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CIRCULATION.

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CONTENTS.

MINING AND POLITICS

The time has come for painfully plain speech about the attitude of the Dominion Government towards the mining industry. Despite the fact that the claims of that industry have been repeatedly put forward, and despite the further fact that the justice of those claims has been proved, the Government, through dilatoriness, indifference, or weakness, continues its policy of neglect.

Since the present Government was put in power, quasi—the Department (or, rather, the Department) of Mining has been blessed with no less than four changes of Ministers. Messrs. Nanton, Rogers, Roche, and Coderre have successively been appointed to this responsible position. Not one of these gentlemen has anything approaching adequate knowledge of the industry. It follows, therefore, that not one was appointed for the benefit of mining, and that only considerations of expediency influenced the situation.

There has been ample mincing of words and phrases heretofore. The Canadian Mining Institute, through its delegations and at its meetings, has voiced the desire of the mining man for better treatment. Whilst its delegates have walked softly and talked politely, they cannot have failed to impress upon the Rt. Hon. Mr. Borden and his Ministers the fact that the Institute as a whole deplores and resents the futility of the past and present situations. Briefly, therefore, the treatment accorded the mining industry appears to be calmly deliberate.

This being the case, there is only one course to pursue. The Canadian Mining Institute has a membership of over one thousand. Its representations to the Government have been without avail. It behoves the members, therefore, to use other means to obtain their rights. And the only means left is the exercise of whatever definite and legitimate political influence they may possess. In short, the members of the Institute and the mining community at large must realize that as a body they cannot afford to have their just claims repeatedly ignored. While there may be no necessity for using threats, it certainly is clearly necessary to demonstrate to the Government that mining men are a strong factor in determining political fortunes.

The forthcoming annual meeting of the Canadian Mining Institute should be made memorable by the formulation of a Bill of Rights. We have definite grievances. The Institute, which is the only national organization representing the industry, must assume the duty of presenting these grievances forcibly and completely. While, of course, the amenities will be regarded, our claims can no longer be put forward as nebulous suggestions; they must be clothed in positive and categorical language. The industry of mining must assert itself.

It is not compatible with the dignity of the industry that its departmental head in Ottawa should be chosen for merely political reasons. He should be first and always a mining man. If such a person be not available in Parliament there is nothing to deter the Government from making a selection outside. This has been done in several notable instances, and never has there been better reason for repeating the step.

If the Institute seizes this chance of facing facts firmly it will have conferred a lasting benefit upon the nation.

At present the second largest industry of Canada is without representation in the House of Commons or in the Senate, and its ministerial administration is a negligible quantity.

THE CANADIAN MINING INSTITUTE ANNUAL MEETING

Owing to the fact that certain officials of the Geological Survey have conspired together to enliven the approaching annual meeting of the Institute at Ottawa, it may be readily believed that the visitors will suffer no boredom. The smoker and the dinner, which, after all, are the main features of the meeting, will be enlivened by flashes of geological wit, and by infusions of departmental humour.

The gathering is to be formally opened by His Royal Highness the Duke of Connaught. Then will follow the regular routine of presenting Dominion and Provincial statistics, etc. Among the papers to be read during the afternoon session are several dealing with the mineral industries of the Ottawa district. These should be the most instructive. The evening session will be devoted to a lecture on Yukon Territory, by Dr. Henry M. Payne. Dr. Alfred M. Thompson, M.P., will occupy the chair and will also speak on the same subject. During the remaining session the papers read will be remarkably well chosen and varied. Speaking generally, they will be of much more practical interest than many of those presented on previous occasions. In fact, if we may judge by the titles, the Secretary is to be congratulated upon securing a fine list of subjects. Certain malign spirits will learn with joy that few geological essays are to be inflicted on unwilling ears. It is not known whether this is or is not a concession to stiff-necked Philistines.

. . . . . .

We hope and believe that every attending member of the Institute will do what in him lies to contribute to the success of each and every session. Much earnest thought has been given to this meeting. It is very necessary that the attendance be as large as possible. It is equally necessary that the proceedings be as animated as they can be made.

Let us get together and see that a record attendance is assured, and that discussion never lags. We owe it to the officers of the Institute, to the Institute itself, and to our official hosts in Ottawa, to make a good showing.

TWO NOTABLE PAPERS

Six times a year the American Academy of Political and Social Science publishers a substantial volume of essays covering a wide range of apposite subjects. The last volume is wholly devoted to things Canadian. Reciprocity is discussed by the Hon. Clifford Sifton—who prebably knows what he is writing about better than most authorities. Canadian banking is tackled by Mr. H. M. P. Eckardt, who is, perhaps, a trifle fulsome in his appreciation of our lop-sided system. Mr. J. Castell Hopkins is equally appreciation of Canadian literati. He tabulates many of our ephemeral performers and is generously inclusive. An Englishman, Mr. W. A. Chapple, M.P., describes us as a hospitable and not unintelligent race, which, by the way, makes us feel deucedly cocky. Other writers discourse upon various other phases of our national life.

The two papers, however, that interest us most are from the pens of Dr. G. A. Young, of the Geological Survey, and Mr. J. M. Clark, K.C., of Toronto. Dr. Young writes on the hackneyed theme, "The Mineral Resources of Canada," and does so very creditably. Mr. Clark's paper is entitled, "Mining Legislation in Canada."

Writing for non-Canadian readers, Dr. Young naturally has to include in his essay much material that to our informed minds may appear trite and worn. In fact, we never have coveted the task of expatiating on this particular subject. But it is to Dr. Young's credit that he has been nimble enough to make his article clear, readable, and comprehensive. After tracing the phenomenal growth of Canada's mining industry and, by means of vivid comparisons, impressing its recent expansion strongly upon the reader, Dr. Young dwells upon the untouched regions of Canada. "In the imperfectly pros-"pected and unprospected regions there is an almost un-"limited area over which the geological conditions are "similar to those of districts of known mineral wealth. "The presence of like geological conditions implies the "existence of like mineral deposits, for experience has "demonstrated that the mineral deposits of any grown "districts have resulted, directly or indirectly, from the "action of the same general forces that gave rise to the "broader geological structures and features of the re-"gion. Therefore, in order to indicate approximately "only the probable extent and value of the mineral re-"sources of a country, it is necessary to give at least a "broadly generalized description of its geological fea-"tures." This generalized description follows, and it is an excellent bird's-eye view of Canada's geological features. Each of the six great geological regions, or provinces, is described, and the characteristic deposits of each are mentioned. The essay concludes thus:—"Only in the "comparatively limited area extending eastward from "the St. Lawrence valley is the annual production in any "way commensurate with the known mineral resources of "the country. And even in this eastern region, the dis-"coveries of late years have indicated the existence of "previously unsuspected classes of mineral deposits. Over "nearly the whole of the vast area of Canada the mineral

"resources at present being developed are confined to "very limited areas bordering the main routes of travel. "Even within these circumscribed areas it is indisput- "ably known that great stores of mineral wealth still lie "untouched or undiscovered."

Mr. Clark's essay is entirely different in character from Dr. Young's. The writer's object is to trace the growth of our mining laws and to show the relations existing between Federal and Provincial legislation. He recognizes the unequal, sketchy, and clumsy nature of the present laws, and emphasizes the need of sounder and more comprehensive enactments. Referring to the proposed Federal mining law, Mr. Clark says:—"The "framing of this general law is regarded by mining men "as supremely important, not only on account of the great "interests actually and potentially involved, but also be- "cause it is looked upon as the first step towards the uni- "fication of the mining laws of Canada. The vital im- "portance of such completeness, wisdom, and practical "convenience being embodied in the Federal statute as "will recommend it to the several provinces for volun- "tary adoption is therefore self-evident."

An allusion to the "apex-law" is also interesting. It runs thus:—"There is no danger that the so-called 'apex "law' will be again introduced into Canada. That law "was copied under the influence of miners from the Pa- "cific States, by British Columbia, but was finally abol- "ished April 23, 1892. . . . . The vested rights of claim "owners who had located their claims under former acts "were protected; and the 'apex law' in British Colum- "bia, as elsewhere, has given rise to costly litigation, "which seems inherent in the system of extra-lateral "rights."

As to the problems of "blanketing," taxation, and royalties, Mr. Clark points out, that has the present opportunity of "taking full advantage of the results of min- "ing codes in other countries and of her own unique ex- "perience of various systems of law."

The three essentials are "generality, equality, and certainty." And the greatest of these, says Mr. Clark, is certainty.

EDITORIAL NOTES

Whether the shortening of working hours in Cobalt was or was not a strategic move, it was commendable. Any reasonable concession to prevent a strike is worth while. It is deplorable, however, that the miners of Northern Ontario are so helplessly in the hands of parasitic labour-union demagogues. The men, if left to themselves, would steadily improve their condition without antagonizing their employers. As for the demagogues, an occasional strike is a necessity if for no other reason than that they may handle the strike funds. We firmly believe that a public investigation of the administration of labour-union funds is urgently required.

Conditions in respect of the Quebec asbestos industry improved greatly of late. There is now a considerable demand for fibre; and, notwithstanding the fact that the production in 1912 was the heaviest on record, stocks, we are informed, are practically depleted.

In an editorial note, in the last issue of the Mining Magazine, commenting on a recent meeting of the Institution of Mining and Metallurgy, the remark is made that really good papers do not provoke discussions; whereas "poor papers stir the combative and controversial powers of an audience to a degree highly beneficial in so far as they tend to balance the inadequate treatment of any subject by supplementing a paper with a discursive and illuminating discussion." Broadly speaking, this is true; but then from the technical society's standpoint the poor paper becomes the good paper, for the principal raison d'etre of a paper submitted for discussion should be to provoke discussion. Fortunately, however, we may have a "good" paper, that is to say an informative and intelligently written paper, provocative of controversy. "The Domes of Nova Scotia," contributed last year by Mr. T. A. Rickard to the Canadian Mining Institute and to the Institution of Mining and Metallurgy, was without doubt an excellent paper, nevertheless it was not received in silence. No one has made a better case for the inorganic origin of petroleum than Mr. Coste, in the several papers he has contributed to the Canadian Mining Institute, yet who will forget the expostulatory storm for which the elucidation of his theories was responsible. We are not altogether inclined to agree, therefore, with the opinion that "really good papers do not provoke discussion."

Neither diamonds nor placer gold has been found on the shores of Hudson's Bay by the several parties that have voyaged to look for it. Morever, the Quebec Government has just issued a report which declares that it will be quite useless to look for the precious stones in the blue clay of the great clay belt, inasmuch as it has an entirely different origin from that wherein the diamonds are found in South Africa.

Partly through the generosity of Dr. James Douglas the Kingston School of Mining has been enabled to extend its tutorial system. At present some twenty tutors are employed.

According to the estimates of L. Vogelstein & Co., the consumption of lead in the United States increased 15 per cent. during 1912. The total consumption approached 460,000 tons. The production from domestic sources was about 400,000 tons, the difference being drawn from stocks on hand. This reduces the working balance to a smaller amount than has been recorded since 1907.

Mr. Malcolm McNaughton, of the Dixon Crucible Co., in an article appearing in the Engineering and Mining Journal, after asserting that Ceylon remains the important source of crystalline plumbago, and that nowhere else in the world does the material occur where the conditions are such that it can be mined with profit, states that during the last twenty-five years some forty projects for the production of flake graphite have been

initiated in the United States and Canada, of which only three are at the present time in full operation. The reason for the non-success of these undertakings is ascribed to verious causes, but chiefly to lack of resources or of knowledge of market conditions. Mr. McNaughton remarks, however, that the capacity of the mills on this continent is from eight to ten times greater than the present demand for flake graphite. The difference between the American and the Ceylon graphite is apparently that of structure. The former occurs as thin flakes disseminated throughout the rick, requiring an elaborate system of crushing and concentration for their separation. The resulting flakes are extremely thin, while the Cox prepared Ceylon plumbago is more granular in structure.

The Engineering and Mining Journal states that the trade in cobalt oxide is closely controlled. Prices during 1912 remained stationary at 80 cents per pound, but an increase to 90 cents has been announced to apply to 1913 contracts. The main imports of the United States are derived from the subsidiary companies of the International Nickel Corporation. It is stated that there is some recovery of cobalt from the ores of the Cobalt district, but by no means to the extent possible if warranted by a wider general use of the metal. It is meanwhile reported that there are over 3,000,000 lbs. of cobalt-nickel residues at Canadian and American refineries at which Cobalt district ores are treated. In view of the possibilities, the result of the experiments now being conducted by Dr. H. T. Klamus, at Kingston, under the auspices of the Dominion Department of Mines, to determine the value of cobalt as an alloy for steel and other means of utilization, are awaited with much interest.

METAL LINER FOR TUBE MILLS

The Komata tube mill liner, which consists of a series of plates and lifting bars, first introduced in New Zealand at the Komata Reefs mine several years ago, is now being used in mills in America. The angle bars which form the ribs of the liners are of manganese steel, and liner plates of the same composition as usually recommended, though they can be made of either semi-steel, white, grey or hematite iron. The filler bars, which are placed underneath the angle bars and are not exposed to wear, are of soft cast iron. The several pieces of the liner are fastened to the shell of the mill by means of square-headed taper bolts. The ribs or angle bars are spaced about 18 or 20 inches apart, according to the diameter of the mill. It is claimed for this liner that (1) it gives a maximum area of mill, and, therefore, increased capacity; (2) absence of slipping of pebbles on the liner results in prolonged life of the liner, the prevention of flattening of the pebbles, and the avoidance of much waste power: (3) by reason of the cascading action of the pebbles their spherical shape is maintained, and this rolling action of the pebbles produces a greatly increased grinding action; (4) the consumption of pebbles or flints and the amount of power required per ton of sand are small; (5) the metal is distributed to give the greatest amount of life and the least amount of scrap when worn out; (6) it alters but slightly as regards thickness and shape, which means constant peripheral speed on the inside of the liners and uniform efficiency; (7) it is easily and quickly installed and repaired; (8) it can be cast at local foundries of semi-steel, white, grey or hematite iron.

TUBE MILLS AT NEW PRIMROSE MINE

Two tube mills of standard size, 22½ by 6 feet, have recently been added to the New Primrose mine's equipment. The "South African Mining Journal" remarks that "the putting in of tube mills at this fine old property affords an interesting commentary on the manner in which the New Primrose is opening up. A few years ago the mine was believed to have but a limited life; in fact, estimates framed just after the conclusion of the war gave one to suppose that by the end of the current year the mine practically would be exhausted. Recently developments have been so eminently satisfactory that the management decided to augment and modernize the reduction plant, and there appears to be every prospect of the company contributing a substantial quota to the dividend list for a number of years to come.

INTERNATIONAL GEOLOGICAL CONGRESS

Suggested Programme for the Twelfth Session.

In a recent circular the Organization Committee of the International Geological Congress has outlined a provisional programme for the Toronto meeting. The general meeting will be held in Convocation Hall, Toronto University, while for the sectional meetings numerous lecture rooms are available. The division into section will probably be as follows:

Section 1. Sub-section a—Pre-Cambrian Geology.
" b—Economic Geology.
" c—Peliology, Mineralogy, etc.

Section 2. Palemtology, Mineralogy, etc.

Section 3. Glacial Geology and Physiography.

On the evening of Wednesday, August 6th, at 8 o'clock, an informal reception and re-union will be held in Convocation Hall.

On Thursday morning, after a conference of the Council of Organization, the formal opening will take place, probably presided over by the Duke of Connaught. The retiring and incoming Presidents and Secretaries of the Congress, the President of the university of Toronto, and his Worship the Mayor of Toronto will give addresses.

At 3 o'clock on Thursday afternoon, discussion of the major topic of the coal resources of the world will be commenced.

In the evening a public address will be given in Convocation Hall.

For a full week thereafter on each day there will be held general and sectional meetings, and a long series of excursions. On the second last evening a banquet will be given in honour of the visitors.

SILVER COINAGE IN INDIA

Mr. Harold Baker (Financial Secretary, War Office), replying for Mr. Montagu, Under-Secretary for India, to a question by Mr. Bigland (U., Birkenhead), says: The amount of silver coined in 1911-12 at the Indian mints was as follows:

	Standard ounces.	Equivalent in fine ozs.
Whole rupees, re-coined ..	9,107,934	8,424,839
Whole rupees, new	nil	nil
One-half, one quarter, and one-eighth rupees, new	nil	nil
One-half, one quarter, and one-eighth rupees, re-coined.	405,829	375,391
British dollars	31,596,753	29,226,997

The British dollars were coined at the requisition of banks. There is no "issue price," since the mint merely coin the silver tendered by banks and issue the dollars to the banks charging 2 per cent. for the work done.

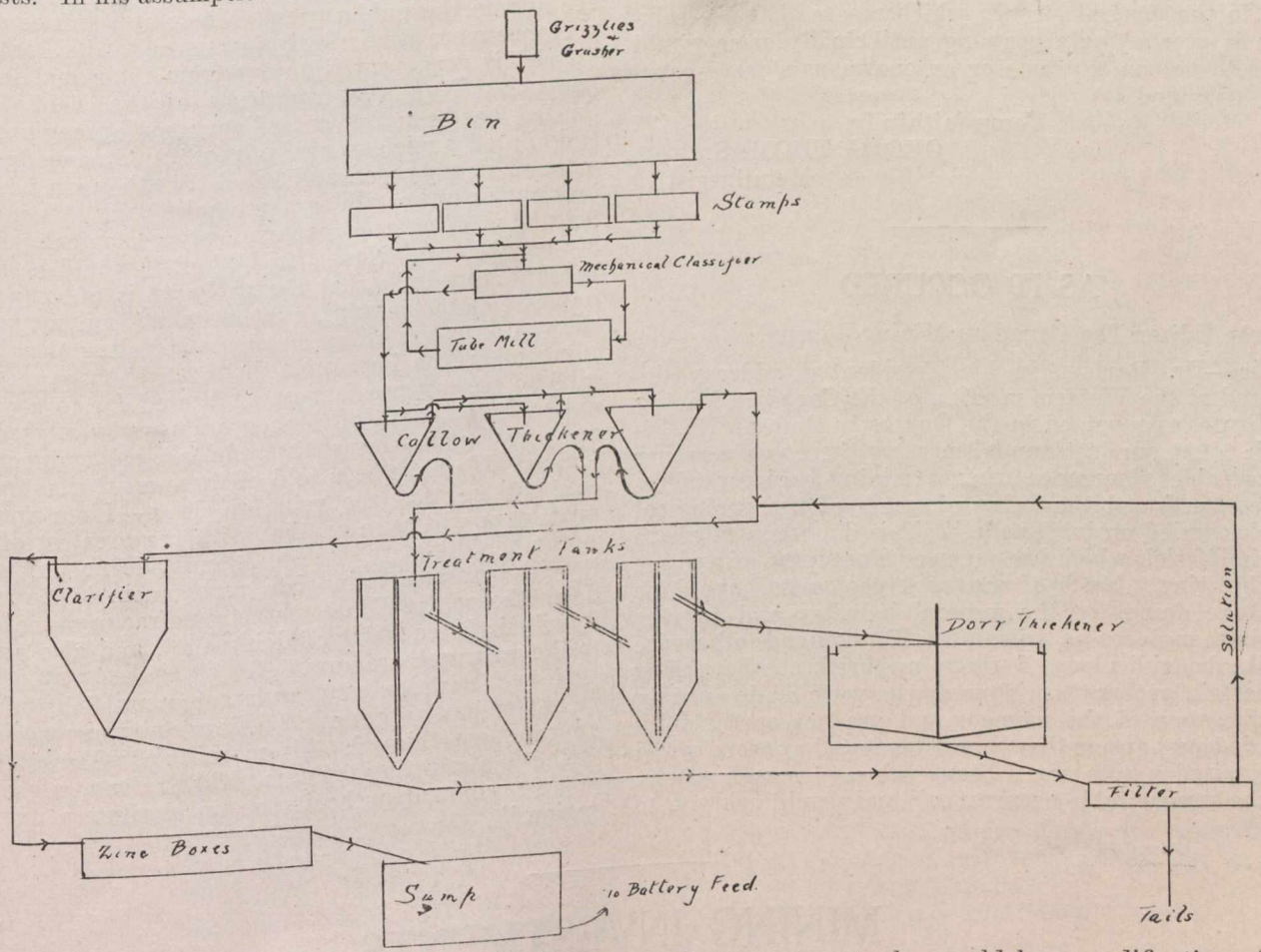
CORRESPONDENCE

INTERMITTENT CYANIDATION

Editor The Canadian Mining Journal, Toronto:

Sir,—Mr. Leon P. Hill's article is of considerable interest to many metallurgists and raises questions upon which there is a great divergence of opinions.

