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TWENTY-SECOND YEAR OF PUBLICATION

# The CANADIAN MINING REVIEW

Established 1882

Vol. XXIII--No. VII.

OTTAWA, JULY 31st, 1904.

Vol. XXIII--No. VII

 <p><b>AIR COMPRESSORS GAS</b></p>	<p><b>THE CANADIAN RAND DRILL CO</b>  <b>SHERBROOKE, QUE.</b>          BRANCH OFFICES IN          MONTREAL, QUE. TORONTO, ONT. HALIFAX, N.S.          ROSSLAND, B.C. RAT PORTAGE, ONT. GREENWOOD,          VANCOUVER, B.C.</p>	 <p><b>ROCK DRILLS</b></p>
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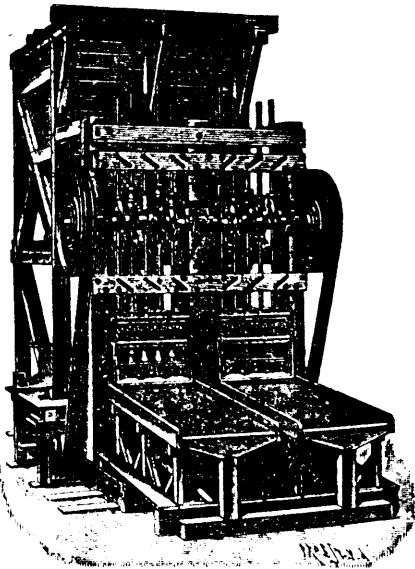
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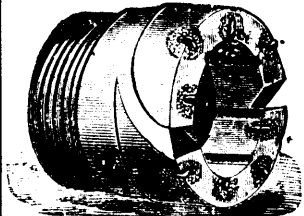
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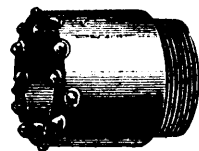
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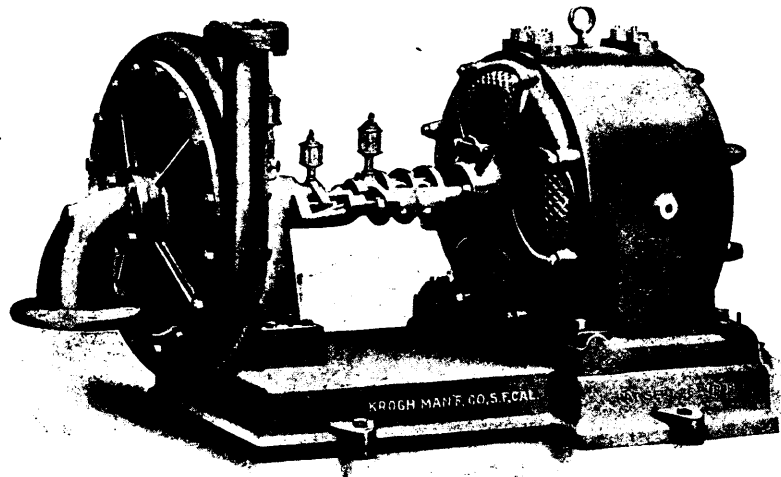
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# Ontario's Mining Lands..

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

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

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

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

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

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

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

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

**HONORABLE E. J. DAVIS,**

Commissioner of Crown Lands,

or

**THOS. W. GIBSON,**

Director Bureau of Mines,

Toronto, Ontario.

# PROVINCE of QUEBEC

The attention of Miners and Capitalists in the United States  
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## GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago,  
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ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

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

Mining concessions are divided into three classes:—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.
2. In surveyed townships the three classes respectively comprise one, two and four lots.

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

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

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

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

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

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

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

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

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

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,  
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# THE CANADIAN RAND DRILL CO.

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50-40 "	RAND	RAND	RAND
40-35 "	RAND	RAND	RAND

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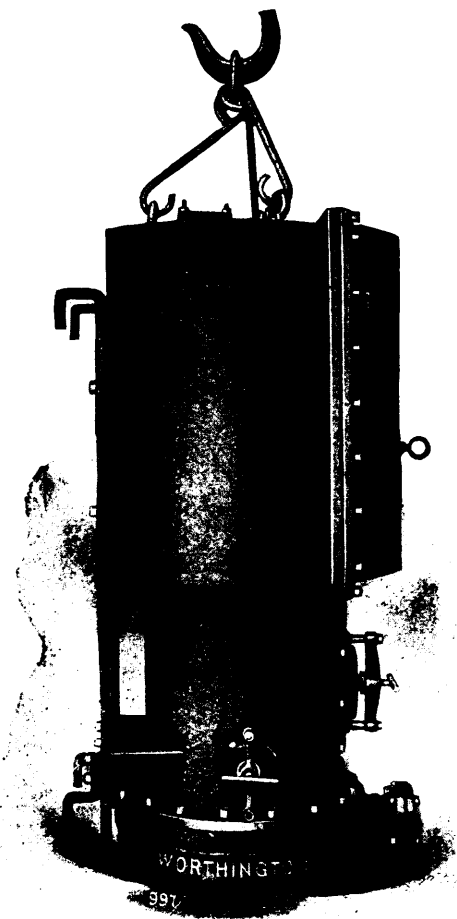
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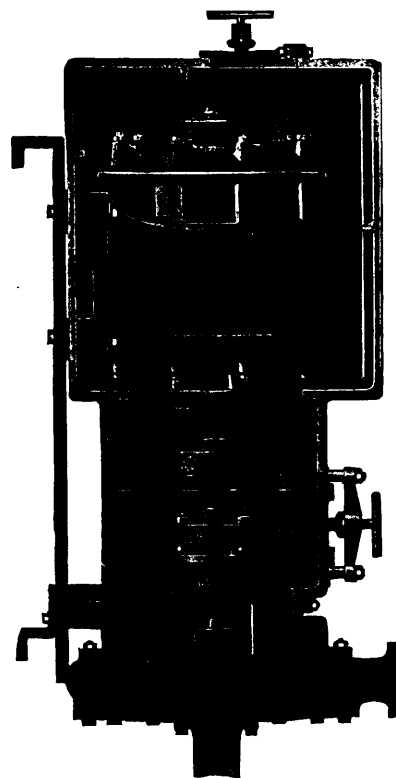
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Three-inch Turbine Sinking Pump.

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# Dominion of Canada

## SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

### COAL.

Coal lands may be purchased at \$10 per acre for soft coal and \$20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

### QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of \$7.50 per annum for an individual, and from \$50 to \$100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within fifteen days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is \$5.

At least \$100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When \$500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at \$1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory, of an area not exceeding 160 acres.

The patent for a mining location shall provide for the payment of a Royalty of 2½ per cent. of the sales of the products of the location.

### PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee, \$5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, \$10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent collected on the output after it exceeds \$10,000.

### DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, \$100 per mile for first year and \$10 per mile for each subsequent year. Royalty, same as placer mining.

### PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be obtained within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate. The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, \$10. Royalty at the rate of two and one-half per cent on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of \$2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least \$200.

A certificate that work has been done must be obtained each year: if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

### PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North west Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of \$1.00 an acre, subject to royalty at such rate as may be specified by order-in-council.

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WIGAN, ENGLAND

PATENT

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310,000 IND. HORSE-POWER AT WORK

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WALKER BROTHERS have constructed 700 Air Compressing Engines, with Steam and Air Cylinders ranging from the smallest sizes to 72 in. diameter, including 350 from 30 in. to 70 in. diameters.

One installation, in process of construction, has four Steam Cylinders (Corliss type) and four Air Cylinders.

The Low-pressure Steam Cylinders are 64 in. diameter, the Low-pressure Air Cylinders are 58 in. diameter. Steam Pressure, 140 lb. per square inch; Air Pressure, 100 lb. per square inch.

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Messrs. WALKER BROS.,  
Loftus Mines, Loftus in Cleveland, R.S.O.,  
3rd December, 1901.

Dear Sirs,—I have much pleasure in stating that the air compressing machinery, supplied by you in 1891 and 1897, to Pease and Partners, Ltd., Loftus Ironstone Mines, has given every satisfaction.

The valves of the air cylinders are remarkably good, and have never given any trouble or needed repairs. The compressor is a double horizontal compound engine, steam cylinders, 28 in. and 48 in. diameters, air cylinders, 40 in. diameters by 72 in. stroke.

The compressed air is used for rock drilling, hauling, and pumping underground.—Yours faithfully,  
For Pease and Partners, Ltd.,  
W. MOORE, Manager.

[NOTE.—These engines have four steam cylinders and two air cylinders.—WALKER BROS.]

The United Alkali Co., Ltd., Chief Engineer's Office,  
Widnes, 23rd December, 1901.

Messrs. WALKER BROS., Pagefield Ironworks, Wigan.

Dear Sirs,—In reply to your enquiry of the 29th November, we have pleasure in being able to state that your blowing engines have given us great service and satisfaction.

We have had for several years quite a number of your large blowing engines in operation, driven direct by both single and cross compound arrangement of steam cylinders.

We consider that the arrangement of the "Walker" valves on the compressor cylinders is a valuable one, possessing the merit of simplicity and efficiency, while giving a large throughway with a small clearance space.—Yours faithfully,  
For the United Alkali Co.,  
EDWARD J. DUFF, Chief Engineer.

[NOTE.—See the number and dimensions of the compressors referred to in the list of users in our catalogue. The steam and air cylinders are nearly 70 in number, from 20 in. to 50 in. diameter.—WALKER BROS.]

Barrow Hæmatite Steel Company, Limited,  
Barrow-in Furness, 7th October, 1901.

Messrs. WALKER BROS., Pagefield Ironworks, Wigan.

Dear Sirs,—I have much pleasure in stating that after a long experience of your Bessemer blowing cylinders, extending over 15 years, we find the valves perform their work most satisfactorily, and they are most enduring; indeed, we cannot speak too highly of their performance or life.—Yours faithfully,  
For Barrow Hæmatite Steel Company, Limited,  
J. M. WHILE, General Manager.

[NOTE.—The various blowing engines (air compressing engine) referred to above include several air cylinders 48 in. diameter.—WALKER BROS.]

Messrs. The GLENGARNOCK STEEL AND IRON COMPANY write, in November, 1901, after 15 years' experience of Walker Bros' blowing engines, having air compressing cylinders 54 in. diameter by 6 ft. stroke:—"These engines have given us every satisfaction."

Messrs. DE WENDEL & CO., Hayange, Lorraine, after seven years' experience of air cylinders (four) 54 in. diameter by 6 ft. 6 in. stroke write:—"The working of the air cylinders you supplied leaves nothing to be desired."

S. PEARSON AND SON, Contractors.

Blackwall Tunnell Works, East Greenwich, S.E.,  
May 10th, 1897.

Messrs. WALKER BROS., Pagefield Ironworks, Wigan.

Dear Sirs,—We are pleased to confirm what we told you verbally the other day, viz., that we consider the air cylinders and valves of your compressors to be the best for such work as we have been carrying out on the above contract.

One of your engines ran for almost a year without stopping, and it gives us great pleasure to thus testify to the good qualities of the plant which we purchased from you.—We are, Dear Sirs, yours faithfully,  
(Signed) pro S. Pearson and Son, E. W. MOIR.

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1904

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FOR 1904

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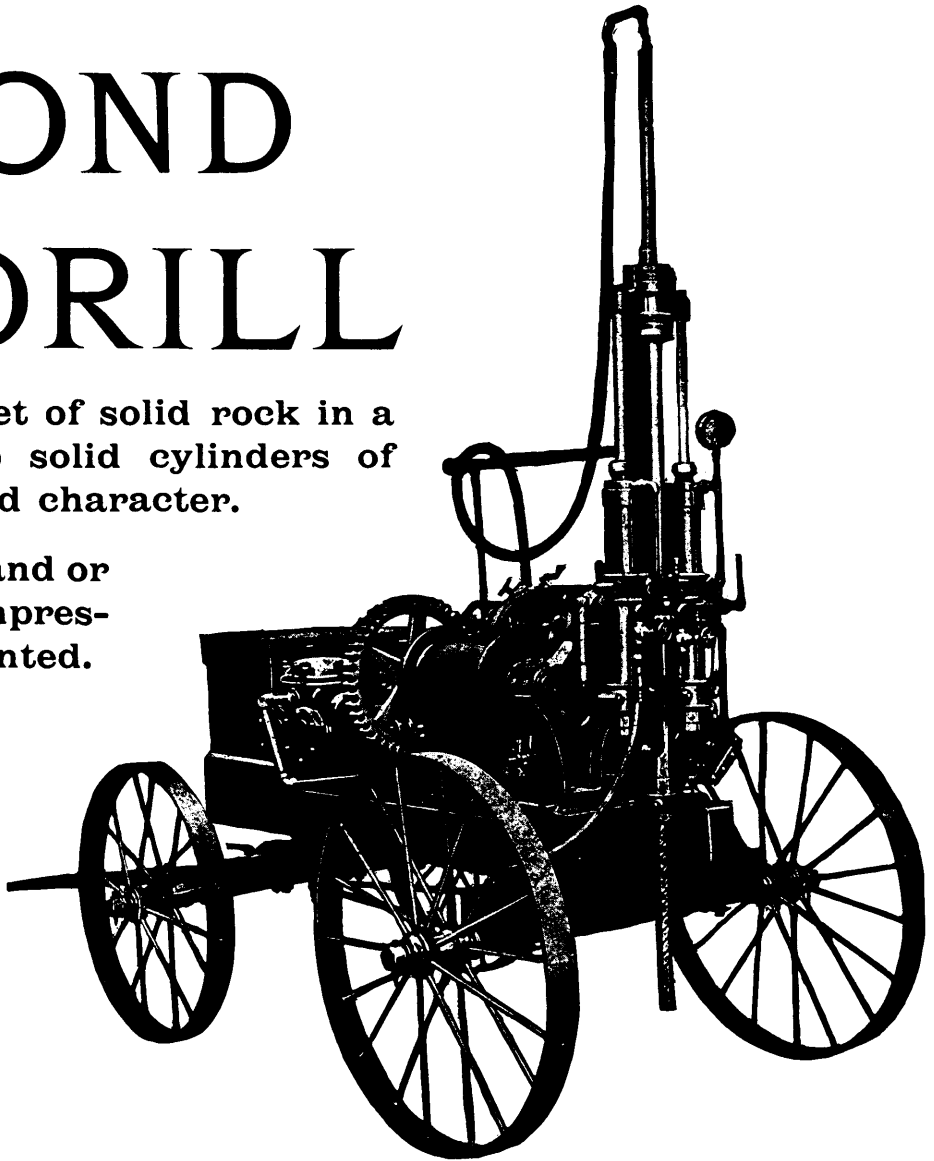
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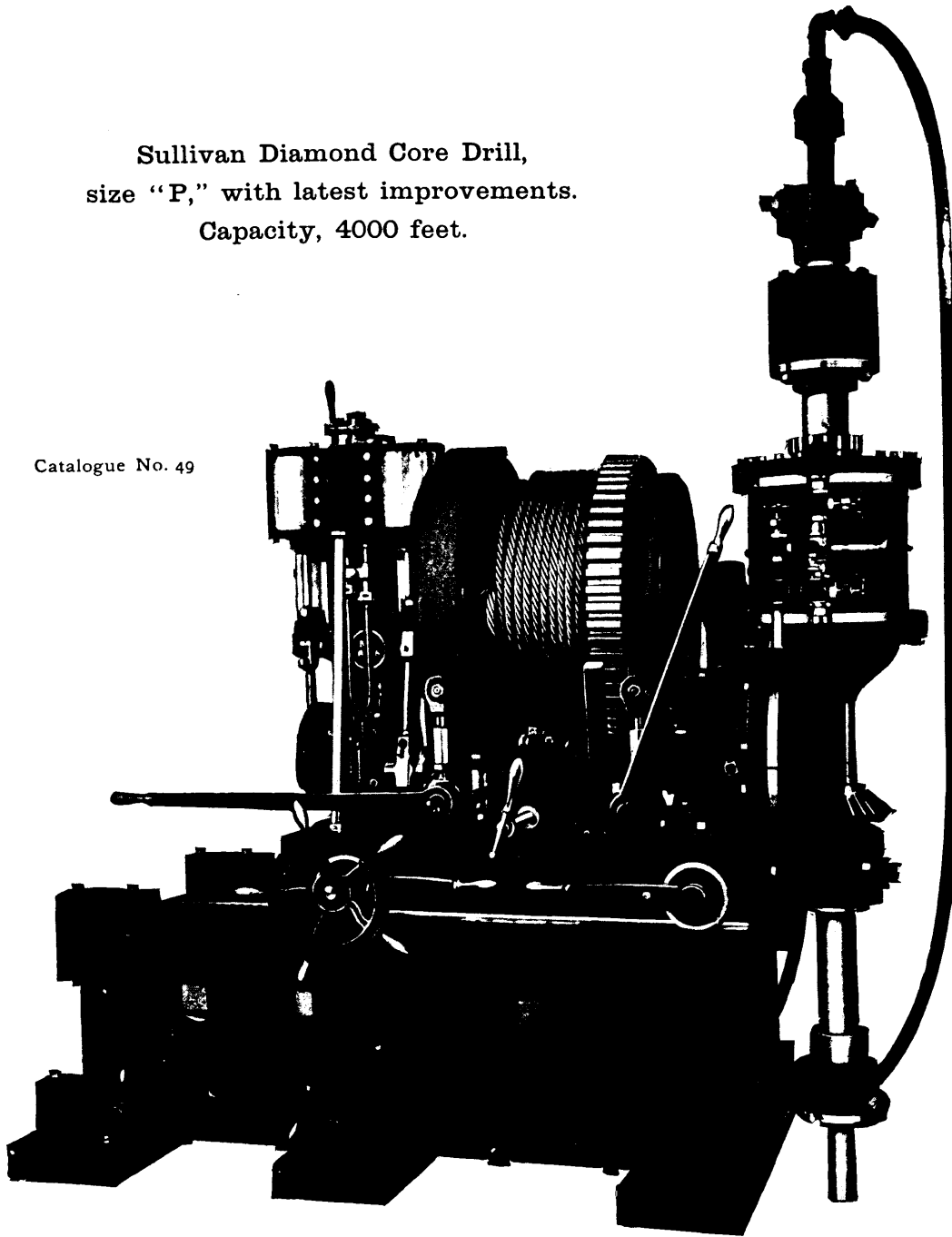
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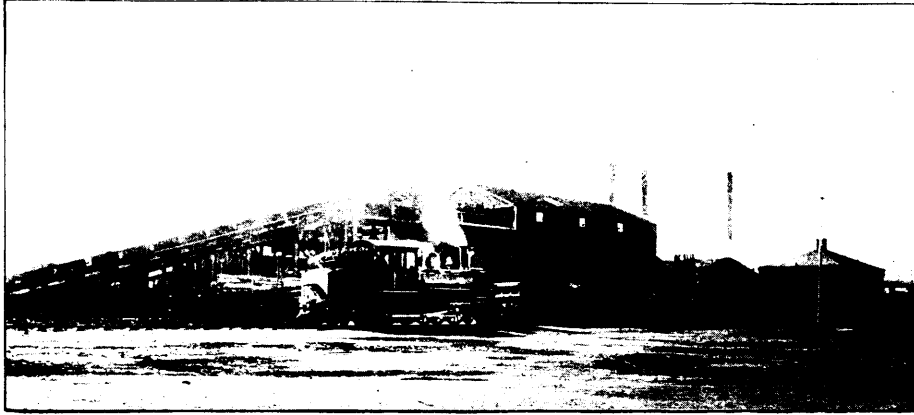
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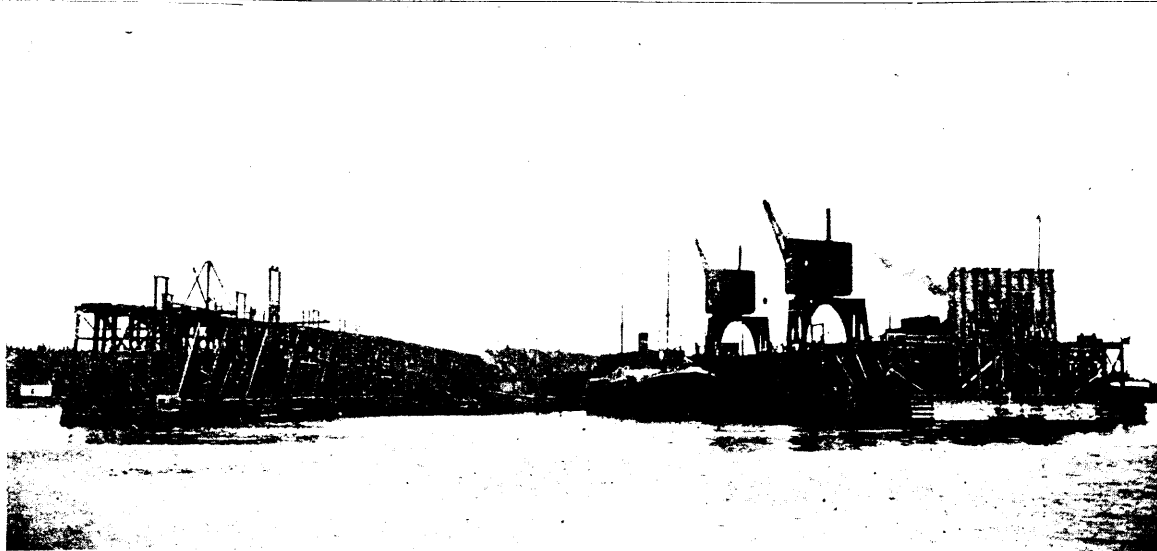
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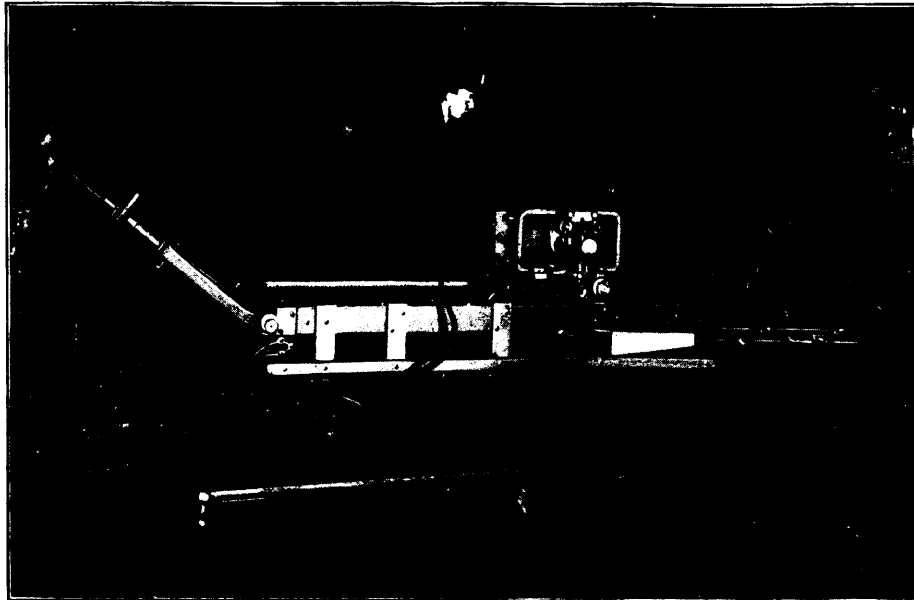


