung*, of March last, the following ultimate analysis of the Thomas slag is given:—

Phosphoric acid.....	19.02
Silica.....	8.20
Manganous oxide.....	5.24
Ferrous oxide.....	8.06
Ferric oxide.....	5.14
Lime.....	49.60
Sulphur.....	0.60
Magnesia.....	3.40
Alumina.....	1.10
	100.66

"Small crystals having been discovered in the slag possessing the composition of Quadrobasic phosphate of lime, the proximate composition of the slag has been computed from the above analysis with the following result:—

Quadrobasic Phosphate of Lime.....	49.02
Silicate of Lime.....	15.85
Lime (uncombined).....	11.00
Sulphide of Calcium.....	1.35
Manganous oxide.....	5.24
Ferrous oxide.....	8.06
Ferric oxide.....	5.14
Magnesia.....	3.40
Alumina.....	1.10
	100.16

This view of its composition is supported by the fact that the slag is decomposed with facility by dilute acids, and further 8.7-8 per cent. of its phosphoric acid is soluble in a solution of Citrate of Ammonia, a circumstance that would indicate its agricultural value to be equal to that of the precipitated or reverted phosphoric acid of artificial fertilizers. This is just what field experiments with it, in an extremely fine condition, have proved. Its agricultural value has been found to be equal to the phosphoric acid contained in Thomas Precipitate or bone ash.

"With reference to price it is calculated that one pound of phosphoric acid, contained in the finely ground basic slag, can be delivered for about one penny. If we take the value of 80 per cent. apatite in Liverpool at 10c per unit., or about ½ per lb. of tribasic phosphate, then the price of the phosphoric acid in it amounts to very nearly 1d. per lb. This is the same price, but a great difference lies in the fact that

while the slag is ready for the uses of the farmer, the apatite is not, and its phosphoric acid has still to bear the cost of manufacture. One pound of phosphoric acid contained in high grade super-phosphate, made from Canadian apatite, cost in 1886  $2\frac{1}{2}$  pence. From this and from the experience gained in Scotland and Germany regarding the relative agricultural value of soluble, precipitated and slag phosphate, it seems plain that making super-phosphate will soon become a thing of the past, and that our apatite miners will require to seek some new method of applying their mineral to agriculture, so that it may be able to compete with its new rival—the Thomas & Gilchrist slag. This is a problem to which our chemists and agriculturists should address themselves with the least possible delay. Very likely, by melting apatite with basic fluxes and grinding the product extremely fine, a material might be produced capable of direct and advantageous application to crops."

There were numerous other important subjects brought up in Mr. Macfarlane's address, but this matter of iron and phosphates seems to us to have a special interest for our readers, and we have, therefore, placed it before them in detail.

### Is Mining a Risky Business?

The lottery is declared unlawful because it dissipates the earnings of the people, but compared with it the game of chance now played in the Ontario and Quebec Land offices under existing laws and mode of locating a claim with reference to a discoverer obtaining the reward of his labour, the lottery is an honest and seemingly legitimate business. Its patrons risk only the price of a ticket, and it is win or lose and the amount lost is known but not so with the application for a mineral lot in the Provincial Land Office, where profits to be derived from labour and prospective value are lost along with the labour and expenses of discovery added. We want a new and more just code framed so that by making the location of a claim or discovery *on the ground in a proper manner first* (and then at the Land Office) imperative, the discoverer will receive the just reward of his labour.

### Protection Wanted.

An American exchange commenting upon the wholesale destruction of life at the Nanaimo mines very properly suggests that more protection should be accorded to miners in deep shafts than has heretofore been given them:—

"Many of the coal mines on the coast have been worked as cheaply as possible, owing to sharp competition—so it is alleged—and due security has not been provided for, either in timbering the mines or in furnishing modes of escape in case of fire or caving in of shafts. One shaft is not enough in any mine, any more than a single stairway is sufficient in a mammoth hotel. There should be some law to protect the lives of labourers in mines providing for means of escape, &c. Laws of this kind do prevail in some places. They should be more universal. In default of such legal protection, the labour associations might restrict their members from labouring where proper safeguards are not provided."

### Our Mines and Minerals.

W. A. Carlyle, Montreal.

Facing a sea of details and technical terms, understood only by the initiated, it has been difficult to make this subject generally instructive and popular. Still this part of the great natural resources of Canada cannot fail to excite deep interest among those who are studying the wealth and power of our country.

When we begin to write about the mines of Canada we have before us a vast extent of territory, as the name *Canada* is no longer confined to a narrow strip of country along the River St. Lawrence and the great lakes, but from ocean to ocean, from the turbulent Atlantic to the calm Pacific, rings out the name *Canada*; and then dies away in the vast regions of the North and the Arctic Ocean.

Everywhere throughout the different provinces people are flocking to establish new homes; and great regions, not long since the home of savages, are beginning to blossom with the labor and industry of the white-man's civilization, while the cheerful whistle of the locomotive re-echoes through the valleys and across the prairies of that which no longer can be called the "Great Lone Land."

From the beginning it must be remembered that Canada can scarcely be regarded as a metalliferous country of explored richness, although her mines are numerous and extensive, only awaiting energy, capital, and a more favorable state of the markets for their development. Canada has been gifted with almost every natural wealth, but the vast forests are fast melting away before the choppers axe to satisfy demands from all parts of the world; and the time is not far distant when this seemingly inexhaustible supply of timber will fail, and other regions and new countries must become the sources of this commodity. The fisheries seem an illimitable source of wealth as periodically the deep gives up its revenue, paid in gigantic swarms of fishes, but even here experience teaches that these great harvests may be devastated and ruined. The mineral wealth of this country will yet become of greater value as the demand increases and railroad and other facilities improve, though at present many mines remain idle and undeveloped.

If you will permit me to briefly state a few well-known facts concerning the geology of this continent it may aid to a better understanding of our subject, as mineral deposits are not scattered about hap-hazard, but are always found under certain circumstances and in certain localities.

It is doubtless that in the beginning the globe was in a molten state, and eventually, becoming cooler, a hardened crust was formed, which in turn was violently bent and folded as the cooled surface contracted, thus pushing up great ridges that since have become the nuclei of all mountain ranges. As the temperature decreased the vast impenetrable and enveloping cloud of vapor dissolved into rain, and oceans and seas, rivers

and brooks were formed, which, aided by heat and frost, began their attack on the great rock masses, wearing and grinding them into sand and mud, which, carried out by the waters, were spread over the vast ocean floors. In studying rocks, it is seen that the granites and gneisses, such as form our great Laurentian hills; are the oldest known, forming as it were the floor of the earth, or the lowest part of the rocky crust; and by their disintegration and crumbling away there have been built the great deposits of newer rock, thus sand and mud have been consolidated by intense heat and pressure into sandstone, slates and limestone. These newer rocks can be readily distinguished as they lie in layers or strata as one bed has been successively deposited upon the other, while in most of these strata are the fossil remains of animals that lived myriad years ago, the great primeval oceans having been the birth-place of most of them. Glancing at a map it is seen that along the eastern and western coasts of the continent are two great mountain ranges, the Appalachians and the Rockies, while between extends a great inland sea or plateau. When geologists examined these ranges the startling discovery was made that the great mountain masses, whose peaks often towered 10, 12 or 13,000 feet high, consisted greatly of those stratified rocks all twisted and piled up on end, and on the loftiest summits were found the fossil remains of animals, whose shells buried in the mud and sand of ancient ocean bottoms, were firmly imprisoned when these were hardened into stone.