It may be that theoretically the charge system surpasses the continuous, but I venture to say that in many cases theory and practice are at variance with one another, and as far as Mr. Hill's statement as to the popularity of the continuous system goes I should say that there is a direct verdict in favour of such a system and that it has been approved by many metallurgists. In his assumption of a series of 100-ton tanks,



Mr. Hills gives some figures which are no doubt correct, but he states that the heavier and coarser particles make the most rapid transit through the series. This I do not agree with, my experience has been the reverse, namely that the finer and lighter particles will pass most rapidly through a series of tanks, thus giving the heavier and coarser particles the longer treatment which is in some cases required; at the same time I should say that the most ideal system would be one which shows an even flow of all sizes of particles.

The following are a set of figures which were obtained from a set of three tanks on the continuous system using both air and centrifugal pump agitation:

	Pct.	Pct.	Pct.	Pct.
On 100 mesh	7.9	6.6	3.6	2.8
On 150 mesh	18.8	12.8	9.4	9.6
On 200 mesh	16.2	22.4	26.2	25.8
Through 200 mesh...	57.0	58.2	60.8	61.8

These show a tendency of the finer particles to go through the tanks, after some adjustment and on somewhat coarser material hardly and difference was shown as follows:

	Influx to first tank. Pct.	Efflux from third tank. Pct.
On 100 mesh	12.4	12.0
On 150 mesh	61.0	62.0
On 200 mesh	12.4	11.6
Through 200 mesh	14.2	14.4

My idea of a continuous plant would have a flow sheet as follows:

The treatment tanks would be a modification of the Pachuca and Patterson having both air and centrifugal pump agitation, through a central column, and having a baffle which gives a circumferential quiet zone, this zone would have a double use, one for decanting and the other for pump suction, thus saving pump liners by not having any grit going through. The three callow thickeners would be used as follows: Two would take the direct overflow from the classifier, the thickened product going to treatment tanks. The overflow from these two goes to the third callow which would be somewhat larger than the others, the thickened product from this also going to treatment tanks and the overflow which would be fairly clear to the clarifier. This clarifier should be one of the canvas leaf system which not only takes the solution from callows, but also solution from Dorr thickener and filter, ensuring a perfectly clear and clean solution for the zinc boxes. Again,

if any slime should get in the clarifier this would be let out occasionally to the Dorr thickener or filter. The filter used could be either pressure of vacuum. The choice rests with the person who supervises the putting up of the plant. Personally I like a Butters or Moore but have no data to offer on these filters.

The merits of such a system as this are, I think, far superior to those of the intermittent system, inasmuch as the time factor of settling and decanting on the intermittent as described by Mr. Hills would be enormous, and sufficient tank capacity must be provided to take the ore while the first or second tanks are undergoing this settlement, etc. Again, in his system of charging the tanks I should say that the finer and lighter particles would find their way more rapidly to his washer than would be expedient. I also notice that Mr. Hills has the washing solution and water returning to the general circuit, which means that the solution is everlastingly growing until finally some would have to be run to waste or an enormous storage capacity provided.

Yours faithfully,
GEO. G. THOMAS,
Metallurgist.

AS IT OCCURED

To the Editor The Canadian Mining Journal:

Sir,—Dr. Barlow, in his Presidential address, delivered at the Victoria meeting of the Canadian Mining Institute, as reported in the Quarterly Bulletin No. 20, said: "At our last annual meeting there was a rather regrettable occurrence when a mining engineer of repute questioned the value of much of the geological work carried on in Canada." This doubtless refers to the half-brick which his paper on Porcupine stirred me to throwing. Much of the work geologists have done and are doing for the mineral industry and for the mining engineer is splendid. To contend otherwise would be ridiculous. I threw my brick at the posing of certain geologists. My remarks were made entirely on the spur of the moment and are not as carefully worded perhaps as they might be, but they were sound and raised a note not without value. I attach a copy of the "regrettable occurrence" and would ask you to publish it. I am sorry that the publishing committee have not seen fit to publish Dr. Barlow's paper that provoked the remarks.

Yours faithfully,
H. E. T. HAULTAIN.

February 20th, 1913.

Mr. Haultain—I must confess to a growing peevishness, and peevishness is a bad thing to be afflicted with, at the attitude of our local geologists. There are a great many of our local geologists who since they have broken from the Survey——

Mr. Tyrrell—I object to that term, I do not see there is any peevishness whatsoever——

Mr. Haultain—As I was saying, those geologists who have broken loose recently from the Survey, have posed and loomed very largely in the public mind and public eye and in the public press. Their appearance of importance more particularly in regard to the Porcupine district is very very different from their real importportance. Now my experience of the field, fairly limited, has been that an ordinary mining engineer has assimilated sufficient useful geologic knowledge for most of his purposes, and I find that the man who was brought up primarily as a geologist, and goes into the field later, often remains hopelessly geological. This is my peevishness. Now, I will admit, I would be one of the first to admit, that the geologist is of very great importance to the mining interests, as you, sir, so ably showed to us yesterday, but he is not altogether everything up in the Porcupine district. I am particularly glad to see my peevishness accounted for to a certain extent in the result of these two papers by alleged eminent geologists—I say that, sir, alleged eminent geologists. We have been told of three results, as far as I can gather: that the veins go down—I am sure the promoters will seize on that with the greatest of glee. A further thing we were told, and I do not know that it will worry metallurgists very much, is, as we go down the gold will become more refractory—no doubt it will, it has a habit of doing that, and also another to the man up there now.

Now I wish to congratulate our publicity department, for having got off, I believe quite unconsciously, an excellent thing in this morning's "Globe" which strikes me as fitting the case. They refer to a geologist as "An eminent authority on an absolutely unknown region."

MINING INVESTMENTS

Written by a Mining Accountant.

(Continued from February 1st Issue.)

In the February number of this Journal, when dealing with the matter of sizing up the merits and demerits of mining investments, the writer gave reasons why the acquirement of mining stocks after the payments of dividends thereon generally involves risks far greater than when buying shares in a company at its inception. That this is so and will always remain so in the majority of cases just as long as the present practise of distributing the whole of the surplus income over revenue expenditure in the form of dividends is continued, appear evident. For whereas on the one hand the shares are generally too high to make the ultimate return of capital and a fair rate of interest possible—except in cases when the mine becomes richer at depth—the investment on the other hand offers fair chances of success when due caution is exercised in the manner suggested and when, also, the mine is well investigated and not over capitalized.

The question of inflation or over capitalization, however, is quite another matter and there is no reason why mining companies should not conduct their affairs more in keeping with sound business principles or in such a manner that the shares are never in excess of their actual value.

Under prevailing conditions a company capitalized at $1,000,000 and having, say, an annual income exceeding the revenue expenditure by $400,000, would distribute this so-called profit in the form of dividends.

With this return of 40%, the shares would then in the usual course advance to nearly treble their par value, or until at market price they returned only 15%. This is where the investor is up against inflated values unless, as is very seldom the case, the positive ore reserves, or the conditions generally are such that a similar income is reasonably assured for the next twenty years, as would be necessary for the ultimate replacement of capital and the payment of a rate of interest high enough for mining investments.

On the Transvaal and several other established fields there is some justification for figuring so far ahead of developments. There the ore bodies have been proved to exist at great depth, and the values are so evenly distributed that it is safe to assume that by sinking a certain depth and driving a certain distance within the vertical limits of adjoining properties on the same vein, so much ore having a certain value would be blocked out. On new fields, however, such as Porcupine, the indications at present are certainly not sufficient to justify figuring on any ore for than 100 feet beyond the bottom level and then only when the ore body does not show a falling off in width and value. If tonnage merely is considered this method of determining the life ahead of any Porcupine property for instance, may be considered unduly conservative. But although geologists may agree that the veins must persist to a great depth, there are other points to be considered, such as the falling off in values, shortening of ore shoots, faults, blanks for hundreds of feet as in Bendigo, Australia, (one of the oldest fields in the world) to say nothing of increased working costs and the development of refractory instead of free milling ore as depth is attained. With such contingencies, the possibilities ahead of any Porcupine mine as regards the payment of dividends can only be classed with safety with the "positive" and "probable" ore reserves. In the case of a company such as already instanced, having on the "positive" and "probable" reserves only sufficient ore to maintain the profit of $400,000 per annum for three years, it will readily be seen that there is really no justification for the shares advancing to a price returning only 15% on the investment. Thus the shareholder coming in on such an inflated value is very lucky indeed if he does not clean up minus a large portion of his capital.

This unsatisfactory state of affairs brought about by the common practice of returning capital in the form of enlarged dividends would not exist if mining companies were compelled by law either to create an "Amortization Fund" for the replacement of capital or to notify the shareholder what proportion of the income over revenue expenditure should—guided by the estimated life ahead of the mine—be set aside for the replacement of capital, and how much of this so-called profit should be considered such.

For instance, in the case of a mine as already cited being capitalized at $1,000,000 and having an annual balance of $400,000 over all charges including depreciation and development redemption, and sufficient ore —"positive" and "probable"—to maintain this surplus for three years, we contend for reasons given above that one-quarter of the capitalization at least, that is $250,000, should be set aside for the replacement of capital thus leaving $150,000 for dividends on an annual payment of 15 per cent. On this distribution of the actual profit it will be seen that the shares when returning 10% would show an advance of 50% on the par value thereof. This, then, would be legitimate and those acquiring shares at this valuation would be duly protected against the loss of capital. To bring this about is really the duty of directors and consulting engineers who should, in the writer's opinion, be compelled to give the shareholders the benefit of their experience and of their knowledge of the mine by compulsory semi-annual statements in connection with affairs generally at the mine. They should in fact give a definite idea of what the shares are actually worth after ample provision is made for the replacement of capital and for paying, say 10% interest. The directors or consulting engineers should also be compelled to show how their valuation is arrived at so as to enable shareholders to judge for themselves whether their conclusions are sound.

Out of respect for the powerful arguments which must naturally exist in support of all established methods, the writer would like it to be understood that the object of this article is merely to secure a general expression of opinion as to whether it is possible, or, rather, advisable, to impart a heathier tone to the mining industry by adopting reforms such as suggested herein. In other words, although of the opinion that the present methods are unfavorable to the investor, it is quite possible that the suggested methods for reducing the speculating element in mining to a minimum, may be considered as merely so many flies in an ointment which although undoubtedly injurious to many, may after all be more fit for general use than any other preparation. On the other hand if "amortization funds" are recognized and required by law in other countries, why not in Canada?

(To be continued.)

TRETHEWEY ANNUAL REPORT.

Consulting Engineer's Report.

Toronto, Feb. 6, 1913.

The President and Board of Directors,
Trethewey Silver-Cobalt Mine, Limited.
Toronto, Ontario.

Gentlemen,—Herewith I beg to submit report of operations of the Trethewey Silver-Cobalt Mine, Limited, for the year ending December 31st, 1912.

Shipments in 1912.

	Net Dry Weight Lbs.	Oz. Silver per Ton.	Total Oz. Silver.	Gross Value.	Net. Returns.
To Orillia	48,097.0	1,010.0	24,505.42	$ 14,341.80	$ 13,359.14
To Deloro	859,561.5	1,255.5	539,605.51	331,651.79	307,768.46
To Denver A. S. & R. Co.	234,374	237.5	27,828.95	17,533.78	14,105.41
To London (Bullion)	.....	.....	28,983.24	18,165.52	17,939.17
Totals	1,142.032.5		620,923.12	381,692.89	353,172.18

Summary of 1912 Shipments.

Total ounces of silver in shipments.....	620,923.12
Gross value of shipments in 1912	$381,692.89
Net cash returns from shipments in 1912	353,172.18
Aver. price at which silver was paid for	61.47 per oz
Average net cash return, per ounce silver shipped	56.89c.

Milling.

During the year $8,197.84 was spent on alterations in the mill and charged to operating account. Besides this amount $4,789.02 was spent in additions to building and equipment. The object of alterations and additions was to increase capacity, to reduce the time lost in break-downs of machinery and to ensure a better recovery of silver from the ore. These alterations were made gradually without interfering with the steady production from the mill, and are now practically completed.

Mining.

Development. The amount expended on development for the year was $50,790.65 for which a total of 3,885.5 lineal feet of development and exploratory work was done, besides 275 cubic yards of sation and grade cutting incidental to development.

Summary of Development to Date.

Year	Shafts.	Drifts and Cross-cuts	Winzes and Raises	Tl footage per year	Tl footage to date
1906 and 1907	383	2,099	217	2,699	2,699
1908.	0	1,711	360	2,131	4,830
1909.	213	2,688	268	3,169	7,999
1910.	43	3,010	226	3,279	11,278
1911.	102	2,801	168	3,071	14,349
1912.	79	2,950	856.5	3,885.5	18,234.5

In conenction with the development work a thorough examination of the mine was made during the summer and a system of records started which inventories the "positive" ore at the end of each month. The following table gives a summary of the tonnage of positive ore on hand at the end of each month, dating from August 31st.

Positive Ore Reserves and Development.

Aug. 31	4980	3757	23,784	32,521	2,246	..	541.5	..
Sept. 30	4866	3428	22,955	31,249	2,474	1,202	543	2.21
Oct. 31	5278	3168	22,164	30,610	2,700	2,061	603	3.42
Nov. 30	6422	2997	21,325	30,744	2,727	2,861	436.5	6.55
Dec. 31	6413	3825	20,934	31,172	2,284	2,712	409.5	6.62

As shown by the foregoing table, the balance between new ore developed and the ore extracted has held up fairly well during the last four months of the year for which figures are available.

The average rate at which development work placed new ore in sight during the last four months was 2,209 tons per month.

The greater part of the development work was done in the south-east quarter of the property that is tributary to No. 2 and No. 5 shafts. This work has continued to yield good results and several small veins were found which gave a good grade of milling ore. In other cases the extensions or parallel branches of older veins were discovered, the working of which was very profitable.

The No. 6 shaft was sunk to the second level and some exploratory work done on the east central portion of the property in conglomerate. While a strong vein with a calcite filling exists at this point, the work done on it has so far not yielded any ore.

With the exception of a small amount of cross-cutting done during the first three months of the year, no development work was done in the north-east section of the property from No. 4 shaft. There are three veins in this section close to the T. & H. B. Co.'s boundary, and, while no 'positive' ore reserves from this section are included in the estimates, some exposures of good veins exist in pillars left in the old stopes, and the chances of finding other veins are favorable.

Ore Reserves.—The total amount of "positive" ore in sight in the mine, blocked out at the end of 1912 was 6,413 tons with an average silver content of about 28 ounces per ton. In addition to this there were 3,825 tons of ore broken in the stopes averaging about 26 ounces per ton, and 20,934 tons of broken ore on the surface dumps averaging 15 ounces per ton, all of which may be considered "positive" ore.

In the above estimate of Ore Reserves no allowance has been made for ore not thoroughly blocked out, nor for ore on dumps not sampled and measured.

A change of management was made in the middle of the year which involved numerous changes in the personnel of the staff at the mine. Considerable credit is due Mr. H. G. Young, who has done excellent work since his appointment as manager.

I have pleasure in submitting herewith Mr. Young's report.

Yours very truly,
D. L. H. FORBES,
Consulting Engineer.

Manager's Report.

Trethewey Silver-Cobalt Mine, Limited,
Mine Office, Cobalt, Ont.,
February 4, 1913

Mr. D. L. H. Forbes, Consulting Engineer,
Trethewey Silver-Cobalt Mine, Ltd.,
306 Manning Chambers,
Toronto.

Dear Sir,—I beg to submit the following report of operations at the Trethewey Mine for the year ending December 31st, 1912:

Development.

During the year $50,790.65 was spent on development, and 3,885.5 lineal feet of work was accomplished, made up as follows:

	Feet
Drifting	2072.5
Cross-cuts	877.5
Raises	788.5
Winzes	68.0
Sinking	79.0
Total	3885.5

In the cast of this work is included 250 cubic yards of station cutting and 25 cubic yards of grading.

(1) S.W. Section, Near No. 5 Shaft.

(A) First Level.—In this section the north branch of "D" vein was picked up, and an ore chute developed 75 feet in length and about 40 feet vertically. The vein is one to two inches wide of high grade ore, and the wall rock carries good milling values. Some stoping was done during the year on this vein, which gave us excellent ore.

(B) Second Level.—In this section the "D" vein was developed by a winze below the first level to the Keewatin-Conglomerate contact and drifted on for a length of about 60 feet. This work gave us an excellent grade of ore. The vein is one to two inches wide.

"H" vein. This vein was developed by raises from the second sub-level. It is two to three inches wide of medium ore. The ore chute developed was about 60 feet long and 40 feet in depth. Considerable stoping was done here during the year, with good results.

(2) East Section, Near No. 2 Shaft.

(A) First Level.—The continuation of main vein was picked up west of "S" vein, and developed for a length of about 140 feet and 30 feet vertically. We obtained from this work a very good grade of milling ore on which no stoping has been done as yet. A parallel vein called "G" vein, which joins the main vein, was opened up for a length of 60 feet and 30 feet vertically. This gave us a very good grade of milling ore, which still remains intact.

"E" vein, parallel to "S"—This vein was drifted on for 80 feet, and a raise put up about 40 feet. The ore was very good. No stoping was done here.

"S" Vein.—A small amount of milling ore was developed on this vein above the first level by a series of raises.

No. 1 vein south, off main vein and Nos. 2 and 3 to the north of main vein were developed, and gave us a good grade of milling ore from small ore chutes.

(B) Second Level.—On this level vein No. 151 was picked up from a cross-cut. A small amount of development was done on it by a raise to the first level, a distance of about 40 feet. The vein is about an inch wide of high grade ore, and development to date looks very promising.

South Extension of No. 10 ein.—This vein, although small, gave us an excellent milling ore in the development done on it. The ore chute is about 50 feet long and 30 feet vertically.

(3) Central Section.

No. 6 Shaft.—This shaft was sunk during the year to the second level, and approximately 450 feet of drifting was accomplished on the "mill fissure" vein, 100 feet of which was one on the first level and 350 feet on the second level. This vein is a wide calcite vein which at first gave promise of producing ore, but developments proved disappointing. We also did about 225 feet of cross-cutting from this vein to the south and found nothing.

(4) North Section.

Considerable cross-cutting was done in the early part of the year on the second level to the south in No. 4 shaft workings. No veins were encountered. No work has been done in this section during the last nine months. However, this section gives promise of producing considerably more ore.

Acreage.

The Trethewey Mine consists of approximately 40 acres of which is made up of Keewatin formation and very shallow conglomerate, in which no values have been found. The remaining twenty-five acres is composed of conglomerate. About 12.5 acres of this productive conglomerate formation has been developed. The remaining 12½ acres is so far unexplored.

Compensation to Miners.

During the last six months we have introduced the contract system of labour as far as possible. This has given us very good results. We find that the miners make more money, and take more interest in the work and are more contented, while the company on the whole gets cheaper work done and better results.

Boarding Camp.

In October we closed down the boarding camps. We found it very difficult to operate these without a constant loss of $300 or $400 per month to the company. They also necessitated a great deal of attention from the office in order to run them economically. Our proximity to the town enabled us to do this without any great inconvenience to the miners, and we find the present arrangement much more satisfactory to all concerned.

Accidents.

I regret very much to report to you the large number of accidents which have occurred on this property during the last year. Fourteen were minor accidents which might have happened in almost any operation. However, a number of them were more serious and one fatal. Twenty accidents occurred altogether. It is the constant endeavour of the management to reduce these to a minimum.

Changes in the Mill.

During the last six months it was found necessary to make a number of additions and changes to the mill plant. During October and November we installed a complete return heating system, which is working out very economically. Our consumption of coal for heating the mill and drying concentrates is about a ton per day. We also built a new dry house for drying and storing mill concentrates. We also erected a tailings stacker in order to pile up our mill tailings and hold them on the property. At present we are altering the rock crushing plant in order to make it more economical of operation and to do better crushing, which will help out our mill tonnage.