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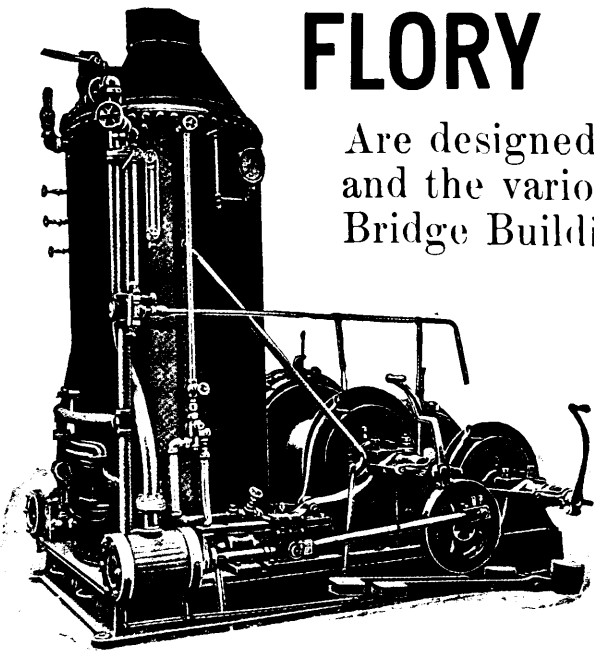
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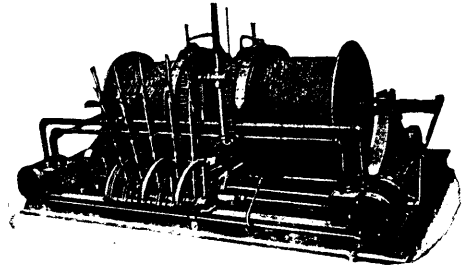
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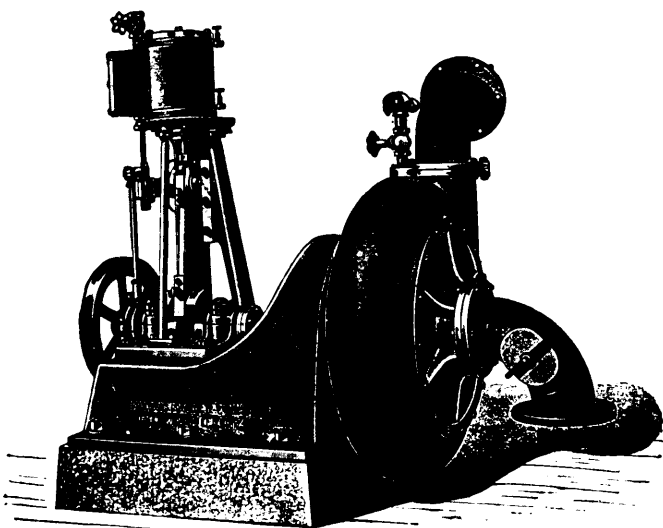
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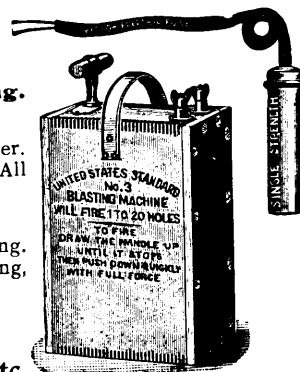
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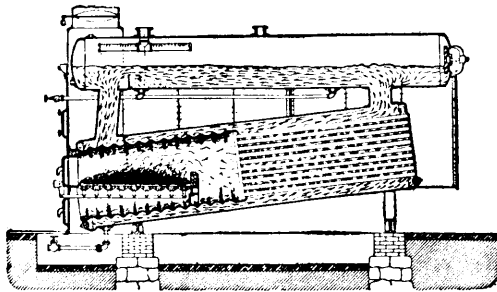
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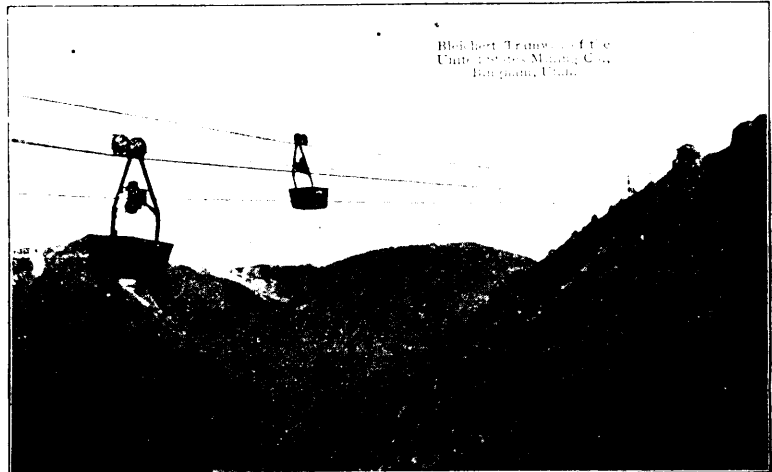
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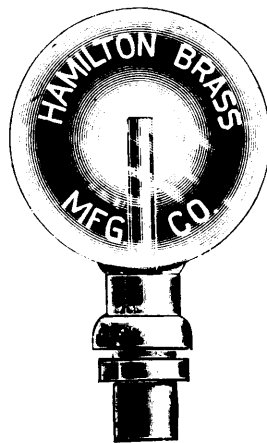
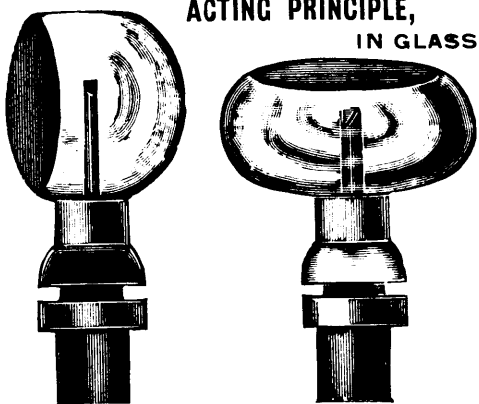
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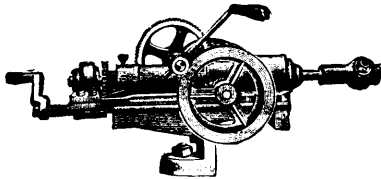
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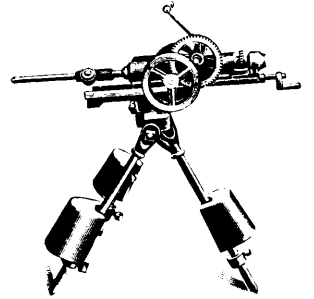
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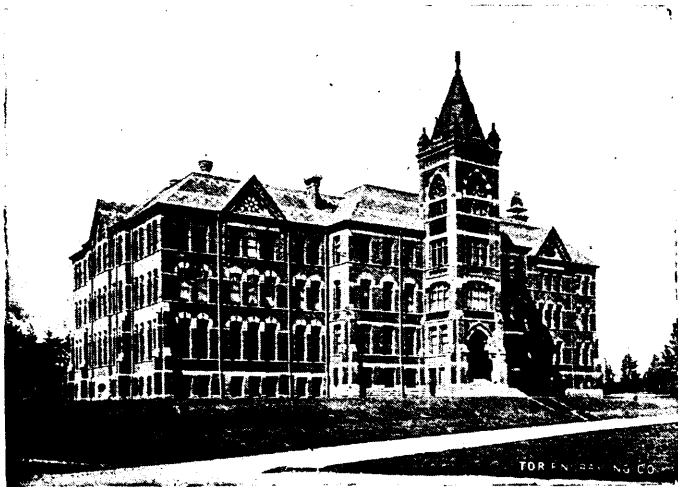


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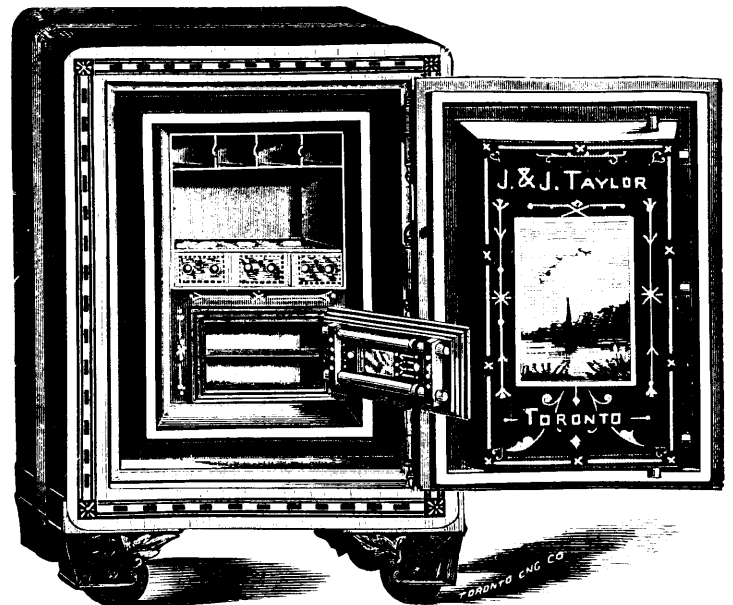
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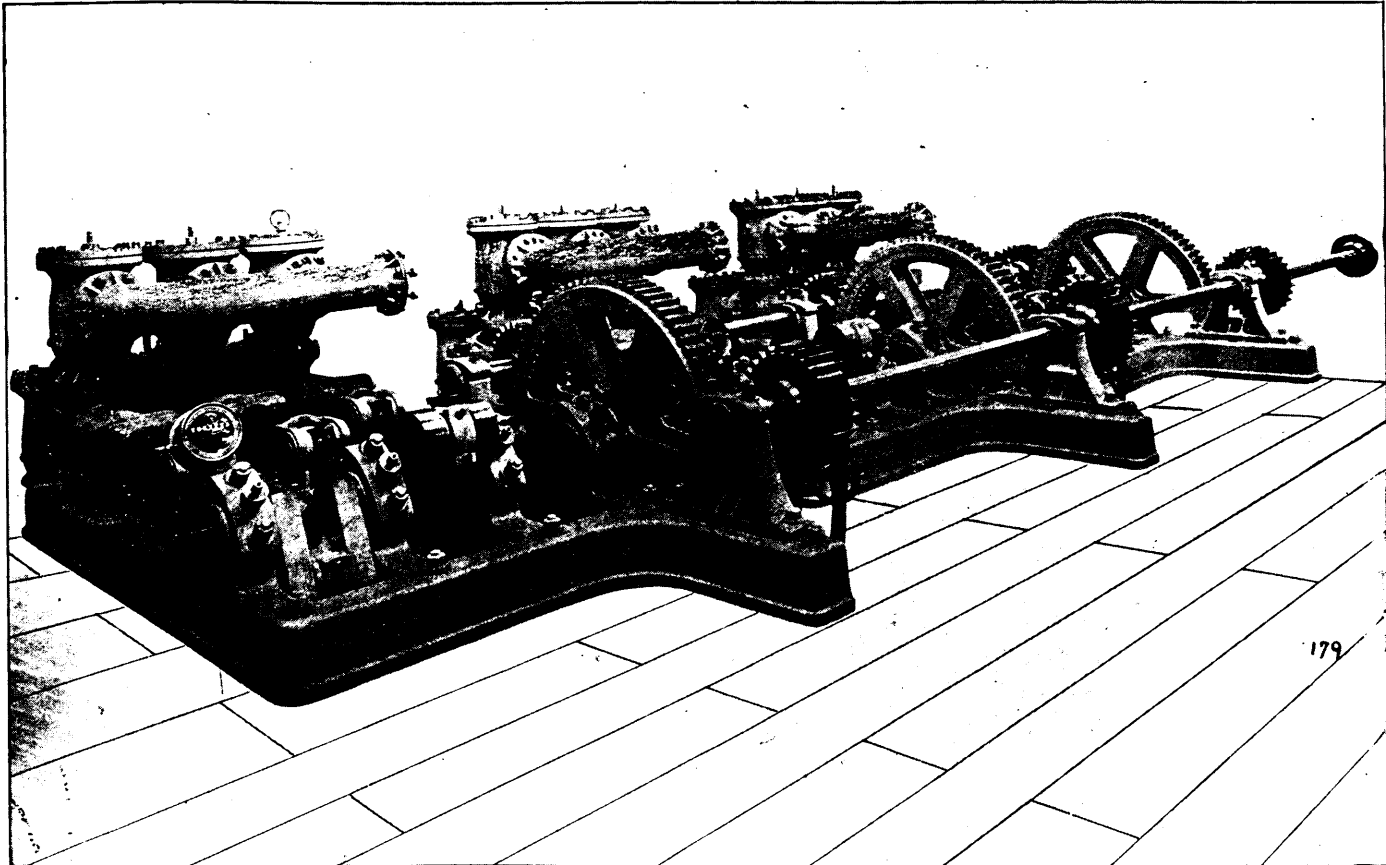
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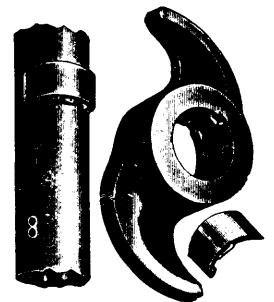


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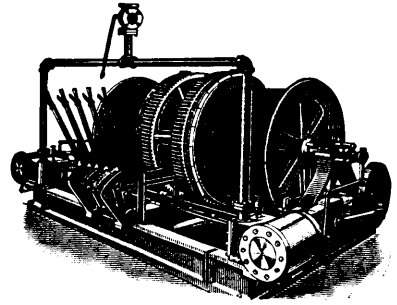
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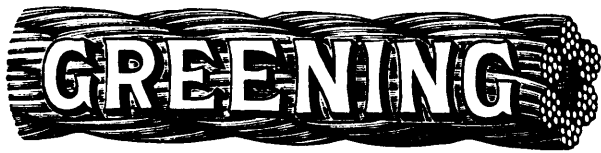
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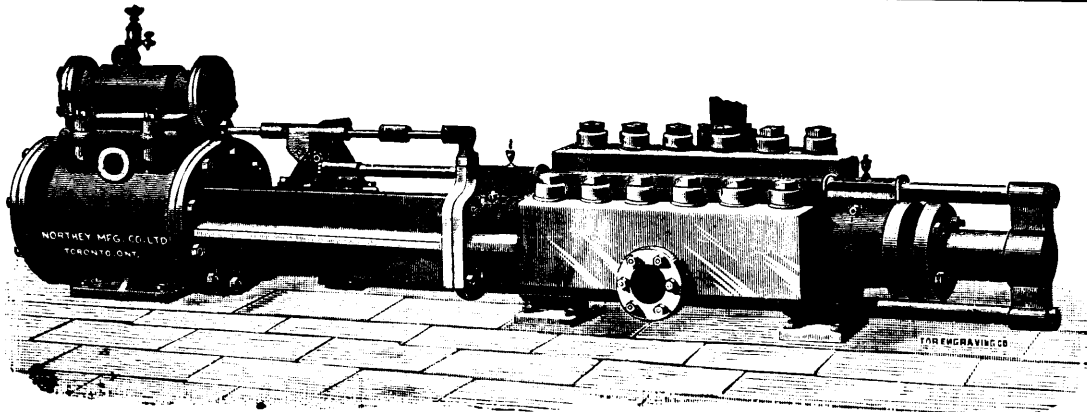
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## ANNOUNCEMENT.

Announcement is made to our subscribers, contributors and advertisers that the offices of The Canadian MINING REVIEW have been removed to No. 157 St. James Street, Montreal, P.Q. The REVIEW and MINING MANUAL passed into the hands of the Review Publishing Company, Limited, about a month ago, in which corporation the heirs of the late Mr. B. T. A. Bell are the controlling shareholders. All communications should be addressed as above.

In consequence of the interest shown in and the increasing importance of, chemical and metallurgical work the REVIEW opens a chemical notes column this month to which all chemists and metallurgists are invited to contribute accounts of their experiences, methods, doubts, apparatus and

conclusions in the investigations carried on in their laboratories.

The promise made to the shareholders of the Crow's Nest Pass Coal Company at the last annual meeting that the Great Northern Railway would be extended from Morrissey to Fernie this season is being fulfilled. Contracts have been let for  $9\frac{1}{4}$  miles of construction which will connect the two towns. A branch line 5 miles in length has to be built by the Coal Company from Fernie to the mines up Coal Creek, and when this work is completed the Company will have competing transportation and Mr. J. J. Hill will have realized his project of direct communication with the most valuable coal field in the West. The effect on the fortunes of the Coal Company should speedily be felt in an increase of their American trade. Having glutted the B.C. market they must, in order to maintain a profitable output, ship largely across the line. This can only be done over the Great Northern Road, as the C.P.R. cannot give advantageous rates to Montana and Washington points because of the transfer involved. Trade has been slack in the Fernie District this season in consequence of lessened demand. As soon as these railway connections are completed there is no doubt the Great Northern can keep all the Crow's Nest mines busy. This outlet is all the more necessary in view of the rapid development of production in the Blairmore and Banff districts, the whole of which is absorbed in the Canadian market.

The action of the B.C. Government with reference to the coal and oil lands in East Kootenay is not turning out as satisfactorily as was expected. The decision to raise the price of a license from \$50 to \$100 and to give no guarantee of title, but to leave more than 200 claimants to fight out the issue in the courts, has so little attraction for bona fide locators that so far as can be learned not a single application has been made for a license, and as no one seems disposed to move, the Government finds itself minus the expected revenue from the issue of several hundred licenses and with an unsolved problem still on its hands. As there is no scarcity of coal the Province can afford to await the progress of events, meanwhile the only sufferers are the speculators and promoters who hoped to reap a rich harvest from new flotations.

There are many reasons why oil lands should be classified apart from coal lands and separate licenses issued just as in the case of mineral claims. It would greatly simplify matters if this were done in B.C. In the case of the Flat Head district, careful work done by the Geological Survey has located practically all the valuable coal. The existence of oil in economic quantities is entirely problematical, but can be determined by deep boring on a few isolated locations. The instances are rare where a deep hole would not settle the question over an area of many square miles—why then should this entirely distinct project be complicated with the acquisition of coal lands? If licenses were granted (say, at \$100 each for an oil claim 1,500 feet square) without reference to coal or other mineral it would meet all the requirements of the case and greatly cheapen the cost of prospecting.

It is not always that the relations of a Manager are equally cordial with his employers and his workmen—when such is found to be the case it is worth noting. Mr. T. R. Stockett who, three months ago, was appointed General Manager of the Crow's Nest Pass Coal Co. has just resigned to accept a similar position with the Western Fuel Co. at Nanaimo. This is the Company which recently took over the New Vancouver Coal Company, managed so successfully for many years by the veteran Mr. S. M. Robins. Mr. Stockett has been with the Crow's Nest Pass Co. for nearly four years in various capacities and on leaving was banquetted and received valuable tokens of good will from the Directors and workmen. That he is fully entitled to them we can readily believe after reading his modest speech in which he paid a frank tribute to his pioneer predecessors who had "blazed the trail."

In pursuance of the policy initiated two years ago the C.P.R. are proceeding with the development of coal areas at various points in the West and North-West, the object being to ensure an adequate supply of steam fuel for their own use. Their most important works are at Banff, where several seams of semi-anthracite coal are being rapidly opened up. It is expected that by the spring of next year an output of 1,000 tons a day will be attained. The requirements of the Company in Manitoba and the North-West will shortly be supplied from the Bienfait Mines in Assiniboia, and during the present season much development work is being done in the Nicola coal field, from which it is the intention to supply the main line and branches from Revelstoke to the Coast. The requirements of the Kootenays will probably be met from the sections recently ceded to the Company by the C.N. P. Coal Co. at Hosmer, about eight miles north of Fernie. It is not unlikely that, at the latter point, coke will also be manufactured for the Canadian smelter at Trail. How far these extensive operations may be checked by the activities of private enterprise remains to be seen, but it may be taken for granted that the C.P.R. will not be caught napping again in respect of an abundant supply of cheap fuel for both themselves and the industries which they serve.

#### Concerning the Lead Bounty in B.C.

In its last issue the REVIEW printed a telegram from Mr. Alfred C. Garde, President of the Associated Silver-Lead Mines of B.C., which requested the withdrawal of the statement that the smelters, either directly or indirectly, obtained part of the bounty on lead, and which advised the REVIEW that an explanatory letter for publication had been mailed. We then regretted that this letter had not been received before going to press, and expressed our willingness to publish, and our hope of commenting upon, all facts relevant to the matter; the letter came to hand on the 5th of July and appears in another column of this issue.

Our comment upon the facts pertinent to this subject follows.

It is not proposed to discuss smelter rates, since that question is complicated to the uninitiated and involves many factors affecting the cost of smelting which are dependent upon the quality of the ores treated, their varying composition and the changing conditions of transportation and market; rates are only mentioned as leading up to some reasons which have been advanced why the smelters *should* participate in any bonus granted.

Some time in the year 1899 the Western smelters realized that their lead bullion was sold abroad on the basis of the London market price, with the exception of such small part (not exceeding 10%) as the U.S. Government allowed to be retained free of duty, and that their charges were really based on the relation of the London price to the New York price, and and that the payments were also based upon the same relation. They knew that this was unsatisfactory to themselves and in consequence, the representatives of the smelters independent of the trust Everett, Selby, Trail and Nelson, met in St. Paul in December 1899 to discuss matters, and to propose that the market to govern the buying price should be the market which governed the *selling* price, *i.e.* London. At that meeting the basis of payment and settlement for Canadian ores was changed to the London quotation, and, instead of making a deduction on account of the duty (as had been done on the basis of the New York price) there should be made an arbitrary deduction from the London price to cover costs of transportation of bullion to the refinery, the refining charge, transportation of pig lead to its market, the marketing charges, and leave a surplus out of which would come such extra charges as might not be fully covered by the original \$20 per ton for cost of freight and smelting, and also leave a margin for profit—this arbitrary deduction got to be known by the name of "marketing charge", which misnomer has persistently clung to it to this day. In the REVIEW'S opinion it is due, in no small measure, to the failure of the smelting companies to disclaim this phrase that mine owners have been led to believe that it covered up a multitude of sins on the part of the smelting companies, and really represented a large profit for the smelter.

In January 1900, therefore, the B.C. Smelters' charges were fixed at "\$20 per ton for freight and treatment, and a deduction of 70c. per 100 lbs. of lead contained." Under this

basis the ore was sold, not alone to the "independent" smelters but also to the American Smelting & Refining Company, familiarly known as the "Trust", which alone bought in that year between 15,000 and 20,000 tons of ore, and paid for all of it on the new basis of London prices.

In the following year, 1901, the freight and treatment charge was reduced to \$19 per ton but the deduction was raised to a rate of \$1 per hundred pounds of lead.\* In the second year thereafter (1902) the freight and treatment charge was reduced to \$15 per ton (at which price it has remained to the present time), and in 1903 the rates were still further bettered by increasing the zinc limit to 10% instead of 8%. Other conditions, of perhaps minor importance, were also imposed such as making the settlement due ninety days after the receipt of the ore by the smelter; producers complained of this condition on the ground that they had to accept all the fluctuations in the market price during that period of three months, if the price advanced of course the producer obtained a bigger sum, but as the price at that time was steadily decreasing the complaint that the smelters were getting a little the better of the producers was apparently well sustained. We believe that as to these facts there is no possible denial.

In 1901 the Canadian Smelting Works at Trail installed a new Dutch process for the refinement of lead, and justly obtained from the Government a bounty on lead refined in Canada. This bounty started at \$5 per ton for the first year and decreased by \$1 per ton, each year, until it was extinguished. In the meantime matters for the lead miner instead of getting better rather got worse, and an agitation began in 1902 for the securing of a bounty upon all pig lead smelted or produced in Canada from Canadian ores. This culminated in 1903 in the granting by the Government of a bounty at the rate of  $\frac{3}{4}$ c. per lb. on lead produced in Canada from Canadian ores, and was made payable to the owners of the ores; under this Dominion Act payments of large amounts were made a month or two ago by Mr. G. O. Buchanan, acting as the disbursing officer of the Government for this purpose.

Although this bounty was of very great value to the mines producing high grade ore it did not help out the producer of low grade ores to a similar extent, and the largest producer in the Province closed down in 1902 and remained closed until this year when agitation was begun early in the year to obtain a bounty, or an application of the existing Bounty Act, to such Canadian lead ores as might be exported to foreign smelters. This agitation was perhaps originated by the smelters, who asked the Silver Lead Mines Association, at a meeting held in Nelson in March, to guarantee them an annual supply of 40,000 tons of lead ore or else be prepared to accept an increase of the freight and treatment rate to \$17 a ton, the figures named being, as before, based on a 40% lead ore. The feeling of the mine owners at the Nelson meeting was that, even with the present bounty, those mines which produced only low grade ores or concentrates could not make a profit, and that therefore to meet the minimum tonnage

required by the smelters would require strong and vigorous action on their part in the shape of a counter-blast. Therefore a New York ore buyer, Mr. Ehrenzoller, was brought forward by a representative of the St. Eugene mine and openly offered to take 50,000 tons a year for export for two years, at a freight and treatment rate of only \$8 per ton. It has been commented (with what truth the REVIEW is unable to state) that this offer was a pure bluff and made as such, and intended to influence the smelter representatives. If this was the case it was certainly successful, since the smelters met the bluff promptly by making a counter proposition to take the entire output of the mines of East and West Kootenay, irrespective of quality, if the mine owners would join them in endeavoring to have the surplus of the existing bounty in each year made applicable, pro rata, to the surplus ores which the smelters could not at present take care of and which they would themselves export.

This counter proposition occasioned many conferences between the smelters and the miners, and it was at the time of these conferences that the writer, whose editorial communication appeared in our April issue, put forward the statement that the smelters were directly obtaining a percentage of the bounty. From Mr. Blakemore's letter, which we print on another page, it appears (according to paragraph 6) that during these conferences the miners and smelters agreed that if the readjustment were effected it would be fair for the miners to benefit to the extent of 60% of the bounty granted, and the smelters to the extent of 40%. Doubtless this discussion is what our writer had in his mind when he was rash enough to make the statement that the smelters obtained 75% of the bounty, and, so far as our investigations have gone we freely admit that this proposition, discussed as it were *in camera*, is the *only* basis upon which there is any evidence of facts to support this contention.

In view of all the facts recited, and of numberless other ones which the REVIEW has received and has not space to publish, it makes the explicit statement that, it was *not* justified in publishing the statement that the smelters received 75% of the bounty, and that statement is *herewith explicitly withdrawn* and our apology to the smelting companies offered. Whether the smelters *desired* to obtain a portion of the bounty (as might appear from the paragraph in Mr. Blakemore's letter and other items which have been communicated to us) and were afterwards willing to abandon that project is not pertinent to the purpose of this article: it is evident that at the present time they have no direct interest in the question.

EDITOR.

#### The Carbonization of Peat by Electricity.

A new utilization of the electric current in an economic direction is reported from England, where Messrs. Johnson and Phillips, in their works at Charlton in Kent, have used electricity for the conversion of peat into a fuel having a calorific value of 9,000 B.T.U. The points of attraction in the process are two:—

(1) The conversion is accomplished without the loss of

\* Mr. Blakemore's statement that a \$15 rate was made in 1901 is an error.

any of the heat-producing hydro-carbons, which are always destroyed in attempting the coking of peat by fire, and no conditions of weather affect the operation of the process.

(2) The low cost of conversion, which is stated not to exceed \$1.20 per ton of fuel obtained.

The process, in brief, consists in first packing the cut peat into large rotary iron cylinders, which are a form of centrifugal dryers. These cylinders are rotated at a high speed, and, with the assistance of beating arms arranged on the interior of the cylinder in such a way as to both beat the peat and turn it over, something over 95% of the contained water is expelled. The cylinders are then brought to a standstill and wires are attached to cups on the exterior, by means of which a large current of low voltage is sent through the peat which remains in the cylinder; electrodes being permanently arranged on the heads of the cylinders, and connected with the wires through the cups before mentioned.

The passage of the current through the mass of peat meets with high resistance, thereby causing heat, which, in time, carbonizes the organic matter and converts it into particles of black carbonaceous matter which retain all of their carbon.