After careful observation the secret of this enormous uplifting from ocean depths to mountain summit was learned from the fact that the beds of the Atlantic and Pacific oceans had subsided, and being very strong and firm, on sinking down had pushed with profound force against the more yielding continental masses, forcing up into these mountain ranges the great areas of rock. During the past four years Dr. Dawson has brought to light many more marvellous facts concerning the building up of these Pacific coast ranges. It has been found that there are four distinct ranges: (1) the Rockies, (2) Gold range, (3) Coast range, and (4) a submerged range, of which Vancouver and Queen Charlotte Islands are summits, and by the different ages of the constituent rocks it has been proved that these ranges have been formed at different periods, and the most inland, the Rocky range, is the youngest. To push up the towering heights of this great mountain chain, natural forces have been so great, the shoving energy of the Pacific Ocean bed has been so terribly grand that these deeply-rooted mountain ranges, the Vancouver, Coast and Gold ranges, over 400 miles in width, have all been pushed bodily towards the east, folding up inland plateaus into the grand precipitous cliffs and precipices of the Rockies.

All this is pertinent to our subject, as in these disturbed regions are found the great mineral deposits, collected mostly in great

cracks or fissures made by the bending and distortion of the rocks. To these great earth movements are due the differences in the coal measures. Coal beds are the remains of forests that flourished under such favoring climates that some plants, now seen as small club mosses, then grow as trees, while all vegetation grew in rank luxuriance. These great forests were finally submerged by the encroaching seas, and upon them were piled great depths of sand and debris, crushing down these deposits of vegetable matter into the hard black coal. Where this has lain undisturbed by those earth movements, as in the prairie beds of the North-West, the coal or lignite is poor, soft and watery. Where subjected to some upheaval or twisting the quality, known as soft coal, is much better, but where the beds have been all twisted and crushed, as in the mountains of Pennsylvania, the oily and volatile matters have been passed out, leaving the hard, shining hard coal or anthracite. In Canada anthracite coal is found only in Vancouver Island or along the Pacific coast, while that of the prairie province is poor until the mountains are approached.

The principal ores of Canada are gold, silver, copper and iron, and, though very valuable mines are known, yet none are startling in their extent or value when compared with those of Australia, Spain or the United States. Much capital has been spent upon their development and much has been lost, partly through ignorance and blundering, and partly through natural disadvantages and insuperable competition. One expert has said:—"that among the industrial enterprises begun from time to time in our Dominion few have been more unsuccessful than seeking the development of her vast mineral resources. The fault being not always through lack of mineral, but more often through blundering and inexperience on the part of the operators."

The rapid settlement of our country and the wide extension of the railroad system are beginning to make the opening up of good mines, long known, possible, while their value is rapidly increasing as the promises of better profits brighten. One thing to be deplored is that at present much of the energy and capital being expended in Canadian mining is American and not Canadian.

In this age of iron, now but at its dawn, when the use of this invaluable economic metal is spreading throughout all the branches of the arts of men, fast superceding timber and stone in many industries, the iron mines of Canada have attracted much attention. The present annual importation of iron and steel exceeds \$15,000,000, while since confederation \$235,000,000 of foreign metal has come into Canadian markets. The question has often been raised why do our own iron beds not supply this growing demand. The great reason is that the cost of smelting or converting the ore into iron or steel is much greater than in some other countries, as Britain or the United States, from two causes—

I. The foreign iron beds are much vaster in extent;

II. The want and greater cost in Canada of suitable fuel.

In the United States some of the most valuable mines are found in rocks the same as comprise our Laurentian Hills, and all so extensive as to seem practically inexhaustible, some producing from \$500,000 to \$1,000,000 worth of iron annually. With such deposits it is safe to erect the very extensive mills and blast furnaces, which alone can now be profitable. Many of these noted mines are found in and near the great coal fields, in fact, in some rich mines, beds of iron are in direct contact with beds of coal. This is a great factor in iron mining, as it requires 2,000 to 3,000 tons of coal for smelting 1,000 tons of iron ore. Under such favourable circumstances, when coal can be got for the cost of the mining, good iron can be profitably sold at one cent a pound. Remembering these facts, and the intense competition among the great American Iron Corporations, the position of Canadian iron mining may be better understood.

In Ontario and Quebec iron has been mined in many different places with varying success, the ore being smelted at the mines or shipped to American furnaces. But the dearth of cheap coal and poor means of access have made this enterprise barely profitable. North of Lake Ontario are several mines as the "Coe" mine near Wollaston, from which 45,000 tons of ore were shipped to Cleveland from a vein of very pure ore 20 to 40 feet wide. At Bedford, in Frontenac, is a rich bed 100 feet thick, while several are near Madoc, one yielding 40,000 tons of ore.

In Quebec, furnaces have been worked at St. Maurice, near Three Rivers, since 1737, while good beds are known at Bristol, Sherbrooke and Leeds, and at Moisu are great beds of iron sand that, however, proved unprofitable. In the Laurentian rocks at Templeton and Hull are rich deposits, and it is not at all improbable that very rich finds will yet be made in these rocks when this country becomes more cleared. Iron is found, of economic value, around the shores of Lake Huron and Lake Superior, and in British Columbia rich mines are known near excellent coal fields. On Lexada Island are deposits 25 feet thick, while the coal beds of Comox Harbor are only 20 miles distant, but the industry in this part of Canada awaits the increasing demands of a much larger population. But it is in Nova Scotia, along its northern part, that the best Canadian iron beds are found in large veins intersecting rocks of all ages. The coal fields are close at hand, with every facility for shipment, but after many spasmodic attempts these mines are now almost idle, unable to overcome the great foreign competition.

Furnaces have been built, but the history of iron-smelting in this Dominion is neither a long one nor a brilliant one; the list of failures is greater than the list of successes, but such is

likely to be the case where enterprises are too often undertaken by persons of little or no experience.

To be continued.

### The New Tariff.

(Iron Trade Review.)

The best possible tribute to the wisdom and efficiency of the present American tariff is the fact that Canada has adopted a system modeled very closely upon it and differing chiefly in the fact that it levies about two-thirds of our duties upon articles entering that country. The revised and amended schedule on iron and steel products appears on another page, but it may be interesting to bring into comparison herewith some of the principal articles in the schedule, under the old and the new duties:

	Old Duties.	New Duties.
Pig iron .....	\$2 per ton	\$.84 per ton
Slabs, blooms, puddle bars... Not specified..	9 "	"
Bar iron .....	17½ per ct.	17 "
Flats, 1 in. wide and less.....	17½ "	13 "
Round iron, 7-16 to 3 in. diam. 17½ "	15 "	"
Round iron, less than 7-16 in. diam.....	17½ "	25 per ct
Iron and steel boiler plate.....	12½ "	30 "
Malleable iron and steel castings. 25 "	25 per to.	"
Cast iron plates and vessels.....	25 "	16 "
Cast iron pipes.....	30 "	12 "
Sheet iron, below 20 gauge.....	12½ "	12½ per ct
Hoop or band iron.....	Not specified..	\$12 per ton
Rolled channel and T iron.....	12½ per ct.	12½ per ct
Iron bridges and structural iron. 25 "	14c per lb.	"
Iron and steel forgings.....	25 "	14c "
Wrought iron and steel scrap... Free	2 per ton	"
Steel ingots, blooms, &c., 4c or less per lb. ....	12½ per ct.	36 per ct.*
Steel ingots, blooms, &c., above 4c per lb.....	10 "	12½ "
Wire rope.....	25 "	25 "
Hardware.....	30 & 35 "	35 "
Firearms and surgical instruments. 20 "	20 "	"
Cut nails and spikes.. 10 per ct and 4c per lb.	1c per lb	"
Street railway rails.....	75 per ct.	\$6 per ton
Safes.....	25 "	35 per ct

\*But not less than \$12 per ton.