I wish to thank the staff and employees for their willing and hearty co-operation with the management towards obtaining good results.

Yours truly,

H. G. YOUNG,

Manager.

OCCURRENCE, DISTRIBUTION AND UTILIZATION OF BISMUTH ORES*

BISMUTH MINERALS.

Bismuth minerals are not of very frequent occurrence, and they are usually found only in small quantities. The localities at which they are found in sufficient abundance to constitute workable ores of bismuth are few, and they rarely if ever occur in such a degree of purity that they can be worked for bismuth alone, the bismuth usually being one of several products obtained.

The minerals of chief importance as constituents of workable bismuth ores are native bismuth and bismuthinite. Bismite and bismutite also occur in considerable quantities. Other minerals containing a high percentage of bismuth are bismutosphaerite (carbonate) ,pucherite (bismuth vanadate), uranosphaerite (bismuth uranate), guanajuatite (bismuth selenide), tetradymite (bismuth telluride) as well as a considerable number of double sulphides containing lead, copper or silver. Bismuth also occurs as a natural alloy with gold, the composition of which corresponds to the formula Au_2Bi, as in maldonite, found at Maldon, Victoria, Australia. It also occurs alloyed with silver in chilenite, found in the San Antonio mines, Potrero Grande, in Copiapo, Chile. These minerals, however, so far as is known at present, are comparatively rare and of no economic importance as constituents of bismuth ore.

The following is a brief description of the more important ore-minerals of bismuth referred to above:

Native bismuth is a greyish-black heavy mineral the freshly fractured surface of which shows a white metallic lustre with a somewhat pinkish tinge. It is usually found in lamellar or granular masses, and is very brittle and sectile. Its specific gravity varies from 9.6 to 9.8. Native bismuth occasionally contains traces of other elements, notably arsenic, sulphur, and tellurium.

Bismuthinite, or bismuth glance, bismuth sulphide (Bi_2S_3), is a lead-grey brittle mineral, having a specific gravity of about 6.5, a hardness of 2, and a grey streak. It crystallizes in the orthorhombic system, is readily fusible and sectile, and often occurs associated with other bismuth ores, particularly the native metal. It contains about 81 per cent. of bismuth.

Bismite, or bismuth ochre (Bi_2O_3), occurs in massive form and is occasionally foliated. It varies in color from grey to yellowish-white, and has a specific gravity about 4.4. It contains about 90 per cent. of bismuth.

Bismutite is a hydrated bismuth carbonate. It is soft and easily crushed, and ranges in colour from white to yellow. The specific gravity varies from about 7.0 to 7.5 and hardness from 4 to 4.5. The mineral contains about 90 per cent. of bismuth.

Bismutosphaerite is a bismuth carbonate containing little or no water. It occurs in spherical forms with concentric and radiating structure. In colour it varies from bright yellow to dark grey or dark brown, has a hardness 3 to 3.5 and a specific gravity about 7.3 to 7.6. It contains about 90 per cent. of bismuth.

Although the chief bismuth minerals contain high percentages of the metal, the ores as mined seldom contain more than about 10 or 20 per cent.

Bismuth ores sometimes occur in the quartz and pegmatite veins traversing gneisses, granites, porphyries, and slates, and also in a disseminated form in these rocks. The minerals other than those of bismuth most frequently found in bismuth ores are galena, zinc blende, iron and copper pyrites, sulphides of cobalt and nickel, barytes, cassiterite, wolframite, scheelite, molybdenite, and haematite. Antimony, gold, and silver minerals also occur.

DISTRIBUTION OF BISMUTH ORES.

Europe.

United Kingdom.—This country does not figure in the official returns as a producer of bismuth ores, but occurrences have been reported from several localities. Native bismuth occurs at the Wheal Sparnon mine, Cornwall, in a rich vein at the Atlas mine in Devonshire, and at Carrock Fells, Cumberland. At the last-mentioned locality bismuth sulphide also occurs in quartz, associated with molybdenite and apatite; it is also found in Cornwall at the Botallack mine, near Redruth, at the Lanescott mine near St. Austell, and at the Hedland mine, Gwennap. Bismite occurs at St. Roach and near Lostwithiel, Cornwall. At one time bismuth ores, which occur with copper ore, spathic iron ore an diron pyrites, were obtained from the Fowey Consols mine, near Tywardreath, Cornwall.

France.—For some years bismuth ores were obtained at Meymac from a vein in the granite, which gave chiefly wolframite and arsenical pyrites near the surface and increasing quantities of bismuth in depth. The percentage composition of a sample of the native bismuth from this locality is as follows: bismuth 99.00, antimony 0.15, arsenic 0.09, lead 0.41, iron 0.1, sulphur 0.06.

Austria-Hungary.—Bismuth ores occur and have been worked in Bohemia, Carinthia, and near Salzburg. Bismuth telluride occurs in the Banat at Cziklova and in the gold and silver mines of Rezanya, Small quantities are won from the Joachimsthal uranium ores.

Germany.—In the past, bismuth ores have been obtained from many localities in Germany and for many years the greater part of the world's output was obtained from Saxony. One of the most important deposits in the latter State is that of Schneeberg, which consists of large masses of granite surrounded by mica schists and clay slates, the mineralized veins usually being found in the latter. A variety of lodes occur; the bismuth ores are generally found in the cobalt veins, which are numerous, and contain quartz, hornstone, cobaltine, native bismuth, pyrites, galena, pyrargyrite, native silver, and other minerals. At Altenberg bismuth glance and native bismuth occur in quartz veins which traverse the "zwitter," a dark-coloured rock composed of quartz and mica, and containing a small quantity of finely divided tinstone. The bismuth ores are associated with iron and copper pyrites, wolframite, molybdenite, fluorite, and other minerals.

In the neighbourhood of Johanngeorgenstadt ores of bismuth are found along with those of silver and cobalt, in the vicinity of the metalliferous greenstones, which traverse the granite.

Australian Commonwealth.

Victoria.—Bismuth ores are stated to be found in some quantity among the deposits of Wombat and

*A paper published in the Bulletin of the Imperial Institute.

Snowy Creeks, in the north-eastern district of Victoria. The ores also occur in reefs at Moliagul and Kingower, in Gladstone; Linton, in Grenville; St. Arnaud and Maldon (The Economic Minerals and Rocks of Victoria, A. E. Kitson, Melbourne: Victoria Department of Mines, 1906). During 1910 deposits were discovered at Round Hill, Bendoc, in East Gippsland, containing wolframite and bismuth ore in payable quantities, and several small parcels of ore were marketed. The prospects are said to be encouraging, but further development work will be necessary in order to determine the value of the deposit (Ann. Rep. Sec. Mines, Victoria 1910, pp. 26, 131).

New South Wales.—Bismuth and its ores have been found in many places in this State, but the production during recent years has practically all taken place from two localities: Kingsgate, near Glen Innes, and Whipstick, near Panbula. During the period 1880 to 1910, 527 tons of bismuth ore, valued at £125,527, were exported from New South Wales. The Kingsgate deposits are situated at Yarrow Creek, about eighteen miles east of Glen Innes. Geologically, the country consists of granites and indurated claystones of Carboniferous age. The bismuth deposits are found in nearly circular pipe-veins, which occur near the junction of the granite and claystones and dip in an easterly or north-easterly direction at an angle of about 30°. These pipe-veins vary from 10 ft. to 50 ft. in diameter, several often uniting as they are traced downwards. The gangue in the pipes consists of quartz, containing molybdenite in large crystals and occasionally wolframite and mispickel. Gold and silver are usually present in variable amounts. Near the surface the bismuth ore, which is less plentiful than the molybdenite, occurs as the oxide and carbonate in the joint fissures of the quartz. At greater depths native bismuth and the sulphide are found.

The pipe-veins contain from 0.5 to 5.0 per cent. of bismuth. An average sample of the ore-stuff yielded: metallic bismuth, 2.6 per cent.; gold, 8 dwts. per ton; silver, 3 oz. 5 dwts. per ton. The concentrated ore had the following composition: metallic bismuth, 69.3 per cent.; gold, 4 oz. 1.5 dwt. per ton; silver, 57 oz. 3 dwt. per ton.

The Whipstick deposits, situated about fourteen miles west of Panbula, at one time produced nearly all the bismuth ore obtained in New South Wales. The deposits are very similar in character to those of Kingsgate described above, except that the filling of the pipes here consists of quartz and felspar, with a little mica and some garnet rock. Wolframite is generally absent.

The ore, after being roughly hand-picked, contains on an average 4 per cent. of bismuth and is sent to Sydney for concentration and reduction, the wet process, described later, being usually employed for the latter purpose. Bismuth ores have been found in many other localities in this State. For an account of these see Mineral Resources of New South Wales, by E. F. Pittman. (Sydney: W. A. Gullick, 1901).

Queensland.—For many years past this State has produced varying quantities of bismuth ore. Recently the chief producing area has been the Biggenden district, where bismuth occurs associated with magnetic iron ore. Other producing deposits occur in the Herberton and Chillagoe districts, and small quantities are occasionally obtained in the Etheridge and Star River districts. An occurrence in the Degilbo district has been worked to some extent. The lode, which is 3 ft. wide, is said to outcrop in a position favourable for working. The ore consists of bismuth carbonate, sulphide and telluride, and contains varying amounts of gold, silver and copper, and occurs in fissures. The country rock is an altered slate intersected by porphyry dykes. A sample of the picked ore contained 3.6 per cent. bismuth, 12.1 per cent. copper, and 5 oz. of silver per ton. The Glen bismuth mines of the Herberton district have already been referred to in this Bulletin (1912, 10, 330).

South Australia.—Although during the period 1867 to 1876 about 71 tons of bismuth ore, valued at £16,679, were obtained from South Australia, no production was recorded from 1876 to 1906; and during recent years the quantity raised has been insignificant. Bismuth ore, in the form of sulphide, carbonate, oxide, and native metal, has been found in at least 18 mines in this State. An account of these occurrences, together with a record of the amount of development work done, which in some cases has been considerable, will be found in the Record of Mines of South Australia, by H. Y. L. Brown (Adelaide: C. E. Bristow, 1908).

Tasmania.—There is a small but steadily increasing production of bismuth ore from Tasmania, the output during recent years being almost entirely obtained from the Shepherd and Murphy mine in the Middlesex district. The ore here occurs in quartz-topaz veins in a metamorphic limestone, together with wolframite and cassiterite. It also occurs at other mines in this district. Bismuth ore has also been located at Mount Black in quartz, associated with gold, wolframite, and other minerals. A sample of the ore contained 7.4 per cent. bismuth, 0.8 per cent. copper, and 0.95 oz. of gold per ton.

In the Heemskirk Mountains bismuth is said to occur in lodes with tin and silver, and near Ringville a number of lodes have been worked yielding rich argentiferous bismuthic fahl ores.

Asia.

India.—Very few occurrences of bismuth ore have been recorded in India. Bismutite is said to occur with antimony ore in the range of hills between the Attaran and Maulmain rivers, Tenasserim. Bismuth also occurs in small amounts, with the copper ores of Hazaribagh and Singhbhoum, Bengal, whilst certain ores from Nepal carry 24 per cent. of bismuth and 14 per cent. of copper. The copper ores from the Mundi State, Punjab, are also said to contain bismuth (S. C. Rudra, Trans. Amer. Inst. Min. Eng., 1903, 34, 81).

Japan.—At one time bismuth was extracted from the ores of Nishizawa district, Hida, and small quantities of ore are produced from mines in Rikuchu and Mimasaka. The ore is known to occur in many other localities, a full list of which will be found in Mining in Japan (Tokio Bureau of Mines, 1909).

Sumatra.—Bismuth ore is stated to occur in commercial quantities near Lake Toba.

Africa.

Rhodesia.—All the commoner ores of bismuth enumerated on pp. 628, 629 have been recorded from Rhodesia, the chief localities being Mazoe and Lomagundi. Bismuthinite occurs as an impregnation together with molybdenite and pyrrhotite disseminated through syenite at the Hay mine, Mazoe. The ore is worked for its gold, but the bismuth does not appear to be recovered.

Bismutite has been found in notable quantity in gold-bearing quartz veins at Victoria and Lomagundi. Native bismuth occurs in the Hartley district and bismuth ochre at Gadzema.

Transvaal.—Bismuth telluride is said to occur about twenty miles north-east of Pretoria and bismite in the auriferous deposits of the Lydenburg district.

German South-West Africa.—Native bismuth is found mover a large area in the Kuisib district of Damaraland, in quartz veins which traverse a mica schist. The metal is often accompanied by bismuth ochre, and by gold, silver, and copper ores.

America.

Canada.—Native bismuth is said to be of fairly common occurrence in the sluice-boxes of the alluvial gold workings of Highet Creek, a tributary of the Stewart River, Yukon. The same mineral also occurs in quartz veins with smaltite, in the Montreal River district. Bismutite occurs at New Ross, Lunenburg county together with ores of tin, tungsten, and molybdenum in pegmatite and aplite dykes. The mineral also occurs in quartz veins in an altered granite near Kewagama Lake, Quebec; also near Lyndock and at Clarendon, Ontario.

United States.—Only during the last few years has bismuth been produced in the United States, and at the present time there is very little bismuth ore raised as such, the bulk of the bismuth obtained being recovered from the refining of other metals. Amongst these sources may be mentioned the anode slimes from the electrolytic refining of copper at Chrome, New Jersey, and the Betts electrolytic lead process worked at Grasselli, Indiana, where the lead ores from the Tintic district are smelted. At Leadville, Colorado, ores carrying 7 to 14 per cent. of bismuth have been obtained. Deposits near Mesa and Phoenix, in Arizona, have been developed to some extent. Small shipments containing 11 to 25 per cent. of bismuth have been made from San Andreas Mountain section, New Mexico.

Mexico.—High-grade bismuth ore has been obtained from Sinaloa and Sonora. The Rey del Bismuto mine in Sinaloa yields a large quantity of ore containing bismuth 2 per cent., iron 33, silica 31, copper 0.9, and alumina 12.5. A smelting trial gave 80 to 90 per cent. of the theoretical yield of bismuth. Rich oxidized ores have been obtained near Ojo Caliente, Chihuahua. Bismuth ochre occurs in the nickel-cobalt deposits in Jalisco.

Brazil.—In Entre Rios, Minas Geraes, deposits of metallic bismuth have been located. The ore is stated to carry less than 7 per cent. of impurity.

Peru.—Deposits have been worked near San Gregorio, Cerro del Pasco. In San Mateo, Lima, the mineral chiviatite, a sulphide of lead and bismuth, has been found; and it also occurs with bismuthinite in Yauli, Lima, and Juaja, Junin.

Bolivia.—At the present time a large proportion of the bismuth ore produced is obtained from Bolivia. The most important deposits are situated at Tasna, where the ores, which include the native metal, carbonate, sulphide and ochre, are said to carry from 20 to 30 per cent. of bismuth, 10 to 17 per cent. of iron, 9 to 12 per cent. of sulphur, and traces of antimony, silver, and lead. The ores occur in quartz veins in slates at an altitude of 5,100 ft. The ore is smelted at Quechisla, the products being metallic bismuth and a copper matte carrying 5 to 8 per cent. of bismuth. The matte is re-smelted and about half the bismuth contained in it is recovered. The second matte is treated by the "wet process" described later.

Dressing of Bismuth Ores.

At first sight it would appear that the concentration of bismuth ores, owing to their high specific gravity, should present few difficulties. Owing, however, to the extreme brittleness of the minerals, they form slimes very readily when crushed, and so considerable loss occurs during dressing. The finely powdered mineral, even if saved by suitable slime treatment, is objectionable, as losses occur by "dusting" and also during calcination by reason of the ready volatility of bismuth. These difficulties, combined with the fact that many bismuth mines are only operated on a small scale, have caused the question of the effective concentration of bismuth ores to be much neglected. Recently more attention has been paid to the subject, and magnetic separation has been successfully employed in some cases as in the separation of wolframite.

A method of concentration formerly employed for ores containing native bismuth, or the sulphide, is that of liquation; but, owing to the losses involved in the process, it is now not often used. The process consists in heating the ore in inclined iron tubes closed at the top end, the lower end being fitted with a grating and arranged to deliver the molten matter into a graphite crucible containing a layer of carbon. The method of concentration sometimes employed in New South Wales is as follows: After being hand-picked the ore is crushed to ¼-inch size, and then treated in a sluice-box having a fall of 9 in. in 12 ft., being worked meanwhile with a shovel and birch broom. By this means a concentrate carrying 20 per cent. of bismuth is obtained which is treated again in a similar sluice-box, and, after removal of the larger pieces of molybdenite by hand, a product containing 50 to 60 per cent. of bismuth is obtained.

According to the Annual Report of the Minister of Mines for Queensland (1909, p. 95) the mill in operation in the Biggenden district (see this article) consists of a stonebreaker, sizer, and two 5-foot Huntington mills and the concentration plant of two Frue vanners, 1 card, and 2 Wilfley tables and an electromagnetic separator.

Extraction of Metallic Bismuth.

The concentrated ore is usually submitted for the extraction of the metal to one or all of a series of operations, which may be roughly divided into roasting, smelting and refining.

Roasting.—The ores containing arsenic, sulphur, or antimony, before being smelted, are crushed to pass a sieve having four meshes to the linear inch and then roasted with carbon. As neither "heap" nor "kiln" roasting is suitable for bismuth ores, the operation is best carried out in a long hearth, reverberatory furnace; a furnace having a hearth 16 ft. by 9 ft. is suitable for treating about six to seven tons of material per day. The charge is subjected during heating to constant rabbling to prevent the mass agglomerating and to assist the volatilization of the arsenic and antimony.

Smelting.—This is done either in crucibles or in a reverberatory furnace, the latter being the more economical unless small scale operations are intended. Descriptions and plans of suitable furnaces will be found in an article in The Mineral Industry (1907, 16, 112). Owing to the readily volatile character of bismuth the charge must be of a very fusible character, and usually contains 10 to 20 per cent. of sodium carbonate, together with oxide of iron, lime, and old slags in suitable proportions, and 3 to 5 per cent. of crushed coke or charcoal. The charge in the furnace is raised to a red heat, and when the bismuth is reduced the temperature is rapidly raised to a white heat. As soon as

the contents of the furnace are quite fluid the charge is run into iron moulds, which are often provided with a taphole at the bottom to permit of the still liquid bismuth being run off as soon as the top slag has solidified. This crude bismuth contains most of the lead, gold, silver, and antimony, and a small proportion of the arsenic and copper which were present in the original charge. The copper, for the most part forms a matte, whilst the nickel and cobalt form a speiss with part of the arsenic. Both the speiss and matte contain appreciable quantities of bismuth.

Several "wet" processes of extraction have been employed for the treatment of oxidized bismuth ores. One which was used at Meymac, France, for a number of years is as follows: The finely crushed ore is heated in earthenware pans with strong hydrochloric acid and the solution filtered from the insoluble gangue. By diluting this solution with a large excess of water the bismuth is precipitated as the oxychloride, which can be converted into the metal by treatment with iron or zinc. The method now usually employed at Meymac is to precipitate the bismuth from the acid solution by means of metallic iron and then melt the precipitated bismuth in a plumbago crucible under a layer of carbon.

Refining.—The crude bismuth produced by any of the above processes is not usually sufficiently pure to place on the market. Owing to the small affinity that bismuth has for oxygen, a process similar to that employed for refining lead is used. The molten bismuth is exposed for some time to the influence of atmospheric oxygen, which causes any tin, arsenic, antimony, sulphur, zinc, iron, etc., to be either volatilized or separated as "dross."

The percentage composition of crude and refined bismuth as produced in some of the most important centres is shown in the following table.

	Crude Bismuth.			Refined Bismuth.	
	Australia.	Bolivia	Peru.	Saxony.	
Bismuth.	96.2	99.05	93.57	99.74	99.98
Antimony.	0.8	0.56	4.57	—	—
Arsenic.	trace	—	—	0.01	trace
Copper.	0.5	0.26	2.06	0.02	0.03
Lead.	2.1	—	—	0.11	0.06
Iron.	0.4	—	—	trace	trace
Sulphur.	—	—	—	0.04	—
Silver.	—	0.08	—	0.07	—

Properties and Uses of Bismuth.