After carbonization the cylinder is emptied, and the carbonized matter is fed to machines which break it up, mix it with a binder, and press it, either into the form of briquettes which are then left to harden in the atmosphere, or it is made into large masses which are afterwards broken up and screened to sizes required.

This new form of peat fuel is said to give great satisfaction, leaving little ash and forming no clinkers. A plant for the conversion of 100 tons of peat per diem is stated to cost \$20,000, and the cost of manufacture to be \$1.20 per ton of fuel produced.

Results, of course, are dependent upon the cost of the electricity at the peat bog; at the works at Charlton the electricity was generated by steam power, so that the cost would manifestly be less if water power were available. The process is worthy of the closest examination by our Ontario and Quebec friends who have been struggling with the peat industry.

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#### Present Sentiment Towards Mining.

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We publish in this issue a letter and a contributed article, both of which are indicators of the sentiment at present prevailing in Canada towards mining. With the views expressed in our correspondent's letter we are in accord, for nothing (probably) has been more characteristic of the general Canadian attitude towards mines and mining than the gambling in shares which has been so much in evidence during the last six years. Capitalists, merchants, professional men, clerks, parsons and women have all bought mining shares to get money quickly, and have, each and all, talked as if they were "in mining," or as if their money was. There is nothing more certain than that less than 25% of the money paid for mining shares ever saw the mine's bank account.

We need not remind our readers of War Eagle, Centre Star, Big Three, Montreal & London, etc., etc., ad nauseam. People bought their shares because induced to do so by the people who had them to sell, and also because they trusted to some one, a Hosmer, a McCuaig, or a Blackstock, to make money for himself, and each man thought himself smart enough to get out as quickly as any of the "big" men—to-day they better know their nimbleness.

Not one of the victims of the last six years bought because he *personally* believed in the investment, or because he personally investigated the merits of the property. Nor were these victims eager to accept the advice of engineers who *had* investigated and *did* know. Instead, they seemed rather to see red and black only, and if red came up they felt satisfied to pat themselves on the back, and think themselves quite "financial sharps," but when black came up (as it did in the end most frequently) then anathema—maranatha was his cry—someone had "done" him—poor fool! he had "done" himself.

Mr. Brown's clear exposition of the lack of brains in most mining schemes is in a soberer tune, but his statements are deadly facts. His encomiums upon the management of the Brookfield are well deserved.

We commend perusal of M. W. G.'s letter and Mr. Brown's article to those of our acquaintance who have "been up against it."

#### The Late Frederick Siemens.

Advices from Berlin announce the death of Mr. Frederick Siemens, the eminent German scientist and manufacturer, in the month of May of this year. Mr. Siemens was in his 78th year, and was born at Menzendorf near Lübeck in 1826. Frederick Siemens was the third and last survivor of four brothers who together constituted one of the most remarkable families Germany has known, all of whom became famous in the worlds of science and of industry.

Werner Siemens, the eldest of the brothers, was a highly distinguished electrician, and one of the founders of the well known electrical engineering firm of Siemens & Halske. The second brother, Sir William Siemens, the most of whose life was spent in England, was the founder of the Landore-Siemens Steel Works. The youngest brother, Hans, founded the glass works at Dresden, which Frederick took over in 1867 when the youngest brother died.

It was Frederick Siemens who originated the open hearth furnace and process which, today, is producing both in Great Britain and on this continent a large percentage of the total steel tonnage. He sought and effected a combination with M. Martin whereby the Siemens-Martin process became established. An important stage in its progress was the invention of the regenerative furnace which, although founded upon the researches of Sir William into the theory of heat, was nevertheless primarily the idea of Frederick, who carried out the regenerative principle in the simplest manner and applied it directly to ordinary fuel consuming furnaces.

Frederick Siemens was not as well known in England as his brother, Sir William, for he rarely appeared at meetings of the Iron and Steel Institute, or at functions of a similar character. It is probable that no invention connected with the steel industry has been of more solid value than that of his open hearth furnace.

## CORRESPONDENCE.

**Payne Consolidated Mining Company, Limited.**

PAYNE MINE, SANDON, B.C., June 27, 1904.

TO THE EDITOR.

SIR :—Referring to your editorials in April and May issues of the MINING REVIEW, I note your statement that Canadian smelters in some cases have obtained over 75% of the \$15 bounty granted by the Dominion Government per ton of lead mined and smelted in Canada. I believe that I understand the situation between the Associated Silver-Lead Mines of B.C. and the smelters fairly well, but confess that I am at a loss to understand how you can substantiate the above statement. As you probably know, I am in no way connected with the home smelting industry—contrary—hereto my interests are on the other side—having mined and for several years contracted for a considerable tonnage of silver-lead ores. I should be in a position to speak authoritatively on the subject, and can assure you that the Canadian smelters since the granting of the bounty have not enjoyed any benefits from same except so far as an assurance of a steadier and larger tonnage of ore favors a lower cost of operation.

With the particular view of avoiding complications the Government granted the present bounty to the miners direct, and as a matter of fact it was not until the Canadian smelters relinquished their claim on the then existing refining bounty that the Government would consider the question of bonusing the lead industry at all. It will have to be admitted that this action was a sacrifice on the part of the smelters. The refining bounty starting at \$5 per ton for the first year was granted in 1901 for a period of five years on a yearly reducing sliding scale of \$1 per ton and was in reality a smelter bonus. On the strength of same the Canadian Smelting Works at Trail invested a considerable sum of money for erecting works for the refining of Canadian lead ores, and when the new lead bounty act took effect last year there still remained in force three years of the former bounty.

It is in my opinion only fair that this statement should be made public in justification to our friends in the smelting business. There have been times when our views differed materially, but I am pleased to state that for some time past the Associated Silver-Lead mines and the home smelters have been working in harmony. On several recent occasions we have joined hands, and the lead mining and smelting industry of British Columbia has thereby been benefitted, as clearly pointed out in your April editorial.

In conclusion I may state that the entire adjustment of the lead bounty is in the hands of Mr. G. O. Buchanan, Government Inspector of Lead Bounties in British Columbia. No claims for bounty can therefore be honored until verified by him. Our experience at the Payne Mine has fully demonstrated this feature. No one but the party mining the ores can therefore enjoy the benefits of the bounty. This feature combined with the fact that freight, smelting and marketing charges have remained unchanged

since January 1st, 1902, will explain that the smelters are, neither directly nor indirectly, participating in the bonus, the sole advantage gained by them being the assurance of an increased tonnage and steady supply of ore.

Hoping that this will throw some further light on the question, I beg to remain,

Yours very truly,

ALFRED C. GARDE,

*President, Associated Silver-Lead Mines of B.C.*

[See our editorial on the "Lead Bounty" in this issue.—EDITOR.]

### Mining vs. Share-Peddling.

TO THE EDITOR.

SIR :—

It may be confidently asserted that more fortunes have been made in actual legitimate mining than in any other form of investment; while it may also be asserted with equal confidence that more people have been ruined by purchasing picturesquely printed mining certificates than by any other form of indiscriminate gambling. There is a vast difference between investing in a mine and dealing in mining shares, yet the most curious and conspicuous feature of the game is the utter inability of the business man to recognize and appreciate this distinction. Experience apparently counts for nothing. One glib-tongued peddler in shares is succeeded by another, one failure is followed by another failure, the public is the perennial prey and the game goes merrily on.

To the practical mining expert there is nothing more astounding than the eagerness displayed by sound business men to buy mining shares at 10 or 20 cents on the dollar; while it is equally astounding to observe the difficulty in interesting business men in a legitimate mining proposition. Nineteen business men out of twenty will prefer to buy pretty mining certificates at ten cents on the dollar from the smooth-talking peddler who is, as a rule, absolutely ignorant of real mining, rather than invest an equal amount of money in prospecting or developing under expert and reliable advice and guidance. In the former case the business man has repeatedly written his cheque unhesitatingly, and rarely asked for expert advice; in the latter case he will haggle about terms, demand a large controlling interest and, as a rule, wholly fail to appreciate the value of expert testimony. In other words, he will readily give his cheque to a peddler in shares without asking for control, or haggling in any way, but he will not give his cheque for an equal sum to a thoroughly reliable and efficient mining expert to test or examine a property which the practical man tells him is really worth the venture.

This is the most curious and incomprehensible feature of the game. By investing from two thousand to five thousand dollars in a prospect under the advice of a competent and reliable mining expert, a small syndicate of business men would stand a reasonable chance to make a fortune, an excellent chance of obtaining large profits, retain control and secure the working capital required by placing shares at par with their friends; but by giving \$2,000 to \$5,000 to the share peddler in exchange for showy certificates, which may represent a hole in the ground, and frequently not even that, there is practically no chance of a return at all. It is, of course, attractive to get a pretty certificate marked "Par value \$1.00" for 10 cents, but it should not be forgotten that 10 cents will really pay for the printing of ten certificates and the concern disposing of the certificates at 10 cents really make a very hand-



some profit. If the business man is very anxious to buy pretty certificates I should strongly advise him to print his own—he will get them much cheaper.

The most unfortunate feature of this unfortunate method which is unfortunately so fashionable is that, it has a tendency to discredit mining and retard the development of the industry. I frequently hear business men say "Don't talk to me about mining—I am through with it. Never made a dollar yet at it,"—when the fact is clear that he never had a dollar invested in a mine. He has simply been the prey of the share selling shark and has been dealing in certificates and not engaged in legitimate mining at all.

When the business man will apply the same rules and the same common sense to mining that he has applied to his own business, he will be equally successful.

Yours truly,

MONTREAL, July 13th, 1904.

M. W. G.

### The B.C. Smelters and the Lead Bounty.

TO THE EDITOR.

SIR:—In consequence of the conflicting opinions expressed in the columns of the REVIEW on the above subject, I have made the fullest inquiries as to the existing arrangements between mine owners and smelters, and summarize the results as follows, first stating the facts as briefly as possible, and then making my own inferences:

1. When trade was at its worst in 1901 a \$15 freight and treatment rate was granted by the smelters with a sliding scale attached entitling them to \$1 additional for every £1 increase in the price of lead in the London market above the basis of £12 per ton.

2. In 1902 the zinc limit was reduced from 10% to 8%, an additional penalty of 2% against the producer.

3. In 1903 the zinc limit was again raised to 10% where it still remains.

4. In 1903 the sliding scale clause was abolished and the charge for freight and treatment made constant at \$15.

5. In 1903, in consequence of representations made by Mr. Retallack (representing the lead miners) that the \$100,000 bonus granted by the Government for the establishment of a lead refinery in Canada stood in the way of the bounty being granted it was voluntarily surrendered by the smelters.

6. In 1903 it was mutually agreed between the mine owners and the smelters that, if the bounty were granted, it would be fair for the former to benefit to the extent of 60% and the latter 40%, and some plan was to be devised to achieve this end.

7. In the spring of 1904, pursuant to the above, it was contemplated to raise the rate from \$15 to \$17. This was discussed between the parties interested and ultimately abandoned in favor of joint support to the petition for applying a portion of the bounty to exported ore.

8. The smelter charge to-day is therefore actually lower than at any previous time, since the standard rate is the minimum \$15, the sliding scale which permitted an automatic increase is abolished and the zinc penalty has been improved to the extent of 2% in favor of the producer.

The inferences to be drawn from the foregoing facts are as follows:

1. That there has been no increase in any branch of smelter charges either for freight, treatment or marketing since the lowest figures were established.

2. There has been a reduction represented by a more favorable adjustment of the zinc penalty, equal to about \$1 a ton, and a further concession in the abolition of the sliding scale.

3. The smelters derive no benefit whatever from the bounty either directly or indirectly except from the increased tonnage available for treatment as a consequence of the support accorded to production of lead ores.

4. The smelters have voluntarily relinquished the bonus of \$100,000 granted for a refinery and the Canadian Smelter is erecting works for the manufacture of lead pipe and sheet lead without government assistance.

5. Having had an opportunity of examining all the returns and documents necessary to verify the above statements and conclusions I am convinced that any charge that the smelters are sharing the bounty, or that they are crippling the lead mining industry, can not be substantiated and would not be concurred in by the producers themselves.

W. BLAKEMORE, M.E.

NELSON, July 14th, 1904.

### Mica Deposits.

By FRITZ CIRKEL, M.E.

(Continued.)

As to the general occurrence of mica deposits, especially in the Ottawa valley, from a great many observations the writer may state that speaking in a practical sense two different deposits may be distinguished, that is first, the vein-like deposits forming the contact between pyroxene rock and gneiss, and second, pockety deposits occurring either at the contact between diorite and feldspar or wholly in pyroxene.

The former are the most important for mica mining, inasmuch as the mica can always be traced and followed along the line of fracture or the solid walls of the gneiss formation, horizontally as well as in depth. A good example of this mode of occurrence is the Wallingford mine at Perkins Mills, P.Q., and the property belonging to the Wakefield Mica Co., on lot 16, third range of the

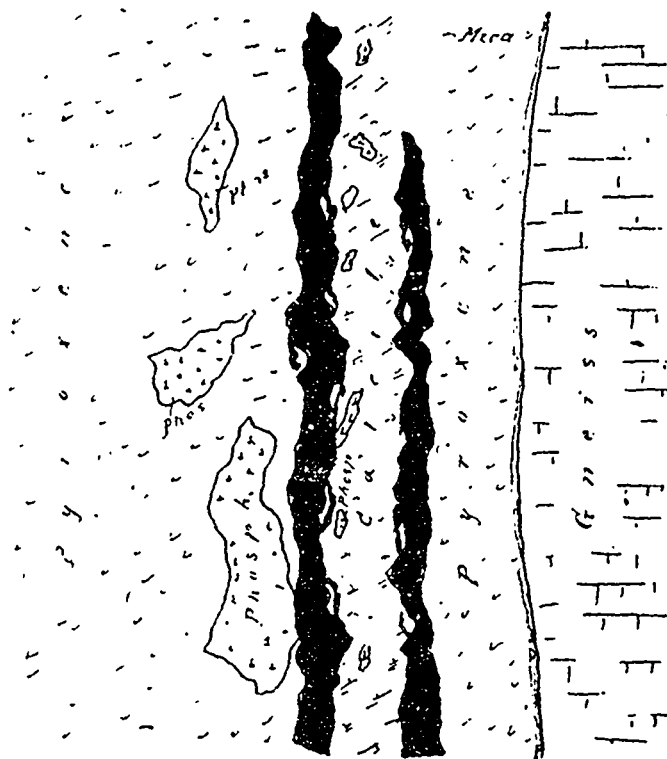


FIG. 11—Vein in the Wallingford Mine, Perkins Mills, P.Q.

township of Wakefield; also the once famous Lake Girard mine in the same township. These deposits have been worked downward, along the contact with the gneiss, for over 250 feet as at the Lake Girard, and there is no doubt that if operations at the latter mine were continued in depth that considerable quantities of mica could be found just as in the upper levels. The vein-like deposits are the most desirable from a mining point of view, the mica being deposited, as mentioned above, near the line of fracture, or mostly near a solid wall, and in spurs or branches leading from the main deposit, can easily be traced or followed and in nearly all cases little dead rock separates the depositions of the mineral. Calcite is a frequent companion of mica in these vein-like deposits, and the presence of this mineral, on account of its contents of mica crystals of mostly perfect quality, is looked upon with favor by miners. The question has often been raised whether mica deposits go down in depth, and whether the quality of the crystals would improve or diminish in depth. As above outlined, the occurrence of mica has much in common with that of phosphate deposits and as the latter have been mined to a depth of over 700 feet and seem still to be continuous there is no reason to suppose that the occurrence of mica is of superficial character.

The amount of dead rock, and consequently the risk, in vein-like deposits is reduced to a minimum while systematic developing

deposits render their detection very difficult, and this is the main reason why we hear so much of a mica mine giving out. This is also the cause why the underground work of a mica mine belonging to this class is of such a twisted and irregular shaped character, and resembles so very little the methodic mining seen in lode mining. The mica generally follows certain lines of faults or fracture, forming occasionally stringers or narrow veins, splitting up or converging into each other and forming a larger accumulation. It is also frequently observed, near the contact with feldspathic or dioritic rocks, that the pyroxene formation holds a great many boulders of a dark feldspar mixed with quartz, sometimes merging into a granite, and that between these boulders mica

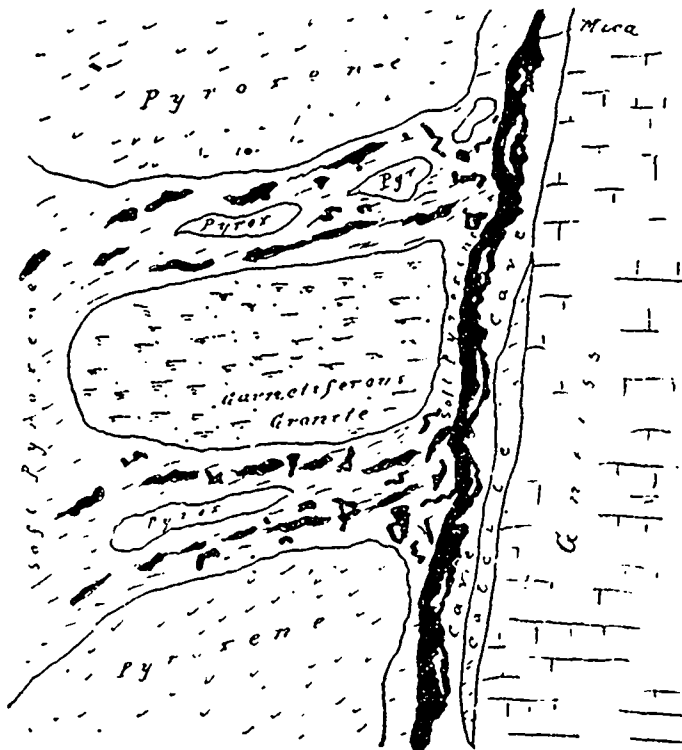


FIG. 12.—Vein in the Rhéaume Lake Mine, Gore of Templeton, P.Q.

work, preparing the mine for a large output, can be pursued more easily.

As to the second mode of occurrence—that in pockets near small dikes of diorite and feldspar, or wholly in pyroxene—it must be stated that, although some good mines of this class, like several properties at the Cascades on the Gatineau River, have been discovered and yielded a large output, their mode of occurrence, on account of the uncertainty and the risk involved, is less desirable than that of the vein-like depositions. Many mines of this class contain splendid deposits of large size, and the general occurrence of the latter resembles a chain of lenticular bodies, extending towards the depth as well as horizontally, but the dead rock and the absence of any leading indications between the

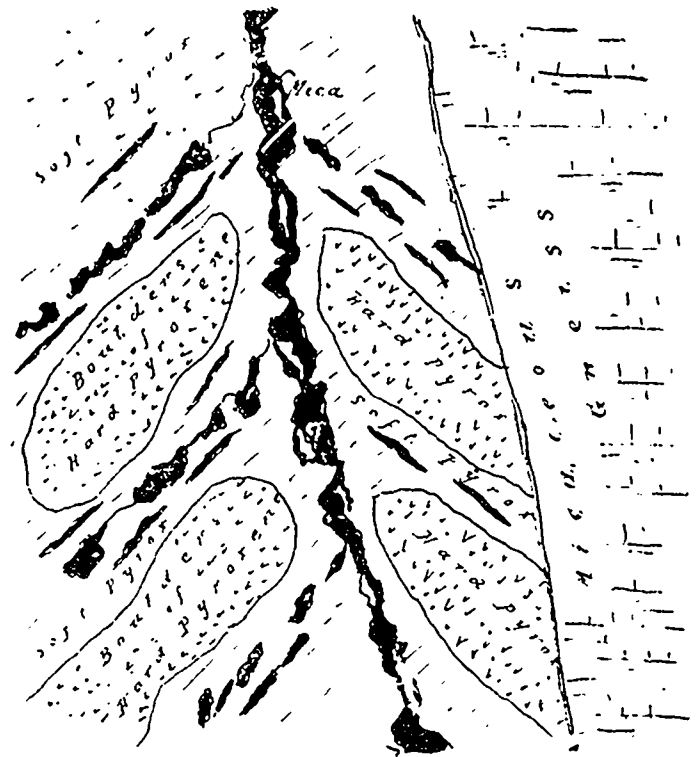


FIG. 13.—Vein in the Battle Lake Mine, Township of Templeton.

crystals are imbedded in a matrix of a soft, and pale green pyroxene, giving the whole a cob-webbed appearance. Cavities are frequently met with, sometimes of very large dimensions lined with mica crystals or crystals of pyroxene, and apatite. The quality of the mica generally found in cavities is very fine, as the crystals seldom show a lateral disturbance in their foliation and possess all the qualities demanded for a commercial product.

Very often we find that a deposit contains a very small percentage of useful mica, that almost the whole body is made up of shattered, contorted and twisted mica crystals—sometimes also of micaceous rock matter. This condition is apparently brought about by disturbing influences, either by the shifting of the adjacent formation, or by a sudden change in temperature during the process of the formation of these crystals out of Ha<sub>2</sub> heated magma which filled the fissures from below.

As to the color of phlogopite mica we have all shades from the black variety up to the lighter shades, the silver or amber being the most frequent. The very dark, or nearly black, varieties as chemical analysis has shown, contain sometimes a large amount of iron and for this reason their application to electrical purposes is restricted. The lighter shades are generally obtained from soft, pale green pyroxene; where the latter is dark and hard the mica appears to be harder also and the color darker. There are

also greenish and pink shades, but these varieties are rare in phlogopite species.

As regards the occurrence of apatite in association with mica, we can discriminate, although there are exceptions, between three different regions in the country north of Ottawa, (1) the Lievre District; (2) the Templeton District; and (3) the Gatineau. In the Lievre District, that is in the country north of Buckingham, the deep phosphate mines for the greater part show the occurrence of very large apatite deposits to a depth (as at the "High Rock" and "North Star" mines) of 1000 feet and over, while mica in connection with this mineral is rarely met with. Wherever the latter is associated with apatite, the mica crystals generally are brittle, break up, or are contorted and twisted, and the quality of

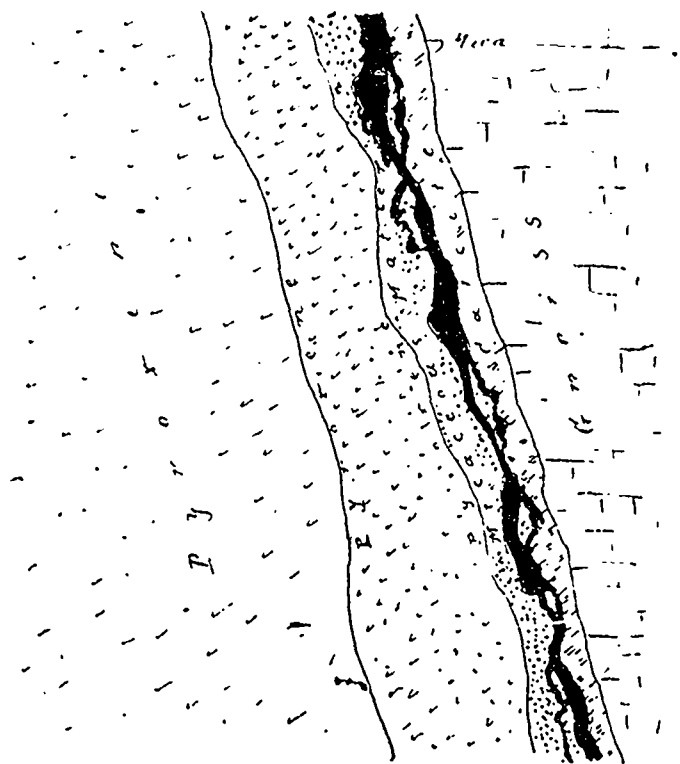


FIG. 14.—Vein in the mine of the Wakefield Mica Co., Limited, Township of Wakefield, P.Q.

the phosphate is seriously impaired. In the Templeton District, and more especially in the pyroxene belt around McGregor Lake, we find mica freely associated with apatite and the crystals met with are perfect and of sound condition. In the Phosphate King mine near Perkins Mills a very fine crystal measuring 18 inches in diameter, was found in solid apatite, while at the Wallingford mine in the immediate vicinity the mica in association with phosphate is amongst the best found round the mine. Another example is the Blackburn mine, where large masses of clean, high grade phosphate are occasionally met with in association with mica deposits of considerable extent. The occurrence of a pink calcite is one of the characteristic features in connection with mica and phosphate in the Templeton area, the calcite very often replacing the apatite and carrying good mica crystals of commercial value. The Gatineau District is distinguished from the others by carrying a larger amount than usual of calcite in the pyroxene, and while the latter may at times hold in connection with mica large crystals of phosphate, still it is seldom that the latter can be worked profitably. There are exceptions to this rule but taken as a whole the district under question offers very little encouragement for the profitable mining of apatite in connection with mica.

On account of the great irregularity and variation of occur-

rence, surface indications are not sufficient to give a judgment on the value of mica deposits, as many prove of superficial character; all outcrops on the surface must be explored to depth before any definite idea can be gained as to extent and quality. In many cases we find that the humus covering the solid rock contains a considerable amount of mica sheets or fine laminae, especially on mountain slopes or small ravines, and much money has been spent in the effort to find the mica in the solid rock—but often in vain. This is due to the weathering and decomposing process of nature; all crystals on the surface undergo decomposition by the time the sheets are loosed, separated, split up in fine laminae—and all, or part of them, carried away by the action of water and deposited in places lower than the outcrop whence they came, and sometimes far away. Thus it comes that we have an apparently large deposit of sheet mica and decomposed crystals in the soil, while we find nothing in the underlying rock. In examining a mica property, therefore, the uninitiated is betrayed by this sporadic occurrence of mica and gains the impression that the property so examined is really a very desirable one, whereas it contains perhaps deposits of little or no value, or even might contain nothing at all.