The re-adjustment of rates has proceeded upon the theory that Canada has iron ore and coal in close proximity to each other and special facilities for the production of charcoal iron, and that the exclusion of foreign products would be more than compensated by the resulting growth of the Canadian iron and steel industry. The annual Canadian consumption of pig iron is 250,000 tons, not inclusive of steel rails. To make this quantity in Canada, 750,000 tons of iron ore, 120,000 tons of limestone and 750,000 tons would be required, and considering the benefit which would accrue to the country by the development of the iron industry the Government felt that it was justified in losing the coal duty of half a million.

The United States has little to lose by the new arrangement, and it would certainly be in bad grace to characterize the present policy otherwise than as pre-eminently politic on the part of our neighbour. May she reap great national and material results from the new system.

### Coal Dust in Mines.

Some time ago there appeared in these columns the report of a valuable paper on this subject read by Mr. M. Mercier before the Manchester Geological Society. The following discussion on the paper took place at a recent meeting of the organisation and is full of interest to our readers.—

Mr. J. S. Burrows said Mr. Mercier had dealt with several means for lessening the quantity of dust in a mine. He (Mr. Burrows) had since

been looking into the question, and it seemed to him that in places where the haulage was done by machinery they had to face conditions which must of necessity cause a large quantity of dust to rise from the tubs. He had found that when the roads were packed the dust had gone a long way into the pack and lodged there. He had swept one piece of road, but in less than a week it was fully coated with dust. He had tried water on a small scale, and he found that unless he put on a heavy quantity it simply ran away in little globules. If they put on a large quantity of water they wet the timbers, they made the roads slippery, and would no doubt eventually cause the floor to lift. In his opinion the real danger which arose from the presence of dust in a mine would be best overcome by providing some substitute for the use of gunpowder, rather than take so much trouble as would be necessary to get rid of the dust.

Mr. Mawson said the idea of having water pipes laid down along the roadways seemed to be a good one, but it would entail very great expense and he thought would be found hardly practicable in mine. The best suggestion was to have a water tank carried like a tub along the roads, which would discharge the water through a rose.

Mr. Burrows thought such an arrangement would require an enormous amount of water if they were to effectually lay the dust.

Mr. Mawson suggested that if the dust were once properly swept up, and the water tanks used, the road might be prevented from getting dusty again.

Mr. Burrows, as an illustration of the quantity of dust that was constantly accumulated mentioned that in one double road 900 yards long, they filled at least 18 tubs every night with dust, and in addition to this they had extra cleanings up.

Mr. Hall, Inspector of Mines, thought that they might be able to prevent the dust blowing off the tubs by sprinkling the tubs with water as well as the roads. The dust question was a very important one and would have to be tackled in some shape or another. He had been reading a description of a water-sprinkling machine brought out in the North of England which could water 800 yards of road with less than a thousand gallons of water; this was a tank that went on wheels with a longitudinal tail from which the water was discharged. He thought colliery managers sometimes overdid the difficulty of watering mines, so far as lifting the roads was concerned. There was no doubt a good deal of difficulty in some kinds of roads, but if they persevered with the water and got the temperature something like regular, this difficulty would cease.

Mr. Burrows did not think that sprinkling the tops of the tubs with water would prevent the dust rising.

Mr. Mercier said in watering the roadways the idea was not so much to soak the dust as to have a fine spray thrown into the current of air. It would be almost impossible to saturate the dust, but if the moisture were carried along on the air it would effect the purpose. He did not think, even with a soft warrant floor, that if the water were simply mixed with the atmosphere it would affect the floor to any extent. With regard to the dust blowing off the top of the tubs this was a difficulty which might be very considerably overcome by improving the roads and using closed tubs. At one colliery in South Wales where they had been blocked with dust when using open tubs, by adopting the means above stated they had been able to reduce the dust about two-thirds. He thought the pit tubs had more to do with the dust ques-

tion than anything else, and where iron boxes had been introduced the mines were nothing near so dusty as where wooden boxes were used. In using a water cart a considerable difficulty was in getting into the return roads, and the laying down of the requisite lines of rails would, in some cases, cost quite as much as putting down water pipes by which the mine could be watered automatically. He might add that at one colliery they used compressed air with the water so as to get a very fine spray.

Mr. Burrows admitted that there was a good deal in what Mr. Mercier had said with regard to bad tubs, but whatever they did they could not prevent the dust shaking out.

The Chairman said the whole question was one of great interest to colliery proprietors. The other day he had a conversation with Mr. Wm. Galloway who was a well known authority on the dust question, and he said the practice of watering the roads was largely on the increase in South Wales, but he also strongly recommended that the tubs should be made as dust proof as possible. He further expressed the same opinion as Mr. Hall, that the coal dust question was one which would have to be gone into thoroughly, and if this was done, he was satisfied good results would follow.

Mr. Burrows suggested that but for the danger of explosion attendant on shot firing the coal dust question would not be regarded as being of such great importance.

Mr. Hall remarked that shot firing was not the only cause of explosions, and that whilst there were other contributory causes, the presence of coal dust in the mine must always be a danger and render it desirable that the dust should be got rid of.

The Chairman observed that some persons held the opinion that an explosion might be caused by coal dust alone without the presence of gas. He did not hold that theory, and in his opinion it was impossible to have a serious explosion without the presence of gas. In some of the extensive collieries in South Wales, they might find in almost every case a "cap" in the main return, and the colliery officials would tell them that this was dust, and it was one of the reasons they went for the coal dust theory.

Mr. Mercier remarked that if the mines inspectors in South Wales were of the same opinion as the colliery officials on the coal dust theory, it was time there was a change.

### Geology of the Gold Regions.

#### How the Ancient Streams of the West Developed its Auriferous Placer Deposits.

*From a paper read before the Royal Society at the Annual Meeting at Ottawa, May 27th, 1887, by Anna Bowman, Mining Engineer, of the Geological Survey of Canada.*

We extract from Mr. Bowman's paper, read before the Royal Society, the following description of one of Nature's most interesting operations, which will be best understood and appreciated by those who have been actually engaged in gold mining in the Western or Rocky Mountain regions of the Dominion.

Mr. Bowman's paper covered the general subject of the Gold Bearing Rocks of British Columbia, about to be reported upon by the Geological Survey, and gave introductoryly a general view of the field described and its geological problems. This was followed by an account of the different formations found to be gold bearing, that is to say, the distribution in time of the gold bearing rocks; then of the geological distribution of the productive regions

overrun since 1858, and the formations to which they belong. The succeeding portion on "mechanical enrichment, its methods and degrees to a stage adapted to placer mining and the natural forces at work," is what we have here copied.