Bismuth is a silver white, lustrous metal, having a specific gravity 9.83 and melting at 270°C. In appearance it somewhat resembles antimony, but has a foliated texture.

Molten bismuth, on cooling, expands about 2.3 per cent. of its volume, a property which makes it of value in alloys used for the production of stereotype plates. The molten metal can be cooled 6°C below its solidifying point and still remain liquid, but when solidification occurs it is accompanied by a rise in temperature. The metal is not affected by dry air, but in the presence of moisture it becomes coated with a reddish powder. When raised to a red heat in air it burns with a bluish flame producing the yellow oxide, Bi_2O_3. Metallic bismuth has a very low thermal conductivity compared with silver, the ratio of the two being 1.8:100. Owing to its low melting-point, the metal is much used in fusible alloys; the composition of certain of these is given in the following table:

Name of alloy.	Melting point	Percentage composition Bismuth.	Tin.	Cadmium.	Lead
Rose's.	94°C.	50	25	—	25
Wood's. . .	66°C.-70°C.	50	14	12	24
Lipowitz'. . .	60°C.	50	13	10	27
Newton's. . .	94°C.	20	30	—	50

These figures show that the replacement of a portion of the tin by cadmium considerably lowers the melting point of the alloy.

An amalgam of bismuth and mercury with or without the addition of lead and tin is stated to be sometimes used for silvering mirrors.

A small quantity of bismuth, not exceeding 0.25 per cent., is a component of many anti-friction metals. Certain electric fuses have the composition: bismuth 50, cadium 15, lead 20, tin 21 parts. A solder used by pewterers consists of bismuth 25 per cent., tin 50 per cent., and lead 25 per cent.

Stereotype plates often contain bismuth; in one case the percentage composition is as follows: bismuth 15, lead 70, antimony 15.

Bismuth oxide (Bi_2O_3) has been used as one of the constituents of optical glass, and also for colouring porcelain and other purposes.

The basic subnitrate (oxynitrate) was at one time used as a cosmetic, but is now largely displaced by the cheaper zinc white.

Bismuth compounds also find considerable employment in medicine, the chief of these being the oxide, oxycarbonate, oxynitrate, and salicylate.

Commercial Value of Bismuth Ores.

Owing to the fact that the principal European bismuth smelters are members of an association which regulates the price and output of the metal, there is practically no competition amongst buyers, and the market is very restricted.

Ores containing less than 10 per cent. of bismuth are not usually saleable. As is usually the case with metallic ores, those containing a high percentage of the metal realize a higher price per unit than those of lower grades. No definite information can be given as to the value of bismuth ores, but the following statement, based on data given in The Mineral Industry (1907, 16, 118), may be of service in affording approximate estimates of value.

If the value of an ore containing 10 per cent. of bismuth is taken as unity, the value of a 15-per-cent. ore would be 1.7, a 20-per-cent. ore 2.3, a 30-per-cent. ore 3.7, a 40-per-cent. ore 5.0, and a 50-per-cent. ore 6.7. With metallic bismuth at 6s. 8d. per lb., the value of a unit varies from £18 15s. to £20 16s., e.g., an ore carrying 15 per cent. of bismuth would be worth £31 17s. 6d. to £35 7s. per ton. These prices are c.i.f. smelting works. Gold and silver in the ore is either not paid for at full rates or a treatment charge is made.

Other constituents present in the ore may also influence its selling value. Copper, iron, and arsenic are stated to be objectionable (Mineral Industry, 1909, 18, 74). Up to 10 per cent. of copper is permitted in an ore carrying 25 per cent. of bismuth, and up to 2 per cent. in ores carrying 6 per cent. or less of bismuth. Up to 10 per cent. of iron is permitted; arsenic must not exceed 12 per cent.

Early in 1905 the price of bismuth was 9s. per lb., but during the year it was reduced to 5s.; in 1907-9 the price was 6s. 6d.; the current value is 7s. 6d. per lb.

Production of Bismuth Ores.

Statistics of production of bismuth ores in recent years, so far as they are available, are given in the following table:

Specimens of bismuth ores from the following localities in the British Empire are shown in the Public Exhibition Galleries of the Imperial Institute.

Queensland—Erin Mine, Eidswold; Cloncurry; Mount Biggenden; Chowney Creek; Kaboonga, near Kilkivan; Mount Shamrock, Maryborough.

New South Wales.—Mount Gipps, Barrier Range; Jingera, Co. Auckland; Kingsgate, New England.

Tasmania.—Middlesex district.

	1908.		1909.		1910.		1911.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Metric tons.	£	*Metric tons.*	£	*Metric tons.*	£	*Metric tons.*	£
Germany[1] .	8,535	33,000	10,388	33,700	10,313	31,450		
Italy[2] . .	—	—	12	48	—	—	not available	
Norway . .	12	330	—	—	5	1,377		
Spain . .	96	1,920	78	1,621	53·5	—		
New S. Wales	9	2,017	9	1,624	6·0	2,004	8	1,800
Queensland[3] .	23	10,595	10·5	2,771	21	9,708	10	5,525
S. Australia .	2	300	—	—	—	—	—	—
Tasmania .	3·8	462	2·9	980	11	4,249	14·5	5,758
United States[4]	2·3	—	No returns		41	—	not available	
Bolivia . .	160	24,552	311	153,873	237	116,086		
Peru . .	9	1,908	30	9,772	24	7,556		

[1] *Bismuth, nickel, and cobalt ores.* [2] *Bismuth, silver, cobalt, and gold ores.*

[3] *Also produces mixed bismuth and wolfram concentrates. In* 1911 *the quantity was* 129 *tons, valued at* £11,564.

[4] *Metallic bismuth from refining of lead and copper ores.*

THE ANNUAL MEETING OF THE CANADIAN MINING INSTITUTE

The final programme for the Annual Meeting of the Institute, which will be held in Ottawa on March 5th, 6th, and 7th, next, is as follows:

Wednesday Morning.

The meeting will be opened at 11.00 p.m. by H.R.H. the Governor-General. The President, Dr. A. E. Barlow, will then deliver an address. This will be followed by the consideration of proposed amendments to the By-laws; and by the presentation of mineral statistics for the year 1912 by Mr. John McLeish, of the Mines Branch of the Department of Mines, Ottawa; by Mr. T. W. Gibson, Deputy Minister of Mines of Ontario; by Mr. T. Denis, Superintendent of Mines of Quebec; and by Mr. W. Fleet Robertson, Provincial Mineralogist of British Columbia.

Wednesday Afternoon.

At this session the papers will be mainly relative to mining industries in the vicinity of Ottawa, and will include the following: "Mica Mining in Canada," by Hugh de Schmid, Ottawa; "Mica Manufacture and Marketing," by S. O. Fillion, Ottawa; "The Origin of Graphite," by John Stansfield, McGill University, Montreal. These papers will be followed by a short lecture by Mr. J. J. Penhale, of Sherbrooke, on "The Evolution of Mining and Milling Asbestos in the Eastern Townships of Quebec."

Wednesday Evening.

On Wednesday evening Dr. Henry M. Payne, of New York will lecture on "The Development and Problem of the Yukon." The chair at this session will be occupied by Dr. Alfred M. Thompson, M.P., of Dawson, Y.T., who will introduce the lecturer, and also deliver an address on "The Progress of Mining in the Yukon."

Thursday Morning.

The papers at this session will relate more particularly to the metallurgy of the gold and silver ores of the Porcupine and Cobalt districts, respectively. They include: "Cyanide Practise in Canada," by Herbert A. Megraw, New York; "The Metallurgy of the Porcupine Gold Ores," by D. L. H. Forbes, Toronto; "Grading Analyses, and Their Application to Cyanidation, Classification, etc.," by John W. Bell, McGill University, Montreal; "The Measurement of Compressed Air Delivered by the Hydraulic Compressor at Cobalt," by C. H. Taylor, Toronto, and "Notes on Mine Sampling," by G. C. Bateman, Toronto.

Thursday Afternoon.

All the papers to be presented at this session will deal with iron mining or metallurgy. They include the following: "Aglomeration of Iron Ores," by N. V. Hansell, New York; "Prospecting the Iron Sands of Natashkwan, Quebec, with the Empire Drill," by G. C.

Mackenzie, Mines Branch, Department of Mines, Ottawa; "The Steel Industry of Nova Scotia," by Thos. Cantley, New Glasgow, N. S.; and "Iron Mining in Cuba," by Chas. F. Rand, New York.

Thursday Evening.

In keeping with tradition, Thursday evening has been set apart for the annual smoking concert. The programme has been arranged entirely by a local committee, who, while refusing to divulge details, have given assurances that the entertainment will eclipse all former efforts in this direction.

Friday Morning.

The following papers will be presented: "Recent Advances in our Knowledge of the Sudbury Region," by A. P. Coleman, Toronto; "Money Metal," by Wm. Campbell, New York; "Magmatic Origin of the Sudbury Nickel Copper Deposits," by Reginald E. Hore, Houghton, Mich.; "Some Notes on the Pearl Lake Section of the Porcupine District," by H. G. Skavlem, Aura Lake, Ont.; "Investigations of the United States Bureau of Mines in Metal Mines," by George S. Rice, Pittsburg, Pa.; "State Aid to Mining in Australasia," by H. Mortimer-Lamb, Montreal.

Friday Afternoon.

"The Clay Deposits of Western Canada," by Heinrich Ries, Ithaca, N.Y.; "Core Drilling," by P. H. Moore, Toronto; "An Economic Investigation of the Coals of Canada," by J. B. Porter, McGill University, Montreal; "The Lignites of Saskatchewan," by R. O. Wynne Roberts, Regina, Sask.; "Prospecting and Washing for Diamonds," by W. J. Dick, Ottawa; "Recent Metallurgical Developments," by Alfred Stansfield, McGill University, Montreal; "The Pulmotor in Mine Rescue Work," by Henry E. Bertling, Toronto.

Friday Evening.

The annual dinner will be held at 7.30 p.m. The feature this year will be that music is substituted for the usual long toast list, the only speaker of the evening being the Right Hon. R. L. Borden, who will be the guest of honor.

WHY THE NICKLE PLATE MINE WAS SOLD

By E. Jacobs, Victoria, B.C.

When in Spokane, Washington, last November, I had a talk with Mr. F. A. Ross, formerly general manager for the executors of the late Marcus Daly, of the Nickel Plate group of gold mines, in Hedley camp, Similkameen, and the 40-stamp mill at Hedley, relative to the sale of that property to the syndicate that organized the present Hedley Gold Mining Co. Reflections on Mr. Ross' management of the mines and statements concerning the sale of the property by the Daly interests having been publicly made, I was desirous of hearing the other side of the story. Immediately after my return to Victoria I had to give all my time and attention to the work of preparing the several annual reviews of mining in British Columbia, since published in half a dozen influential mining journals, so had to defer for the time putting in shape for publication what Mr. Ross told me of the circumstances that led to the sale of the property. Quite recently, however, I received a copy of the Northwest Mining News, edited by Mr. L. K. Armstrong of Spokane, and in that journal found printed a copy of a paper on "The Microscope in Mining Geology," by Mr. C. A. Stewart, professor of geology, at the Idaho State University, Moscow, Idaho, and discussion by Mr. Ross of that paper, at the time it was read before the Spokane Local Section of the American Institute of Mining Engineers. I shall not now give a synopsis of Professor Stewart's paper, but shall quote only Mr. Ross' comments, as follows:

"Professor Stewart's paper is timely and to the point. With the passing years we grow more dependent upon practical applications of the principles of economic geology in the search for new ore bodies and too much emphasis, therefore, cannot be placed upon the importance of that science and of all that relates thereto. From Yucatan to the Yukon, our continent has been well-combed by prospectors, ancient and modern, until most of those bonanzas have been located and worked that had their signs sticking out of the ground, as if saying to all who passed that way, 'Here I am, come and get me.' In future, then, the proverbial tenderfoot luck and prospector's grind must give way, in large measure, to logical reasoning and deduction, well exemplified by Parke Channing's brilliant work at Miami.

"In exploratory work, especially, whether of examination prior to purchase or undertaken in the development of ore reserves, the part played by microscopic analysis of rock sections is most important. Yet there are instances in which geological theories must fail in advance of exploratory work and the discovery of 'the law of the camp.' Such instances are those in which detached ore bodies or shoots lie in different planes or horizons, as they do in Nickel Plate mountain, Hedley, British Columbia. Here, the tilted and contorted sedimentaries are penetrated and parted along their bedding planes by spurs and sheets of monzonite that have so altered and silicified the limestones at points of contact as entirely to mask their identity to the naked eye and to cause experienced geologists to classify them as quartzites, by which name they were known for years, before rock sections were made, just as the monzonites were called andesites. Microscopic analysis showed the presence of the critical minerals and indicated deep-seated action, resulting in the formation of true contact metamorphic deposits of arsenical pyrites containing gold and presenting peculiar and unique mining and geological problems as well as a delicate problem in professional ethics and commercial expediency.

"Prior to 1909, when it changed hands, there was but one known ore-bearing horizon on this property, nor was any other discovered until two years later. When, therefore, this known horizon, or contact, showed signs of exhaustion and when systematic surface prospecting and extensive underground exploration had failed to open new ore bodies, a comprehensive plan for development became necessary, and, owing to the absence of guiding indications such as veins, fissures, mineralizing dikes, etc., the preliminary estimates of the possible cost of this work ran very high. Pay-ore might occur anywhere in depth, or nowhere at all. So far as could be foreseen, it meant a detailed exploration of the entire mountain and the odds against

finding pay-ore with a minimum of work and expense appeared very great. Moreover, competent geologists had already been consulted and there seemed to be no hope of aid either from analagous reasoning or geological deduction, inasmuch as this formation is unique, according to the best authorities.

"Consequently, without a reasonably positive assurance of success, which could not, of course, be given, the owners were reluctant to authorize the expenditure, especially since it had become necessary to remodel the entire plant owing to the disappearance of free gold with depth. They determined, therefore, to sell, at a profit on their investment, to others who stood ready to purchase on the showing at that time, and to take the very long 'mining chance' that remained. The new owners entered at once upon the necessary expenditures for plant improvement and development, and, after some two years' work, when the old workings were practically exhausted, were very fortunate in finding another ore-bearing horizon or contact, several hundred feet below the lowest of the old workings, thereby prolonging the life of the property and once more proving the fact that long odds sometimes win out.

"Now the ethical question, and the commercial expendiency, involved in this case was this: In cases of grave doubt, should managers advise and encourage heavy expenditures solely on the basis of the 'mining chance,' thereby risking a total loss, or should they advise for safety and an assumed profit? At first sight there would seem to be but one answer to such a question, assuming, of course, that the first duty of a manager to his principals is to protect them from ultimate loss. Yet, as everyone knows, mine owners in general more readily forgive advice that causes heavy loss when ore does not materialize than they do advice that loses them the profit others may make out of ground they once owned, notwithstanding the fact that the percentage of cases under the first condition is vastly in excess of that under the second, as the history of mining conclusively shows.

"It is precisely this peculiarity of human nature that decides many examining engineers, mine managers, and geologists in taking long chances on unduly favourable predictions. It is true that conditions are gradually changing in this respect as regards the heavier mining investors. These men are learning to appreciate conscientious reports and conversative advice, and they value accordingly the services of those who make them or give it. But with the general investing public it is still as it always has been—optimism is expected and demanded and the only unpardonable sin is advice that loses a possible profit that others realize, no matter how long the odds.

"To return then to Professor Stewart's excellent paper—the aids offered by rock sections in exploratory work cited by him would doubtless fail in formations similar to the one just described—at least in advance of exploratory work sufficient to demonstrate the 'law of the camp' if this were possible, which at present writing and in this instance appears doubtful."

NAMES OF MINERALS

By Wm. Thomlinson, New Denver, B.C.

The following was written for publication in a mining district of British Columbia. It was prove readable as well to some of those interested in minerals and resident in some of the many other mining camps in which The Canadian Mining Journal is read:

Many prospectors and miners have a habit of making rude remarks regarding the technical names of rocks and minerals. They may be justified in doing so, or, perhaps, it may be, that as the Arabs say, "they don't know what they don't know," therefore may be excused.

As a sort of pastime I have looked up this matter of technical names and find that really there is as much "method in the madness" of the mineralogists as in the work of other men who are responsible for the names used in botany, horticulture, pomology, and so on.

Our worthy metal-miners rail at such names as Rhodonite, for a rose-pink mineral, but are respectfully silent when a botanist calls a shrub a Rhododendron; Cauliflower, for a vegetable, and Duchess of Oldensburgh, for an apple, are quietly accepted; but when a miner, who has been some to school, speaks of calcite, bornite, argentite and so on, some proudly practical friend is sure to retaliate with professional words used mostly by sailors, teamsters, and troopers.

More in sorrow than in anger I shall try to show that the technical names for minerals, such as Fluorite, Bornite, Smithsonite, etc., are nearly as appropriate as "Blue John," "Black Jack," "Dry-bone ore," "Horseflesh ore," "Turkey-fat ore," "Spiderleg," and "Mustard" gold.

Upwards of eight hundred different minerals are known to mineralogists and it was evidently "quite a job" to find for them all names not previously taken for use in other branches of science. However, they seemingly did the best they could under the circumstances.

Referring to about two hundred of the commoner economic minerals, the names are mainly formed from the names of places where the minerals were first found; from names of persons who first noted the minerals or proved their composition, or some peculiarity of shape, colour, weight, or other physical property of the mineral.

The following are examples of how the names are derived:

From Names of Places.

Altaite, telluride of lead, found in the Altai mountains, Russia.

Bauxite, hydrous-oxide of aluminium, at Baux, in France.

Franklinite, an iron-zinc-manganese mineral, at Franklin, New Jersey, U.S.A.

Calaverite, telluride of gold and silver, found in Calaveras county, California.

Muscovite, white mica, first used for windows at Moscow, Russia.

From Names of Persons.

Sperrylite, arsenide of platinum, after Mr. Sperry, who discovered the mineral at Sudbury, Ontario.

Stephanite silver, antimony and sulphur, "brittle silver ore," after a Grand Duke Stephan of Austria.

Proustite, silver, arsenic and sulphur, "arsenical ruby silver ore," after Dr. Proust, who first noted the difference between this mineral and the antimonial ruby silver ore, Pyrargyrite.

Bornite, copper, iron and sulphur, "peacock copper ore," after Mr. Born, who first determined its composition.

Millerite, Garnerite, Smithsonite, and a large number of others are named in this manner.

From Forms of Crystals.

Tetrahedrite, "gray copper ore," from two Greek words meaning for faces or sides. the mineral, when crystalized, having a four-sided wedge-like form.

Octahedrite, titanium oxide, similarly because of its eight-sided form.

Orthoclase, potash feldspar, from two words meaning right and cleavage, the mineral splitting or having cleavage lines at right angles.

From Colour and Other Peculiarities.

Hematite, an oxide of iron, from a Greek word meaning blood, the mineral when powdered has a dark red blood colour.

Rhodontie, manganese silicate, from a Greek word for rose, the mineral has a rose-pink colour.

Azurite, a carbonate of copper, of azure blue colour.

Maganetite, a black oxide of iron, so named because it is highly magnetic.

Barite, sulphate of barium, "heavy spar." Name from a Greek word meaning heavy.

Tungsten, from Swedish words meaning heavy stone, its great weight being noticeable.

Petroleum, derived from the Latin words meaning literally rock oil. Many minerals and economic substances are named in this manner.

Some minerals are named after the principal metal or element found in their composition, as cobaltite, nicolite, biscuthite, and so on. A number of metals and minerals were known and used ages ago, and in many cases the old Greek, Latin, and other names are still used by chemists and other scientific men. These are examples: Gold, aurum; silver, argentum; copper, cuprum, also chalco, lead, plumbum; iron, ferrum, also sideros; antimony, stibium; tin, stannum; lime, calx. From these are derived such names as argentite, sulphide of silver; cuprite, red oxide of copper; chalcocite and chalcopyrite, two other copper-bearing minerals; siderite, carbonate of iron; stibnite, sulphide of antimony; stannite, sulphide of tin and copper; calcite, "lime spar," carbonate of lime.

It is not assumed that scientific men are entirely blameless in the matter of coining or selecting names for rocks, minerals, etc., but it may be reasonable to remember and consider the size and difficulty of the task of finding such a large number of suitable names.