As to the quality of the Canadian phlogopite or amber mica, its fitness for electrical or general domestic purposes is so well known that it is not necessary here to go into this at length. In comparison with the East India mica the Canadian product seems to hold its own and in several respects is even superior. The late Dr. George Dawson having sent samples of the Canadian phlogopite mica over to London with the object in view to determine their commercial value and the possibility of an extension of trade in the United Kingdom, Professor Wyndham Dunstan, M.A., F.R.S., Director of the Scientific and Technical Department of the Imperial Institute, reported as follows:—

“General physical and chemical examination showed that the samples were uniform in character, pliable and softer than much of the mica which appears on the English market. In order to ascertain its commercial value, especially its fitness for electrical purposes, the samples were submitted to one of the largest electrical manufacturers in London, and also to one of the largest mica brokers in the city.

“The electrical manufacturers report that the mica is suitable for a variety of electrical purposes. On the general question of the uses and comparative value of the Canadian amber mica the brokers remark that this variety of mica is of no value other than for electrical purposes, its special value being principally due to its softness and easy lamination. They are of opinion that Canadian amber mica is of greater value for electrical work than most of the Indian mica that comes to this country. They remark, however, that there are two or three varieties of Indian mica, such as White Bengal, Cochin from the west coast of Madras, and Ceylon amber mica which compare very poorly with the Canadian product, whilst the selling prices of these Indian varieties are often from one third to one half those asked for the Canadian mica. They confirm the opinions expressed in Dr. Dawson's letters of February 16th and April 4th, (1901), that Canadian miners obtain a better price in the United States than in the London market chiefly from the circumstance that American electricians prefer the Canadian product, which is close at hand and can be depended upon for uniformity of quality and regularity of supply.”

Although circumstances point to the United States as being the natural outlet for Canadian mica, nevertheless it would be worth while to take steps to make it better known in the British

market since there are several factors operating against the Indian product, especially the matters of tariff and regularity of supply.

As to the chemical composition of phlogopite mica, it must be assented that the latter, in order to be use for electrical appliances, should contain very little iron. In the following table are analyses from different specimens.

	Mica from North Burgess.	Mica from Templeton.	Mica from Perth.	Biotite Mica.
Silica . . . . .	40.97	40.00	39.66	39.5
Aluminum . . . . .	18.56	17.00	17.00	16.5
Magnesia . . . . .	25.80	26.50	26.49	22.00
Potash . . . . .	8.26	10.00	9.97	—
Soda . . . . .	1.08	—	0.60	—
Iron . . . . .	—	0.50	0.47	8.5
Volatile . . . . .	1.00	3.00	2.09	4.00

From the above table it appears that the mica obtained from some localities in North Burgess is the purest, as it contains no iron. In one of the analyses from this locality the mica was decomposed by heated sulphuric acid, and in another by fusion with carbonate of soda. The alumina contained no trace of iron. The mica from Templeton and from Perth comes next, containing only 0.47 and 0.50% of iron—while black phlogopite (perhaps biotite) taken from a property on the Lievre River contained as much as 8.5% of iron, rendering the same entirely unfit for use for electrical appliances.

The question whether a mica mine pays or not is concentrated in the form. "What is the lowest percentage of commercially useful mica sheets in the rock mined, in order to make a mine pay." To answer this question we must discriminate between open quarry work, which is generally carried on in large pocket deposits and during the summer months only, and under ground workings in vein-like deposits of a cob-web or cavity nature are mined, the quantity of rock to be hoisted is generally very large. Experience in different mines of this class has shown that with present prices at least 1,000 lbs. of mica of all sizes, from 1" x 3" up, trimmed, must be taken out for every 100 tons of rock under ordinary circumstances in order to pay for all mining expenses including management and to leave a good profit besides. As to the underground mining, the quantity of rock hoisted for a given quantity of mica is not so large since mining is more or less confined to the narrow shafts and drifts following the course of the mica veins or lenticular deposits. Experience in this direction shows that under ordinary circumstances at least 2,000 lbs. of trimmed mica must be raised for every 100 tons of rock mined—the depth of the shafts not exceeding 300 feet—in order to pay for all current expenses, including management, and to leave a good profit besides. The run of mine (that is the rough mica crystals, as they come from the pits and are delivered to the cobbing sheds) is of course much larger, in some cases it is as high as ten times the commercially useful quantity; in good paying mines, however, the run of mine should not be more than from four to five times the quantity of trimmed mica. In other words, in the case of an open quarry mine about 2½ tons of run of mine—yielding at least 1,000 lbs. of all sizes, and in the case of underground workings about 5 tons of run of mine—yielding at least 2,000 lbs. of all sizes, should be extracted for every 100 tons of rock in order to make a mine working under ordinary conditions pay all expenses and leave a good profit. There are exceptions to the above, but generally speaking the above figures represent the experience in many mica mines of the Quebec Division.

As to the yield of the different sizes in the run of mine, of course it is difficult to give figures as a basis of calculation, as

this depends solely upon the character and quality of the deposits mined. Some deposits yield only small mica, with a very small percentage of larger sizes while others—but they are not so frequent—yield a comparatively large percentage of the larger sizes. Generally the mica of commerce is trimmed to the following sizes: 1" x 3", 2" x 3", 2" x 4", 3" x 5", 4" x 6", 5" x 8" and over, and under "large sizes" is commonly understood a mica cutting 4" x 6" and over. One mine in the Wakefield Township yielded with a certain regularity

61% of . . . . .	1" x 3"
26% of . . . . .	2" x 3"
9% of . . . . .	2" x 4"
3% of . . . . .	3" x 5"
1% of . . . . .	4" x 6" and over

A mine which delivers exceptionally large sizes is the Battle Lake mine in the Templeton Township. This mine yielded since the beginning of operations, which consisted mostly of open quarry work:—

36% of . . . . .	2" x 3"
27% of . . . . .	2" x 4"
20% of . . . . .	3" x 5"
17% of . . . . .	4" x 6", 5" x 8" and over

Generally speaking a deposit of fairly good quality should yield as an average about 50% of 1" x 3", 30% of 2" x 3", 10% of 2" x 4", 6% of 3" x 5", and 4% of 4" x 6" and over.

The prices paid for the different sizes of course fluctuate a great deal and much speculation is manifested amongst mica dealers. However, the following table gives the prices paid at present by a large firm:—

Size 1" x 3" 12 cents per pound trimmed (not cut)			
" 2" x 3"	25	"	"
" 2" x 4"	35	"	"
" 3" x 5"	65	"	"
" 4" x 6"	90	"	"
" 5" x 8"	\$1.10	"	"

In this connection it may be interesting to learn that Sir William Logan in his report of progress for 1863 mentioned a sale of mica in London of several hundred weights of large selected crystals: "Taken from a locality north of Burgess, and fit for splitting into thin plates, at two shillings the pound, while from four-pence to seven-pence were given for inferior qualities. There was also a large demand for smaller sizes of mica and for the refuse portions from its workings. These among other uses were employed in making letters for window signs. Ten shillings a hundred weight were lately offered in London for fifteen or twenty tons of such material."

While up to 1898 the larger sizes mostly were saleable, a much larger demand has now sprung up for the smaller sizes, 1" x 3" and perhaps 1" x 2" owing to the rapid progress in the art of mica insulation for electrical apparatus. Instead of using large sized mica, the fine sheets of smaller size are now moulded and cemented together into so called "micamite" practically a mica board—and by this new and very practical invention the natural crystals are almost entirely replaced. This micamite or board is made by building up layer after layer of the thinnest mica sheets, moulded or coated together by cement or shellac and then subjecting the whole to hydraulic pressure. The boards are generally about 3 x 4 feet square and 1 inch thick, and can be sawn up as desired. The fact that the smaller sizes may now be utilized

places many mica mines in a most favorable position ; nearly all deposits, as shown above, produce a very large percentage of small mica, while the output on the larger sizes in many mines is very small or practically nil, and as there appears to be a steady market for the smaller sizes the existence of a mica mine is attended with less difficulties, and its life prolonged.

On account of the irregular character of most of the mica deposits the methods employed to work a mine are manifest. The easiest work and the one which requires little or no systematic preparation is the open quarry—where several deposits or pockets are mined together until the rock in situ show no more mica. The disadvantages of this method are obvious ; no work can be performed during the winter on account of the rigid weather, while in many cases where the deposits are not rich the hoisting and removing of so much dead material is a cause of great expense. Working underground has therefore many advantages, the principal one being the possibility of continuous operations. In the case of a vein-like deposit, with a solid hanging or foot wall a shaft is usually sunk on the latter, and the deposit opened up at intervals of 30 to 50 feet by side drifts and subsequently by upraises and winzes. The mica so laid open is then stoped whenever desired. Occasionally pillars are left supporting the walls and roofs in the drifts. Of course this system of working cannot always be strictly followed especially in a case where the deposits to be mined are those of the second class above referred to, that is of a pockety, highly irregular character ; the natural outcome of such a working system is a combination of unusually wide shafts, and excavations of a highly irregular shape. The machinery employed is of the usual type, consisting of boilers, double cylinder hoists and solid gallows-frames over the shaft mouth ; usually little water is met with in mica mines and a small pump fills the requirements. Cages are not employed, the hoisting of the mineral and dead material being done in buckets sliding on skids in inclines or swinging free on guides in vertical shafts. Only in one mine in the Quebec Division, where quarry mining to a depth of 200 feet is going on, are cable derricks in use ; the preference of these over all other hoisting machinery lies in the fact, that the area covered for hoisting is very large, while mining can be carried on simultaneously at many points of the quarry. Dynamite is used as an explosive, but not to such an extent as in lode mining on account of the care to be exercised in blasting down the mica crystals ; shots loaded too heavily may destroy the quality of the mica. The principal mica mines are situated in the country north of Ottawa in the Province of Quebec, and near Sydenham and Perth in the Province of Ontario. The first large mica producer was the once famous Lake Girard Mica System, which operated the Lake Girard Mine in the township of Wakefield, the Pike Lake and Martha Mine in North Burgess, and different other properties. The Lake Girard mine attained a depth of 210 feet ; an inclined shaft of 75' was sunk on the foot wall of a large and well defined vein-like deposit ; drifts on both sides were run in order to test the same, and for several years the mine yielded a large quantity of mica. In 1893, when the writer made an examination of this property, the daily output for three months amounted to 4.6 tons of roughly cleaned mica crystals with an average number of employees daily of 48.6. For nine months the daily output was 3.18 tons with about the same number of men. All the rough mica was transported from the mine to Ottawa, a distance of 22 miles, where cobbing and cutting sheds were erected for the preparation of the mica for the market. About 70 persons were employed in this factory ; from September, 1891, to July,

1893, the total output amounted to 113,000 pounds of mica cut to size, 109,545 pounds of trimmed mica, all sizes, and 1,250 tons of rough mica cutting, 1" x 3". At that time this smaller mica was not saleable, the larger sizes being mostly in demand, and although the mines delivered a very large percentage of larger sheets, still it was difficult to satisfy the demand for the latter. This, in connection with the difficulties encountered in locating new deposits on the east side of the shaft, towards the latter part of 1893 prompted the management to suspend operations. Since that time the mine has been worked intermittently and it is reported that some fine deposits have been opened up and mined. The Wallingford Mica Mining Company is working the Wallingford mine near Perkins Mills, and the Battle Lake property, both situated in the Township of Templeton. The Wallingford mine has been a steady producer since its discovery in 1893, and up to October, 1896, when the writer made his first examination of this property 472 tons of trimmed mica were shipped from the mine. The output per month averaged 12 tons, with an average number of men employed of 19. It must be mentioned, however, that the small mica, cutting less than 2" x 3" not being saleable, was thrown into the dump, which of course represented a very valuable asset when the large demand for the smaller sizes was created. The main deposit of the Wallingford mine forms a vein, striking in an east-west direction with solid hanging wall dipping to the south. It has been mined and developed for a length of over 400 feet and to a depth of 200 feet, yielding an appreciable amount of apatite also. The mine is equipped with a modern machinery plant of large capacity, and is prepared for a large output.

The Battle Lake property is remarkable on account of its production of large sized mica. Since the beginning of operations 17% of the total output was in sizes cutting 4" x 6" and over, one crystal weighing 200 lbs. cut 14 x 19 inches while another one gave sheets measuring 19½ x 27 inches. Mining operations are carried on, near the lake, on a system of parallel deposits, which so far have shown to be continuous both in depth and horizontally. One shaft follows a vein of mica near the contact of pyroxene with gneiss ; this vein sends out spurs and branches, which are again divided by boulders of a hard pyroxene and granite. The mica from this property is remarkable for its fine appearance and cleavage. About fifty men are employed on both properties.

The Rheume Lake Mine in the Gore of Templeton is working with a force of twenty-two men on a vein-like deposit. This deposit resembles the vein worked in shaft of the Battle Lake mine in sending off branches and spurs of mica, which are divided by large boulders of a garnetiferous granite. Apatite of a high grade quality is met with in connection with the mica and it is likely, judging from many indications, that both mining for mica and apatite can be worked together advantageously.

The Blackburn mine in the Township of Templeton is one of the largest producers of mica. The property comprises some 900 acres of phosphate and mica lands. The mine up to 1893 was worked for apatite only—since then more especially for mica ; the depth of the main shaft is 225 feet the size of the large open cut is 200 feet by 100 feet, and 60 feet deep, with numerous drifts and crosscuts. The mine employs about 50 persons, is equipped with a large machinery plant and with heavy cable derricks. The Wakefield Mica Company has a shaft sunk to a depth of 165 feet on the hanging wall of a well defined vein with a strike of 40° east of north and a dip to the east of 65°. The vein consists of calcite, micaceous matter and mica crystals, to some extent intermixed with phosphate (apatite). The same is developed and partially

opened up for a length of over 300 feet and has delivered large quantities of commercial mica sheets. Owing to liquidation operations are suspended.

Another large producer is the Lacey mine near Sydenham, Ontario. The main shaft has reached a depth of 140 feet on an incline of 84° to the north-east, while drifts to the east and to the west are opening up the mica deposits for a length of over 140 and 75 feet respectively. Two other shafts have been sunk of 40 and 30 feet depths. The mine is equipped with a first-class machinery plant. The roughly culled mica is sent via Sydenham, to the mica trimming works of the company at Ottawa. About 50 persons are employed at the mine.

The Vavassour mine comprises a mica lot in the Township of Hull, Que., and although it has not been a steady producer, it is remarkable by reason of the number of outcrops of mica which can be seen all over the property. These outcrops appear to be parts of several parallel veins striking through the property in an east and west direction, and it is reported that over 2,000 feet of these mica veins can be traced in the prospecting ditches and excavations which have been made. One vein is opened up for seven hundred and fifty feet by seven shafts, the deepest being 100 feet.

Other companies largely interested in mica mining are the Canadian General Electric Company, the Laurentian Mica Company, and W. Webster & Co., all of them with headquarters at Ottawa.

Concerning the production of muscovite and phlogopite mica all over the globe as already mentioned—India ranks foremost amongst all producers, then come Canada, United States and Brazil. The world's production of the mineral, and the number of persons employed, for 1902 is given in the following table :

Year 1902	Tons.	Value.	Persons employed.
India.....	1,685	\$507,770	9,219
Canada.....	445	242,310	675
United States.....	180	98,859	325
Brazil and other countries.....	110	55,200	200
	<u>2,420</u>	<u>\$904,139</u>	<u>10,419</u>

#### Notes on the British Columbia Zinc Problem.

By ALFRED C. GARDÉ, SANDON, B.C.

Paper presented at the Sixth Annual meeting of the Canadian Mining Institute, March, 1904.

In submitting the "Zinc Problem of British Columbia" as a topic for discussion, I desire to state that I have been encouraged in doing so by observing the keen interest manifested by the Silver-Lead miners and others in determining the best methods for treating and handling the extensive bodies of zinc-blende found in ledges as well as deposits, over a considerable section of the province.

I shall be only too willing to admit that this subject, on account of its importance and certain complicated features, deserves to be dealt with by a more experienced pen than mine. I expect that this, in due time, will be done, but in the meantime, I believe that a starting effort would not be out of the way, for even the best authority would find it to be an endless task to suggest the proper remedies unless all features of the subject had been clearly described. In some instances I have been obliged to draw conclusions from unsettled conditions, and these will no doubt be subject to change when a more definite base is reached; at the same time, I hope that the members of the Canadian Mining Institute, including my friends in British Columbia who are particularly interested

in this matter, will bear in mind that this treatise is the first one to appear in Canada on the subject and that all records and data, therefore, had to be collected chiefly by personal observation. If I should succeed in pointing out the principle characteristic elements and be permitted to offer the following notes for discussion, my present object will be achieved and I venture to hope that the initial step towards the eventual solution of this most interesting problem will be thereby taken. The features involved are as much of an economic as a technical nature, and I have mentioned elsewhere that a great many of them can and will be overcome by individual efforts of companies operating in British Columbia. After wrestling with the zinc problem, single handed, for more than a year, the Payne Mining Company under my management decided to erect a special zinc dressing plant, and are now in a position to produce from 200 to 300 tons of desirable zinc concentrates per month. Markets for the various products have also successfully been established both in Europe and the United States, and steady shipments are now being made. Since then the other companies have followed suit and there are a number of zinc shipping mines on the list now. Besides, several of the old mills are now being reconstructed with the view of treating their zinc ores on a commercial scale which points favorably towards an increased production of this useful mineral.

#### HISTORY OF EARLY ADVERSITIES.

In order to clearly understand the present situation in British Columbia it will be necessary for me to relate briefly the early history of the Ainsworth and Slocan districts, being the first mining divisions in West Kootenay to record discoveries of zinc and lead. Both districts came into prominence approximately twelve years ago on account of their remarkably high grade ledges of silver-lead ores. Zinc-blende was also found in ledges and in association with galena, but for ten years not the least regard was paid to the economic features of zinc. Only in one instance a certain Mr. Brown, of Manchester, in 1899, undertook to send an experimental shipment of 1800 tons of zinc-blende from the "Lucky Jim," mines near Sandon to one of the zinc smelters in England. The assays of this shipment average 50% zinc, 3% lead and 6 ozs. in silver, per short ton. Unfortunately, Mr. Brown died in England before the shipment reached its destination, and his well intended project came to grief with him. I have not the least doubt that if he had had an opportunity to carry out his plans, our zinc ores would have had an established market five years ago. Since then the "Lucky Jim" mine fell back into obscurity; however, it is well worth noting that this property has recently been secured by local parties for a large cash consideration, and is now generally regarded to become one of the largest producers of zinc-blende in the Slocan. The chronicle of this mine as well as the assay values of shipment mentioned will illustrate better than can otherwise be explained, how entirely the zinc industry in British Columbia has been overlooked and also what may be expected from it in time to come. It may possibly be argued that in the upper ore zones extending towards the crest and along the surface of the mountains, only a small percentage of zinc was found to be associated with the galena. This feature, however, can readily be explained as caused through corrosive action of surface water and exposure to the elements whereby the sulphides of zinc (and to quite an extent the sulphides of lead) were changed into carbonate ores. The carbonates with average contents of 80 ounces of silver, 40% lead and low in zinc, furnished an excellent smelting product on which the smelters did not impose any zinc penalty.

In several of the mines familiar to me the carbonates and galena ores free from zinc extended to a depth of 4 to 500 feet below the apex of the mountain, but by degrees a material percentage of zinc-blende made its appearance. In most cases under my observation this transformation would take place gradually, although I am aware of numerous instances where the zinc-blende has replaced the clean galena abruptly and vice versa. The result of the steadily increasing percentage of zinc was that the lead smelters found it necessary to place a penalty of 50 cents per unit on galena containing more than 10% of zinc. This penalty was accepted by the high-grade mines of Sandon who were in a position to ship a galena product averaging from 80 to 90 ounces in silver, and 45 to 50% lead. As an instance I might quote that during 1900 the Payne mine shipped 10,411 tons of galena averaging 83.79 ounces in silver, 45% lead, and 15% zinc, and that the penalty paid on zinc alone during this year amounted \$28,203.42, being equal to a deduction of \$2.71 per ton of ore shipped. Other mines had similar experiences and found that the zinc contents, in spite of close hand-sorting, could not be kept within the 10% limit, and that different means would have to be resorted to in order to keep the galena free from excess zinc. To overcome this difficulty mechanical concentration by water was eventually applied. A number of 100 ton mills generally driven by water power, and nearly all constructed on the same plan, were built in a comparatively short time. Hartz jigs with two, or sometimes three cells, were used in separating the coarse galena from the waste rock as well as the zinc-blende and iron, all of which went through the tail-races. For the finer lead products, buddles and Frue Vanners were used. The system of concentration employed often left much to be desired as to efficiency, but the point of keeping the galena contents within the zinc penalty limit was gained. From the above it will readily be seen that one of the essential features of concentration in the Kootenays was to send as much zinc through the tail races as possible, and it must be admitted that this aim was carried out to a high degree of perfection. The tonnage of zinc thus wasted was immense, and its extent will probably never be known; it can only be roughly estimated from assays of the tail products which would often exceed 30% zinc and rarely go below 20%. A considerable amount of silver contained in the blende also went into the various creeks with the tailings, but so as not to get myself into hot water, I prefer not to quote any assays. In summing up the various losses, we have:—

1. Direct loss to the mines due to zinc penalty payments.
2. Loss of zinc values in smelting lead ores high in zinc.
3. Loss of zinc and silver values run to waste through the tail races of the various concentrators.
4. Hand-sorted zinc ores left on the dumps or in the old mine stopes.

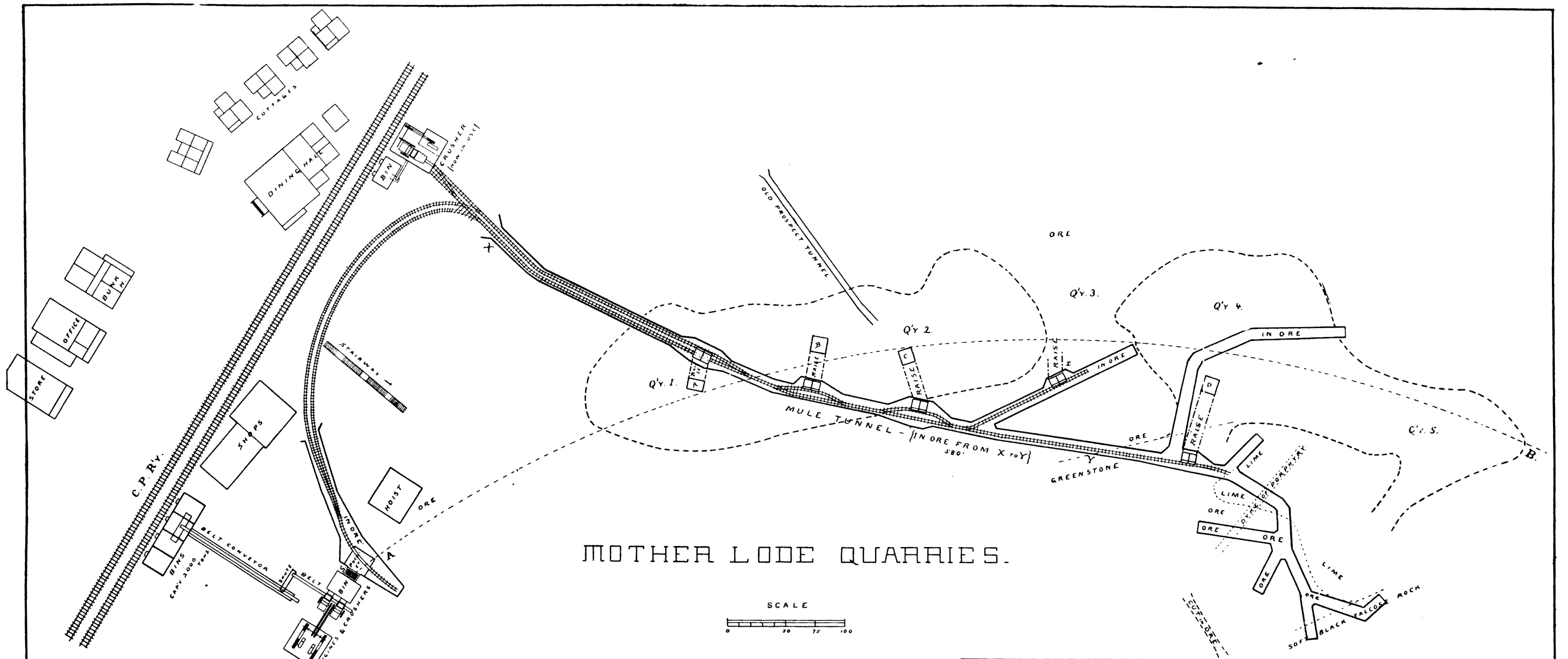
Of the above losses the fourth item is the only one that can partly be recovered providing the material is present in sufficient quantities to permit of economic handling and concentration. At the Payne, the Ruth, the Ivanhoe, the Wakefield and the Alamo Concentrators, this is being done successfully now. Furthermore, the Slocan Star, the Washington, the Jackson, the Monitor, the Rambler, and several other well known properties are now preparing to alter their present plants or erect new ones whereby they will be able to recover the "zincy" material on hand, as well as all zinc that in the regular course of mining is broken down with the lead ores. In order to give an idea of results that have been obtained, I may state that during the first ten months run (May

1902 to March 30th, 1903) the Payne Concentrator handled 33,000 tons of old and 7,000 tons of new stope fillings, from which 1,247 tons of high grade silver-lead concentrates were derived and sold to local smelters. In addition hereto 1,391 tons of 42%-43% zinc-blende concentrates, containing 8 ounces in silver, were produced as a by-product at no extra cost. A 1,000 ton lot was disposed of to the Lanyon Zinc Company of Iola, Kansas, and netted the Payne Company, after paying an \$11 freight rate, \$8 per ton. Encouraged by these results the company at once added a magnetic separating plant, whereby they have been able to, at a cost of from \$1.50 to \$2.00 per ton, improve the zinc product from 42% to 55%. This plant has now been in successful operation for the past four months and will no doubt be followed by other companies ere long.