The paper continued to consider the processes of chemical enrichment, the results of which are witnessed in the quartz veins of the country, having for its ground material the deep water sediments, commonly described as slates, which were off shore palaeozoic sediments adjacent to very ancient crystalline areas; and concluded by a description of some of the most noteworthy features of the cordilleran system in Canadian territory; being accompanied by a map and six sections.

#### The Natural Forces at Work.

**CONDITIONS OF PLACER MINING.**—Great wealth in gold may still exist, however, where placer mining has not been successful. This will become apparent when I point out the operation of the natural causes of workable placers; and will form a significant comment upon possible gold countries which are not placer mining countries, such as the Appalachian gold regions.

Three circumstances have to combine to make a good placer-mining region: first, the veins must carry free gold along with the baser metals; secondly, the conditions of natural concentration in streams must have operated upon them; and thirdly, after such operation, the product must be accessible to the miner. Either of these conditions wanting, though we walked over untold millions, we could not realize it by successful placer-mining. In California all three of these purely geological considerations happened to be superb. In British Columbia they are not exactly identical, as I have elsewhere pointed out.\*

**SILTING UP OF STREAMS.**—A peculiar circumstance pertaining to profitable placer mining regions is to be observed in connection with this silting up or filling of previously eroded canons, I refer to its universality in all the famous gold mining regions. Hence it has occurred to me that I should perhaps have included it among the above mentioned necessary natural conditions of placer forming. The process appears to have served as a means of arresting the gold. In its absence the gold would have been hammered between the boulders along with which it travelled, and the bed rock of the stream, until it became flattened and frequently sub-divided. By continued erosion and undermining this process of hammering and subdivision would of course be continued indefinitely, until it is readily conceivable that all the gold entering a river would, unless otherwise retarded, be carried down stream, and finally scattered again among the sediments of the plain.

**CAUSES OF SILTING UP STREAMS.**—The silting up of the old river channels was due to a cause which can be very precisely stated, viz:—An alteration in the transporting power of running water, from greater to less. It arose from a different combination of its two factors of *Volume* and *Grade*. Prof. Whitney has attributed all of it to a change simply of volume. Prof. Le Conte has attributed all to a change only of grade. Both have drawn important conclusions regarding climate and uplift. As it is plainly a resultant of these two factors it appears to me that the geological problem involved is a more complicated one than has been assumed.

\*Address before American Institute of Mining Engineers at Scranton meeting, February, 1887.

**Method and Degrees of Mechanical Enrichment to a Stage adapted to Placer Mining.**

The tertiary streams of the north-western Pacific coast were silted up, as has been stated, and covered in some places by lava flows, in others directly by post pliocene glacial clays and drift. Examples are seen of the former in the chasms of the "Green Timber," on the Cariboo road, and in the bluffs of the Pentatoncut river, opposite Quesnel; and of the latter in every mining camp in Cariboo.

As the silted gravels were derived from the adjacent older formations, which have been described, it is proper to remark in this connection that the distribution of the auriferous deposits is nevertheless not necessarily co-extensive with the gold bearing rocks. It was limited by the conditions necessary to bring about the phenomenon of silting or filling up with detritus, taking the place of preceding conditions of erosion and transportation. Usually this occurred *only for a short distance* along the course of the older eroded valleys. The effect is very striking in placer mining regions. Down stream they are represented by sands and clays, containing very much less gold, as well as gravel, than in the deepest part of the cycloid of erosion.

**POST-TERTIARY AND RECENT ENRICHMENT.**—In the post-tertiary, or rather recent period, concentration of gold into workable placers took place, generally speaking, only in the silted up river valleys. Its method was that of replacement, and sorting of the material of the bench or terrace epoch. This could not have taken place to any great extent during the post-tertiary Terrace epoch; because the raw material so to speak, was only then being deposited, and it was upon this that concentration did its work. *Itself* had buried all the pliocene concentrations out of sight, and out of reach of the flowing waters of that valley-filling period. Examples were found in all the early diggings of 1858-9 along Fraser river.

**INTERVENING OF THE PLATEAU LAKE PERIOD.**—The transformation of valleys into lakes, and the confluence of lakes into one or more inland seas of vast proportions—from causes not yet satisfactorily explained—put a stop to the effective concentration of gold until the turning point was reached at the close of the pleistocene (post-tertiary), when the filling had been completed, and eroding conditions were once more established. Any one who has seen the map of British Columbia, and still more, any one who has seen the country itself will recognize the far reaching and general importance of this plateau lake period by its remaining and enduring landmarks.

**THE "BED ROCK" MISSED AND FOUND.**—Nearly all the benches and washes of the Fraser and its tributaries, profitably mined by the placer miners after 1858, and by the Chinese and Indians in subsequent years, accordingly belong to Recent time. No bed rock was reached by the early miners of British Columbia until they got into the higher mountainous region of Cariboo, where the recent erosions had tapped some of the higher bed rock channels left intact on the sides of the older valleys during their erosion. They are known among the placer miners as bed rock benches, or "high channels," and are generally understood by the miners themselves to be older in date than the deeper deposits of the tertiary streams. Examples are universal in any mining country.

**OLDER AND NEWER TERTIARY STREAM CHANNELS.**—Similar bits of streams running on bed rock were often not older, however, than the recent erosions, as is frequently seen where

the recent eroding stream had been displaced by a slide. It is true, however, that the highest old side channels were, generally speaking, the oldest. They are all hidden in Cariboo District by a universal covering of drift.

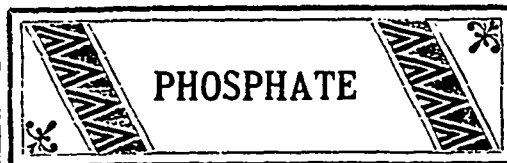
The deepest channels cut during the tertiary period are in Cariboo generally from 40 to 120 feet underneath the present stream beds, and separated from the stream concentrations, of recent date (like those of the Fraser), by beds of clay marking the separation between pliocene tertiary, and pleistocene or older post-tertiary. Nothing is more important to the process of drift mining, or better known to the miner than the "clay." It sometimes "gives out," to his grief, from removal by a side stream or other causes; in that case involving much pumping or expensive working.

**WHY THE TERTIARY STREAM BEDS ARE RICHER.**—Now these older channels of the tertiary period which ceased cutting and began filling, as already remarked about the close of that period, necessarily contained in their deepest gutters the accumulated gold of the entire tertiary eroding period. The history of the concentrating process accounts for the richer placer deposits in most cases.

The bulk of the gold has been taken out in Cariboo District accordingly by drifting.

Not only less time, but much less disintegrated country rock was represented in the recent erosions which terminate in their downward wear above the clay.

It would seem incredible were it not a fact that in less than two years after the commencement of gold mining in British Columbia, near Hope, the perseverance and ingenuity of the California prospector had actually explored and exploited the valley of the Fraser river for a distance of four hundred miles from the starting point, at Hope, into the interior of British Columbia, and as early as the fall of 1860 had penetrated the hidden mystery of the tertiary streams, and found therein what he was seeking. The wealth of Keithley, Harvey, Cunningham, & Antler creeks was quickly disclosed. Soon after them followed the famous discoveries on Williams & Lightning creeks. They were successively revealed by accidental bits of "shallow bed rock," along with a good deal of shrewdness, on the part of the prospector, directed to a solution of the problem.