However, if any fiercely practical prospector or miner will be good enough to furnish a list of, say, 600 short, apt, and easily pronounced names, suitable for rocks and minerals, the writer will be happy to reforward the same for careful consideration to the next congress of "rock sharps," "mining experts" and mineralogists.

THE COPPERMINE COUNTRY

By J. B. Tyrrell

(Continued from our last issue.)

After Hearne's visit in 1771 no white man visited the country for fifty years, until Sir John Franklin arrived at the head waters of the river, and then descended and made a survey of it from Point Lake to the Arctic Ocean. Franklin's account of the country is interesting. He states:

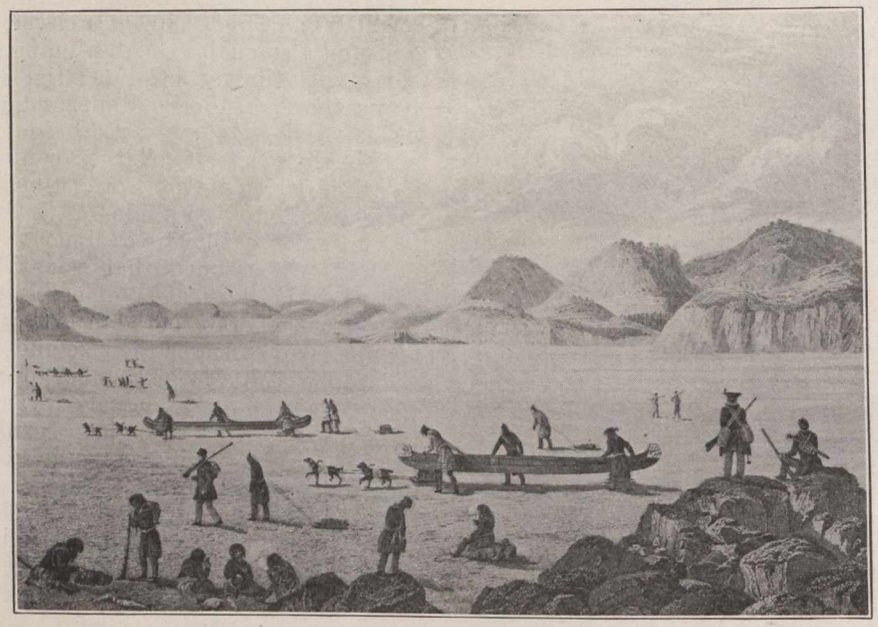
"We rejoined our hunters at the foot of the copper mountains, and found they had killed three musk-oxen. This circumstance determined us on camping to dry the meat, as there was wood at the spot. We availed ourselves of this delay to visit the copper mountains in search of specimens of the ore, agreeably to my instructions; and a party of twenty-one persons, consisting of the officers, some of the voyagers ,and all the Indians, set off on that excursion. We travelled for nine hours over a considerable space of ground, but found only a few small pieces of native copper. The range we ascended was on the west side of the river, extending W.N.W. and E.S.E. The mountains varied in height from twelve to fifteen hundred feet. The uniformity of the mountains is interrupted by narrow valleys, traversed by small streams. The best specimens of metal we procured were among the stones in these valleys, and it was in such situations that our guides desired us to search most carefully. It would appear that when the Indians see any sparry substance projecting above the surface, they dig there; but they have no other rule to direct them, and have never found the metal in its original repository. Our guides reported that they found copper in large pieces in every part of this range, for two days' walk to the northwest, and that the Esquimaux come hither to search for it. The annual visits which the Copper Indians were accustomed to make to these mountains, when most of their weapons and utensils were made of copper, have been discontinued since they have been enabled to obtain a supply of ice-chissels and other instruments of iron by the establishment of trading posts near their hunting grounds. That none of those who accompanied us had visited them for many years was evident, from their ignorance of the spots most abundant in metal.

"The impracticability of navigating the river upwards from the sea, and the want of wood for forming an establishment, would prove insuperable objections to rendering the collection of copper at this part worthy of mercantile speculation."

Among the members of Franklin's party was Sir John Richardson, the great naturalist, and his account of it is much more detailed than that given by his chief and is here appended:

"The Copper Mountains appear to form a range running S.E. and N.W. The great mass of rock in the mountains seems to consist of felspar in various conditions; sometimes in the form of felspar rock or claystone, sometimes coloured by hornblende, and approaching to greenstone, but most generally in the form of dark reddish-brown amygdaloid. The amygdaloidal masses, contained in the amygdaloid, are either entirely pistacite (epidote), or pistacite enclosing calc-spar. Scales of native copper are very generally disseminated through this rock, through a species of trap tuff which nearly resembled it, and also through

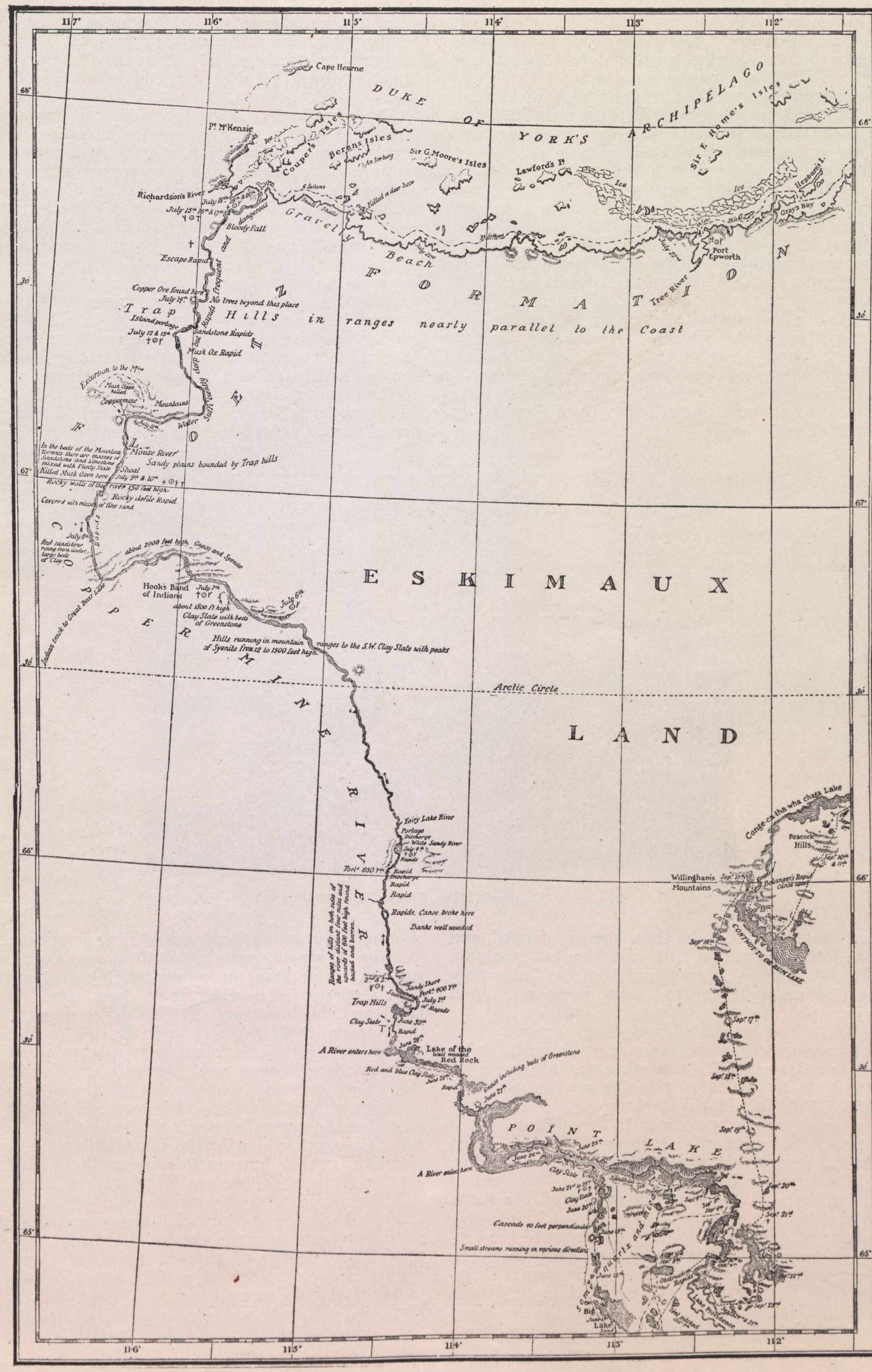
a reddish sandstone on which it appears to rest. When the felspar assumed the appearance of a slaty claystone, which it did towards the base of the mountains on the banks of the river, we observed no copper in it. The rough and in general rounded and more elevated parts of the mountain are composed of the amygdaloid; but between the eminences there occur many narrow and deep valleys, which are bounded by perpendicular mural precipices of greenstone. It is in these valleys, was crystallized in rhomboidal dodecahedrons. We also found some large tabular fragments, evidently portions of a vein consisting of prehnite, associated with calcareous spar, and native copper. The Indians dig wherever they observe the prehnite lying on the soil, experience having taught them that the largest pieces of copper are found associated with it. We did not observe the vein in its original repository, nor does it appear that the Indians have found it, but judging



On Point Lake, June 25th, 1821

amongst the loose soil, that the Indians search for copper. Amongst the specimens we picked up in these valleys, were plate of native copper; masses of pistacite containing native copper; of trap rock with associated native copper, green malachite, copper glance or variegated copper ore and iron-shot copper green; and of greenish grey prehnite in trap (the trap is felspar, deeply coloured with hornblende), with disseminated native copper; the copper, in some specimens, from the specimens just mentioned, it most probably traverses felspathose trap. We also picked up some fragments of a greenish-grey coloured rock, apparently sandstone, with disseminated variegated copper ore and copper glance; likewise rhomboidal fragments of white calcareous spar, and some rock crystals. The Indians report that they have found copper in every part of this range, which they have examined for thirty or forty miles to the N.W., and that the Esquimaux

Bloody Falls, July 17th, 1821


Cape Hearne
DUKE OF YORK'S ARCHIPELAGO
Pt. McKenzie
Couper's Isles
Berens Isles
Sir G. Moore's Isles
Lawford's I.
Sir E. Home's Isles
Hepburn I.
Gray's Bay
Richardson's River
Bloody Fall
Gravelly Beach
Port Epworth
Tree River
Escape Rapid
Copper Ore found here
No trees beyond this place
Trap Hills in ranges nearly parallel to the Coast
Island portage
Sandstone Rapids
Musk Ox Rapid
Coppermine Mountains
Mouse River
Sandy plains bounded by Trap hills
Rocky defile Rapid
Hook's Band of Indians
Clay Slate with beds of Greenstone
Indian track to Great Bear Lake
ESKIMAUX LAND
Arctic Circle
COPPERMINE RIVER
Fairy Lake River
White Sandy River
Rapids. Canoe broke here
Banks well wooded
Trap Hills
Lake of the Red Rock
A River enters here
POINT LAKE
Congecatha wha chaga Lake
Peacock Hills
Willingham's Mountains
Belanger's Rapid
CONTWOYTO OR ROM LAKE
Cascade 40 feet perpendicular
Small streams running in various directions
Big Lake
Lake Providence
117° 116° 115° 114° 113° 112°
68° 67° 66° 65°

come hither to search for that metal. We afterwards found some ice-chisels in possession of the latter people twelve or fourteen inches long, and half an inch in diameter, formed of pure copper."

In the same year, 1821, Franklin and Richardson found trap rocks of the copper-bearing series eastward along the Arctic coast for nearly two hundred miles, or as far as the east side of Bathurst Inlet, though no copper or copper ore seems to have been found in them.

On Franklin's second journey in 1826 Richardson recognized the existence of rocks of similar character at a number of points along the Arctic coast for 200 miles west of the Coppermine river.

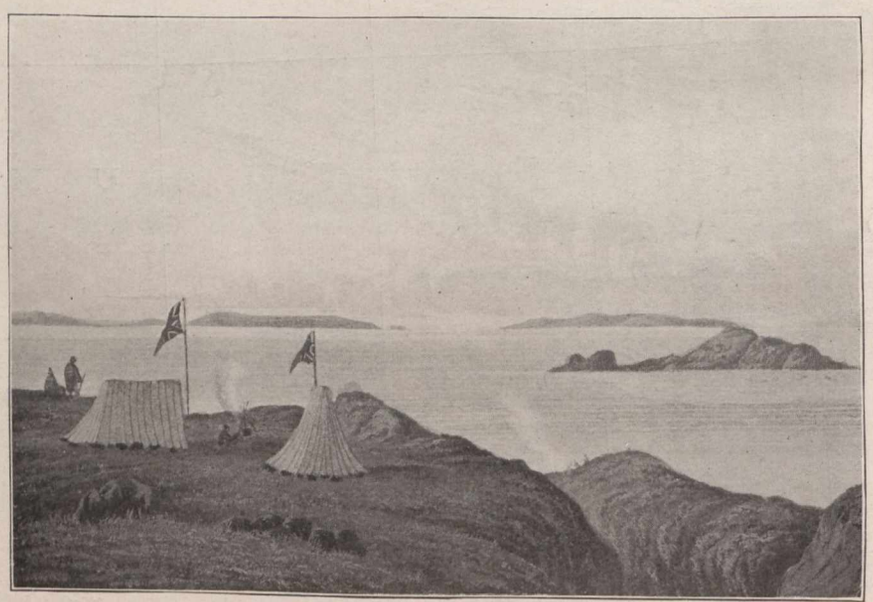
From the description quoted above it would appear that the rocks on the Coppermine river are similar to the copper-bearing rocks on Lake Superior, and that the conditions under which the copper occurs are also similar to them under which it occurs on Keewenaw Poin on the south shore of Lake Superior. Speaking broadly, these rocks would appear to indicate a repetition to the north of the great Archean protaxis of the conditions which have prevailed on Lake Superior to the south of it.

tained in a letter from Mr. V. Stefansson, dated Langton Bay, July 1st, 1911, and addressed to Dr. H. C. Bumpus, Director, American Museum of Natural History, New York City. Mr. Stefansson writes as follows:—

"That copper was to be found on the Coppermine river has been generally known for more than a century; we found, however, that even the Eskimos nearest the river, while they pick up some copper on the banks occasionally, depend chiefly on the richer deposits north of Dismal lake. Neither of these regions is rich in native copper, however, compared with the mountains northeast of Prince Albert Sound" (on Victoria Land).

This is the first record of the occurrence of native copper or the copper-bearing rocks on any of the large islands in the Arctic Ocean, and as Prince Albert Sound is probable accessible to ocean-going ships by way of Behring Sea, the locality might be much easier to explore and mines might be much more readily developed than in the districts on the mainland in the vicinity of the Coppermine river.

Judging from the evidence here presented, the existence of a great copper-bearing area on the Arctic coast



Mouth of Coppper Mine River, July 20th, 1821

Since Franklin and Richardson visited, mapped, and described this region, very little attention has been paid to it, though Thomas Simpson and John Rae both crossed the Coppermine river, and make mention of it in their journals.

The traps and associated rocks may cover a very much larger area than we know of at present, for, in 1903 I found them on the north shore of Doobaunt lake, and on the Doobaunt river below the lake. As late of 1902 the late David Hanbury ascended Coppermine river as far as the portage to Great Bear lake in his journey from Hudson Bay to the Mackenzie river, and he has mentioned in his book that one of his men named Sandy, while tracking up the river, "was nearly tripped up by a chunk of native copper on the shore. I weigher about twelve pounds."

An important addition to our knowledge of the copper-bearing rocks of the northern coast of America has just been brought to my attention by Dr. James Douglas, of New York, and I am permitted to publish it through the kindness of the secretary of the American Museum of Natural History. The information is con-

of America near the Coppermine river is certain, and it is also reasonably certain that that area is very much more extensive than the copper-bearing area south of Lake Superior, extending, as it does, from Victoria Land and the hills west of the Coppermine river, to the shores of Bathurst Inlet far to the east, but whether native copper will be found anywhere as plentifully distributed or in such rich segregations as on Keewenaw Point, is yet quite uncertain. As the copper-bearing area in Northern Canada is larger it is quite possible that the mineral deposits may be similarly larger, and it is worth while for the Canadian people to find out whether they have in this far northern country a great reserve of copper ore for the use of themselves and the world when the mines that are now being worked shall become depleted. It may seem foolish for us to spend money at the present time to determine the existence of bodies of ore which we cannot use, but copper is one of the most useful metals in the world to-day, and it behooves a nation like an individual to study its ore reserves in order that it may deal with them wisely, and have them developed in such a way

HENDERSON TALC MINE, MADOC, ONT.

Pillar and Wall Solid Talc.—This is second of series of underground photographs of Canadian Mines.

that they will bring the greatest benefit to the people. Therefore, I say that we Canadians, knowing that we possess an area of potential wealth in copper in that far northern country, should examine it carefully and find out whether we have a natural asset there that, if intelligently used, will add greatly to the wealth of the nation, or whether we are prepared to hand over that possible asset without knowing whether it is valuable or not, to private individuals, who, by the expenditure of a little capital and energy, may make enormous fortunes as a result of our negligence.

NEW TYPE MINE LOCOMOTIVE

The accompanying illustrations show a new type of mine locomotive which has recently been placed on the market by the Baldwin Locomotive Works and the Westinghouse Electric & Mfg. Co. The notable features are the open, cast-steel bar frame and the specially designed commutating pole mine motors shown in Figs. 2 and 3.

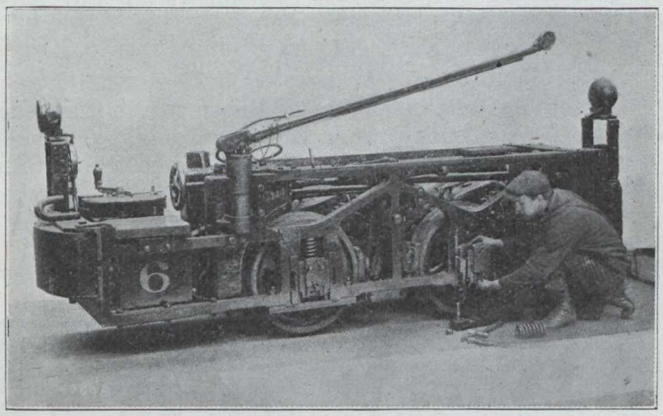


Fig. 1

This type of locomotive is distinguished for its accessibility, simplicity, durability and strength. It is claimed that it will operate satisfactorily under the worst conditions with minimum attention and maintenance expense. The frame is designed to give maximum strength and to allow ready access to all parts so that the locomotive can be inspected and overhauled, when

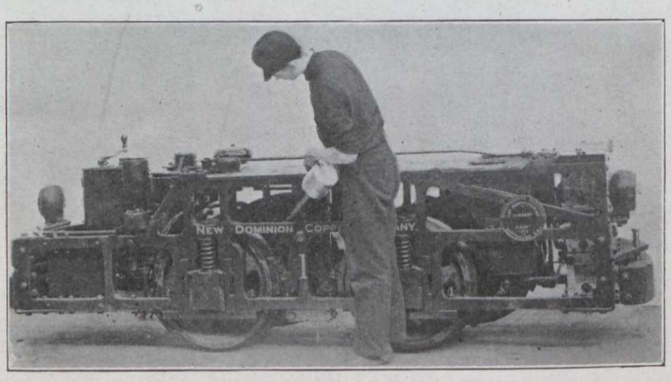


Fig. 2

necessary, in the least possible time. The construction is the same as that used on heavy Baldwin steam freight engines.

The open frame gives much better ventilation to the motors and resistance than that obtained by armour-plate frame construction. The motors, brake rigging, brake shoes and sand boxes are easily accessible. The upper parts of the motors and armature bearing housings can be removed without disturbing the suspension, so that each part of the motor is exposed for inspection. To remove the grid resistors the only work necessary is to take off the locomotive covers and loosen the bolts and terminals that hold the resistor frames in place.