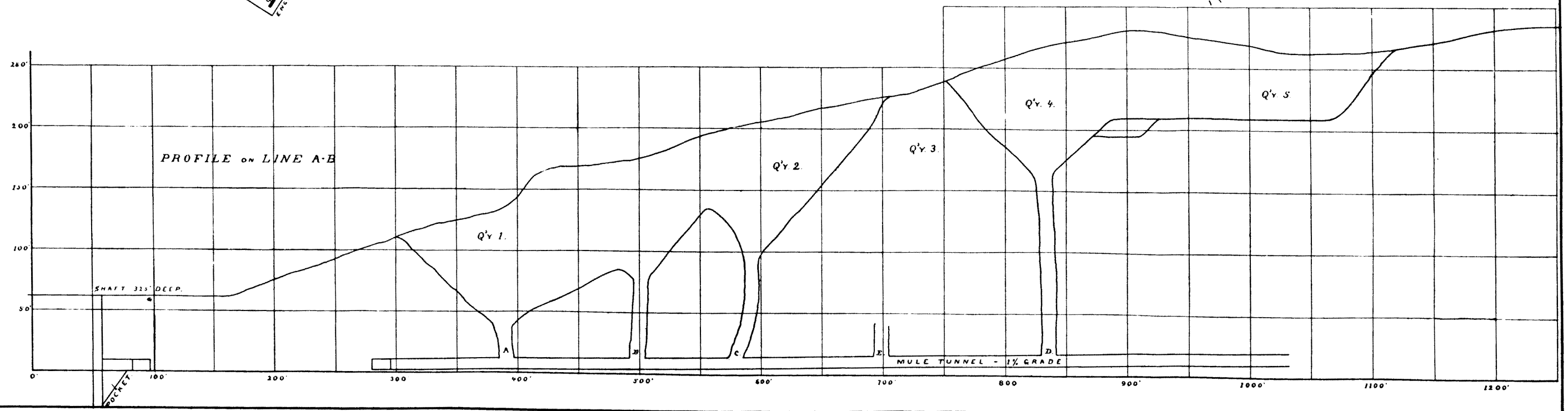
For a moment we will leave the "high-grade" mines of Sandon, located at elevations from 4 to 8,000 feet, and see how the Silver-Lead-Zinc mines situated at altitudes ranging between 1,700 and 4,000 feet, fared in reference to the zinc question. Here we find that the ratio of silver in the galena is of much lower tenor, or approximately, one half ounce of silver to one per cent of lead, while in many instances, the lead contents is low and the percentage of zinc high. In the Kootenays an ore of this class is termed "low grade," and it will readily be understood that on these the penalty on zinc worked a severe hardship. In addition hereto the price of silver continued to decline, and when the American Smelting and Refining Company in January 1900, withdrew from the Canadian lead market and compelled the producer in Canada to sell his lead at much lower prices in the Continental market in competition with cheap Spanish and Mexican labor, it was not to be wondered at that the "low grade" mines were obliged to shut down. To some considerable extent this last feature has been overcome within the past eight months by the liberal bounty of \$15 per ton granted by the Dominion Government for five years on all lead mined and smelted in Canada. The bonus has particularly proved of great benefit to the mines in a position to produce a heavy lead ore or lead concentrates, but in order to re-open the low grade lead-zinc mines it will first be necessary for the owners of same to make a by-product of the zinc, which may be disposed of at once if of sufficiently high grade to stand present freight charges, or stored until such time as zinc smelting works will be erected in British Columbia.

I have, in the above, aimed to show how the zinc industry gradually succeeded in struggling ahead. Kind reception could not be expected. For years the zinc had been looked upon as a mongrel intruding upon the peerless silver-lead ores. Was it possible that the black stuff, found everywhere in the mines and on the dumps, possessed any value, and if so, how was it that it had been wasted by the thousands of tons during a period of over ten years when prices of spelter in London and New York continued to soar higher and higher? Of all the difficulties that have been thrown up against the industry since its infancy, the very feature of even being tolerated was by far the most difficult problem to overcome, and it seemed that those who had done the least to stop the wasting of it were the least anxious to help it along, and the first ones to clamour about difficulties, many of which were either false alarms or have since been solved.

I am now getting to the juncture where I intend to point out certain complications, and I shall in my next chapter mention them in the order in which they appeared. By presenting them in the form of questions such as have often been put to me, I think they will be more conveniently answered.



MOTHER LODE QUARRIES.





### Notes on Mining and Smelting in the Boundary District, B.C.\*

By FREDERICK KEEFER, M.E., Greenwood, B.C.

Two years ago the writer contributed a paper on mining low grade ores as carried on at the Mother Lode mine in the Boundary District. It is the purpose of the present paper to briefly note developments of the system, particularly as regards the quarrying and economical handling of ores, and also to touch upon certain features connected with smelting operations.

At the mine in question, the series of quarries has been extended until there are at present four raises to the surface from the main tunnel, with a fifth in course of driving. In so far as possible, the tops of these raises are maintained funnel-shape so as to reduce handling to a minimum. While the pits remained shallow it was an easy matter to remove barren or very poor rock by loading it into cars and tramping to waste dumps; but as the funnel system developed it became quite inadvisable to remove any except large bodies of waste, for the cost of removal had become greater than the cost of smelting. Experience has shown, however, that the evil effects of these smaller bodies of waste have been more than offset by the improvement in the general run of the ore body due to lesser quantities of partially leached surface rock being included. So that the average copper contents of the 135,500 tons mined in 1902 was appreciably less per ton than that of the 137,800 tons mined in 1903.

In places, however, large dykes of epidote and alkali porphyry, and occasionally isolated bodies of limestone occur, which are removed by blasting into raises, all the ore having been previously withdrawn.

The crusher plant located at the entrance of the quarry tunnel has taken care of quarry ore alone, that from the stopes being crushed by a Gates machine located at head of shaft.

Work is now being carried forward to consolidate the crushing plants and to do away with the Gates machine, which, although a No. 5 size, is entirely inadequate to the demands made upon it.

To this end a tunnel is being driven to intersect the main shaft on the same level as the quarry tunnel. At the shaft will be located a very large pocket, and this will discharge into five ton skips which will replace the cages now used. The skips will empty into a bin at the head of the shaft, thence passing to either one of a pair of Jenckes-Farrell crushers, each crusher having a jaw opening of 2x3 feet. These crushers will be driven by a pair of 100 h.p. engines so arranged that either engine can drive either crusher, this to eliminate all chances of stoppages through breakdowns in either engines or crushers—stoppages which past experience has shown to be inevitable as well as costly. The crushed ore will be conveyed by a Robins belt to the main ore bins. All car dumping and opening of bin and pocket gates will be done with compressed air. The same skips and crushers will, of course, serve all levels in the mine.

Although the ore will need to be handled further under new management, crushing costs will be lowered. For the reason that aside from stoppages for repairs to machinery being practically eliminated, the provisions of capacious pockets and shaft bins insure steady operation of crusher, which machine, if constantly supplied with ore can crush a furnace days run in a single shift, instead of this work taking one and a half shifts as at present.

Jamming of elevator buckets, constant repairs to them, and

their clogging with frozen fines in winter will be eliminated—all serious drawbacks to rapid work. The short tunnel to shaft will also become the general entrance to mine, both for men (whose houses are all on this level) and for materials from shops and storehouses.

The main features of this work are shown in the accompanying plan.

In the matter of power, the cost of this item at the mine has been greatly reduced through the consolidation of power plant, and the driving of all machinery with compressed air. The 100 h.p. crusher engine formerly steam driven from boilers near by, now uses compressed air which is heated to a considerable degree just before entering engine. This expedient has effected a direct saving in labor and fuel of from 5 to 7 cents per ton of ore crushed. Air is furnished by a cross compound condensing Corliss compressor, capacity 3,200 feet free air per minute. A pair of boilers located near crushers and hoist can furnish steam on short notice should the compressor machinery break down, thus guarding against stoppages through this cause.

From a smelting standpoint, the ores of the larger Boundary properties have as a rule grown less basic as the workings have extended and deepened. That is to say, the proportion of iron oxide ores to the whole ore body has sensibly diminished, there being no great change in the amount of other base. Whether this reduced proportion of base to acid is to remain permanent, it is (at least in the case of the Mother Lode mine) quite impossible to predict. Long experience in mining these deposits has shown that it is impossible to make safe predictions as to occurrence of zones of mineralization, new ore bodies being frequently found in unexpected places. On the 200 ft. level of this mine there has been found considerably less oxide of iron ores than in either the quarries or the 300 ft. level. The iron oxides of this latter level are uniformly of higher grade than those of the quarries, carrying more copper and gold, and do not appear to be directly connected with the upper deposits, although this is not absolutely proven. No exploratory work has been done beneath the 300 ft. level, (which is about 500 feet under the highest croppings of the ore).

A considerable body of iron oxide ore is at the mouth of the main tunnel, but no work has been done on it owing to close proximity of the crusher plant.

This change in the basic character of the ore is illustrated by the following average slag analyses, taken over corresponding periods 1901-2 and 3. The small tonnage of foreign ores treated affect the assays somewhat, but not materially.

Year	Silica	Iron	Lime	Total
1901	33.2%	28.5%	20.6%	82.3%
1902	40.5	22.2	20.2	82.9
1903	42.7	20.4	20.2	83.3

With slags running in silica from 40 to 43 per cent. and with matte at 40 to 45 per cent. copper, it is found that the furnaces can be maintained in good running condition, and slag losses kept within proper limits.

Therefore, to guard against possible scarcity of iron fluxes, it has become general practice to conserve the iron ores of the mines, using only sufficient to keep slags within bounds above indicated.

The Imperial Coal & Coke Co., of Montreal, has purchased the properties of the Alberta Coal & Coke Co., paying for the same 350,000 shares of stock, all the dues of the Alberta Co. to the Government, and all the miscellaneous debts of that Company. The Alberta Coal & Coke Company had leases on 6,400 acres of coal lands, four miles west of Cowley Station, Alberta, on the Crows Nest Pass branch of the C.P.R.

\* Paper presented at the Sixth Annual Meeting of the Canadian Mining Institute, March, 1904.

### Notes on the History of Some of the Mining Districts of Lunenburg and Queen's Counties, Nova Scotia.

By E. PERCY BROWN, S.B., Bridgewater, N.S.

Glancing over the Annual Report of the Gold Mines of Nova Scotia we find that the districts of Malaga (Molegra) and Whiteburne, Queens County, produced from the year 1862 to the present time 19,282 ounces and 9,625 ounces of gold from 20,846 and 6,583 tons of quartz respectively; in both cases however the major part of this production extended only over a period of three or four years, from 1888 to 1892 or 1893. The history of these districts is, unfortunately, similar to that of many others in the Province of Nova Scotia and it may reasonably be asked if the meteoric rise and fall of many of our mines is the fault of the gold measures themselves or of the men operating them. This is an important question and one deserving of more than passing notice.

The first discovery of gold bearing rock in Malaga is said to have been made in 1886 and there was at once a tremendous rush for mining areas. Many rich finds were made and a regular western boom set in. The construction of a 20-stamp mill was started in 1887 near where some of the richest ore had been found and after the surface had been stripped from some dozen leads in the vicinity.

In the year 1888 the boom continued. The first 20-stamp mill was started and when sufficient ore was on hand yielded good returns. Three other crushers were built by various companies. One company, after doing a lot of indiscriminate work on a large number of leads, erected a very complete 20-stamp mill, going to so much expense on their air plant, drills, etc., that when the mill was ready to start the company was about discouraged.

The other two mills were erected largely as a consequence of excitement.

During the first few months of the year 1889 there were four crushers running at Malaga and the returns are given as 3,976 ounces of gold from 4,388 tons of quartz. In 1890 another mill was erected and the production for the year was 3,883 ounces of gold from 6,633 tons of quartz.

It would undoubtedly be very interesting if the amount of gold actually taken out of the ground during this year could be known. It is said that some of the men working in the mines at \$1.00 or \$1.25 per day not only supported large families, but, during the years of the boom, made small fortunes on which they have lived comfortably ever since.

In 1891 the returns were 4,664 ounces of gold from 4,826 tons of quartz.

In 1892 a production of 2,656 ounces from 2,720 tons of quartz is recorded, while thereafter a gradual falling off is noted with no accurate estimate of the yield.

The history of some of the individual operators would make an interesting record; but space and policy forbid. One company is recorded as having operated, during 1890, thirty different leads with independent shafts on each. Another company, which operated about a dozen leads, confined its attention principally to four of these, on one of which it had seven shafts in a distance of 350 feet, and on another ten shafts in a distance of 450 feet. Hoisting was carried on from each of these shafts in small tubs, the ore being hauled to the mill by horse and cart. It can readily be understood what opportunities such a plan would give to a dishonest miner.

The system of mining pursued does not need further comment. The underground plan of one of these properties (which yielded

4,340 ounces of gold from 4,943 tons of quartz) is interesting (?).

The history of Whiteburne is too similar to the above to need detailed description. Is it probable that a few thousand tons of rich ore were thus scattered over one or two square miles of territory, and within one or two hundred feet of the surface, and that, since this ore has been removed, the deposit is exhausted?

It may be well to look at what has been done on some of the neighbouring districts.

The gold mining centres of Brookfield and Leipsigate are situated within a few miles of the districts of Malaga and Whiteburne.

The early history of Brookfield was somewhat similar to that of Malaga. In 1887, a year after its discovery, 1,691 tons of quartz from the property now owned by the Brookfield Mining Company, Limited, yielded 1,418 ounces of gold. A boom was the result. It was short lived, for the following year the mine was closed down. No doubt the gold measures of Nova Scotia were again blamed by the indignant stockholders.

In 1893 the mine was re-opened under its present energetic and business-like manager, and with an underground foreman who thoroughly understood his business. This foreman, though a Nova Scotian by birth, had had considerable experience outside this Province and saw that in other countries a mine was not closed down because the ore failed to yield an ounce to the ton, or because heavier machinery was needed to cope with the water as depth increased. A system of mapping and sampling the mine was started and thus a well defined pay-shoot of rich ore was located. Economic means of mining and handling the ore were introduced. The loss of gold from the mill was daily chronicled and a modern chemical plant was installed to take care of the values escaping amalgamation.

These are only a few of the steps taken which have made the mine of the Brookfield Mining Company one of the leading producers in Nova Scotia to-day.

Another mine at Brookfield, that of the Philadelphia Mining Company, was opened in 1888. In 1889 it yielded 1,796 ounces of gold from 1,472 tons of quartz. In 1890, 2,500 tons of quartz gave 1,643 ounces of gold and thereafter the returns are not reported.

About this time the mine was abandoned and, though it was subsequently sold and reopened, no serious attempt was made to work it.

At the present time the mine is being pumped out under the management of the foreman who was so successful, under the Brookfield Mining Company, in re-opening that mine and it will be interesting to note the results.

The chief feature of the district of Leipsigate is a strong fissure vein similar in many respects to that worked at Brookfield. It has been traced for considerably over a mile and several properties are located upon it.

One of the first opened was owned by a party of Germans from Minneapolis and Duluth who, about 15 or 18 years ago, erected two Wiswell mills and started out on a large scale. It is said that few, if any, of the company had seen a mine before and certainly some portions of the underground workings, exposed in subsequent operations, would seem to warrant this supposition.

After a year of this work the money of the operators gave out and the mine, in accordance with the fashion of that time, was abandoned, said to have "petered out."

About three years ago a company of Nova Scotians took hold of this property. They sank shafts through the old workings and,

after getting a safe distance below them, drove levels for several hundred feet in both directions along the vein, thus exposing a magnificent body of ore of several thousand tons which has yielded very satisfactory returns in the mill. This work was a further object lesson to the scoffers at the permanency of our gold deposits. Another property on the same lode was first opened by a local company who placed one of their number, a sea captain, in charge of operations. A mill was built under his direction and, though the quartz yielded an average of over half an ounce per ton, from a lead giving about two feet of crushing material and easily mined, the company were, after two or three years operations, forced to close down. There is no need to describe the system pursued in this case as all mining men are familiar with the method of underhand stoping employed under such conditions. Fortunately for the local company, and for the mine, some American capitalists came along at this time and purchased the property. They deepened and straightened the shafts, drove levels and installed a Cyanide plant. The treatment of the tailings dump from former operations yielded them sufficient profit to pay for a large portion of their improvements and at the present time they are pushing steadily ahead with good returns from the mill and Cyanide plant.

Other properties might be instanced but these will suffice to illustrate our point.

Does it now appear to the reader that, in the cases of Malaga and Whiteburne and similar districts, our gold measures should receive all the blame for non-productiveness?

#### **The Geological Survey of Canada as an Educational Institution.**

By PROF. T. L. WALKER, Toronto University, Toronto, Ont.

During the second quarter of the last century the investigations of geologists first received general recognition from those interested in the mineral industry. Then, for the first time, did the governments of progressive people seriously consider the wisdom of engaging trained scientists to examine systematically the lands under their controls with a view to learning the extent of their mineral wealth and the best methods of exploitation.

The Geological Surveys of England, India and Canada were formed during this period. In this country the Survey was to be an economic institution, but this, at times, necessitated the study of theoretical questions. Experience has shown that the two branches—economic geology and pure geology—must be taken up together, if the best results are to be attained. Of late it has often been urged that the Survey devotes too much time to purely scientific geology to the detriment of its economic work. The members of this Institute are agreed that too little exploration of the latter kind is attempted, but that can only be remedied by a larger staff and more generous support on the part of Parliament. I regard the scientific work as absolutely necessary if we are to achieve the best economic results.

It was impossible at first for the director of the Geological Survey of Canada to secure in this country men trained in geology and in the other branches of science required of those who attempt such work. Sir William Logan collected a staff, mostly untrained men—lawyers, masons and farmers—and in a short time they were doing work which has since become classic, not only for us in Canada, but for all the world. This was the beginning of the educational work of the Survey.

Large editions of the reports of the geological explorations are distributed, either free or at a nominal price, to those interested in geology and mining. This, too, is an educational side of its work which has been well sustained for half a century.

There is only one other method to be pointed out—the distribution of specimens of mineral rocks and fossils from Canadian localities to schools, libraries, colleges and learned societies. As a result of this there are now scores of collections accessible to thousands of students and scholars in all parts of Canada. I do not know just when this method was introduced, but I am glad to say that this is still a very fruitful branch of the Survey's educational policy.

It may be maintained by some that the Survey has no educational duties to perform, or that the work mentioned is only of very minor importance. I hold that it has had such a policy from the beginning, because it was early recognized that with the intelligent co-operation of mining engineers, college graduates and enthusiastic amateurs, much more could be accomplished than would be possible to a small group of state paid geologists working alone. At present Canada has very few trained field geologists in proportion to the great areas of unexplored territory. Apart from the work done by the state geologists very little has been accomplished. In England, France and Germany there are scores of amateurs who are doing work of the highest class. If, in Canada, we could only encourage the growth of such a band of volunteers, the advance of geological exploration would be much more rapid.

The absence of well-trained field geologists is much spoken of by those interested in the development of the mining industry. Competent leaders for exploring parties are scarce. It has been said that some years ago, at the time of the opening of the Yukon, if the offer of a certain firm, to build a railway from the Coast to the gold regions in return for extensive concessions in mineral lands, had been accepted, a large fraction of the staff of the Survey would have resigned their posts and taken appointments with the company. We cannot tell what might have been—such things are uncertain—but we do know that a large number have resigned their appointments on the Survey and gone into private work. There is a demand for trained men but no supply. This is evidence of the absence of a sufficient number of competent field geologists. The Survey has almost ceased to regard the training of geologists as one of its functions.

The universities and schools of mining may be thought to be responsible for this scarcity. We can give students a thorough training in certain branches of the subject, but in order to give field experience, it would be necessary for us to send out real exploration parties for several months every summer, and so far as I know, no Canadian college has been able to do this. It would be expensive and apparently unnecessary when one reflects that the Survey sends out over thirty such parties every summer. Year after year the best students in geology apply to their instructors for letters of recommendation, and send formal application for permission to accompany a field party of the Survey. They do not understand why it is that they fail in these applications. For ten years no advanced student in mineralogy, geology or mining, from the University of Toronto, has been able to secure a place on any of these expeditions. I know of some cases in which men quite innocent of any of these subjects have been sent out as field assistants, able neither to assist in the geological work nor to profit by the summer spent in the field with a trained geologist. Now I shall not undertake to explain the cause of this. We are in many respects like our cousins to the south of us. In the

United States it was found very difficult to secure the appointment of the best men for such posts and it became necessary to make their Geological Survey a sort of commission almost independent of the ordinary methods of selection. Now the director has no difficulty in finding out the best men. Is our problem capable of being solved in the same way?

In conclusion, I wish to repeat, the Geological Survey of Canada is, and has been from the beginning, an educational institution. In its generous distribution of its reports and of geological specimens it is following the right path; but it has almost ceased to co-operate with the Canadian universities, their best students finding it next to impossible to get field training on the summer parties of the Survey. Some even apply to the United States Geological Survey for permission to join their field parties. Advanced students want field training, and would in some cases be willing to go as volunteers without pay. For Toronto students at least the door has been shut for ten years.

### **The Zinc Resources of British Columbia.\***

By A. C. GARDE, President the Silver-Lead Mines Association.

For the past ten years zinc ore deposits have been known to exist in British Columbia, especially in the districts where silver-lead mining has been carried on, but only within the past year has attention been paid to its economic feature. In many cases where the zinc and lead were intimately associated zinc proved a hardship for the lead producer, inasmuch as when it reached a limit of 10 per cent the ores were penalized at a rate of 50 cents per unit. With increasing depth in the Slocan and Ainsworth mines it has been demonstrated that the lead sulphides are often superseded by zinc. It has also been proven that the lead is so intimately disseminated with the zinc that processes for independent recovery of the two metals are now receiving the greatest attention in all sections where zinc ores have been discovered. This, naturally, has led up to opening markets for the zinc as a by-product, and while some of the mines have been successful in disposing of their zinc product at a profit in Europe and the United States, there are a great many properties with a complex nature of ores, with lower values in silver, that are not in a position at the present time and with present methods of concentration, to make a product that will stand the high cost of transportation abroad. With smelting and reduction works in British Columbia this would be entirely different, but until the character as well as the extent of deposits have been thoroughly explored, it is hardly to be expected that capitalists will invest in local reduction plants. They must be given assurance of finding a profitable investment by the report of a high authority on zinc. In addition to the direct benefit to the zinc miner the lead mining industry would receive additional attention inasmuch as exploration work for zinc ore bodies would lead to discoveries of lead ore bodies as well. This can be explained by the fact that lead and zinc ores are so closely related that there is no distinct line between the two minerals. Development of zinc fields would, therefore, at the same time, lead to new discoveries of silver-lead ores.

The zinc question is not a matter of local interest alone, but of national importance.

We admit that the selection of the specialist to examine our zinc resources in British Columbia is one of the essential features, and we have therefore suggested Professor Walter Renton Ingalls,

of Boston, whom everybody considers eminent in his profession. Our idea is that he should make a general study of the zinc resources of British Columbia as to the grade of ores for spelter production, etc., and to give his opinion as to the best methods of development of the industry in general. In short, we desire a report that includes the commercial features as well, and will be useful in furthering the zinc mining and metallurgical industry of British Columbia. It is possible that objections will be raised by our patriotic citizens to engaging a foreign specialist for the investigation of Canadian resources, and indeed it would be most fortunate if any of our engineers in Canada could fill the want, but the zinc question is a specialty where an intimate knowledge and study is required, and we do not believe that such a specialist can be found in Canada, and it will therefore be to the benefit of Canada to employ the very best authority obtainable in preference to anyone who would be only fairly well familiar with the subject, but not a specialist on the same.

Specialists on this subject are confined to Europe and the United States, but no European can be readily reached or is likely to be able to grasp the economic conditions of the West at short acquaintance. It may be claimed that the cost of investigation should be borne by individuals or corporations, and it is probable that expenditures in this direction will be made by those able to afford this advantage, but the number of mine or claim owners in this enviable financial condition is insignificant compared to the number of those (especially of the prospector class) who hold properties carrying zinc values and who are not only uninformed as to the value of the zinc deposits they control but are financially unable to secure expert advice. This condition has for some years past been recognized by the United States government, who have had a corps of experts in the various zinc fields of that country with the most beneficial results as regards enlightening the general public as to the nature and capabilities of the resources which nature has placed at their command.

That the resources of the country as to zinc bearing ores are extensive, I have no hesitancy in stating. That the ores as to their physical features in the different districts vary considerably is also beyond question. One feature that has puzzled the miner and metallurgist considerably is the silver bearing nature of the zinc ores. There are mines capable of producing a very large tonnage of first-class zinc ore, which would only carry up to six ounces in silver, while on the other hand we have mines that have large bodies of zinc ores carrying high silver values. Zinc ores containing extremely high silver values are not unusual in this province. I am familiar with certain small bodies of zinc ores in the Slocan and Ainsworth camps that will carry from 1,200 to 1,500 ounces of silver per ton. Such ores are indeed exceptional in any part of the world, and processes for a close recovery of both the silver and the zinc values have, therefore, not kept pace with the rest of the metallurgical achievements obtained on the more commonplace types of ores. Consequently, the miner who produces a zinc ore with very high silver values is at a disadvantage and will, at the best, not be able to get smelter returns for more than two-thirds or three-fourths of the silver values. Undoubtedly this feature deserves particular attention and expert advice. In my estimation, however, the average silver contained in the zinc ores found in the Slocan within a circumference of ten miles (taking Sandon as a center) would be approximately 25 ounces per ton of 50 per cent. ore. I beg to emphasize this feature for the reason that it is generally understood by mining men in the Slocan, as well as by the public, that the British Columbia zinc ores

\* Extracted from the Lead and Zinc News.

on an average would run far above this in silver. It has been pointed out by many that if the smelters could only afford to pay for three-fourths of the silver values the losses would be very high and that it would be better to leave these ores in the ground until some day when a higher recovery could be obtained.