**Latest English Quotations.**

London advices report that the market during the past month has been without any special feature, the only exceptions being the large sales of South Carolina Phosphates, and the demand which has arisen for Sulphate of Ammonia.

**MINERAL PHOSPHATES.**—There is no material change in Canadian, but as the St. Lawrence is again open to navigation, dealers anticipate a renewed interest in this high grade Rock. A very large business has been done in South Carolina Phosphates, as owing to a number of steamers arriving at American Ports without profitable employment, they became available at unprecedentedly low freights for bringing home Phosphate, and most of the large manufacturers were able to secure supplies at about 6½d. to 7d. per unit, delivered at U.K. Ports. Belgian

Phosphate has been in active request since our last, and several contracts have passed both for immediate and next season's delivery, but at ruinous prices for the raisers. Messrs. Conpor, McCarnie & Co. are offering all qualities from 20 to 25 per cent. to 60 to 65 per cent. Somme Phosphate still remains actively in demand, and raisers are unable to keep pace with it, though with the fine weather many of their difficulties will be removed.

The following shipments of Canadian ore have been made from Montreal for month ending 31st May last:—

Date.	Shippers.	Ship.	Destination.	Tons.
May 18.	Wilson & Green	s.s. Ovenholme	Liverpool.	613
" 23.	Gillespie, Patterson & Co.	s.s. Bannewall.	Hamburg	104
" 25.	Anglo Canadian Phosphate Co.	s.s. Colina.	Glasgow.	200
" 27.	Wilson & Green.	s.s. Carropus	Liverpool.	63
			Total....	980

Latest quotations in England for Canadian Phosphate is 11½d. to 11¾d. per unit with one-fifth rise on a guarantee of 80 per cent.

Ocean freights are ruling low this season. Sailing vessels from 2s. to 3s. 6d., and for steamers from 3s. 6d. to 6s.

Captain Williams has been appointed Superintendent of the North Star Mines, vice Mr. W. H. Smith resigned. Present output is expected to assay 88 per cent.

A well authenticated rumour is current that a large and valuable bed of phosphate has been discovered on the lands of Troy Lake Mining Company. An investigation with a view to determine the extent and value of the discovery is being made.

At Little Rapid's Mines the usual output of high grade ore continues. The tramway from the mines to the river has been completed and thoroughly equipped. The ore will now be hauled from the mines to the river edge at a minimum cost. Shaft B has reached a depth of over 200 feet, and shows a vein of pure apatite full width of shaft. Mr. Pickford, sr., of London, England, accompanied by Mr. Green, of Montreal, and other phosphate experts, lately paid a visit to this valuable property and were greatly pleased with the general appearance of the property and its management.

The Otty Lake Mines are now in good working shape; a third pit has been commenced upon this month and yields a large quantity of high grade ore. The present output is 15 to 20 tons daily with about 50 men employed.

Messrs. Butler, Breed & Co., Boston, propose distributing the following circular very widely among the farmers of New England. It is of much interest as shewing a movement in a direction of vast importance to our Canadian Phosphate Industry:—

**GROUND PHOSPHATE.**

"It is very generally admitted that if it were not for the high prices charged for commercial fertilizers, and the doubt often existing in the minds of purchasers as to their quality, and the trustworthiness of the analysis, the use of artificial means for supplying worn out land with the much needed elements for plant food, would be very much more general, and the quantity that would be used by farmers largely increased.

"The undersigned have arranged to put on the market *Fine Ground Phosphate*—soluble in the water of



the soil—superior in quality to Ground Carolina Phosphate, because containing a greater percentage of phosphoric acid. In support of the growing practice of using raw phosphate, we quote the following from the Annual Report of the Conn. Agricultural Experiment Station for 1884—page 30:

"The raw phosphates, South Carolina and Navassa, and the phosphate guanos, have been used by some of our farmers instead of super-phosphates with satisfactory results. While on one hand, the acid phosphates are more quickly available, on the other hand, much more phosphoric acid can be applied to land for the same money, in the form of raw phosphate, which latter advantage may make the raw material in some cases the more economical, as in seeding down to grass, or preparing land for fruit trees, &c."

We also quote from a letter from A. H. Ward, Esq., Agricultural Editor of the Boston Post, as follows:—

"To render raw phosphates as quickly available as the acid phosphates, all that is required is to compost it with fermenting manure, which can be done as the manure is made during the winter. Soluble phosphoric acid, whether made from bones or the mineral phosphates, is all of equal value as plant food.

"The degree of pulverization controls, almost without exceptions under similar conditions, the rate of solubility, and the more or less rapid diffusion throughout the soil.

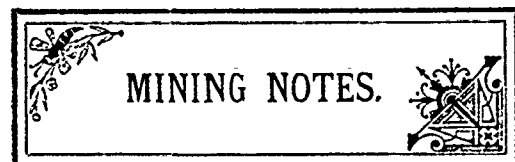
"Soluble phosphoric acid, when applied to the soil, reverts to its original condition in a short time. But it is better to use the Fine Ground Phosphate and render it soluble by the aid of fermenting manure, in preference to using acids, which more than double the cost without increasing its ultimate value as a fertilizer.

"When the raw phosphate is to be used without mixing with manure, it should be put on the land about six months earlier than super-phosphates, and after the lapse of that time, a large percentage will have become soluble, and the balance will be assimilated as fast as the water of the soil can act on it."

Mr. Milne, representing Messrs. W. & H. M. Goulding (Limited), of Dublin, the largest manufacturers of phosphates in Ireland, was recently in Montreal in connection with the purchase of high grade ore. He reports that the prospects on the other side are very favourable.

Writing anent recent cablegrams to the effect that all the phosphate deposits of South Carolina had been "cornered," by a syndicate of wealthy capitalists the *Canadian Trade Review* says:—

"The object of the men who control the Carolina phosphate fields is to put up the price of crude rock. They are reported to have secured absolute control of every ton of rock mined in the state, and propose to regulate prices at will. Last year the aggregate reduction of South Carolina phosphate rock was 449,603 tons, of which 381,603 tons were exported and 68,000 tons were consumed by the local fertilizer manufacturing companies. The aggregate value of this production was, in round numbers, \$2,000,000. The total quantity of phosphates shipped from Canada last year was 25,974 tons valued at \$431,951, but the Canadian phosphate lands are probably capable of yielding more mineral than these of the state referred to."



### Nova Scotia.

The Brookfield Mine is showing up well.

Recent tests made from quartz taken from the Parker and Douglas, Bartling gold mine, at Malaga, have given very satisfactory results. Two leads are being prospected, one being about 42 inches wide between the walls, and the other 10 inches. The yield from the widest lead at a depth of 50 feet was one ounce to the ton, and from the other two ounces and one half to the ton. The owners of this mine intend at once to put up a 20-stamp mill, which will be the largest in the county.

The *Critic* announces that a four foot gold bearing lead has been discovered on the Stemshoon property, Moosteland.

The Provincial Government has introduced a bill to prevent strikes and lockouts in mines. The principal section reads:—

"Whenever any dispute shall arise between the employer and employed of such mines in regard to wages, mode of working, or any other matter, the employer shall not dismiss or lock-out the employed, nor shall the employed strike or abandon work, without first laying complaint in writing before the commissioner."