An attractive feature introduced on locomotive with outside frames is the Vauclain removable gib. To remove a journal box with this gib, it is only necessary to

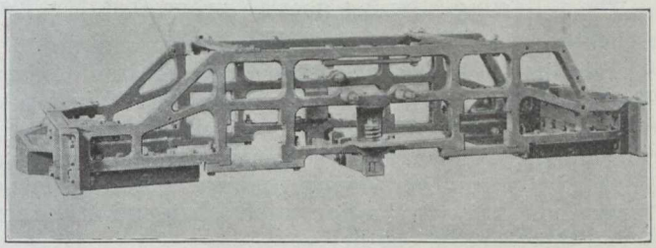


Fig. 3

drop the binder and take the weight off the journal box. The journal box may then be slipped out from the side as shown in Fig. 4. On locomotives with inside frames the journal box cellars are arranged to be easily dropped out for re-packing. If it is desired to take out a set of wheels and axle, this may be done without disturbing the motor suspension or connections by simply

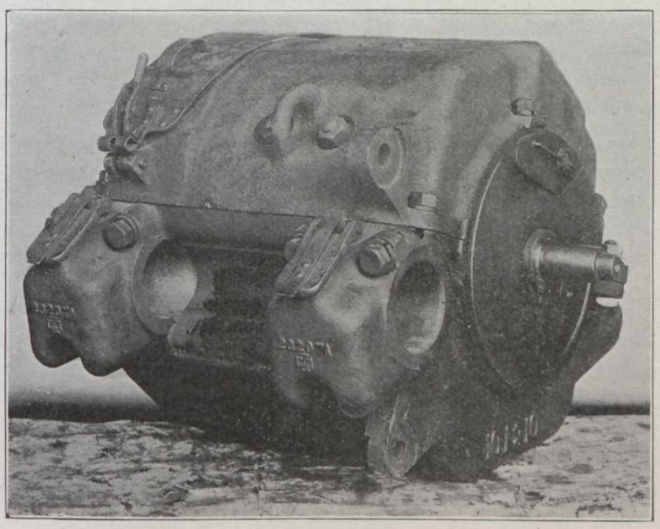


Fig. 4

blocking the motors in place and removing the binders. The wheels may then be dropped.

The motors used in this locomotive have decided advantages over other types, of which their excellent commutation, due to the use of commutating poles, is of first importance, because it increases reliability of operation and cuts down the cost of maintenance. With good commutation, the commutator and brushes require very little attention and brush renewals are sel-

dom necessary. The insultation of armature and field coils remains in good condition for a much longer time than on other types because of the absence of copper and carbon dust.

The frames of the motors are made of cast steel and are split diagonally. The axle bearings and suspension nose are on the lower half of the frame, so that the upper half, the armature, and bearing housings can be removed without disturbing the suspension or axle brackets. The armature core is mounted on a spider to which it is keyed, making it possible to remove the shaft without disturbing the windings, and also reinforcing the shaft against bending. Large openings are provided in the spider and through the core to give sufficient ventilation.

NATIONALIZATION OF MINES

The following clipping goes to prove that Mr. Keir Hardie, M.P., can be as visionary as the best:

"London, Feb. 18.—The Miners' Federation of Great Britain has declared by a majority of 60,000 in a total vote of 232,000 in favour of a five-day working week for miners. The executive committee, however, has adopted a resolution saying that the majority is not large enough for any action to be taken and that there must, therefore be another vote.

"J. Keir Hardie, M.P., has stated that within a few months the labor party, in conjunction with the miners' federation will begin a great campaign for the nationalization of the mines. He says that a bill to accomplish this is now being drawn and will soon be presented in Parliament. According to the terms of the bill, the mines are to be paid for with government stock, a second fund being provided to redeem the stock within a given period.

"The mines would not be bought on stock exchange quotations. That would mean that they would cost at least $750,000,000, but another way of setting a price would be adopted by which the cost to the government would be reduced to not more than $375,000,000.

"If the mines were nationalized, Mr. Hardie declares, coal would be sold at a fixed price, just as postage stamps are at present, and the cost of coal to the consumer would probably not exceed one-half of what was now being paid. By the plan under consideration, the mines would not be controlled by a manager appointed by the government, but would be managed on much the same lines as the national railways in France. Every time there was a dispute a committee of workmen appointed by the workmen from their own ranks should meet to consider the dispute and the decision of that committee should be binding upon the manager as well as the workmen."

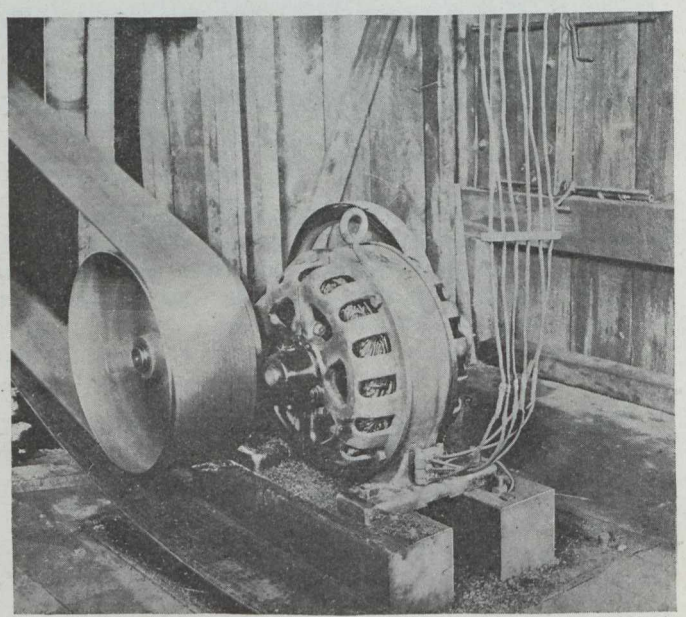
TWO-SPEED A.C. MOTOR FOR MINE FAN DRIVE

An excellent emaple of the efficient adaptation of electricity to mine service is illustrated in the accompanying picture, which shows a two-speed, alternating current, three-phase, 60-cycle, 440-volt motor, belted to a Guibal 12-foot fan installed in the Greensburg No. 1 mine of the Keystone Coal Company, near Greensburg, Westmoreland county, Pa.

The force of miners is considerably less at night than during the daytime, and consequently it is desired to run this fan at only about one-half the speed at night that is required during the day. For this service there was selected a Westinghouse type 661 squirrel-cage type induction motor, with a rating of 7½ horse-power at 600 r.p.m., and 15 horsepower at 1,200 r.p.m.; the other characteristics being as mentioned above.

The change in speed is accomplished by changing the number of poles. The stator of the motor is provided with two windings; one of which gives 6 poles, resulting in a speed of 1,200 r.p.m., and the other gives 12 poles, with a speed of 600 r.p.m. The connections are changed for one set of winding to the other by the controller. This is a most efficient form of control for an installation of this kind, as the motor of control for an installation of this kind, as the motor can be operated at low speeds at its highest efficiency, there being no losses in the control resistance. The motor itself is particularly well adapted to this class of service on account of its rugged characteristics, which insure great reliability of service.

Current for the operation of this motor is furnished by the West Pennsylvania Electric Company. In order to determine the results obtained from the installation, tests were made by Mr. C. V. Elliott, electrical engineer of the Lighting Company, which showed the following results:



The fan is 5 feet 6 inches wide, and the depth of blades 3 feet 6 inches. When running at 120 r. p. m., with 1.5 inches water gauge, or an equivalent pressure of .87 ounces per square inch, 46,200 cubic feet of air per minute were delivered. The motor in performing this work took 9.6 k.w., giving an efficiency of 63.03 per cent. for the outfit. When running at half speed, or 60 r.p.m., with .6 inch water gauge, or .29 ounce pressure per square inch, 14,850 cubic feet per minute were delivered, and an efficiency of 58.33 per cent. was obtained.

These results are particularly important, as they show economy in the use of purchased power, which is becoming standard practice where alternating current is available.

NEW COAL FIELDS IN ENGLAND

The following extract from the Boston News Bureau has considerable interest:

Boston.—The Boston News Bureau some months ago gave brief notes of the discovery of coal by borings in the county of Kent, England, where for a thousand years it has been believed impossible that coal could be found.

Now the London people are in a wordy warfare as to the value of Kent coal. It is indeed difficult to eradicate the British prejudice or to convince a dweller in London that there is just as good coal to the southeast as to the north and west of London, and coal in tens of thousands of acres.

When Sir Edward Watkin, in 1891, started his Channel tunnel at the Shakespeare cliff just below Dover, coal was not in his calculation, if, indeed, in his imagination; but when the British government put an embargo upon the Channel tunnel enterprise, holding that England was an island and must so remain, Sir Sdward Watkin turned his men and machinery to boring for coal, as there were indications that the coal field on the French side of the channel might extend into England. He found the first seam of coal at a vertical depth of 1,600 feet in 1892, or 20 years ago.

This was the nucleus of "Kent Collieries, Ltd.," which has met with indifferent success, but has spent more than a million dollars in wrestling with engineering and water problems at depth, but is now, it is believed, nearing the base of commercial production. In 1904, however, systematic boring of the country north and east of the railroad line from Canterbury to Dover was begun under the auspices of Kent Coal Concession, Ltd., and in 1906 the first payable seam was found at the Waldershaft boring six miles northwest of Dover. Now the whole country has been thoroughly explored and 13 bore holes have proven at a depth of between 1,000 and 3,500 feet coal seams aggregating about 30 feet vertical thickness throughout and extending over an area of about 100 square miles. It is said that this coal can be transported to London two shillings cheaper per ton than any other coal by reason of its proximity to the metropolis, and the quality of coal is declared as good as the South Wales steam coal and better than any other variety in England.

It is estimated that there are 10,000 million tons of coal within this area. The Snowdown and Tilmanstone collieries have at last after a great deal of trouble penetrated into the coal measures. Railways are being constructed and shipments should be into London next year.

Not less significant than the Kent discoveries is the development of the eastern extension of the Midlands coal field in the southeast of Yorkshire and the counties of Nottinghamshire and Lincolnshire. What are without doubt the finest collieries in Great Britain are to-day in the district immediately adjoining Doncaster, in a countryside that for centuries has been purely pastoral. The sum of £250,000 is said to be a usual outlay on the capital expenditure of a colliery in that district. The population has increased beyond the housing capacity, and this once peaceful countryside has experienced the growing pains of a "boom" resembling more the growth of a Canadian prairie town than anything else.

The discovery of the Kent coal seams was the indirect result of a thwarted endeavour in another direction, but the discovery of the extension of the Midlands coalfield was the result of a process of careful industive geological reasoning, chiefly to be credited to Professor Lapworth, who from indications noticed by him near Selby, Yorkshire, came to believe that the Permian formation of East Yorkshire and North Lincolnshire was laid unconformably on an anticline of the Carboniferous rocks. Actual researches proved that his belief was correct, and instead of the valuable seams of the Midlands coalfield being buried under inaccessible depths of Permian formation they were found to exist at depths quite possible for modern methods of coal extraction.

The importance of these two new coal fields to England and the Empire at large can hardly be overestimated, and it is possible that even Englishmen themselves have scarcely taken in the full significance of the new coal fields to the future of their country.

The Standard Underground Cable Co., of Canada, Limited, has established new branch offices at Montreal, Quebec, and Winnipeg, Manitoba, in order to facilitate the prompt handling of their growing business. The Montreal office will handle all business from the province of Qubec and the eastern part of the province of Ontario. The Winnipeg office will handle all business coming from the provinces of Alberta, Saskatchewan, Manitoba and a portion of the province of Ontario lying west of Fort William. The general offices of the company at Hamilton, Ont., will handle all business from the central and northern portions of the province of Ontario. Business originating in the province of British Columbia, Alaska, and Yukon territories will be handled by the Seattle, Wash., office of the company, and business from the Maritime Provinces will be handled by the Boston, Mass. office. This is a temporary arrangement in order to secure prompt service immediately for customers in those districts until the volume of business justifies the establishing of separate offices in the Dominion.

ALLOYS OF COBALT WITH CHROMIUM.

A recent paper contributed to the Transaction of the American Institute of Mining Engineers, by Mr. Elwood Haynes, describes the methods employed in and the results obtained from alloying cobalt with chromium. By the addition of tungsten the hardness of alloy increases. Thus with 10 per cent. tungsten, the metal while still forging readily, is suitable for making both cold chisels and wood working tools. With 20 per cent. tungsten the alloy is decidedly harder, and will make good lathe tools for cutting steel and other metals at moderate speed. With from 25 to 40 per cent. tungsten a very hard alloy results, the tools made from which are very strong and retain their hardness at speeds which almost instantly destroy the cutting edge of a steel tool. When the tungsten reaches 40 per cent. or more, the alloy becomes so hard that it will not only scratch glass, but will readily scratch quartz crystal. Again when molybdenum is added to a 15 per cent. cobalt-chromium alloy, the latter hardens rapidly as the molybdenum content is increased. With 40 per cent. mlybdenuin the alloy becomes exceedingly hard and brittle, cuts keenly and deeply into glass, and scratches quartz crystal with ease. Generally the color and lustre of these alloys, after polishing, are brilliant, and it is stated that they seem to resist atmospheric influences equally well as the binary alloy of cobalt and chromium.

PERSONAL AND GENERAL

Mr. Frank M. Perry has left for Cobalt to supervise development work in several Gillies Limit claims. Mr. Perry will return in time to attend the annual meeting of the Institute at Ottawa.

Mr. J. S. Fraser, of Nova Scotia, who has been superintendent of the Neville Island and Allegheny plants of the Carnegie Steel Company, has been transferred to the Clairton Steel Works, where he will be in charge of the blast furnaces.

Mr. G. S. Scott is in England on mining business. His address until early March is Copse Close, Coombe Lane, Wimbledon, London, S.W.

Dr. Alfred E. Barlow, of Montreal, attended the annual meeting of the American Institute of Mining Engineers, in New York, on February 18, 19 and 20, as the guest of the New York section.

The secretary of the Canadian Mining Institute has been informed that Mr. W. Fleet Robertson, Provincial Mineralogist of British Columbia, intends to be present at the annual meeting of the Institute in Ottawa next week. Mr. M. E. Purcell, superintendent of the Consolidated M. & S. Company's Rossland mines, and chairman of the Western Branch of the Institute will also attend upon the invitation of the Council.

Mr. John Hopp, of Barkerville, B.C., is at present in Montreal, and will remain in the East until the end of the first week of March.

Mr. J. Oblaski has been re-elected President of the Chambre de Commerce Francaise of Montreal.

The three year contract of Mr. A. B. W. Hodges as general manager of the Cerro de Pasco Mining Company, terminated on February 28th of this year. Mr. Hodges leaves at once for Canada and the United States. He will visit British Columbia during July or August.

Mr. J. O'Brien has brought suit in Montreal against the Union Abitibi Mining Company. The plaintiff's claim is based upon injury done to certain timber limits in the Pontiac district, Quebec. The defence claims that as the timber was used for local purposes and not marketed, there was nothing illegal in cutting it.

Mr. M. K. Rodgers, of Seattle, Washington, well known in British Columbia in connection with the development to important mines of the Nickel Plate group, in Similikameen district, and the Hidden Creek group, near Observatory inlet, is in Mexico. The former mines, now owned by the Hedley Gold Mining Co., paid in 1912 dividends totalling 30 per cent. on the company's issued capital of $1200,000 (amount of dividends $360,000) as compared with 25 per cent. in 1911. The Granby Co. owns the Hidden Creek group, and re-recently its directors authorized the expenditure of about $2,000,000 in further underground development, and provision of smelting, hydro-electric power, transportation, and shipping dock facilities, together with buildings for mechanical purposes and accommodation of the company's officials and workmen.

Mr. W. L. Bell, superintendent of the British Columbia Copper Co.'s smelting works at Greenwood, Boundary district, B.C., recently spent a few days in Spokane, Washington.

Mr. Henry Clark has been requested to address the Western Branch of the Canadian Mining Institute on the subject of "Modern Surface Equipment of Coal Mines," and in connection therewith to show lantern-slides and models he has, to illustrate this subject. It is planned to have the benefit of Mr. Clark's address at a meeting of the branch to be held in Nanaimo, Vancouver island, early in March.

Mr. E. E. Campbell (B.Sc. McGill, 1908), of the Granby Consolidated Mining, Smelting and Power Co.'s engineering staff, was a passenger on the steamer "Cheslakee" when that vessel filled with water and sank at the wharf, Van Anda, Texada island, B.C., but fortunately he was one of those who got ashore without injury. When the steamer took such a strong list that water began to pour into her, she was headed for the dock, which she reached in time for most of those on her to get ashore, but several others were drowned.

The Mines Branch of the Canada Department of Mines has published as an advance chapter of the "Annual Report on the Mineral Production of Canada During the Calendar Year 1911," a pamphlet on "The Production of Copper, Gold, Lead, Nickel, Silver, Zinc, and Other Metals" in that year, prepared by Mr. Cosmo T. Cartwright, Assistant Mining Engineer, Division of Mineral Resources and Statistics.

Mr. Wm. B. Bornberg, of Spokane, Washington, manager for the Treasure Mountain SilverLead Co., which, during the past year has been opening a new mining property, situated about 20 miles about Otter flat, Tulameen district of British Columbia, has been in Victoria, interviewing the Provincial Government with the object of getting a wagon road constructed so as to make the new camp more accessible than it is with only a trail to it for about 18 miles beyond the end of the nearest wagon road.

Mr. W. J. Elmendorf, of Victoria, B.C., general manager for the Portland Canal Tunnels, Limited, is supervising the work of driving a 2,000-ft. cross-cut adit undertaken by the company on his recommendation, with the object of proving whether the veins of ore opened at comparatively shallow depths on several claims, continue down to the depth to be explored by this low-level tunnel.

Before leaving the British Columbia Copper Co.'s Mother Lode mine, near Greenwood, B.C., for Sudbury, Mr. E. Hibbert was presented with a gold watch and chain, valued at $210, by the employees who had worked under him at that mine. Mr. F. S. Norcross, who had been superintendent at the Rawhide mine, Phoenix camp, also in Boundary district, has been appointed to succeed Mr. Hibbert as superintendent of mines, and Mr. James J. Johns, for years foreman at the Mother Lode, has been promoted to the position of superintendent of that mine.

Mr. A. B. W. Hodges, of Lima, Peru, general manager for the Cerro de Pasco Mining Co., is stated by the Grand Forks Gazette to be expected to shortly visit Spokane and Grand Forks. Mr. Hodges was for some years manager in British Columbia for the Granby Consolidated M. S. and P. Co. and made Grand Forks his headquarters.

Mr. John Hopp, who is the largest hydraulic placer-gold mining operator in Cariboo mining division, British Columbia, recently left that province on a visit to

Philadelphia and New York. It is probable he will also visit the larger cities of Eastern Canada before returning to the West.

Mr. Andrew G. Larson, of Vancouver, B.C., has been spending a winter vacation in Los Angeles, Southern California. From that city he sent a "good-luck" telegram to the Old-Timers' Association while that organization was holding a reunion in Rossland recently.

Mr. E. G. Montgomery (B.Sc., McGill, 1908), is assistant superintendent at the Consolidated Mining and Smelting Company of Canada's Star-War Eagle group of gold-copper mines in Rossland camp, British Columbia.

Mr. J. L. Parker has been spending the winter on his Lee Lake ranch, near Burmis, southwest Alberta.

Mr. M. E. Purcell, of Rossland, B.C., superintendent of the Consolidated Mining and Smelting Company of Canada's Centre Star-War Eagle group of mines, and who is chairman, for the current year, of the Western Branch of the Canadian Mining Institute, will be the guest of the Institute at the forthcoming annual general meeting, to be held in Ottawa. Mr. Purcell is an active member of the branch, with which he has been associated from the time of its inception five years ago.

Prof. Milnor Roberts, of Seattle, Washington, U.S.A., dean of the College of Mining of the University of Washington, is endeavouring to arrange for his senior mining engineering class to spend part of the spring vacation in Boundary district, British Columbia, where the big copper mines and smelteries would afford them much instructive information. It is planned to also visit Republic gold camp and Chewelah copper camp, both situated in the interior of the State of Washington.

Mr. Wm. Fleet Robertson, provincial mineralogist for British Columbia, has arranged to attend the meeting of the International Geological Congress organization committee, to be held in Ottawa on March 4, and afterward the annual general meeting of the Canadian Mining Institute. Mr. Robertson is a McGill graduate (B.A.Sc., 1880), a past councillor of the Institute, and an ex-chairman of the Western Branch of the Institute.