What I wish to bring out in connection herewith is that the zinc ores of British Columbia even without silver values are worth mining for their zinc values alone, and if they contain some silver values besides, so much the better. The zinc industry should not be hampered nor prejudiced by the fact that a few properties might have an exceptional argentiferous zinc ore that it would prove difficult to get the full value for. Such ores cease to be zinc ores and should be classed as silver ores. It is my opinion that there is an unlimited amount of desirable zinc ores in British Columbia, fit both for spelter and zinc oxide productions. The highly argentiferous zinc ores as a whole should be regarded as exceptions from the rule and not allowed to interfere with the large ore deposits of strictly zinc bearing ore worth consideration for their zinc values only. Our main object is, therefore, as it will be understood from the foregoing, to give the Canadian investing public an opportunity to find out all the particulars of the zinc ore deposits in British Columbia. In the United States and Europe the zinc smelters have not been slow in realizing the future we have before us. Our zinc ores are now being exported every day to the markets of the world where they are made into spelter and zinc oxides, and later on returned and sold in the Canadian market. Unfortunately we have no zinc smelters in Canada, and the consumers will therefore have to bear the additional cost of transportation, duties, etc., not to speak of the profits that would add to the wealth of Canada if a new zinc industry was established here. As to transportation, we are at present shipping our zinc ores to Iola, Kansas, at a freight rate of \$10 per ton, and to Europe at a freight rate of \$13 per ton. It requires approximately two tons of our ore (or any other ore) to make one ton of spelter. On these two tons the freight amounts to one cent per pound, and in addition thereto we have to pay freight on spelter returned from Iola to Canada, which is \$20 per ton, or one cent per pound. From this it will be seen that more than two cents per pound is added to each pound of spelter used in Canada for home consumption. From June, 1901, to June, 1902, the following zinc products were imported into Canada for home consumption, according to official reports issued by the Dominion Government, under a duty of only 5 per cent. ad valorem :

	Quantity	Value
Zinc white (or oxide) and red lead . . . . .	12,324,884	\$489,231
Zinc, in blocks, pigs, sheets and plates . . . . .	3,905,552	141,560
Spelter, in blocks and pigs . . . . .	2,035,872	80,757
Approx . . . . .	9,266 tons	\$711,548

It is an injustice to Canada, who, we will assume, has the zinc ores, fuel, etc., to look for a market for home consumption in a country where high tariff exists (viz., the United States) besides paying high freight rates on long hauls going out as raw material and coming back as a finished product, with an additional tariff charge of 5 per cent. As to the extent of ore deposits, I have mentioned in the above that in the Slocan there are several important veins of desirable zinc ores. On some of these veins considerable work has been done, but entirely for the purpose of obtaining the high silver-lead ores associated with the zinc. Any development work must therefore be credited to the silver-lead industry. Whatever zinc ore was taken out with the lead ores has for a number of years been wasted in the concentrators or left on

the dumps, and treated as equalling so much waste. Hundreds of thousands of tons of zinc have in this manner been wasted through the tailraces and into the creeks. Furthermore a large amount of zinc has been wasted in the lead smelting furnaces and run out with the slag. When hereto is added penalties that have been charged the miner for excess of zinc in the lead ore, it will readily be seen that zinc to the value of several million dollars has been lost. It is impossible to give accurate figures in reference hereto, but I may state that out of a dozen concentrators, each of about 100 tons capacity, the average tailings would assay 20 per cent. zinc, and in individual cases would exceed 30 per cent. Whatever silver was contained in the zinc would of course follow same through the tailraces. In the Slocan mines located at elevations of from 3,000 to 8,000 feet, the veins run parallel, usually with a slight inclination from the vertical. The approximate strike is northeast and southwest. All of the important veins are true fissure, showing considerable signs of faulting and fractures in the slate formation of the country. In no particular instance has mining been carried on beyond a 1,000 foot depth, and here the evidences of increase of zinc is apparent. An unbiased observer must come to the conclusion that the lead, or at least a portion of it, is gradually being replaced by zinc-blende. If for no other reason, this feature alone would be of sufficient importance to the silver-lead miner to solve the zinc question. Unfortunately, while he knows all about lead he is not any too well posted on zinc. In depth he is confronted with ores of more or less complex nature and concentration propositions, and unless he can make a profitable by-product of the zinc ores, he will find it difficult to make his lead ores pay even with high silver values. If it was not for the liberal bounty of \$15 per ton granted by the Dominion Government he certainly could not see his way clear. At any rate he has found out that he cannot afford to pay penalties to the smelter on excess of zinc when this amounts to \$8 and \$10 per ton, as they in many instances have proved to do. If, on the other hand, he is able to separate the zinc from the iron and the lead by means of concentration and magnetic separation, and dispose of the lead and the zinc to advantage, independent of each other, there will be no cause for him to dread the future of deep mining, and instead of looking at the zinc as an intruder on the peerless silver-lead ores, he will in time learn to regard it as a more valuable by-product than lead. London and New York prices of spelter which govern the markets of the world to-day have for a number of years showed considerable strength. At this time of writing the London price of spelter is £22 per long ton, while the London price of lead, plus the lead bounty of 75 cents per hundredweight, is only £15, 7s 6d. It will, therefore, readily be seen that spelter is commanding a far higher price than lead, a feature that has been overlooked by a great many. Peculiar and extraordinary conditions in British Columbia have caused the miner to overlook the prospects and advantages of zinc, also the losses to which he has exposed himself so long. Even at the present time it is with a great deal of tardiness that he realizes the bright future of zinc and the addition of a new and distinct industry to the present silver-lead industry.

The Dominion Antimony Co have been getting some very beautiful ore in their bottom levels; this ore which is mostly stibnite with a little quartz through it shows gold freely, and it looks very pretty on the black background. Recent shipments have produced returns varying from 40 to 45 per cent of antimony and from \$50 to \$56 in gold. It is interesting to note that prior to Mr. McNeil's ownership of the property no gold was ever paid for by the smelters. If the ore shipped in the past contained an equal amount of gold to that shipped recently nearly \$150,000 has been lost to the Province through ignorance on the part of the shippers. We should say that the recent shipments contained none of the ore showing free gold.

### The Imperial Coal and Coke Co., Ltd.

We have before us the elegant prospectus of this important company, which has just been registered with an authorized capital of \$4,500,000, to which is appended the report of Mr. Gust. Sundberg, Graduate Royal Technical School, Stockholm. Following our usual custom in the case of promotions in the mining world which appeal to the public for funds, we shall proceed to comment upon some features of this prospectus which require consideration. As an industrial enterprise this effort has features which may fairly be grouped under two classifications—favorable and unfavorable. We will try to do justice to the former first, and, after careful investigation, are prepared to concede the following :

(1) The area of the property (60,160 acres) is large enough for all purposes. The number of seams of coal actually located and the aggregate thickness (110 feet) are probably as stated.

(2) Whilst the coal has not been sufficiently tested to justify a positive conclusion as to its persistency in depth, the analysis of samples taken at the surface is satisfactory, and justifies the conclusion that, at a reasonable working depth, coal of a satisfactory marketable quality may be mined to a practically unlimited extent. Such coal would, without doubt, be suitable at least for steam and domestic purposes.

(3) The facility with which the seams can be opened, and the moderate cost of mining, are distinctly favorable features.

(4) Owing to the open character of the Elk Valley, and the easy natural grade not exceeding one per cent—the cost of railway construction will be moderate, not exceeding \$15,000 a mile.

The foregoing are distinctly advantageous features, as they include abundance of good coal, ease of access and cheapness of production. There is, therefore, the backbone of a bona fide enterprise which, under certain conditions, would yield satisfactory results to the investor. Do these conditions exist? Let us see.

(1) No mention is made of the price to be paid for the coal lands, whether they are being acquired by purchase from the promoters, if so, at what figure and on what terms—or, whether the shareholders step into the shoes of the original locators and simply take up the Government licenses.

(2) The only report is from a gentleman who, however estimable and competent, is an entire stranger to Canada and unknown in mining circles here. It would have inspired more confidence if Mr. Sundberg's conclusions had been substantiated by an engineer of known repute and who knew more of the local, and especially the market, conditions.

(3) There is too much reference to, and reliance on, the Crow's Nest Pass Coal Company, and the reference to their coal lands as "*adjoining*" is calculated to mislead, since the nearest point at which that Company is operating is about sixty miles from the nearest point at which the Imperial Coal Company's mines could be opened up.

(4) The prospectus claims that these seams are the "*extension*" of the C.N.P.C. Company's seams. Geologically this may be correct, but there the matter ends, since the higher percentage of ash and lower percentage of fixed carbon differentiate them from the latter very distinctly. Even the Michel coals of the C.N. Company (20 miles north of Fernie) contain higher ash and yield a less satisfactory coke than to the south, and the farther north one travels the more this difference is accentuated.

(5) The absence of tests, at sufficient depth to yield satisfactory results, especially as to coking, is a serious omission, and leaves these coals in the same category as those of the Blairmore

section as to *high ash*. In view of this fact Mr. Sundberg's seventh conclusion is very far fetched, viz :—"There are several hundred million tons of fine coking coal in these areas." Fine coking coal is coking coal which is at least equal to the Fernie coal, because it is not the laboratory expert, but the smelter manager who will have to pronounce the verdict. Fernie coal produces coke with 10% of ash. Hitherto no other coal has approached this standard. The smelters, especially in a low grade country, can not afford to buy any but the best smelting fuel and therefore, until the Imperial Company has demonstrated that it can produce coke of this grade Mr. Sundberg's seventh conclusion must be held to be pure assumption.

(6) It will cost \$1,000,000 to construct a railway from Michel to the Company's property on Fording river.

(7) No coal company for years to come can succeed with a capitalization as large as that contemplated by this Company. The experience of the Crows Nest Pass Coal Company proves this. The Managing Director stated publicly (at a banquet in Fernie on June 2nd) that up to date his Company had expended \$6,000,000. After six years operation of a practical monopoly, the dividends paid have been about \$750,000, but, they have received *in premiums on the sale of stock* something like \$1,500,000. He would be a clever expert indeed who could prove how much of the dividend payments came from this source, and how much from actual profits on operation..

(8) When the prospectus proceeds, in conjunction with Mr. Sundberg's report, to deal with the subject of "*Market*," it is erroneous to the last degree, and, if Mr. Sundberg had made himself acquainted with the actual conditions, his statement could only be labelled disingenuous—it is charitable to assume that he did not investigate this branch of the subject. He says: "For several years the smelting industry of B.C. has been suffering from the lack of a sufficient supply of coal and coke." If he had said "*several years ago*" he would have been strictly correct, but at the present time, and for at least a year, there has been a glut of both coal and coke in this market; so much so that the mines of the C.N.P.C. Company have recently been working little more than half time, and not more than 70% of their coke ovens have been in operation. This Company, the first in the field, stumbling over initial difficulties, was a long time in catching up with the demand—now it has overtaken it, and is scouring Montana and Washington for sufficient trade to keep its mines at work. Apart from other advantages, too numerous to mention, it has the Great Northern Railway at its mines, and Mr. J. J. Hill either owns or controls its stock. In spite of these circumstances, which are matters of common knowledge throughout the Kootenays, Mr. Sundberg talks of Mr. Hill wanting 10,000 tons of coal a day, and suggests for the Imperial Coal & Coke Company an unlimited market in the States. Mr. Hill can and will get all the coal he wants from the Company in which he is so largely interested and to whose mines he has built his railways.

The crux of the whole question is in the market, and that is already so glutted that it is a certainty that *all* the companies now operating cannot continue to do so. To increase the number at present is suicidal.

Some delays are being experienced by the new Montreal & Boston Consolidated Mining & Smelting Co., Limited, in obtaining the funds necessary to make some of the large payments which are due on the consolidation agreement. The funds required for the enlargement of the smelter will not be obtained until after all payments due on the properties amalgamated have been made.

### Another Coal Venture.

The latest recruit to the army of coal miners in the Blairmore district is none other than Mr. Rufus Pope the well known M.P. for Cookshire. Mr. Pope is at the head of a company which has purchased several sections aggregating 2,000 acres about two miles south-east of Frank. A capital of \$60,000 has been subscribed and the property is being rapidly developed under the management of Mr. C. P. Hill. It has eight seams of coal varying from 6 to 20 feet in thickness lying at an angle of 65°. Some of these are bituminous and it is believed the coal will yield marketable coke. A branch line two miles in length has to be constructed to connect the property with the Crow's Nest Railway. Mr. Hill expects to be shipping some 300 tons a day before the end of the present season, and hopes ultimately to secure the bulk of the C.P.R. trade in that district. The foreman of works is Mr. J. Wilson who had charge in 1901-2 of the operations of the Hastings Syndicate near Blairmore.

### Developments at Granby Smelter.

If there is anything in the old adage that "Where there is smoke there is fire"—then, to say the least of it, recent developments at Granby smelter are significant. No one who knows Mr. S. H. C. Miner will hesitate to accept his assurance, given a few days ago to the *Nelson News*, that there is no truth in the suggestion that this concern is now controlled by Mr. J. J. Hill; at the same time, the reiterated statement of Mr. F. Carter-Cotton to this effect can not be ignored, in view of Mr. Miner's admission that the bulk of the stock is held by Americans and he was not posted as to recent transfers. Whether Mr. Cotton's statement be absolutely correct or not, those who are on the ground, and have watched the progress of events from the inception of this gigantic enterprise, are fully convinced that there is not only smoke but fire in the rumor. The sudden and unexpected resignation of the three men who have been most actively identified with the company ever since Mr. Miner became the ruling power is in itself significant. No concern could afford in the natural order of things to part at once with three such men as Messrs. Flummerfelt, Galer, and Yolen-Williams. It is well known that Mr. Miner has neither the time nor the opportunity to take any active part in the oversight of the Company's affairs. For this reason Mr. Flummerfelt has acted as President's assistant and his removal clearly indicates the passing of the control.

Mr. Hodges who has managed the smelter with such conspicuous ability is now at the head of the whole concern and no appointments have been made in place of the officials who left. The development clearly places *official* control in the hands of Mr. J. P. Graves and *actual* control in the hands of the capitalists whom he represents. Mr. Graves was the original promoter of Granby properties; so long as American capital dominated the concern he was the official head. With Canadian capital largely subscribed by Mr. Miner and his friends, the official control was more actively exercised by the gentlemen who have just retired. It is a matter of common knowledge that last fall a very large block of stock was sold in New York. A reference to the list of directors shows that the majority are American and there is no reason to doubt, in the light of recent developments, that the control is in their hands. This fact occasions no concern locally, its chief significance consisting in its relation to a series of incidents which clearly demonstrate the progress of Mr. J. J. Hill's

scheme for securing a substantial share of the transportation business of Southern B.C. We have referred elsewhere to his activity in the Fernie District, and it is surely not insignificant that the recent extensive changes at Granby should synchronize with the commencement of Mr. Hill's railway extension from Grand Forks to Phoenix, and with the amalgamation of the Brooklyn, Stenwinder, Athelstan and Boston & Montreal groups involving the construction of a line from Curlew to Midway. Truly Mr. Hill is a sagacious and far seeing schemer. His plans seem to be little understood even by those most directly concerned, and it is only when another link is forged that the on-looker gets a glimpse of the chain which is being constructed to ultimately complete a network of communication throughout the Kootenays. That this policy will accrue to the advantage of the Granby Smelter we can not doubt, since its only result must be to establish effective competition in the transportation of the ore and very sensibly to reduce the freight charges.

## PERSONALS.

The many friends of Mr. Alexander H. Smith, formerly of Toronto, will be pleased to know that he has been appointed Superintendent of Los Reyes Gold Mining & Milling Company, Oaxaca, Mexico.

Mr. Louis Terven, E. E. (University of Wisconsin) has recently been appointed Chief Electrician of the Nernst Lamp Company, Pittsburg, Pa. Mr. Terven was for some time Electrician of the United States Navy Yard, Port Royal, S. C.

Mr. A. M. Mattice, Chief Engineer of the Allis-Chalmers Co., has returned from his European tour of inspection, and has now settled down to the duties of his position in Milwaukee.

The new Management of the Allis-Chalmers Co. is drawing to itself some of the ablest men in their respective lines in the country. The latest acquisition is Mr. Walter H. Whiteside, who has, until the past few days, occupied one of the most important positions in the Westinghouse organization, having been the Manager of the Detail and Supply Department of the Westinghouse Electric & Manufacturing Company, of Pittsburg, and, at the same time, General Manager of the Sawyer-Man Electric Co. of New York.

Mr. Whiteside's new position will be that of General Manager of Sales for all departments of the Allis-Chalmers Co., including, of course, the Bullock Electric Manufacturing Co., which has become the Electrical Department of the Allis-Chalmers Co. His experience thoroughly qualifies him for this important duty, which he takes up with the good wishes of his very wide circle of business acquaintances.

Mr. Whiteside entered upon his new duties about the middle of July.

George R. Mickle, Mining Engineer and Lecturer on Mining at the Ontario School of Practical Science, has gone to Germany. He will also visit England before he returns. He will be back in time to take up work at the beginning of next session.

M. B. Baker, B.Sc., of Queen's University, Kingston, has gone to Nanaimo, B.C., to examine and report on some mining properties for eastern capitalists. Mr. Baker recently made a report on British Columbia coal properties so that he is familiar with the ground.

Bernard Granville, an expert Mining Engineer with Bruebecker of New York, after a visit to the Cordova, Deloro and other mines in the Hastings district, expressed himself much pleased with the prospect, and considers that only more capital, and operations on a larger scale are required to make the low grade ores to be found there pay.

## CHEMICAL NOTES.

SULPHUR IN PIG IRON.—In a paper by John J. Porter of Dubois, Pa. on "Some Examples of Irregular Distribution of Sulphur in Pig Iron," the writer draws attention to the fact that sulphur is always higher in the top of the pig than in the bottom, owing to the sulphide of iron being lighter and rising to the top of the pig before the iron solidifies.

A table of results on fine pigs is given below:

	Pig A.	Pig B.	Pig C.	Pig D.	Pig E.
Hole No. 1 Top	0.115	0.058	0.066	0.165	0.116
" 2	0.125	0.058	0.061	—	—
" 3	—	0.052	0.061	—	—
" 4	—	—	0.084	—	—
" 5	—	—	0.059	—	—
" 6 Bottom	0.040	0.030	0.029	0.175	0.103

All the sulphur determinations were made in duplicate by the evolution

method, without previous annealing of the drillings and in several cases were checked by gravimetric determinations. The writer notes as a point of interest that this iron from a furnace running on Virginia ores invariably evolved all its sulphur as hydrogen sulphide without previous annealing as shown by the close agreement with the gravimetric check analyses.

In the opinion of the present writer, it would have been interesting if Mr. Porter had also run check analysis by evolution after annealing drillings. As is well known it is extremely easy to get low results with certain gravimetric methods. It would also have been interesting if a full description of the evolution method used had been given as there are innumerable modifications of this method. As an illustration of the necessity of this the present writer would draw attention to the four results of sulphur determinations given below. The determinations were made on Sample B Standardized Drillings of the American Foundrymen's Association. The drillings were dissolved in a fractional distillation flask fitted with separatory funnel and having a delivery tube leading into the absorption solution of 150 cc water and 30 cc Cadmium Chloride solution contained in a tall narrow tumbler. To the drillings in the flask, 50 cc strong hydrochloric acid and 50 cc water were added. When the stream of gas bubbles became intermittent a small flame was applied to the flask and the delivery tube was disconnected only after the flask was full of steam.

The results with different modifications are as below :

(a) The drillings were not annealed. Hot water (50 cc) was added, then 50 cc hydrochloric. Evolution was complete in 10 minutes. Number of cc Iodine used in titration—39.5.

(b) The drillings were annealed 15 minutes. Hot water was used. No. cc Iodine—39.3.

(c) Drillings annealed. Cold water used. Evolution complete in 15-20 minutes.

(d) Drillings not annealed. Cold water used. No. cc Iodine—31.0.

It is intended to follow this matter up. It will be noted that the first three results are practically the same, but the last is very low. It may transpire that, with certain irons, the use of hot water will accomplish the same end as 15 minutes annealing. This matter of determination of sulphur in pig iron by the evolution method is in an extremely unsettled state. The following extract from Field's paper on "Methods of Determining the Constituents of Cast Iron" is well worth reading in this connection.

"It has been shown that the rate of evolution of the gas causes a wide variation in the sulphur percentages. Mathewman (West of Scotland Iron & Steel Inst. Section of 1895-6) shows the following almost unbelievable results on a pig iron carrying 15 sulphur by the gravimetric method.

Time of evolution.	Sulphur.
Very fast . . . . .	.132
Rapid . . . . .	.122
Ordinary rate . . . . .	.092
Slow . . . . .	.076
Very slow . . . . .	.049

It will of course be understood that the use of hot water causes rapid evolution.

W. DIXON CRAIG,  
Midland, Ont

**DETERMINATION OF ANTIMONY**—The following will be found to be an accurate and rapid method of determining antimony in sulphide ores.

Take sufficient ore to give from 2 to 3 decigrammes of antimony, add 10 cc of hydrochloric acid and keep at a temperature of 80° c until most of the sulphuretted hydrogen has been expelled, add 10 cc of water and 2 to 3

drops of strong nitric acid and boil briskly for a few minutes, filter and wash with hot 10 solution of hydrochloric acid. To the filtrate add three grammes of mossy tin and keep at a temperature of 80° for an hour, then bring to a boil until nearly the whole of the tin is dissolved. Decant the supernatant liquid through a filter and wash the precipitated antimony, and any small amount of tin which may not have been dissolved, into a flask; add 20 cc of hydrochloric acid and 20 cc of water and boil gently, adding a few crystals of potassium chlorate from time to time; when the metal is completely dissolved boil off the excess of chlorine, and test with iodized starch paper to make sure that no chlorine is present in the solution, allow to cool add 3 grammes of potassium iodide and when the latter has been completely dissolved titrate with a solution of sodium thio-sulphate a convenient strength been 41.32 grammes per litre, 1 cc of which will equal about 10 milligrammes of antimony.

The rationale of the method is that tin precipitates no metal from its solution, other than antimony, having higher chlorides which are reduced to lower chlorides by potassium iodide.

This method has been used on ores containing stibnite, native antimony and kermisite, and has been found quicker and equally as accurate as the more usual methods.

In the event of ores containing difficultly soluble oxides, the usual methods of getting them into solution must be first adopted.

F. H. MASON,  
Halifax, N S.

## ELECTRICAL NOTES.

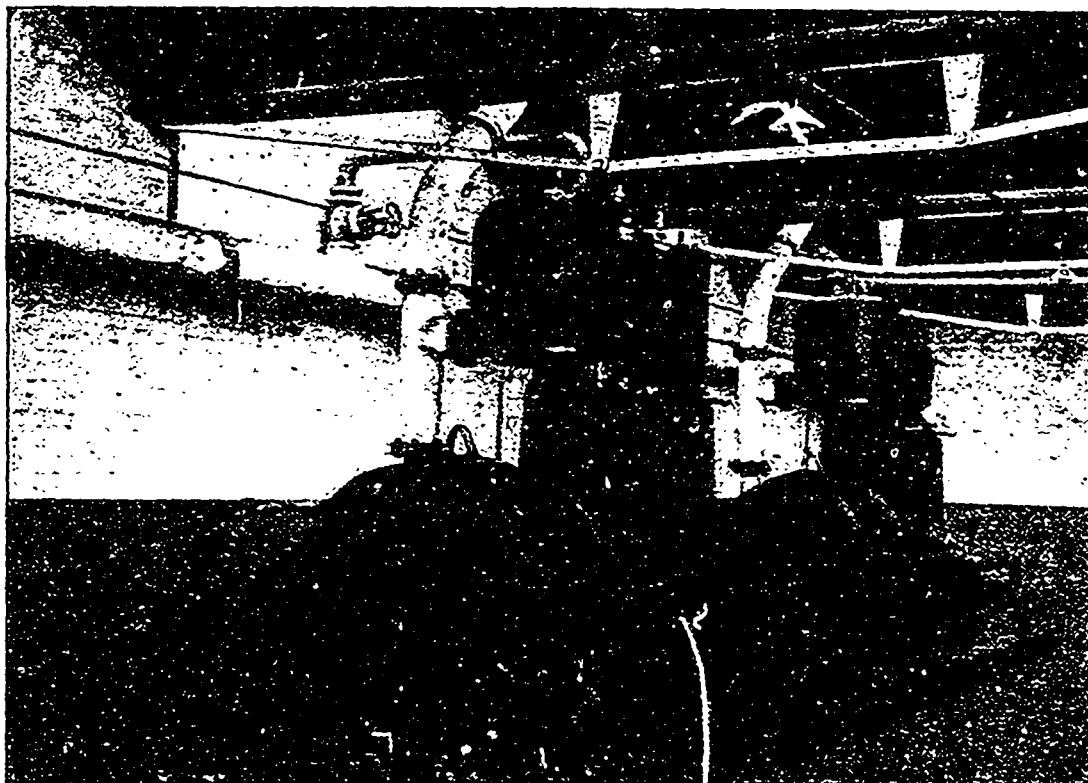
A thoroughly practical 3-phase electrical power plant is most desirable in mining work, and the following description of such a plant, put in at a Yorkshire colliery, is therefore likely to be of interest and use to our readers.