The bill provides that when the employed, or a majority of the employed, shall make a complaint in writing to the Commissioner of Works and Mines, he shall, in his discretion, submit the whole matter to a Board of Arbitrators. This award is to have the same force and effect as a judgment of the Supreme Court and shall operate as an attachment on the whole mining property, after payment of royalties, if the award should be against the employers; and shall bind a certain amount, equal to 14 days wages, which the Act provides shall be reserved and kept from the employees, to meet any such contingencies, in the event of judgment going against the employees.

"The object of the Act" says the *Gazette* "is a good one, but such a law we fear would prove inoperative."

"We doubt if either man or master would willingly accept it. The arbitration clause alone might be productive of good, as tending to bring the opposing forces together before a tribunal which both could respect, and in the integrity of which each could place confidence. But neither would care, we think, to become liable to such a penalty as is provided for a refusal to acquiesce in the court's decision, for there are instances when each party to a labour contest is thoroughly convinced that he is right and that to retire from his position would be to accept ruin. In such a case a confiscation of the property of the conscientious recalcitrant would be an act of tyranny, that we doubt if any British court would sustain. And it is in the settlement of such cases that the great difficulty in the labour problem lies."

The official returns received for month of May are

District.	Mill.	Tons Crushed.	Oz. Gold.
Brookfield.....	Brookfield.....	155	189½
Fifteen-Mile Stream...	Egerton Gold Mining Company...	80	42½
Sherbrooke.....	Miners'.....	29	4½
do .....	Goldenville.....	47	11½
East Rawdon.....	Rawdon.....	280	171½
Dars' Hill, Salmon River.....	The Dufferin.....	236	222

Fifty men are at work at the Essex Gold Mines, at Tangier. The foundations of the new Wiswell Mills are nearing completion.

The *Critic*, of 17th inst., states that Mr. Tonquoy, of Moose River, brought to town last week a gold bar weighing 106 oz., the work of 10 men for a month. Of this, 14 oz. was mortared by hand from 50 lbs. of quartz, the balance being milled from 34 tons crushed.

### Quebec.

Some good specimens of gold and silver ore have lately been brought in from the Portage-du-Fort district.

Operations at the Asbestos mines have been prosecuted vigorously, and show an average steady output. Prices remain firm.

All the other mines are in active operation, but we know of no special feature to report concerning these. New uses for Asbestos are being gradually found, and an increased and growing demand is found for the lower grades of crude stock, which supply a want for materials where cheapness is required.

The Anglo Canadian Company are continuing operations upon the lines indicated in our last, and both the quantity and quality of output show a steady improvement.

The vein of gold recently discovered in the neighbourhood Mattawa turns out to be even more valuable than at first reported, it having been found to extend for a great distance and to become much richer. The vein crosses beneath the Ottawa river and enters the mountains on the north side in Quebec province. An assay which has been made shows the quartz to be exceedingly rich in the precious metal. Dr. A. M. Earle's discovery was made in the mountain opposite Mattawa and assays made from his specimens give 2 oz., 12 dwt. 12 grs. per ton. Numerous parties are out prospecting and moneyed men in the district are reported to have made investments.

Some further information may be gleaned from the remarks of our correspondent who says "gold was first discovered in this vicinity about the middle of last month." The locality is in the Province of Quebec directly opposite Mattawa and in unsurveyed territory. A number of assays have been made by Mr. J. T. Donald, of Montreal, which give results varying from \$19.00 to \$35.00 per ton, gold. The precious metal is not visible in the quartz, but on being pulverized and subjected to chemical process it has readily been obtained.

Three companies have been organized and among others interested are Dr. Earle and Mr. Adam Burwash, Mattawa, and Messrs. McAllister and Metcalfe, of Pembroke.

Operations are being conducted with much activity at the mica mines of the Villeneuve M. & M. Compy., near Buckingham. A fine quantity of very superior clear white mica is being produced. Very large crystals, shewing a perfectly smooth surface without a speck or flaw, have been taken out within the past few days, and the management report that the twist of the vein has now been passed. Two steam drills are at work, and the company are kept very busy handling orders for home and foreign trade. The management state that the demand this summer promises to be much in excess of former years.

### Ontario.

From a circular issued by the Kingston & Pembroke Mining Company we learn that they have 13 distinct mining properties, located along the Kingston & Pembroke Railroad, which are being worked more or less, and are known: 1st.—The Zanesville Glandover, owned in fee simple. Comprises 650 acres, from which 10,000 tons of ore have been sold. Has \$20,000 worth of machinery. There are three (3) openings on this vein, covering a distance of half a mile. A large amount of ore, estimated by a conservative engineer to be 40,000 tons, is in sight in the main shaft. 2nd.—The Grady-Machar Mine. Owned in fee simple, and comprises 100 acres, upon which there is \$2,000 worth of machinery. 3rd.—The Levant Mine. Comprising 450 acres, which is leased for 99 years at a royalty of 15 cents per ton. There are three (3) shafts on this property, from which some 60,000 of ore have already been taken. This property contains the Wilbur mine, which produces ore lower in phosphorus than any Bessemer ore imported into the United States. There is \$40,000 worth of machinery on this property. 4th.—The Lalonde Mine. 100 acres in fee, upon which there is \$2,000 worth of new and improved machinery. 5th.—

The Culhano Mine, 100 acres in fee and \$2,000 in machinery. 6th.—The Williams Mine, 100 acres in fee and \$5,000 worth of machinery. 7th.—The Calabogie Mine. This property is leased at a royalty of 15 cents per ton on ore sold; \$15,000 worth of machinery. 8th.—The "Blue" Ore Lot, 100 acres in fee. 9th.—The Mississippi Mine covers one square mile, and is leased for 99 years at a royalty of 15 cents per ton on ore mined and sold. There has been 150,000 tons taken from this mine thus far. The plant cost \$20,000. 10th.—The Gildersleeve Mines comprise 1,266 acres in fee and 300 acres in rights. This property contains the celebrated "Flower" mine, which is considered to be the largest mine ever found in Canada. 11th.—The company owns options on some 2,600 acres of mining lands in the townships of Palmerston, Sherbrook, Bahurst, Oss and Alden, costing already some \$10,000, and which can be taken up at a cost of some \$26,000 for the lot, or \$1,000 for 100 acres. 12th.—The "Red Ore" Lot, 100 acres in fee. 13th.—The Black Lake Lot, 100 acres in fee. The manager writes that he has just received the first report of the two cargoes of ore sent to the Joliet Steel Company. He says: "The iron is fully up to our guarantee, and the phosphorus is lower than any ore ever sent to Chicago, .005."

Owing to the increased iron duties Messrs. Cleveland, Brown & Co., one of the largest firms in the Western States, propose opening a branch at London which will give employment to 200 men. Exemption from taxation for ten years is asked.

The *Aylmer Times* states that the copper property owned by Mr. Conroy, near Mattawa, has been sold to an American firm for \$20,000.

#### PORT ARTHUR DISTRICT.

The main shaft at the Rabbit Mountain Mine has reached a depth of 267 feet. The quantity of silver ore in sight is very encouraging. Considerable improvements have been made. A new compressor house 22x90 two stories in height, has been erected. In this building are situated the carpenter and blacksmith shops and boiler house. The new compressor machinery and hoist will be brought in as soon as the road leading to the mine is made passable for heavy loads. The capacity of the hoisting apparatus is 250 tons every 24 hours. A new pump has been put in the 250 foot level, which has a capacity of 102 gallons a minute. Other improvements are contemplated.