Mr. Robert C. Sticht, now general manager of the Mt. Lyell Mining and Railway Co., who recently removed his headquarters from Queenstown, Tasmania, to Melbourne, Australia, was formerly well known in North America as a metallurgist.

Mr. G. Stilwell, superintendent for the Silverton Miles, Ltd., of the Hewitt-Lorna Doone group of mines, British Columbia, has spent a number of years opening that mining property, on which a large amount of underground development has been done under his direction. The ore contains silver, lead, and zinc; some of the finest specimens of ruby silver seen in Slocan district have been found in these mines, which will soon have the added distinction of being the first in Kootenay district, in connection with which the Minerals Separation flotation process is in use. Mr. M. S. Davys, managing director of Silverton Mines, Ltd., who resides at New Denver, Slocan lake, is keeping in close touch with the erection and equipment of a new concentrating mill for the company, which is being put in under the direct supervision of Mr. C. Hanckel, formerly with the Zinc Corporation, Limited, at Broken Hill, New South Wales.

Mr. Thos. R. Stockett, of Nanaimo, Vancouver island, B.C., general manager for the Western Fuel Company, with operating coal mines at or near Nanaimo, known, respectively, as No. 1 Shaft, Protection Island, and Brechin mines, continues to take much interest in provision for the protection of the miners. His company was the first in British Columbia to obtain for its own use oxygen-breathing apparatus, and, too, the first to erect and equip a mine-rescue training station. In these matters Mr. Stockett has all along had the active co-operation of his superintendents, first of Mr. Thos. Graham, now chief inspector of mines for British Columbia, and then of Mr. Thos. McGuckie, the present general superintendent. There are now in the company's employ 65 men who have taken the full mine-rescue training course and obtained certificates of competency in that work. An evening session of the meeting of the Western Branch of the Canadian Mining Institute, to be held in Nanaimo shortly, is to be occupied, first, in hearing addresses on mine-rescue matters, and afterward in holding a "smoker" which will be largely attended by the company's mine-rescue "graduates" and their fellow miners.

Mr. Wm. Thomlinson, of New Denver, B.C., who some time since contributed a paper on "Notes on Minerals Found in Slocan District, B.C." (as Canadian Mining Journal for November 15, 1911, p. 737) recently prepared an interesting article on "Names of Minerals."

The University of Washington, Seattle; State College of Washington, Pullman; and University of Idaho, Moscow, Idaho, have been giving short mining courses which have been well attended by miners, some of them for the second year.

Mr. George E. Wearing, formerly engaged in mining at Nome and other outlying parts of Alaska, has for about a year been directing the sinking of two shafts at Morden, near South Wellington, Vancouver island, where the Pacific Coast Coal Mines, Limited, is opening a new coal mine. During the first half of February coal was encountered in the mine shaft, at a depth of 610 ft. A station is being cut so that the mining of coal may soon be commenced. There is stated to occur here a fine bed of good coal, and the shaft is alongside the railway to the company's docks.

Mr. A. B. W. Hodges' contract to remain for three years with the Cerro de Pasco Mining Co., of Lima, Peru, as general manager, expired in February. Mr. Hodges writes that for the next few months he proposes to travel in the United States and Canada, but his permanent address will be P.O. Box 140, Toolele, Utah.

Mr. C. N. Henrotin has resigned the post of superintendent of mines to the Canadian Copper Co. at Copper Cliff, Ont.

At the last meeting of the Council of the Canadian Mining Institute, the following gentlemen were admitted to membership: (Members)—Messrs. John A. Allan, Edmonton South, Alta.; Norman M. Campbell, Montreal, Que.; John R. Cox, Ottawa, Ont.; H. S. Dunn, Jr., Scotland; A. E. Geister, Buckingham, Que.; Thos. C. Gorman, Ottawa, Ont.; A. O. Hayes, Princeton, N.J., U.S.A.; C. B. Kingston, London, E.C., England; Robt. J. Lee, Elcan, Alta.; T. A. MacLean, Ottawa, Ont.; W. W. Mein, New York, U.S.A.; N. C. Pitcher, Lethbridge, Alta.; Chas. F. Rand, New York, U.S.A.; J. A. T. Robertson, Szechwan, China; C. M. Ross, Ottawa; R. S. G. Stokes, New York, U.S.A.; Robt. C. Wallace, Winnipeg, Man. (Associates)—Col. John Carson, Montreal, Que.; The Hon. P. Poirier, Ottawa, Ont.; Paul Rochussen, Vancouver, B.C.

SPECIAL CORRESPONDENCE

NOVA SCOTIA

Dominion Coal Company Outputs.

The corrected outputs in January from the Glace Bay mines of the Dominion Company showed a total of 384,-361 tons, comparing with 281,007 tons in January, 1912. The Springhill outputs were slightly smaller than last year, being 30,424 tons against 39,084 tons in January last. The February outputs will approach 360,000 tons at Glace Bay, and 32,000 tons at Springhill, comparing with 330,326 tons and 34,708 tons respectively in February, 1912. The combined outputs for the first two months of the year will be 807,000 tons compared with 685,000 tons in 1912, giving a net gain of over 120,000 tons. The weather conditions have been unusually favourable for colliery operations, but at sea heavy weather has been the rule for nearly three months.

Barometric Records at Collieries.

The fluctuations of the barometer during the months of December and January were unusually noticeable. The summer of 1912 was accompanied by a persistently low and steady barometer, and there was a marked absence in Nova Scotia of heavy wind and rain storms. Although the summer was cold and apparently wet, the actual rainfall was much below the average, as was evidenced by a pronounced shortage of water. Towards the end of November, however, and in December there were heavy rainstorms accompanied by gales and irregularities of the barometer. On the 27th of December the glass in Cape Breton fell from 30.5 inches to 28.5 inches, apparently the lowest reading in Nova Scotia for many years past. The suddenness of the fall and the low reading reached had a noticeable effect on the ventilation of some of the collieries. The Mines Regulation Act requires that a barometer shall be placed in a prominent position at every coal mine, and records of the reading of the barometer are required to be kept at every colliery by some responsible official. It is difficult, however, to see the real utility of this provision. The mine gases are, of course, a much more delicate index to barometric variations than the most accurate barometer, and the effect of a marked change in the atmospheric pressure is felt in the mine long before it can be noticed on the ordinary barometer. The effect of a change in the atmospheric pressure as felt underground is concerned more with the rapidity of the rise or fall of the barometric index, than with the actual pressure itself. There may possibly be some utility in studying barometer readings if it is possible to forecast a rise or fall, but it is not possible to form any true idea of barometric action from a series of detached readings recorded at some set hour of every day. To study the barometer intelligently there must be a continuous reading, over very extended periods, showing the conditions obtaining before and after every marked variation. For this reason, it is doubtful if any form of barometer outside of a recording instrument, or "barograph" is of any real usefulness at a colliery. The so-called "colliery warnings" issued for many years in the English newspapers are a classic joke amongst mining engineers on the other side. In Canada, however, and the United States, where the continental conditions permit of barometric observations over a large land area, it is possible to form very accurate ideas regarding the tendency of the barometer and the direction of travel of certain barometric zones. This being so, it is conceivable that a colliery manager could so use the telegraphic observations as to anticipate important barometric disturbances and take whatever precautions suggested themselves to him. In Germany telegraphic "warnings" are sent to colliery managers of approaching fluctuations of the barometer, and from the School of Mines at Bochum a warning is also sent out whenever the variation of the magnetic needle is greater than usual.

Dominion Coal Company Employees Benefit Society.

The report of this Society for the year ending 31st December, 1912, shows that the membership increased from 10,045 members at the end of 1911 to 11,120 at the end of 1912.

The receipts for the year amounted to $144,364, of which $63,485 was received from members, $63,197 from the Dominion Coal Company, $11,455 from the Government of Nova Scotia, and $6,245 from interest on investments.

The expenditure amounted to $98,629, leaving a surplus of $45,735. During the year liabilities were undertaken to the amount of $48,585, and there was paid on account of accrued liabilities the sum of $24,353.

The number of deaths was 70, placing on the funds 40 widows and 89 children. On 31st December, 1911, there were 54 widows and 238 children on the fund, and at the end of 1912 there were 87 widows and 293 children, an increase during the year of 33 widows and 55 children.

The payment of $98,629 included $68,910 paid in weekly indemnity to members disabled either by accident or sickness, $7,629 on account of death claims and $16,723 paid to widows and children of deceased members.

The gross assets of the Society amounted to $183,001. The sum of $125,000 is set aside as a reserve to meet liabilities incurred. The net surplus at the end of 1912 is shown as $50,501.

At the end of 1912 the Society had completed two and one-half years of its life, and shows very satisfactory progress in so short a space. The membership includes practically all the company's employees in Cape Breton, and has grown from a little under 7,000 in 1910 to the present figure. A further increase in the membership may be forecasted for 1913. An encouraging feature is the growing income from investments, which now more than pays the expenses of administration. As the payment to widows extends over five years, and the payment to children up to the age of fourteen years, the Society has not yet experienced its maximum liabilities.

ONTARIO

LARDER LAKE.

Goldfields, Limited, of Larder Lake, announces its intention of adding another thirty stamps to its mill, which according to computation will raise its capacity to 500 tons per day. At present there are thirty stamps dropping, but as the mill is of the simplest description the duty per stamp will probably not be very high. Goldfields, Limited, was formed to take over the Harris Maxwell, The Proprietary, and the Tourneninie (Old Indian) properties. The company secured control of these two latter properties after they had gone into liquidation, but only the Harris Maxwell is now being

worked. The outcrop of the ore body has been stripped on a rise about 100 feet above Larder Lake, the mill and the rest of the plant being at the foot of the hill and the ore body cut at a depth of 65 feet. The ore body as it is at present defined is about 115 feet long by about 15 feet wide, and raises are being made through to the surface in several places. The company has a power plant at Raven Falls where there can, if necessary, be generated 15,000 horse power. Everything in the mine is electrically driven including the twelve-drill compressor.

PORCUPINE.

The developments on the McEnaney in Porcupine have been so remarkable that it has been determined to erect a twenty stamp mill with cyanide plant as soon as any addition is made to the five-stamp mill already in operation. The five stamps are at present dropping on forty tons of ore per day. Ore is being taken from the drift on the vein at the second, third and fourth level. It is the progress being made at the fourth level that has surprised the management. When the vein was first cut there was a sixth foot width of $48 ore. That is the biggest ore body and the highest grade yet found in the mine where every level opened has proven better than the one above. This level has been developed for about 30 feet and in the face now there is eight feet of ore running between $30 and $40 with a continuous ore body from the cross-cut. The growth of the McEnaney from a poor prospect to a remarkable mine in one year has been the feature in Porcupine within the last six months.

KIRKLAND LAKE.

From the Tough claims at Kirkland Lake on an open cut 35 feet long there has now been taken 52 tons of ore which will average over $500 to the ton. No considerable depth has been attained yet and the deposits may be very shallow, but it has been demonstrated that the ore in sight can be taken out with good profit and that the insignificant veins on the surface may develop into fair ore bodies below. The most encouraging feature of this remarkable property is that each successive shipment from the property has been richer than the preceding one.

There is now being collected at Swastika a thirty ton shipment of ore which will exceed any consignment of crude gold ore that has left the north country.

GOWGANDA.

The Mann at Gowganda has pushed its drift over the boundary into what was once Boyd Gordon territory and has taken out enough ore to pay back in full the entire price paid for the property.

The Boyd Gordon had a rather spectacular silver showing on the surface and was sold by Al Boyd and his associates for a long price. The purchasing company went to work at a tremendous expense, but it appeared to be merely silver plated as values soon disappeared as the shaft was sunk.

Then the Mann, owning the adjoining properties opened up the claim and began to develop. So encouraged were the Mann owners with what they found that they approached the Boyd Gordon Company for the purchase of the latter property. The directorate of the Boyd-Gordon had given up real hope and were glad to get anything that looked like real cash and the deal was closed for a sum said to have been in the neighborhood of $8,000. The Mann developed the vein right up to the Boyd-Gordon property and followed it over the line. Already the Mann has yielded enough ore to cover the purchase of the property.

COBALT.

The Cobalt Lake fault the Right of Way is now developing to discover what prospects it has of getting ore along the contact. Although, of course, it is not known where it will be struck the management expects to strike it 350 feet below the surface or 200 feet below the level they are working at present. The new ore body which was recently found at the first level has been drifted on as far as the La Rose boundary where it was strong and of high grade ore. In all the Right of Way had about 32 feet of it. The vein for that distance averaged two and a half inches of ore that ran between 1500 and 2000 ounces. The vein has not been picked up on the second level yet, but a shaft has been put down.

After five years of litigation the law suit between the Bailey Cobalt Mining Co. and the Cobalt Central Mining Co. has been settled. $31,000 was the amount awarded the Bailey Cobalt and the long legal fight is over. The action was first brought by the Bailey Cobalt Mining Co. against the old Cobalt Central, but that organization went into liquidation and the liquidators have been waging the fight ever since.

The case dates back to 1907 when the old Cobalt Central was the most advertised producer in the camp and had a higher place on the stocks of the New York Curb than Nipissing. The management of the Cobalt Central discovered that a goodly part of the ore body was close to the Bailey line and made overtures to that company to mine the ore on a royalty basis. The Cobalt Central was to pay all expenses and deduct the same from the gross receipts, the two companies to share equally in the proceeds.

When the time for the Central to make a settlement came a dispute was raised as to the exact location of the line between the two properties the Central claiming a plot of territory and the Bailey disputing.

BRITISH COLUMBIA

The pamphlet, "Preliminary Review and Estimate of Mineral Production, 1912," issued in January by the Provincial Department of Mines, has been in such demand that it has been found necessary to have one thousand more copies printed, the larger supply at first provided having been exhausted.

Dividends from Metal Mining.—The year 1913 has witnessed an encouraging beginning in dividend payments by mining companies operating metalliferous mines in the province. The Standard Silver-Lead Mining Co. paid dividend No. 10 on January 10, and No. 11 on February 10, each of $50,000, being two and a half per cent. a month, or at the rate of 30 per cent. per annum. The company made its first distribution of profits in April, 1912, of $25,000, and has since divided $50,000 each month, so that the distribution as at February 10 brought the total of dividends to that date up to $525,000 on an issued capital of $2,000,000. On January 15, the British Columbia Copper Co. distributed $88,756.35, being at the rate of 15 cents a share on its 591,709 issued shares. The Granby Consolidated Mining, Smelting & Power Co. has declared a dividend of $1.50 a share, payable March 1; as at the date of its last annual report the company's total of issued shares was 149,985, this involves a distribution of $224,977.50. The

total of dividends to March 1, inclusive, will, therefore, be $413,733.85. On February 8, the Engineering and Mining Journal, New York, included in its list of January dividends, Le Roi No. 2, Ltd., 36 cents a share, total $43,740, but pending confirmation from Mondon, this is not included in the aggregate of dividends to March 1, above given.

A Complicated Case.—The Vancouver Daily Province published on February 15 the following: "One of the most complicated cases before the courts for some time was opened yesterday before Chief Justice Hunter, in which the British Columbia Copper Co. is suing E. M. McKittrick, of Indiana, and H. C. Kerman (sheriff), J. S. Birnie (registrar of court at Greenwood), and C. J. Leggatt, a solicitor.

The suit arises out of the death of G. C. McKittrick at one of the mines of the company in Boundary district, on May 28, 1910. The Miners' Union put in a claim for compensation on behalf of McKittrick's father, who resides in Indiana. The claim was referred to the county judge at Greenwood to arbitrate. The Ocean Accident and Guarantee Co., which insured the British Columbia Copper Co., after negotiations with Mr. Kittrick, Sr., in Indiana, obtained from him, for a sum of $250, a release of his claim. After obtaining this release, they notified Mr. Leggatt, who was prosecuting the claim for compensation on behalf of McKittrick at the instance of the Miners' Union. Mr. Leggatt ignored the settlement and suceeded in getting an award of $1,500 from the arbitrator and proceeded in due time to take out an execution against the British Columbia Copper Co. for the amount of the award, though warned by the company's solicitors that they would hold him liable for damages. Under the execution, Mr. Leggatt and his co-defendants garnisheed monies due to the British Columbia Copper Co.

The suit before the court now is for an injunction to restrain the defendants from exercising the execution, a declaration that the award of the arbitrator be set aside, a claim for $2,000 damages for the loss of interest on the monies tied up by defendants on the garnishee proceeding and general damages.

The principal defence is that the plaintiffs did not attend the arbitration and produce evidence to show that any settlement with McKittrick had been arranged. The outcome of the case is being looked forward to with much interest by miners of the interior of the province.

East Kootenay.—The Consolidated Mining and Smelting Co. during January shipped about 3,600 tons of lead-ore from the Sullivan Group mine to its smelting works at Trail. Much exploratory work having been done in new ground last year, an enlarged production of ore is looked for in 1913. Operations at the company's St. Eugene mine are now on a much smaller scale than in past years, but there is still a small production of ore being maintained.

At the several collieries in Southeast Kootenay, coal-mining is generally active, although occasionally the output is unfavourably affected by a shortage of railway cars. One colliery—that of the Corbin Coal and Coke Co., of Spokane, Washington—with coal mines situated about 14 miles south of McKillivray, a station on the Canadian Pacific Railway Co.'s Crow's Nest Railway, is preparing to mine coal open-cast, having cleared off the surface debris from a considerable area so as to allow of the big deposit of coal, occurring almost at the surface and proved to be fully 300 ft. wide, being worked as an open quarry. It is proposed to use a steam-shovel to take the coal direct from the face and load it into railway cars.

West Kootenay.—Deep snow has interferred somewhat with mining operations in Ainsworth and Slocan divisions, though mines situated near one or other of the lakes have not had similar transportation difficulties to those experienced by mines in the midst of the mountains. The Bluebell, near Kootenay lake, and the Standard and Van Roi, near Slocan lake, have kept up their respective outputs with little or no diminution. The Rambler-Cariboo and Ruth-Hope have also made shipments, though on a smaller scale. It is expected that the former of these two will this year produce much more ore than in earlier years, for it now has much improved transportations facilities, an aerial tramway having been constructed from the mine down to the concentrating mill recently completed alongside a newly-finished branch railway line. Near Sandon, deep-level development is being continued at the Slocan Star and Payne mines, but snow slides and accompanying winter difficulties have made it necessary to suspend work for the time at several mines in the vicinity of Cody. The Lucky Jim mine, situated on the divide between Slocan and Ainsworth divisions, and the Retallack & Co. and Utica mines, on the Ainsworth side of the divide, are among the operative mines of this part of West Kootenay district.

In Nelson division, the British Columbia Copper Co. is continuing development of the Eureka copper mine, under option of purchase, and is shipping copper ore from the Queen Victoria mine, purchased last November, to its smelting works at Greenwood. The Kootenay Gold Mines, Ltd., is endeavouring to obtain additional capital for the purpose of doing needed development work, so as to keep its 20-stamp mill regularly running. The Consolidated Mining and Smelting Co.'s Molly Gibson silver-lead mine is also one of the ore shippers of this division. In Ymir camp, development work is being continued at the Wilcox and Dundee mines. Near Salmo, the Emerald and H. B. are shipping lead-ore. Gold ore is being crushed at the respective stamp mills of the Mother Lode and Queen, in Sheep Creek camp, and of the Second Relief, in Erie camp, while the Arlington, also at Erie, is being worked under lease.

Rossland mines made a production of about 23,000 tons in January, of which 13,000 tons was from the Consolidated Co.'s Centre Star-War Eagle group, 7,000 tons from its Le Roi mine, and 3,000 tons from the mines of the Le Roi No. 2, Ltd.

Boundary and Similkameen.—The big copper mines of Boundary district are maintaining their normal output of ore. The largest producers were the mines at Phoenix of the Granby Consolidated Co., the British Columbia Copper Co.'s Mother Lode coming next, and the New Dominion Copper Co.'s Rawhide mine being third, while several small mines also added to the total production for January. The British Columbia Copper Co.'s new general manager, Mr. Oscar Lachmund, has been in local charge for several weeks. No information is yet available concerning the company's future operations in Similkameen district, but it is known that the Hedley Gold Mining Co., operating in Hedley camp, continues to crush about 6,000 tons of gold ore a month and to make good profits.