The colliery at which the plant was installed is a large one, putting out over 3,000 tons of coal per day, from shafts over 1800 feet deep. The plant was put in to supersede a steam haulage plant, and before the electric plant was ordered a correct test of the consumption of steam, by the existing plant, was made. The boilers supplying the steam haulage engines, were afterwards used to drive the engine supplying the current to the 3-phase system, and the saving effected amounted to 65 p.c. of the steam used for steam haulage. In addition, the running costs of the 3 phase system, including interest on the new capital invested in the plant, were less than the costs of the old system.

The plant consists of two Musgrave, high speed, compound engines coupled directly to two 3-phase generators of the General Electric Co. type. The engines have 12 in. and 18 in. cylinders with 10 in. stroke, and run at 420 revolutions per minute. The generators are 6 pole, with an intensity of current of 500 volts and a frequency of 40 cycles per second. The efficiency of the generator is named at 90 p.c. at full load, and 80 p.c. at half load; the consumption of steam is 16 lbs. per I.H.P. at full load. The armature has 36 coils, twelve for each of the three phases; the type is that of the revolving field.

The exciting dynamo, furnishing current to the field magnets, is carried on a bracket forming an extension of the bed plate of the machine; the shaft of the excitor is connected mechanically to the shaft of the generator. In the accompanying cut, the excitor will be seen at the left of the cut.

There are two sets of conveying cables or wires, each consisting of 37 wires of No. 1, 16 gauge and each insulated by paper. These cables (3 in 1)





are enclosed in a lead covering or pipe. Each of the cables is capable of carrying current for the whole of the work.

The switch board is in the engine room on the surface, and is arranged so that either cable can be connected to either dynamo at will; as either dynamo is able to furnish current for the whole haulage, this switch board is of much value.

The haulage plant is of the endless rope type. Three endless rope pulleys are arranged on one shaft, by means of friction clutches, so that either of them can be clutched, in or out, at will. All three can be run together, or any *single* one that is desired. The main driving shaft of the endless rope system is driven from two intermediate shafts, which can be used together, or either singly, by itself, at will. Each intermediate shaft is driven by a 3-phase motor, through spur gearing, the motors running at 470 revolutions per minute, and the main shaft at  $1\frac{1}{2}$  revolutions per minute. Each motor has its own starting apparatus, consisting of resistance which is inserted in the rotating circuit when the current is first switched on, and gradually switched out as the motor gets up speed. The motors are of the "wound" type, as it is termed, in which a drum built up of iron plates, having slots in its periphery, has coils wound in the slots, and also an arrangement for connecting the coils to the resistance when starting up. There is no connection between the rotor (the part which corresponds to the armature) and the stator, the stationary part, which corresponds to the field magnets in continuous current machines.

A notable feature of this plant are the provisions made by which stoppage of the haulage is rendered almost impossible—except at volition: generators, cables, motors, shafts etc., etc., all being in duplicate. Electric power is also used for pumping water to the boiler plant.

## MINING NOTES.

### NEWFOUNDLAND.

The talc property near Manuels is to be developed; thirty men have been set to work in the pits and a number of others are grading for a siding to the terminal of a wire rope tramway which is to be installed. The tramway will be between three and four miles in length, running over 23 towers which vary from 20 to 50 feet in height. The shipping harbor is Duffs, where a large pier is to be built.

### NOVA SCOTIA.

The shipments of coal from the mines of the Cumberland Railway & Coal Company for June amounted to 39,365 tons.

Recent explorations with a diamond drill are reported to have discovered large seams of coal beneath the thirty mile stretch of land lying between the Joggins mine and Springhill.

The total amount of bounties paid to the Dominion Iron & Steel Co. under the Bounty Act has amounted to \$1,721,556 in the period of 32 months, since manufacture began.

A company has been organized at Halifax, N.S., to prospect oil lands near Scotch Village and Brooklyn, N.S.; it is known as The Midland Oil & Gas Company, Ltd.

The Dolliver Mountain Co. are the first to take advantage of the Government's offer of assistance for deep shaft sinking to prove the occurrence of underlying folds of ore.

The Nova Scotia Steel & Coal Co. have largely increased their holdings by leasing the submarine areas, outside of those held by the Dominion Coal Co., to a distance of nearly 10 miles. The area leased extends from Point Aconie south-easterly towards Scaterie Island and covers about 100 square miles, overlying all the important coal seams of Cape Breton.

The development of coal areas near Port Morien in Cape Breton is predicted in consequence of options on the leases held by the Cape Breton Coal, Iron & Railway Co. having passed into the hands of an English syndicate. Mr. Horace Mayhew, an English coal operator, is the President of the new corporation; Mr. Thos. Lancaster will continue as resident general manager.

The *Industrial Advocate* says that an old time arrastra is to be used on some gold bearing veins at Clam Harbor, Nova Scotia. The arrastra has the points of cheapness of construction, and of operation, and, in the hands of Mexicans, has also the point of greater extraction than by stamping; but its adoption for Nova Scotia would be a retrogression and not an advance.

It is refreshing in this very dull period of gold mining to see such excellent returns from the Brookfield Mining Co. During the three months ending June 30th 2527 tons of ore produced 1088 oz. 5 dwts. of gold, while the first month's work of the cyanide plant produced 93 ounces.

A cargo of Mesabi Range iron ore, guaranteed 60% metallic iron and not over 1% phosphorous was shipped during the first of the month to the Dominion Iron & Steel Co. at Sydney C.B. The shipment was made by Pickands, Mather & Co., and the gross weight was 1,704 tons. This, we believe, is the first shipment of Lake Superior ore to the Sydney works.

The boring for oil at Cheverie, in Hants County, has proved useful in a way not anticipated by the promoters. At a depth of 1,400 feet in one hole and 1,800 feet in another brine springs have been struck which are said to contain 25% of solids in solution, 95% of which is chloride of sodium. The property has been bonded by B. F. Pearson and others and we understand that it is their intention to put up a plant capable of producing 700 barrels of salt per day.

The Grand Sub-Council of the Provincial Workmen's Association formally declared the Strike at the works of the Dominion Iron & Steel Co. to

be "off" on Thursday, the 22nd inst. The strikers are to return to work at the rates in force at the time of striking, there is to be no discrimination against the strikers on the part of the company and harmony in the future is promised.

The depletion of the funds of the strikers and the unwillingness of the miners of the Dominion Coal Co. to strike in sympathy hastened the decision. Reliable estimates place the loss to the strikers in wages alone at not less than \$290,000, besides which the reserve fund has been almost extinguished.

A company is being incorporated to be known as the Eastern Cement Co with works at St. Peters, C.B. The Company have purchased a limestone quarry at Barron Point on the Bras d'Or Lake, nine miles from St. Peters, and have also clay and shale properties under option. Four bore holes have been put down and the analyses of the cores were very uniform. Two tons of the stone were shipped to England and made into cement, and the manufacturers reported that the stone was eminently suited for the manufacture of Portland Cement.

The stone is really an hydraulic limestone, the mortar in the St. Peter Canal and Bridge being made from the burnt stone.

The following is the analysis of the burnt stone:—

Lime . . . . .	80.7
Silica . . . . .	11.5
Alumina . . . . .	3.6
Ferris Oxide . . . . .	3.0
Magnesia . . . . .	.5
Mangan Oxide . . . . .	.1
Sulphuric Oxide . . . . .	.5

### ONTARIO.

Advices state that a 50 ton Elmore oil process plant is to be erected at Massey Station, by the Massey Station Mining Co.

Ore shipments from the Helen mine to Lake Erie ports started this month.

A recent letter advises that the troubles of the Big Master mine have been settled for the time being, and that active work will shortly be resumed.

Reports are current that a third attempt to work the Foley mine, in the Rainy River District, is to be made this summer by residents of Houghton, Mich.

It is reported that a strike of rich ore has been made at Belmore Bay, Sturgeon Lake district, on the property belonging to the Northern Light Mining and Development Co.—the tests claim from \$50 to \$60 per ton.

The Burley mining property is apparently to once more start its machinery in the endeavor to get pay ore from its submerged territory, if the presence of Mr. J. Burley Smith in the neighborhood of the Sultana mine is correctly read by the press of Rat Portage.

The Lake Superior Co. are not depending upon the Helen mine to supply iron ore to their Sault plant. What ore the mine may be able to ship is to be sold for American consumption.

The 50,000 tons, or more, of Bessemer pig, needed for the Company's rail mills will be purchased in the United States, and the company are hoping that the Ontario Government will renew the order for rails for the Temiscamingue Railway given last year but unfilled by the Company.

The corundum business is to have another company added to its list in the shape of a New Jersey corporation known as The Ashland Emery & Corundum Co. which has been licensed to carry on business in Ontario with a capital of \$75,000.

The Northern Iron & Steel Co. is the name of the new corporation which has been organized out of the ruins of the former Cramp Steel Co. of Collingwood, Ont.; the capital of the new company is to be \$1,250,000 preferred 6 p.c. stock with an equal amount of ordinary stock.

The New York and Ontario Gold Mining Co., Limited, gives notice of the passage of two by-laws, one to increase the number of its directors from five to eleven, the other to provide for holding of special meetings of the shareholders and directors in the City of New York.

The Atikokan Iron Co., Limited, has been authorized to increase the number of its directors from three to five.

Supplementary letters patent have been granted in Ontario to The Elgin Field Oil and Gas Developing Co. of Dutton, Limited, authorizing an increase of its capital stock from \$49,000 to \$200,000 by the issue of 151,000 shares of new stock at one dollar each.

The following mining leases granted in the Province of Ontario, have been cancelled under Section 36 of the Mines Act of 1897 and amendments thereto:—The south-west quarter of the north-west quarter of Section 17 in the Township of Salter, in the District of Algoma, containing 40 acres, granted to Allen Robert Baker, on the 4th of April, 1900; the south half of lot 11 in the 1st Concession of the Township of Balfour in the District of Algoma, containing 160 acres, granted to Chas. Henry Collings, of Chelmsford, on the 9th of October 1899.

Considerable quantities of Lake Superior iron ore are being taken to the furnaces at Hamilton. It is carried by vessel to Sarnia, thence by railway, the Grand Trunk having put on an ore train. Some 20 carloads are shipped daily.

One of the Ontario Government diamond drills has been sent to Black Bay, Lake Superior, where there are indications of extensive copper deposits. The property is owned by the Black Bay Mining Co., of which N. B. Carlson, of Willmar, Minn., is Secretary. A number of other copper

prospects in the same neighborhood are being looked into. The present low price of copper is the only thing in the way to prevent some of these properties from being worked, but it is expected that they will be developed before long, especially where the copper is found in combination with gold.

The Sarnia Refining Co., encouraged by the new regulations respecting crude oil is about to extend its operations. Ten acres more land have been purchased and \$300,000 will be spent in improvements, which, when completed will give employment to from 150 to 200 more hands. The first cargo of American crude to arrive at Sarnia under the free tariff, consisted of 12,000 barrels for the Imperial Oil Co.

Mr. Parmelee, of the Department of Trade and Commerce, Ottawa, has been in the Western Ontario oil fields, consulting the oil men as to the best method to be adopted in paying the bounty provided for under the new regulations.

A. McIntyre has struck another good oil well on the 12th line of the Township of Finskillen.

Thirty-five carloads of oil were shipped from Bothwell during June, or over a carload per day.

A gas well is to be sunk on the Arderlay property at Dunnville. A gusher has been struck at Byng, in the same neighbourhood.

A well put down by D. S. Robb's Co. at Leamington, to the depth of 2,000 feet, turned out to be dry. Numerous wells are being sunk and oil is in evidence as well as gas.

The stamp mill at Deloro, Ont., has a contract to crush 2,000 tons of ore for the Cook Co.'s mine south of that place.

Work has been commenced at the Bannockburn Gold Mine by the Continental Mines Co.

Considerable prospecting is going on at Pelee Island and the show is considered good for gas.

#### BRITISH COLUMBIA.

The old placer diggings near Ymir are attracting attention again this summer.

The old Cliff mine at Rossland has started work again after an idleness of four years under the charge of Mr. Robert Angus, lately of the LeRoi mine.

The present value of the ore coming from the Ymir mine is a little less than \$3.00 per ton according to reports from the London office.

The western papers assert that Mr. Jas. J. Hill now has control of the Granby mines and works through uniting the holdings of a large shareholder to his own.

Up to the 1st of July the Granby Furnaces had treated 312,795 tons. The total ore products of the Boundary for the same half year totalled 413,007 tons.

The tonnage sent from the LeRoi mine in June to the Northport smelter amounted to 6,055 tons of picked ore; that sent from the LeRoi No. 2 smelters was less, being 1,600 tons.

The Silver Cup Mine in the Lardeau, near Ferguson, West Kootenay, is turning out bars of bullion from its new combination mill. Ore of satisfactory grade is reported to be plentiful.

The War Eagle and Centre Star Mines have both been shipping mulling ore to the Rossland Power Co.'s works during the month; some minor details only are delaying the starting of the concentrator.

The Alamo, Idaho, Payne, Slocan Star and Wakefield Mines all shipped zinc ores this month. The largest producer was the Slocan Star which averaged 20 tons a day, the Payne averaged about 15 tons daily; the daily average of the mines mentioned was 45 tons.

In an upraise from No. 1 Tunnel of the St. Eugene Mine, at a point about 1,600 feet in from the mouth, a new ore body has been found which carries higher values in silver than have yet been obtained from other portions of the mine. This new find is reported as being 14 ft. in width.

Before leaving this country for England, Mr. Anthony J. McMillan made the statement that the LeRoi Co. do not intend to close either the LeRoi Mine or the Northport smelter at present. He reported the mine as in very good condition, and a large amount of ore to be in sight.

Reports from the Lillooet District say that high water has somewhat interfered with dredging operations during the last few weeks; the big dredge of the Iowa Co. is working regularly but with smaller returns than at first; at Lytton both dredges are idle owing to the high water.

The Canadian Smelting Works at Trail, B.C., are busy erecting the plant for making lead pipe, and expect to be in the market with that product in August. It is also contemplated to put in a plant for the manufacture of sheet lead if the lead pipe plant shows satisfactory earnings. The refining works are now turning out eleven tons of pure lead daily.

The assets of the Mollie Gibson Mining Co. were sold on a judgment held by The Eastern Townships Bank at Sherbrooke, P.Q., on the 5th of the month. The property was bid in for a syndicate of the former shareholders, represented by Mr. S. W. Jenckes, for the judgment of \$23,000. The syndicate will form a new corporation to be known as The Aspen Mining Co. and the property will be re-opened as soon as the new capital is subscribed.

The Canadian-American Coal Co., of Frank, Alberta, has re-opened the

old tunnel, crushed by the landslide of a year ago, and is now extracting some 400 tons of coal per day from it. The bulk of this amount is taken by the C. P. R. for locomotive use. The shaft has also been cleaned up and re-opened to a depth of 370 feet. By August it is expected that this shaft will be in a position to produce 400 tons daily. At the present time a force of 125 men are kept steadily at work.

The installation of electric power at the Mother Lode Smelter of the B. C. Copper Co. is reported as working very satisfactorily. The electricity is brought about 5 miles from the Phoenix, sub station of the Cascade Water Power and Light Co., Ltd., and the ultimate power delivered amounts to a little less than 800 h. p. The Company makes a matte carrying about 50% of copper, which is blown in the converters to a 98° or 99° black copper, and then shipped to an Eastern refinery.

Strikes of rich silver ore, in the shape of horn silver and the black sulphurets of silver, are reported on the south fork of Kaslo Creek. The location is near the mouth of Long Creek and is supposed to be the extension of the line of mineralization running through the province and claims. The vein is reported to be about 18" in width of quartzose matter lying between walls of talcose schist, and near the contact of the schist with the granite.

Advices from the Cariboo country are to the effect that there is plenty of water there this season, China Creek and other creeks in the vicinity of Bakerville have been running full for some time. The Consolidated Cariboo Hydraulic is expected to have a record yield if the water supply will hold through the season.

The forty stamp mill of the Nickel Plate property in the Similkameen, began dropping about the middle of the month and the reports from that section are to the effect that the mill worked *mechanically* to perfection but it is too soon to say anything about the percentage saved. The mill has a cyaniding plant as well as a concentration plant attached and should the work of the concentrators be found satisfactory the management will undertake the erection of a small blast furnace to utilize the concentrates in connection with ores coming from mines in the vicinity. There are quite a number of promising copper properties in the vicinity which would furnish the base for collecting the precious metal values in the concentrator.

Comparisons of the grade of the gold obtained from the Yukon with that coming from Cariboo and Omineca districts in B.C. are strongly in favor of the B.C. mines: the Cariboo gold coming from Keithly Creek and Quesnel Forks has a value of \$18.20 per ounce; the Omineca in Cassiar gold averages about \$17.75, whereas the average value of the gold from Dawson does not exceed \$16.50.

The first clean-up of the Cariboo Consolidated Hydraulic Co. is reported to have been \$60,000 but this does not represent work on new ground. If the water supply continues to be sufficient the September clean-up should be a very large one.

#### YUKON.

The June clean-up from the Amalgamated McKee Creek Mining Co.'s property amounted to about \$10,000.

Advices received state that the coal found at Carnacks is of considerable thickness and can be delivered at Dawson at a lower price than is now paid for wood.

The new provision in the Yukon Regulations allowing the diversion of water from the original course of the stream, is being availed of by many claim owners; the time periods granted vary from five to twenty years.

The Detroit-Yukon Mining Co. have already commenced extensive operations on Bear Creek and have received a large portion of their equipment which was constructed in the United States last year for this corporation. It includes two steam shovels, four locomotives, twenty cars, each of the capacity of two cubic yards, and a miscellaneous equipment for the sluicing plant. The cars are to be filled by the steam shovels and then transported by the locomotives to the sluicing boxes where the cars will be dumped and returned to the gravel bank.

## INDUSTRIAL NOTES

The street car system of St. Louis has found itself short of power to transport the large number of visitors attending the World's Fair, and in consequence application was made to the Fair authorities for permission to purchase power from some of the large exhibition engines. The authorities, in consequence, have assented to a contract between the St. Louis Transit Co. and the Allis-Chalmers-Bullock Co., by which the huge Allis-Chalmers engine in the Machinery Building will deliver power to the Transit Co. between the hours of 2 p.m. and 7 p.m. each day.

This secures an abundance of power to the Transit Co. during the busiest hours.

The engine, at 75 rev. per minute and 150 lbs. of steam, develops 8,000 H.P. It is used after 3 p.m. to supply the power to a Bullock generator which furnishes the current for the decorative lighting of the buildings and grounds of the Fair, supplying some 200,000 incandescent lamps.

The working model of a concentrating plant built by the Allis-Chalmers Company and exhibited in the Utah Section of the Mines and Metallurgy Building, is to be presented to the Utah School of Mines after the close of the St. Louis Fair. The Allis-Chalmers Co. is adding to its large exhibit at the fair an interesting display of the various sizes of crusher-shafts made by the Company. These shafts vary in size from a maximum of 17' in length and 7 tons in weight to small ones of only a few thousand pounds weight.

The Allis-Chalmers report sales as follows:-- To Mexico, two sets of battery mortars, to La Compania Aviadora de Mina operating La Natividad Mine; a new silver-lead smelting plant of 100 tons daily capacity to the American-Mexican Mining & Development Company; a 60 ton copper furnace to the Quintera Mining Company; a 40 ton dry crushing cyanide and lixiviation plant to Charles Brandaes. To Idaho, a 100 ton cyanide plant, to the Dewey Consolidated Mining & Smelting Company; a sectional ten stamp mill with accessories to the Twentieth Century Mining & Power Company, Ltd. To Michigan an Overstrom table to the Mass. Consolidated Mining Co.; a two stamp gravity battery to the Calumet Hecla Mining Company. To Arizona, an Erie steam engine and two 5 ft Huntington Mills, to the Middlemarch Copper Company. To Pennsylvania, a Style "F" Gates crusher, to the Jones and Laughlin Steel Company; two new blowing engines of the vertical long cross-head type with cylinders of 44 and 54 inches diameter, and 60 inches stroke to the Redding Iron Company.

The Crocker-Wheeler Company of Amper, N.J. announce that they have made an agreement with the electrical firm of Brown, Boveri & Co. of Baden, Switzerland, whereby they have secured rights to manufacture the alternating current machines of this celebrated Swiss firm. This New Jersey firm has already contracted for a 200 K.W. 60 cycle 440 volt alternating current generator for the Atlanta plant of the Proctor & Gamble Soap Company of Cincinnati.

The De Beers Company, Ltd. of Kimberley, S.A., have ordered a third Westinghouse-Parson steam turbine for their power plant at Kimberley, to be used in generating current of 1500 K.W. capacity. The new turbine is identical with the two which have been in operation at Kimberley for over a year. The new turbine will operate at 150 lbs boiler pressure and about 25 inches of vacuum; on account of the altitude of Kimberley this will be equivalent to 27 inches of vacuum at sea level.

Messrs Hadfield's Steel Foundry Co., of Sheffield, England, have received an order for ten of their gyratory crushers, size T, from the Premier (Transvaal) Diamond Mining Company. These crushers have a capacity of 750 to 1,000 tons per hour and are intended for one plant.

## Digest of Recent Patents; Mining and Metallurgical.

### UNITED STATES.

- 762,755—Apparatus for Magnetic Separation. Clarence Q. Payne, Stamford, Conn. A transversely-laminated separating-carrier provided with a plurality of contacting magnetizable laminae whose outer edges are wholly out of contact with those of their adjacent laminae, in combination with two-opposing magnetic surfaces; both placed external to said carrier and between which said carrier is arranged to travel, and means for feeding the material to be separated.
- 762,580—Crushing and Grinding Mill. James M. Dyer, Douglas City, Cal. The combination in an ore-crushing and grinding apparatus, of a cone carried by a vertically-turnable shaft and having a spherically-curved base-flange a cylinder supported thereon and having a base concaved to fit the cone-flange, a tubular extension of the upper part of the cylinder with a surrounding grooved raceway; balls fitting said raceway; a ring surrounding the cylinder extension, said ring having a raceway in its lower surface resting upon the balls and an upper convex surface; a concave plate fitting and movable upon the convex surface of the ring; and means for moving the plate in a horizontal plane to tilt the cylinder with relation to the cone.
- 762,774—Apparatus for the concentration of Minerals by means of Oil. James W. Van Meter and Martin P. Ross, San Francisco, Cal. An apparatus comprising a channel through which the oil flows, means for supplying pulp and water to the oil at the head of said channel, means in said channel at intervals for drawing off the settled gangue and water, means at the foot of said channel for separating the relatively upper and lower portions of the oil, and means for returning said separated upper portions of oil to the head of the channel.
- 762,567—Ore-Separator. Henry A. Allen, Chicago, Ill. An apparatus in which is combined a stationary circular closed receptacle, an inlet-pipe arranged tangentially thereto, discharge-openings above and below the level of the inlet opening, and a series of spirally-inclined ledges arranged with the forward end of one ledge above the rear end of the next succeeding ledge, the lower end of one ledge being below the level of the inlet-opening, whereby the material fed to the receptacle may be directed upwardly upon the inclined ledges while the heavier particles may be free to fall between said ledges.
- 763,019—Ore Sizer and Concentrator. Ansel H. Phinney, Turner, Mich. An ore sizer and concentrator comprising a vat having a discharge element at one end, means at the opposite end to supply material, suspended in liquid, to the vat, a plurality of hoppers below the level of the discharge element and forming a series of water-chambers, and a screen forming a false bottom extending over the hoppers and having longitudinally-disposed laterally spaced screen elements extending below the water-level of the vat, said screen elements serving to form a series of straight guiding-channels opening at the bottom into the hoppers and extending from the feed to the discharge ends of the device.
- 763,197—Ore Slimer. Ira F. Monell, Boulder, Colo. An ore-slimer comprising a main frame, a belt-frame supported in the main frame, rollers at the ends of said belt-frame, the said rollers being tapered from their centers outward, small rollers arranged between the first-named rollers, and tapered from their centres outward, an endless belt movable over the several rollers, and means for distributing stock onto the belt.
- 762,869—Apparatus for Treating Ores. Henry A. Allen, Chicago, Ill. An apparatus comprising a continuous closed separating system in which is combined a main circular separating vessel, means for introducing thereto the materials to be separated, a pipe system leading from the top thereof and back to said vessel with which it is connected by means of a series of induction-pipes arranged tangentially thereto, reservoir interposed in said pipe system each having an inlet at or near the bottom and an outlet at or near the top a pump for inducing a circulation, heating means interposed in said pipe system, and a normally closed outlet at the bottom of said separating vessel, whereby a vortical whirl may be imparted to the material and fluids in said separating vessel while the heated fluid may be used over and over.
- 763,260—Separation of the Metallic Constituents of Ores from Gangue. Arthur E. Cattermole, Highgate, London, Eng. A process which consists in agitating a mixture of powdered ore and water with oil in emulsion in water containing an alkaline emulsifying agent, so as to agglomerate the oil-coated particles into granules, and subjecting the mixture to classification to remove the small non-coated particles from the granules.
- 763,783—Concentrating Table. Gustav A. Overstrom, Anaconda, Mont. A Concentrating Table, in combination with means for imparting a reciprocatory movement thereto, said table having an unobstructed tailings-delivery edge, said edge being inclined away from the line of reciprocatory movement from the head end of the table toward the opposite end thereof, and riffles arranged in diagonal relation with respect to said table.
- 763,662—Apparatus for use in certain processes of Extracting Sulfide from Ores. Guillaume D. Delprat, Broken Hill, New South Wales, Australia, assignor to Broken Hill Proprietary Company, Limited, Melbourne, Victoria, Australia, a Company registered under the laws of Victoria, Australia. An apparatus in which the concentrates are floated to the top of a body of liquid, a pan having an inclined imperforate bottom down which the ore slides, means to feed liquid to the pan, a sump at the lower edge of the bottom for tailings, a discharge for concentrates at the liquid level of the pan, a baffle plate between the sump and pan extending from the discharge to near the lower edge of the inclined bottom to maintain a quiescent body of liquid in the sump and at the same time maintain a flow of liquid from the pan through the discharge.
- July 5th.
- 764,044—Process of Smelting and Reducing Metals. Christian Diesler, Coblenz, Germany. A process consisting in mixing the materials to be treated with carbonate of lime and carbon, placing the mixture in an air-tight retort, exhausting the air from the retort, subjecting the mass to the action of an electric current within the retort and to the action of the gas generated therein in excess of five atmospheres of such gas, and exhausting such resultant gas after it has acted on the materials treated.
- 764,197—Concentrator. Charles H. Muhleman, Los Angeles, Cal. In a concentrator a concentrator pan mounted upon a shaft; riffles in the bottom of said pan arranged in radial rows; and means to give said pan a rotary gyratory motion comprising a bearing for said shaft intermediate its ends, in which said bearing said shaft is revoluble; a revoluble wheel having a socket into which the lower end of said shaft projects; said socket being at one side of the centre of said wheel.
- 764,332—Converter. Ralph Baggaley, Pittsburg, Pa. A converter having ventilated passages open to the air at the bottom, and other passages leading therefrom along the shell, said converter having a burner for supplying auxiliary heat within the same.
- 764,355—Dump Car. Harry S. Hart and Otto W. Meissner, Chicago, Ill., assignors to Rodger Ballast Car Company, Chicago, Ill., a Corporation of Illinois. The combination of a supporting framework provided with upwardly extending side boards formed of swinging sections pivoted at their upper edges, and locking angle-bars pivotally secured to the framework of the car near the sides thereof to engage with the lower free edges of the swinging doors to seal and hold the same in locked position.
- July 12th.
- 764,979—Ore-Concentrator. Samson Beer, Butte, Mont. An ore-mill, a pan, a driving-shaft extending vertically through the pan, a hub surrounding the shaft, a cap on the hub, a screw operating in said cap and engaging the top of the shaft for moving the hub vertically, a cylindrical part attached to the hub and having side openings, cheek-pieces extended outward from the sides of the openings, bearing-boxes mounted to rock in said cheek-pieces, and rollers having their shaft-bearings in said bearing-boxes.
- 765,042—Ore-Concentrator. Fred. N. Rogers, Denver, Colo. The combination with plurality of independent classifying concentrating-surfaces arranged for progressive concentration, of means for independently shaking the respective concentrating-surfaces to impart classifying movement to the pulp particles and a conveyor adapted to convey and deliver desired portions of the more or less classified pulp in a sheet from one concentrating-surface, without substantially intermingling or disturbing the existing classification thereof, to a succeeding concentrating-surface, thereby effecting a progressive concentration over the successive concentrating-surfaces.