Some idea of the value and progress made by the various mines in the district may be gathered from the following from the pen of Prof. C. F. Eschweiler in the *Evening Wisconsin*:

"The worst time for the silver district of Port Arthur has passed. The Beaver, Rabbit Mountain and Silver Mountain will dispel all doubt about the paying capacity of these mines. People have forgotten that Silver Islet paid \$600,000 in dividends, besides paying for the mine and the very expensive coffer dam around the shaft. Under ordinary circumstances that mine could have paid about \$2,000,000 in dividends, having 3,500,000 product. The Beaver has all the advantages a mine requires. It has wood and water close at hand, it is kept out of the stock market, and can ship its products at very low rates. Mine and mill are but 2,000 feet apart. The shaft of the Rabbit mine is 260 feet deep, and the vein is getting richer, showing that the silver is not confined to the junction of trap and slate. The Silver Mountain mine seems to promise well. The slate belts of Silver Mountain are underlying those of the slate in which the Rabbit Mountain and the Beaver are finding their silver, because the whole slate formation dips with an angle of about ten degrees towards the coast. Therefore, it is safe to draw the

conclusion that the veins will hold out in depth, if only the proper deposits are worked."

Work at the Beaver mine is being conducted with much vigor. No. 2 shaft has reached a depth of 185 feet, and the quality of the ore is pronounced to be very good.

#### Manitoba and North-West Territories.

A meeting of the directors of the Canadian Anthracite Coal Company was held during the month at Ottawa. Shipments from the mines are to begin forthwith.

#### British Columbia.

Latest despatches report that the fund for the relief of the sufferers by the recent calamity at Nanaimo now amounts to \$11,497.75. It is expected that the amount will reach \$25,000.

With a view to securing benefit under the new Act to encourage quartz mining, the B. C. M. & M. Co. have presented to the Government a report on their properties. It is said to be in the highest sense favourable.

New and important discoveries of gold and silver bearing quartz are reported in the Nicola Valley. Prospecting is being pursued with vigor in the district.

The annual meeting of the Vancouver Coal Mining and Land Company (Limited) was held at London on 3rd inst. In moving the adoption of the report the Chairman stated that during the past six months there had been a gross profit of £8,289.10s. £3,754 had been applied to repairs and depreciation, £921 to reserve fund, £1,546 to debenture interest and £744 to London charges, totalling up to £6,700,000 and leaving a net profit of £1,522. The net profit for the previous half year was £2,934. The report was adopted. Messrs. Needham and Trendor were re-elected directors and Messrs. Hill and Lovelock auditors to the corporation.

The *Colonist* announces that rich quartz has been discovered at the forks of Rock Creek in the direction of what is known as Bald Mountain. The surface rock is stated to be very rich, containing free gold. The ledges are wide and the appearance of the country indicates a large quartz belt. The attitude at which the quartz is found is about 3,500 or 5,000 feet above sea level. The quartz is evidently a feeder of Rock Creek, in which stream desultory mining has been carried on for years, and where at one time there was a great placer excitement. Several locations have been made.

We learn that travellers returning from the northern end of Vancouver Island have brought to Victoria rich samples of gold and silver quartz taken from that district.

It is understood that the Island Mountain Quartz Mining and Milling Company have complied with all the requirements of the Act granting bonuses and guarantees to quartz mills, and are now qualified to draw on the Government for the \$20,000 applied for under the Act. The old Kutz & Lane engines and boilers and the Enterprise Company's stamp mill are in the possession of the company, and will be at once moved to the mill site prepared for them last fall at Jack of Clubs lake, while chlorination for smelting works, whichever is best adapted for treating the ore, will be erected during the summer months. Considerable work has already been done on the ledge by tunnelling in tunnels, &c., and it is understood that the

engineer's report to the Government states that there is 10,000 tons of ore in sight. The ledge is of considerable width, and at whatever point it has been struck, assays and mill tests made have resulted highly favourable.

#### Great Britain.

The peril which in spite of all the preventative efforts of science and legislation ever attends the avocation of the coal miner has received a fresh and terrible illustration by the recent explosion at the Udston Colliery, about two miles from Hamilton in the West of Scotland. This colliery was opened about ten or eleven years ago. The district has an evil reputation in respect of the "fiery" nature of the principal seam worked in it—the well known "splint," and barely ten years have elapsed since the memorable disaster at the Blantyre pits when more than two hundred persons perished. The workings, it would appear, have been carried on in three seams of coal, the "ell," the main and the "splint," the latter at the great depth of nearly 300 feet below the surface. Partly, no doubt, on account of its position the seam gives off a large quantity of gas; but it does not appear that any large accumulation of this dangerous element has ever been observed in the pit, and it is stated that the working regulations have always been stringent and strictly enforced while the arrangements for ventilation and for communication with the surface are in accord with the most modern principles of coal working. The pit is ventilated by a fan of about 20 feet in diameter, and as the explosion was not so violent as to wreck the apparatus, the volumes of pure air which it drew into the workings neutralised to a large extent the deleterious effects of the gas. Every precaution was taken against explosion. Before the men went down in the morning an inspection of the workings was made in case of "fire," and this had been done as usual. Throughout the mines Scotch gauze safety lamps were used, and no open lights were allowed. Of 74 men and boys in the mine at the time of the accident only two were brought out alive. A thorough investigation is being made as to the cause of the accident, but it seems doubtful whether the most rigid enquiry will be able to throw light on the subject for the lips of those who could have explained it have been closed for ever.

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ST. PAUL, MINN. WINNIPEG, MAN.  
O. H. INGRAM, Treasurer,  
EAU CLAIRE, WIS.

### Mines at Anthracite, N. W. T., CANADA. v.1—1y

#### Dominion and Industrial Exhibition.

In the prize list, which has just been issued, for the Dominion Exhibition to be held in conjunction with the Annual Exhibition of the Industrial Exhibition Association, at Toronto, from the 5th to 17th September next, the following prizes will be awarded exhibitors in class 85:—

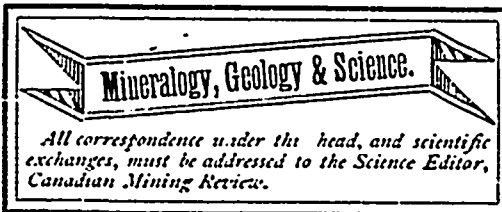
ECONOMIC MINERALS AND ORES OF CANADA.  
Sec.

1. Salt, crude..... Bronze Medal
2. Salt, dairy (judges to test for impurities)..... Silver Medal

- |   |   |
|---|---|
| 3. Salt, table (judges to test for impurities).....   | Silver Medal                              |
| 4. Oclres and other mineral paints, best collection of.....   | Diploma                                   |
| 5. Gypsum, best collection, crude and calcined.....   | Bronze Medal                              |
| 6. Marbles and Lithographic Stones best collection of.....  | Silver Medal                              |
| 7. Phosphate of Lime, and its manufactures, not less than 50 lbs., each, well displayed.....  | Silver Medal                              |
| 8. Clays and Sands for pottery, moulding and glass-making, collection of.....   | Bronze Medal                              |
| 9. Cements, best assortment of, for building purposes, exhibitors to be present with the judges to have tests made.....   | Silver Medal                              |
| 10. Asbestos and its manufactures, if exhibit is worthy.....  | \$10                                      |
| 11. Mica, in mass and sheets, labelled with locality where found.....   | 10  |
|   | 1st 2nd                                   |
| 12. Iron Ores, large specimens, Diploma and.....  | \$10 \$5                                  |
| 13. Copper Ores, large specimens, Diploma and.....  | 10 5                                      |
| 14. Gold and Silver Ores, Diploma and.....  | 10 5                                      |
| 15. Lead Ores, large specimens, Diploma and.....  | 5 3                                       |
| 16. Plumbago and its manufactures, large specimens, Diploma and.....  | 10 5                                      |
| 17. Best collection of Mineral and Geological specimens, properly classified and described, of which one-fourth at least have not been previously exhibited here..... | 10 5                                      |
| 18. Best collection of Mineral and Geological specimens, as in Sec. 17, by students under 18 years of age.....  | 5 5                                       |
| 19. Best Archaeological collection. {   | 1. Dominion Gold Medal<br>2. Silver Medal |
| 20. Extra Entries   |   |

The entrance fee is 25 cents. Any of our readers who may desire a copy of the complete Prize List can obtain one by communicating with Mr. H. J. Hill, the secretary, Toronto.

At a recent meeting of the Berlin Physical Society, Dr. Gross explained his theoretical view on the heat of solution of magnetised iron, and showed why, in accordance with these, the heat of solution of magnetised iron must be greater than that of unmagnetised. One result of these views was that a piece of magnetised and unmagnetised iron in a conducting fluid capable of dissolving the iron must give a current; this he has already demonstrated two years ago. The current in such an element as this flows across the fluid from the magnetised to the unmagnetised pole, and is independent of the nature of the magnetisation. The source of the electric current is in this case, according to the views of the speaker, to be sought for in the loss of specific magnetisation which the molecules of iron undergo as they pass from the solid to the fluid condition. Of the various solutions of salts of iron which were used in these experiments, only neutral salts of ferrous oxide were found to yield a result, while the salts of ferrous oxide gave no current. The cause of this is, according to the speaker, that only the ferric salts lead to a solution of the magnets. Nature says: "Dr. Nichols has quite recently carried on some experiments on the heat of solution of magnetised iron, and has obtained the same experimental results—namely, that the heat of solution of magnetised iron is greater than that of unmagnetised, although he starts with theoretical views respecting the magnetic potential of solid iron and iron in solution which are diametrically opposed to those of Dr. Gross."



**Ottawa Field Naturalist Club.**  
Notes on the Utica and Trenton Formations at New Edinburgh.

By. H. M. Ami, M.A., F.G.S.

Ever since the opening of the collecting season this year there have been ample opportunities afforded the members of the Ottawa Field Naturalist Club and others interested in the science of geology to examine a number of interesting exposures about Ottawa, and not a few have availed themselves of this opportunity. Foremost among the numerous sections observed in the series of Cambro-Silurian rocks are those which may still be visited in New Edinburgh, along Creighton street. Since the addition of the vice-regal suburb to the city, Engineer Surtees has been busily engaged carrying on excavations for waterworks purposes in this new ward, and as New Edinburgh is for the most part built immediately upon the Trenton and Utica formations, which are overlaid by exceedingly thin and for a considerable extent of our Post-Tertiary deposits, such as drift clay, sand and the like—there is a considerable amount of blasting to be done.

The highly fossiliferous measures of the Utica, resting immediately and conformably upon these of the Trenton, may be well seen on Creighton street. The contact of the two formations occurs near the northern end of this street, and the Trenton strata occurring then at the northern extremity of the street, show clearly the transitional character of this series of strata.

The Trenton here consists chiefly in dark grey or black bituminous limestones, for the most part nodular and holding such characteristic form, viz.—*Murchisonia*, *bellicincta*, *Hall*, *Trochomena*, *nubilicatum*, *Hall*, *leptaena*, *Sericea testudinaria*, and the *Strophomena alternata*.

Before crossing Union street, nearly 100 yards from that street, the Utica is well seen and such well-known and characteristic forms as *Asaphus Canadensis* indicate the horizon of the rocks. No less than thirty species of fossils have already been obtained from the measures of the Utica in New Edinburgh, and no doubt more will be found when careful collecting has been made and when the material obtained shall have been examined.

A special interest attaches itself to the rock which confines the measure of this formation. They are for the most part highly bituminous, and when distilled can be made to yield a highly inflammable substance which belongs to the petroleum group. The shales of Windsor, Ont., a village near Collingwood, have yielded bitumen, and coal oil was obtained from those shales. The percentage of this useful material in the shales, however, is not such as would warrant their being distilled for oil. The operations at Windsor being leased where the abundant supplies from the Devonian shales of the Essex peninsula in Western Ontario and elsewhere was discovered. The bituminous character of the rocks of the Utica formation is no doubt due to the presence in vast numbers of the remains of trilobites, and such forms of by-gone life.

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# Mining Regulations

TO GOVERN THE DISPOSAL OF

## Mineral Lands other than Coal Lands, 1886.

**T**HESSE 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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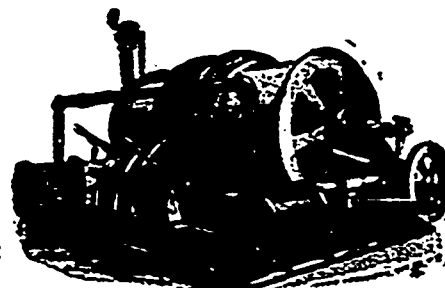
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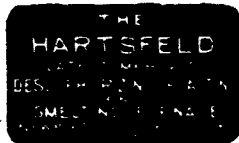
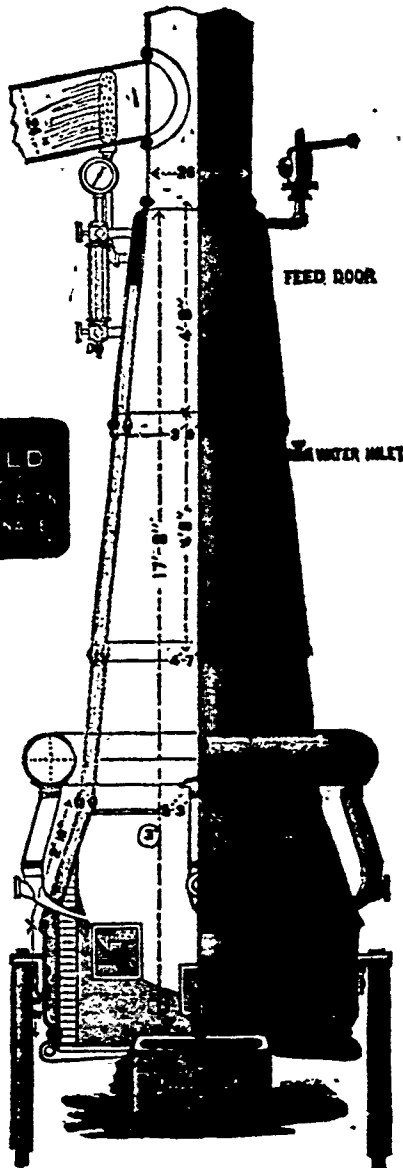
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