765,013—Magnetic Ore-Separator. Frederick J. King, Croydon, England. A magnetic separator comprising a set of magnet-bars for sorting the material, and another set of curved magnet bars at right angles to the first set and overlapping the lower end of said first set for the purpose of separating the sorted material.

764,973 Device for Separating Slimes in Ore Reduction. Oliver P. Ankeny, Deadwood, S.D. A filtering-cell comprising a peripheral frame, a filtering-web covering the opposite sides of said frame and secured to the bars thereof; bars extending across said frame between the webs for spacing the latter apart, and clamping-bars outside the filtering-webs binding the latter to the edges of the spacing-bars.

July 19, 1904.

765,290 Crucible-Furnace. Charles W. Spears, Battersea, London England, assignor to the Morgan Crucible Company, Limited, Battersea, London, England. The combination with the moveable furnace-body, comprising a metallic casing having air-passages therein, discharge apertures on the inner side of said casing communicating with the interior of the furnace, and a passage at the upper end of said casing communicating with said air-passages, a hollow base for supporting said furnace, hollow standards connecting said base with said passage at the upper end of the furnace-body and pivotally connected with the furnace-body to form a pivotal support on which it can be tilted, means for supplying air to said base and valves controlling the passage of air through said hollow standards.

705,520—Process of making Sulphuric Acid. Auguste L. Stinville, Paris, France. The process for the manufacture of sulphuric acid in lead chambers which consists in causing to circulate in the dishes of the said chambers acid having a density of 3° to 5° Baume below the density of the acid produced on the vertical sides and having a temperature of 5° to 20° centigrade lower than the temperature of the gases in the chambers.

FRENCH PATENTS.

337,967—Iron-Nickel Chromium Alloy. F. & M. Laur. A selection is made of chrome iron ore and of nickeliferous ores, such as "garnierite" a magnesium-nickel silicate, a mixture of which is heated with the minimum of carbon necessary for reduction in an electric or other furnace. The product may contain ordinarily from 10 to 30 parts each of iron, chromium, and nickel, 3 to 12 parts of Silicon, and 3 to 5 parts of carbon. Such alloys are stated to be especially applicable in the preparation and refining of steel.

GERMAN PATENTS.

150,069—Electro-osmotic process for dehydrating Peat. Farbwerke vorm. Meister Lucius & Bruning in Höchst. a. M. Alkaline substances, or salts, which cause during the electrolysis on the negative pole a secondary alkaline reaction, are added to the peat.

NEW COMPANIES.

ONTARIO.

Sovereign Oil Co., Ltd.—Incorporated 8th June, 1904. Authorized capital \$50,000 in shares of \$100.00 each. Head Office: Comber, Ont. Provisional Directors: John C. Winters, Mount Morris, N.Y.; Wm. McIntosh, Petrolia, Ont.; John A. McIntosh, Toronto, Ont.

Empire Salt Co., Limited.—Incorporated 22nd June, 1904. Authorized capital \$5,000 in shares of \$100.00 each. Head Office: Sarnia, Ont.

Canadian Michigan Gold Mines, Limited.—Incorporated 15th June, 1904. Authorized capital \$1,000,000 in shares of \$5.00 each. Head Office: Sault Ste. Marie, Ont. Provisional Directors: Wm. Coyne, Chas. J. Brown, J. A. McPhail, of Sault Ste. Marie, Ont.; John B. Spellman, E. S. B. Sutton, Otto Supe, of Sault Ste. Marie, Michigan; Harry Asmus, of Buffalo, N. Y.

Eldorado Mining Company.—Incorporated under the Laws of Arizona and licensed to operate in the Province of Ontario, 30th June, 1904. Authorized capital \$50,000. Head Office: G. H. Draper, Rat Portage, Ont., attorney for the company.

BRITISH COLUMBIA.

Hawkeye Gold Dredging Co.—Incorporated 19th May, 1904. Authorized capital \$50,000 in shares of 10 cents each.

Palma Mining and Development Co., Ltd.—Incorporated 6th June, 1904. Authorized capital \$15,000 in shares of one cent each.

Kootenay Coal Co.—Incorporated 6th June, 1904. Authorized capital \$1,000,000 in shares of twenty-five cents each.

Mt. Meadow Gold Mines, Ltd.—Incorporated 20th June, 1904. Authorized capital \$90,000 in shares of three cents each.

White Channel Gold Hill Hydraulics, Ltd.—Incorporated 22nd June, 1904. Authorized capital \$575,000 in shares of \$1.00 each.

Royal Banner Copper and Gold Mining Co., Ltd.—Incorporated as an extra-provincial company, 10th June, 1904. Authorized capital \$1,000,000 in shares of \$1.00 each. Head Office in British Columbia: G. W. Averill, Attorney, Grand Forks, B. C.

Flathead Valley Oil Lands Development Co., Ltd.—Incorporated 7th July, 1904. Authorized capital \$250,000 in shares of twenty-five cents each.

Elk River Coal and Oil Co., Ltd. Incorporated 12th July 1904. Authorized capital \$25,000 in shares of \$1.00 each.

New Caledonia Nickel Output.

T. W. Gibson, director of the Bureau of Mines for Ontario, recently received a copy of a report, which gives some interesting facts respecting the nickel output of New Caledonia, hitherto the principal source of supply for the world's nickel, outside that obtained in Canada. The figures show that the production in New Caledonia is on the decline. In 1902 the island produced 129,653 tons of nickel ore which had fallen off in 1903 to 77,360 tons, which is only about half the output of the Copper Cliff Mines. The falling off is attributed to the competition from Canadian nickel. The New Caledonia report speaks in disparaging terms of Canadian nickel, for which there is no ground, for while the process of reduction is quite different, the quality when the metal is obtained is the same.

The report also gives the statistics of other ores which come into competition with Canadian products. The colony produced in 1903, of cobalt ore 5,292 tons, chrome ore 21,437 tons, and copper ore 9,815 kilo-grammes, in all cases an increase over the previous year, nevertheless the total mineral exportations fell from 12,283,285 francs to 8,963,895 francs.

International Nickel Co.

The International Nickel Co. which virtually controls the nickel output of the world, being interested in the mines both in New Caledonia and Canada, the two chief sources of supply recently issued a brief report covering the year ending 31st March, 1904. The report is of an optimistic character. The president remarks:—"While the most of the improvements outlined in our report of last year have been completed, the reconstructed works at the Canadian Copper Company's plant are not yet wholly in operation; yet we are far enough along to convince us that our saving in the item of fuel for power alone will be very large, and we fully believe that other economies anticipated will be realized." Again:—"Our present foreign and domestic contracts are such as to insure us a tonnage not less than we have enjoyed this year, for several years to come. This practical insurance of a tonnage sufficient to run economically far into the future, coupled with the fact that our efforts in exploiting the uses of our material are meeting with constant success, indicates staple and gradually increasing business." Some of the contracts referred to run for six years, thus giving a sure market for their product for a considerable time.

The financial statement shows earnings of \$966,225, and expenses \$624,123, leaving a net profit of \$341,102.

The Canadian Copper Co. is a subsidiary of the International Nickel Co., and their product, from the only smelter working in the Sudbury district, is included in the above.

Nova Scotia Coal Shipments.

Company.	June, 1904.	June, 1903.	Six Months, 1904.	Six Months, 1903.
Dominion Coal Co	347,357	261,843	1,218,515	1,379,075
Nova Scotia S. & C. Co	65,603	43,525	202,922	176,627
Cumberland Ry. & C. Co	39,365	38,321	204,542	230,438
Acadia Coal Co	23,624	33,041	123,097	168,974
Intercolonial Coal Co.	23,481	20,090	122,368	114,428
Maritime Coal Co.	3,660		24,680	

Exports from Canada Nickel Fine in Ore, Matte or Speiss.

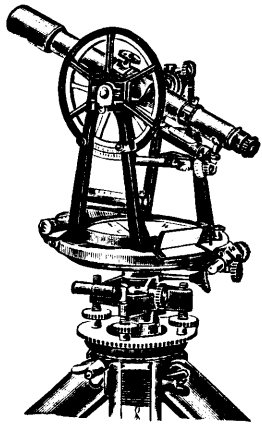
Year.	Quantity lbs.	Value
1899	14,428,063	\$994,437
1900	13,493,239	1,040,498
1901	9,537,558	958,365
1902	3,883,264	\$34,513
1903	9,032,554	\$78,159

The following are the net outputs of the various collieries of the Dominion Coal Company for the month of June:—

Dominion No. 1	37,810 tons.
Dominion No. 2	76,586 "
Dominion No. 3	41,386 "
Caledonia	50,066 "
Reserve	84,195 "
International	22,130 "
Hub	18,947 "
Total	331,090 tons.

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ONE NEW MORGAN-GARDNER ELECTRIC LOCOMOTIVE; weight 12 tons; built for 44" gauge track; motors wound for 220 volts. Locomotive has never run a single day. Immediate delivery can be made. Price \$1400.00. Address Box "1", Columbus, Ohio.



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### AIMS AND OBJECTS.

(A) To promote the Arts and Sciences connected with the economical production of valuable minerals and metals, by means of meetings for the reading and discussion of technical papers, and the subsequent distribution of such information as may be gained through the medium of publications.

(B) The establishment of a central reference library and a headquarters for the purpose of this organisation.

(C) To take concerted action upon such matters as effect the mining and metallurgical industries of the Dominion of Canada.

(D) To encourage and promote these industries by all lawful and honourable means.

### MEMBERSHIP.

MEMBERS shall be persons engaged in the direction and operation of mines and metallurgical works mining engineers, geologists, metallurgists, or chemists, and such other persons as the Council may see fit to elect.

STUDENT MEMBERS shall include persons who are qualifying themselves for the profession of mining or metallurgical engineering, students in pure and applied science in any technical school in the Dominion, and such other persons, up to the age of 25 years, who shall be engaged as apprentices or assistants in mining, metallurgical or geological work, or who may desire to participate in the benefits of the meetings, library and publications of the Institute. Student Members shall be eligible for election as Members after the age of 25 years.

### SUBSCRIPTION.

Members yearly subscription.....	\$10 00
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### PUBLICATIONS.

Vol. I, 1898, 66 pp., out of print.  
Vol. II, 1899, 285 pp., bound red cloth.  
Vol. III, 1900, 270 pp., " "  
Vol. IV, 1901, 333 pp., " "  
Vol. V, 1902, 700 pp., " "  
Vol. VI, 1903, 600 pp., now in press.

Membership in the Canadian Mining Institute is open to everyone interested in promoting the profession and industry of mining without qualification or restrictions.

Forms of application for membership, and copies of the Journal of the Institute, etc., may be obtained upon application to

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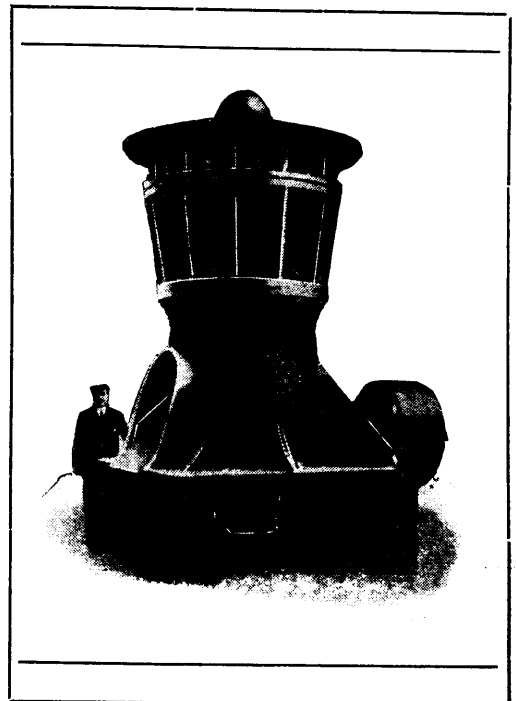
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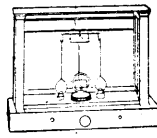
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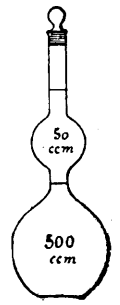
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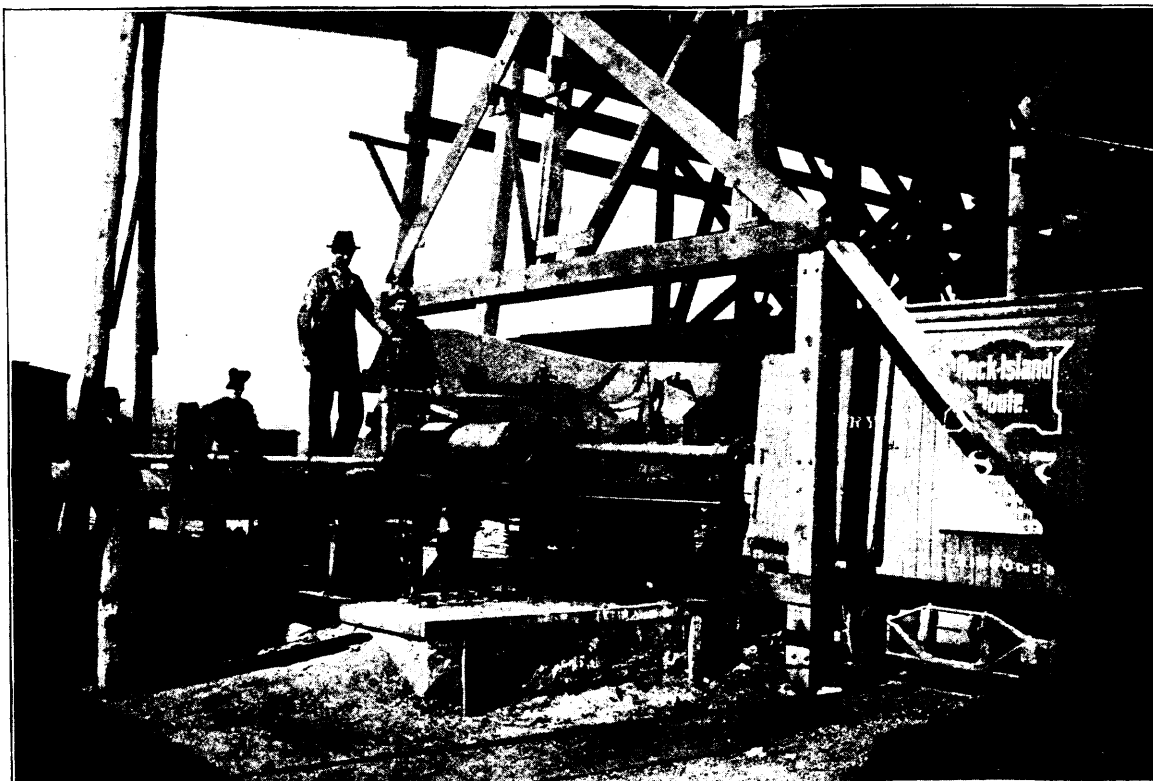
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Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one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

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

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

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

**MINES OTHER THAN GOLD AND SILVER.**

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

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

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

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

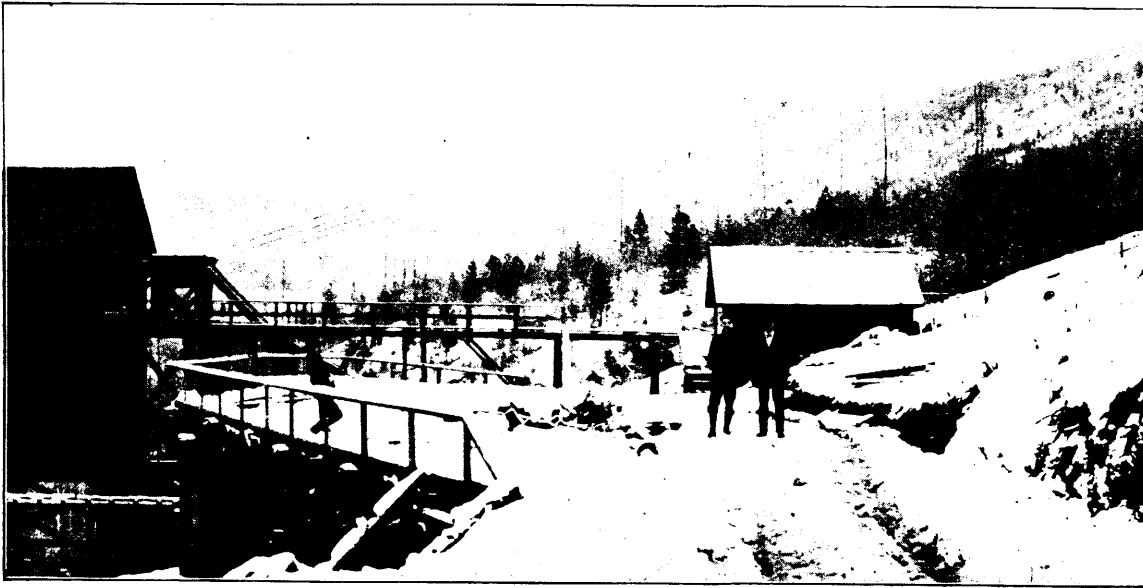
The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

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

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

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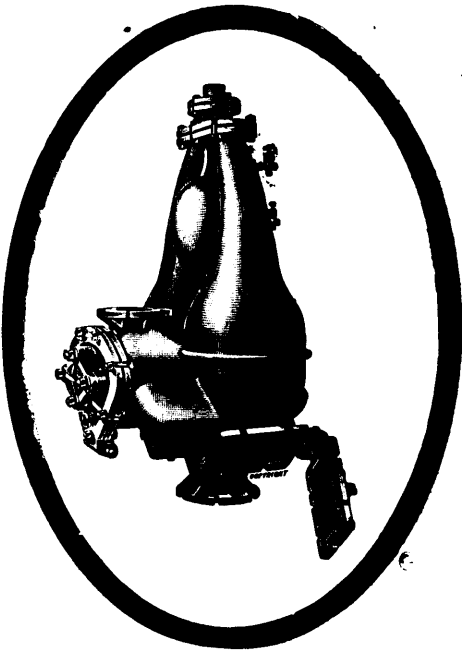
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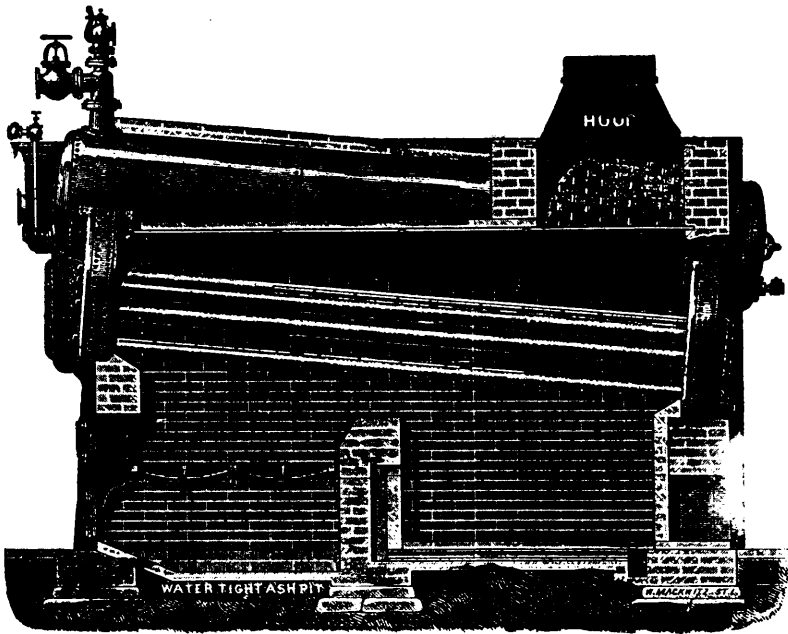
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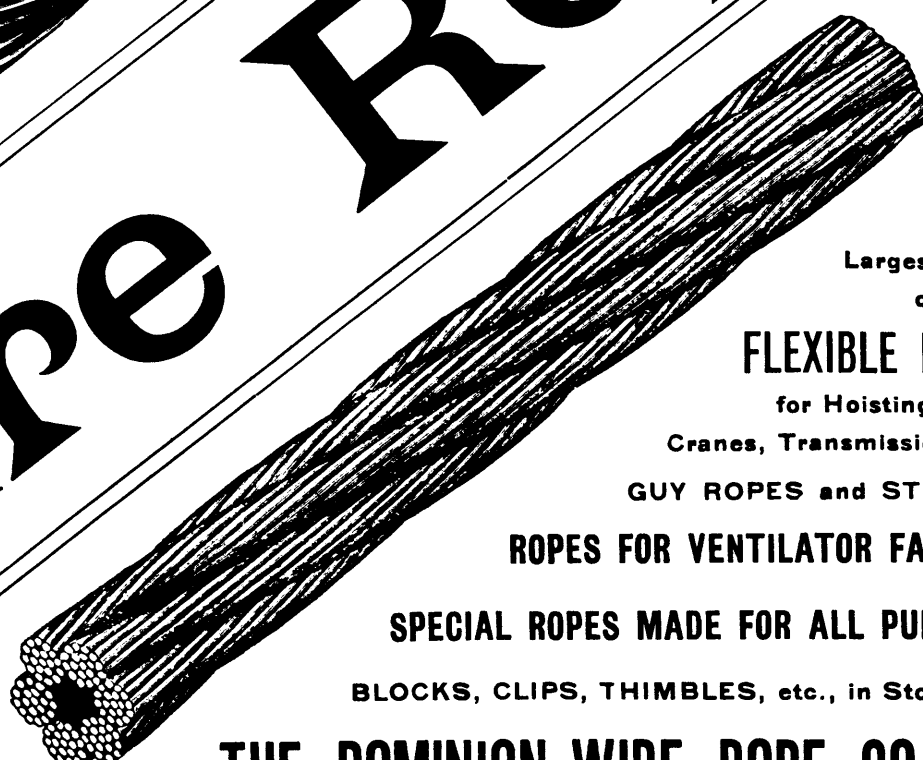
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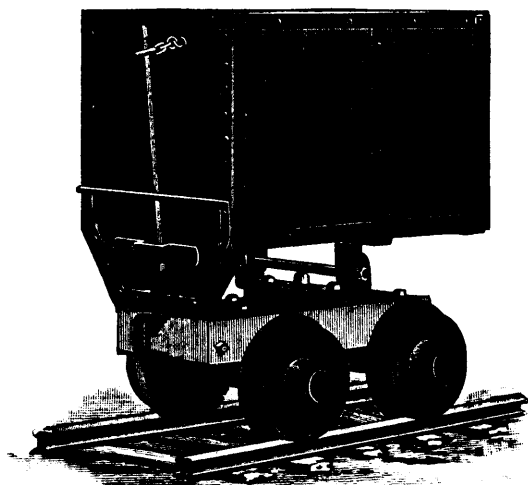
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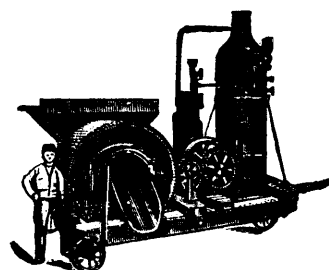
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