Coast District.—The Britannia, near Vancouver city, and the Granby Co.'s Hidden Creek mines, in the vicinity of Observatory inlet, are doing the chief development work in connection with metalliferous mining on the British Columbia coast. The Marble Bay mine, on Texada island, in which bornite ore has been mined down to a depth of 1,000 feet, is now being opened at about 1,100 feet vertical depth.

Important developments are taking place on several coal-mining properties on Vancouver island. The Western Fuel Co., of San Francisco, has already spent $500,000 in connection with the opening, equipment, and transportation facilities of a new mine within five miles of Nanaimo. The Pacific Coast Coal Mines, Ltd., has lately reached coal in a new shaft, at 610 feet from the surface. The Canadian Collieries (Dunsmuir), Limited, is also opening a new mines, this being in Comox district, farther north on Vancouver island than the other properties previously mentioned.

Altogether, the outlook for mining in the Coast district of British Columbia is promising, and a larger all round production in 1913 is expected.

COMPANY NOTES

CALMET AND HECLA.

A quarterly dividend of $10 a share was declared by the Calumet and Hecla Mining Company on February 20th.

THE ENGLISH COBALT LAKE COMPANY.

Under the title of the Cobalt Lake Silver Mining Company, Ltd., a company was registered on January 21st with a capital of £300,000, in £1 shares, to carry on the business of silver and general miners, prospectors, explorers, metallurgists, etc., and to acquire and deal with any mines, mining rights and metalliferous lands in Canada or elsewhere. The signatories are: J. E. Way, 36 Waveney Avenue, Peckham Rye, S.E.; C. H. Perry, 62 Ainslie Wood Road, Chingford; J. H. Jones, 212 Totterdown Street, Tooting, S.W.; H. H. Piddington, 10 Heron Road, Herne Hill, S.E.; H. C. Allaway, 15 Blucher Road, Camberwell, S.E.; A. T. C. Warbey, 57a High Street, Kingsland, N.E.; W. T. Bond, 6-21 Cranworth Gardens, Brixton, S.W. (one share each).

Minimum cash subscription, seven shares. The first directors (to number not less than three nor more than seven) are to be appointed by the signatories. Qualification £200. Remuneration, £100 each per annum (Vice-Chairman, £150). Registered office, Balfour House, Finsbury Pavement, E.C.—Exchange.

SENECA-SUPERIOR FIRST ANNUAL MEETING.

The first annual meeting of the Seneca-Superior Silver Mines, Limited, was held in Toronto on February 15th. Total production since the early part of October of just under $200,000 worth of silver and net profits of $121,618 are shown in the annual report. Out of these profits a ten per cent. dividend was paid of $47,683, leaving a surplus on January 31st of $73,980.

Mr. R. H. Lyman, mine manager, in his report, stated that the Worth vein, which was discovered early in October, has been developed for 213 feet, and has shown an average value of 3,500 ounces to the ton for this distance. The cross-cut has been continued to 174 feet beyond this vein, and will be continued to the southeast shore of Cart Lake.

Mr. W. E. Segsworth, consulting engineer, said that it was hoped this cross-cut would disclose other producing veins. During development an area of 2,500 square feet on the vein has been broken, and the ore produced is estimated to contain about 310,000 ounces of silver. Mr. Segsworth estimates that this development has put in reserve about 1,150,000 ounces of silver.

The following directors were elected for next year: Messrs. F. H. Worth President), A. H. Dewey, F. W. Zoller, W. E. Segsworth, and R. F. Segsworth.

HOLLINGER DIVIDENDS.

The dividends of the Hollinger mine, with the declaration to be paid February 18th, will reach nearly a half million dollars and that mine, with its four weekly basis, is as yet the only property to establish a regular dividend payment. The dividend payable this month will disburse $90,000, like the previous ones. It makes a total of 15 per cent. and $450,000 paid.

The payments to date follow:

	P.C.	Amount.
1912—November 2	3	$90,000
November 30	3	90,000
December 30	3	90,000
1913—January 28	3	90,000
February 3	3	90,000
Totals	15	$450,000

CROWN RESERVE MINING COMPANY.

Notice is given that a dividend of 2 per cent. for the month of February, 1913, and bonus of 3 per cent., for the same period, making a total payment of 5 per cent., has been declared and will be payable on the 15th March, 1913, to shareholders of record the 28th February.

COBALT LAKE MINING COMPANY.

The annual general meeting of the Cobalt Lake Mining Company was held in Toronto on February 26th.

COBALT TOWNSITE CABLE.

Estimated results for week ended 25th January: "Value of production, £4,773; operating expenses, £1,738; weekly profit, £3,035."

DOMINION MINISTER OF MINES.

At the annual convention of the Conservative Association of British Columbia, held at Revelstoke, B.C., a few weeks ago, and largely attended by delegates from many widely-separated parts of the province, among the resolutions presented for endorsement by the convention was one favouring the appointment of a Dominion Minister of Mines. The resolution was presented by delegates from Nelson, B.C., but in committee was altered at the persistent request of Mr. E. Jacobs, so that as presented to the convention and adopted it read as follows:

"That, whereas the mining industry has become one of the most important in the Dominion, having attained a production of $102,291,686 in the year 1911; and

"Whereas the value of the mineral production of Canada has shown a steady growth in having risen during the last decade from $63,231,836 to the first above-mentioned sum; and

"Whereas the further development of the whole mining industry of the Dominion of Canada can be materially aided by greater attention being paid to its requirements and possibilities; and

"Whereas the Canada Department of Mines is at present under the control of the Minister of the Interior, the work of whose department is so heavy that he cannot give to the Department of Mines the attention its great importance demands,

"Therefore be it resolvel, that in the opinion of this convention it is urgent that there be a separate Minister of Mines who will be free to give this department the attention essential to the further development of the mineral resources and the best interests generally of the mining industry of Canada."

DRILL FOR CUTTING SAMPLES.

Cuting samples in a mine where the ore is hard, tough, compact quartzite, such as is the banket ore on the Rand, or similar material, is a laborious task, often requiring half an hour per foot of sample. Mr. Noel Griffen has described in the Journal of the Chemical, Metallurgical and Mining Society of South Africa a method by which a small chipping hammer, not unlike a pneumatic rivetter adapted for carrying a cutting bit, can be used, greatly facilitating the cutting of mine samples. The chipping hammer recommended is an Imperial, size B, No. 1, weighing 10½ pounds. A rose bit 2 inches in diameter has been found preferable to any other shape. The clippings and dust are caught in a canvas bag, supported in an open position by a stiff wire or round iron frame, and measuring about 24 by 18 inches, so arranged that the drill bit can be passed through a hole in the bottom of the bag, the opening being reinforced by two washers to prevent tearing at the edge. The bag is held against the face and the bit directed by the left hand, while the handle of the drill is grasped by the right hand so that the controlling trigger can be operated by the right forefinger. The drill requires ½-inch air hose. It is stated that at first the drill is difficult to control, but after a few days' practice the operator becomes proficient enough to cut a channel 2 inches wide and ½ inch deep across the face of a drift at the rate of 2 feet in ten minutes in the hardest rock. The work requires much muscular exertion, but in tough ground far less exertion is required to cut a sample by machine than by hammer and moil. The rock cut out by the rose bit ranges from powder to chips half the size of a pea, so that if any larger pieces flake off beyond the edges of the desired channel they may be readily removed by screening. It is said that if the drill is held well up against the face the chips do not fly as much as when sampling is done by hammer and moil.

STATISTICS AND RETURNS

BUFFALO MINES FOR DECEMBER.

Buffalo Mines, Ltd., reports for December: Mill ran 582 hours, ore milled 4,616 tons; average assay portion before milling 44.16 ounces; silver recovered 178,371 ounces and silver paid for during month shipped previously 33,179 ounces.

HILLCREST COLLIERIES.

From Hillcrest Collieries, Limited, is reported steady progress at the property and the demand for the company's coal is excellent. The progress made in the past two years may be seen by the comparative figures for January 1913, 1912, and 1911, as follows:

Jan. 1911	8,375 tons
Jan. 1912	11,805 tons
Jan. 1913	17,800 tons

The new plant is proving satisfactory. The annual meeting will be held March 4th.

DOMINION STEEL JANUARY OUTPUT.

The output of the Sydney plant of the Dominion Steel Corporation, Limited, for January was as follows:

Pig iron	27,164 tons
Steel ingots	28,022 tons
Blooms	25,809 tons
Rails	14,410 tons
Wire rods	3,092 tons

The coal output in the Cape Breton collieries for the month was 414,944 tons, as compared with 320,091 tons in 1912.

McKINLEY-DARRAGH IN JANUARY.

During the month of January the McKinley-Darragh Savage mines produced 180,000 ounces the cleaning-up process, which is the rule at most of the mines in the camp, cutting down the tonnage somewhat. Owing to the very heavy program of development at the Savage, and the alterations proposed to the plant there, the Savage only contributed 20,000 ounces.

B. C. ORE RECEIPTS.

The Consolidated Mining & Smelting Co., of Canada, Limited, ore receipts at Trail Smelter for the week ending February 1, and from July 1 to date, in tons:

Company's mines:

	Week of Feb. 1	July 1 to date
Centre Star	2,568	93,835
Le Roi	1,579	27,081
Sullivan	720	17,975
Molly Gibson	128	1,277
St. Eugene	.....	801
Richmond-Eureka	.....	778
No. 1	.....	153
Other mines	1,371	45,643
Balance	6,366	187,543

VAN ROI.

Cable:—"Mill report for December: Total amount crushed, 3,334 tons (average assay 8.9 ozs. silver, 2.5 per cent. lead, 5.0 per cent. zinc), yielding 106 tons lead concentrates, assaying 129.9 ozs. silver, 56.5 per cent. lead, 14.3 per cent. zinc; and 124 tons zinc concentrates, assaying 42.0 ozs. silver, 3.7 per cent. lead and 44.0 per cent. zinc. Mill ran 596 hours. Total approxi-

mate value, $12,557 (£2,589). Estimated expenditure for corresponding period—Development $2,195, ore production $11,796, milling $3,200—$17,191 (£3,544). Capital expenditure, $203 (£42). Westward drift, level 7—Breast is 1,453 feet west of portal. Advance 118 feet driven. Promising. Westward drift, level 9—Breast is 1,338 feet west of portal. Advance 74 feet driven. Promising. Drift eastward—35 feet up. No. 3 intermediate raise above level 2—Advance 32 feet, of which 25 feet averaged 20 ozs. silver, 4 per cent. lead, 5 per cent. zinc, across 6 feet."

MARITIME COAL SHIPMENTS.

Coal Shipments, January, 1913, Dominion Coal Co., Ltd.

Output and shipments for January, 1913:

	Output.	Shipments.
Dominion No. 1	44,788	
Dominion No. 2	65,793	
Dominion No. 3	11,042	
Dominion No. 4	32,549	
Dominion No. 5	20,901	
Dominion No. 6	20,322	
Dominion No. 7	18,185	
Dominion No. 8	8,255	267,795
Dominion No. 9	33,144	
Dominion No. 10	19,091	
Dominion No. 12	27,972	
Dominion No. 14	30,241	
Dominion No. 15	17,277	
Dominion No. 16	18,973	
Dominion No. 21	13,089	
Dominion No. 22	2,749	
	384,361	

Shipments, January, 1913	267,795
Shipments, January, 1912	186,346
Increase, January, 1913	81,449

Springhill.

Shipments, January, 1913	22,003
Shipments, January, 1912	28,732
Decrease, January, 1913	6,729

Inverness Railway & Coal Co.

Shipments, January, 1913	21,960
Shipments, January, 1912	22,679
Decrease, January, 1913	719

Acadia Coal Co.

Shipments, January, 1913	40,539
Shipments, January, 1912	30,964
Increase, January, 1913	9,575

COBALT ORE SHIPMENTS.

The shipments from the Cobalt camp for the week ending February 15, amounted to 332.25 tons from nine members. But two of these shipments were of low grade ore. The bullion all went out in one day, on Tuesday, and constituted a record for the camp and probably for the Dominion, three mines shipping about $190,000 in silver bars. Shipments were as follows:

Mine.	High.	Low.	Tons.
Cobalt Lake	1	..	39.00
Peterson Lake (Seneca-Superior lease)	1	..	31.75
Drummond	1	..	42.10
Nipissing	..	1	42.00
McKinley-Darragh	2	..	59.27
Hudson's Bay	1	..	30.70
Coniagas	1	..	24.24
La Rose	1	..	32.94
Beaver	1	..	30.25
	9	1	332.25

Bullion Shipments.

Mine.	Bars.	Ounces.	Value.
Nipissing	176	214,206	$132,807
Crown Reserve	15	15,691	9,354
Dominion Reduction	*72	79,200	45,405
	263	308,997	$187,567

*Estimated.

LA ROSE MINE IN JANUARY.

The January statement of La Rose is not quite as good as the preceding month.

Production for January was 219,977 ozs., with a value of $134,724. This plus a sundry income of $3,741, gives a total income for the month of $138,465. From this amount is deducted $62,187 for market expenses, etc., leaving January profits of $76,278.

The cash surplus totalled $1,324,290, plus outstanding shipments of $229,978 or a total of $1,548,268.

Ore on hand ready for shipment totals $53,913.

The total cash surplus stands at $1,602,181.

The actual cash surplus on December 31, 1912, was $1,667,104.

NIPISSING IN JANUARY.

During January, Nipissing mined ore of estimated net value of $204,780, and shipped ore estimated at $170,377 net. The decrease in the shipments is due to the annual clean-up at the high grade mill. At 20 feet of milling ore is being opened up. Shaft 64 has reached a depth of over 560 feet, and in 100 feet station will be cut.

B. C. ORE SHIPMENTS.

Week ending February 8th.

	Week.	Year.
Boundary.		
Total	36,428	193,887
Nelson.		
Total	1,764	13,029
Slocan and Ainsworth.		
Total	3,957	19,745
East Kootenay.		
Total	463	4,209
Lardeau.		
Other mines	....	65
Rossland.		
Total	5,130	27,087
Granby Smelter Receipts. Grand Forks, B.C.		
Granby	24,616	115,414
Consolidated Co.'s Receipts. Trail, B.C.		
Total	6,626	35,836
B. C. Copper Co.'s Receipts. Greenwood, B.C.		
Total	9,880	69,302
Zinc Shipments.		
Noble Five	65	65
Van Roi	169	169
Standard	125	125
Total	359	359

B. C. ORE SHIPMENTS.

Week ending February 15.

What was probably the first shipment of ore sent out from the north of the province over the new Grand Trunk Pacific Railway line to Prince Rupert was smelted last week at the Consolidated Mining & Smelting Company's plant at Trail. The ore came from the Silver Standard mine at Hazelton, a property owned by J. W. Stewart, of Foley, Welsh & Stewart, and partners. From Prince Rupert the ore was shipped by steamer to Vancouver and then brought to Trail over the Canadian Pacific line.

Four properties in Kootenay were added to the year's shipping list during the week. They were the Lily B., Fidelity, Nickel Plate, and Hope.

Ore production in the Kootenay and Boundary districts last week totalled 47,764 tons, and for the year to date 309,606 tons. Smelter receipts for the week ending February 15 were 42,101 tons, and for the year to date 263,163 tons. Production in detail was:

Boundary.

	Week.	Year.
Granby	24,546	139,800
Mother Lode	5,520	41,955
Rawhide	5.091	30,510
Napoleon	595	4,629
Knob Hill	72	509
Ben Hur	243	755
United Copper	165	636
Jewel	28	63
No. 7	137	222
Nickel Plate, milled	1,500	10,500
Jewell, milled	200	1,400
Other mines	....	945
	38,097	232,084

Lardeau.

Ajax	32	68
Other mines	....	29
Total	32	97

East Kootenay.

Sullivan	565	4,605
St. Eugene	34	203
Total	599	4,808

Nelson.

Queen Victoria	296	3,262
H. B.	304	1,194
Emerald	81	277
Mother Lode, milled	500	3,500
Granite-Poorman, milled.	250	1,750
Queen, milled	400	2,800
Second Relief, milled	200	1,400
Other mines	....	876
	2,030	15,059

Rossland.

Centre Star	2,256	16,230
Le Roi	727	8,822
Le Roi No. 2	449	2,753
Nickel Plate	30	30
Le Roi No. 2, milled	350	2,450
Inland Empire	90	630
Other mines	....	74
	3,902	30,989

Slocan and Ainsworth.

Standard	436	1,652
Bluebell	278	1,264
Rambler-Cariboo	33	376
Van Roi	64	190
Utica	28	190
Lily B.	15	15
Hope	39	39
Fidelity	11	11
Standard, milled	500	3,500
Bluebell, milled	1,200	8,400
Van Roi, milled	1,100	7,700
Kilo, milled	100	700
Rambler-Cariboo, milled.	300	2,100
Other mines	....	532
	3,104	26,569

Granby Smelter Receipts.

Granby Forks, B. C.

Granby	24,456	139,960

B. C. Copper Co.'s Receipts.

Greenwood, B. C.

Mother Lode	5,520	41,955
Rawhide	5,091	30,510
Napoleon	595	4,629
Queen Victoria	295	3,262
Other mines	....	547
	11,501	80,903

Consolidated Co.'s Receipts.

Trail, B. C.

Centre Star	2,256	16,230
Le Roi	727	8,822
Le Roi No. 2	449	2,753
Nickel Plate	30	30
Sullivan	565	4,605
St. Eugene	34	203
H. B.	304	1,194
Emerald	81	277
Ajax	32	68
Standard	436	1,652
Bluebell	278	1,264
Rambler-Cariboo	33	376
Van Roi	64	190
Utica	28	90
Lily B.	15	15
Hope	39	39
Fidelity	11	11
Knob Hill	72	509
Ben Hur	243	755
United Copper	165	636
Jewel	28	63
No. 7	137	222
Hazelton Standard	28	28
Other mines	....	1,090
	6,054	41,941

SILVER PRICES.

	New York. cents.	London. pence.
Feb. 8	62¼	28⅝
" 10	61⅞	28 7/16
" 11	61⅞	28 7/16
" 13	61¾	28 7/16
" 14	61¾	28 7/16
" 15	62⅛	28 9/16
" 17	62	28½
" 18	62	28½
" 19	62	28½
" 20	61⅝	28⅜
" 21	61⅝	28⅜

CANADIAN MINING INSTITUTE.

By J. C. MURRAY

A national organization that has an active membership of more than 1,000, including technologists and business men of all grades from the professor to the promoter, from the geologist to the prospector, from the managing engineer to the investor, is bound to exercise large influence on the country's life. The Canadian Mining Institute is not only national; it has important international connections and affiliations. Its members are distributed all over the world. Its publications reach South America, Asia, Europe, Africa, and Australia, beside having wide circulation in Canada and the United States. Hence they are uniquely valuable media for the dissemination of information. Official correspondence is maintained with representative foreign members, and the accounts of the annual meetings reach every important country in the civilized world and many remote mining districts.

The annual meetings have been, and are, remarkably interesting in character. Professional papers, the cream of current technical thought, historical and economic treatises, are read and discussed. Important questions of trade, of politics, and of ethics are debated, and wide publicity is given to the Institute's resolutions. At the social functions that are part of the annual proceedings, to wit, the dinner and the smoker, the nation's leading legislators and officials are honoured guests. The smoker, by the way, has developed into an outstanding event. Free rein is given the reckless ingenuity of certain members, and the results are often amazing. Honoured, if somewhat irregular and unconventional customs, mark the evening of the smoker. It is unnecessary to expatiate upon these. The arcana of the Institute when it "stands easy" need not be explained. Each member must learn for himself.

The Institute is much more than a technical society. It is a brotherhood. In a mild way, masonry is its archetype. The isolated mining man can count upon at least one annual foregathering with his fellows and his friends. He comes, therefore, to the place of meeting determined to learn what he can, to have a thoroughly good time, and to take his part dutifully in the proceedings. During the three days he meets friends, old and new; rubs elbows with novices and notabilities, hears speeches excellent and otherwise, keeps reprehensibly irregular hours, and leaves refreshed, inspired, and ready for another long year of labour. How much good he receives cannot be estimated; but it is beyond doubt that the atmosphere of the convention is charged with beneficent influence. The man who is not responsive or receptive has only himself to blame.

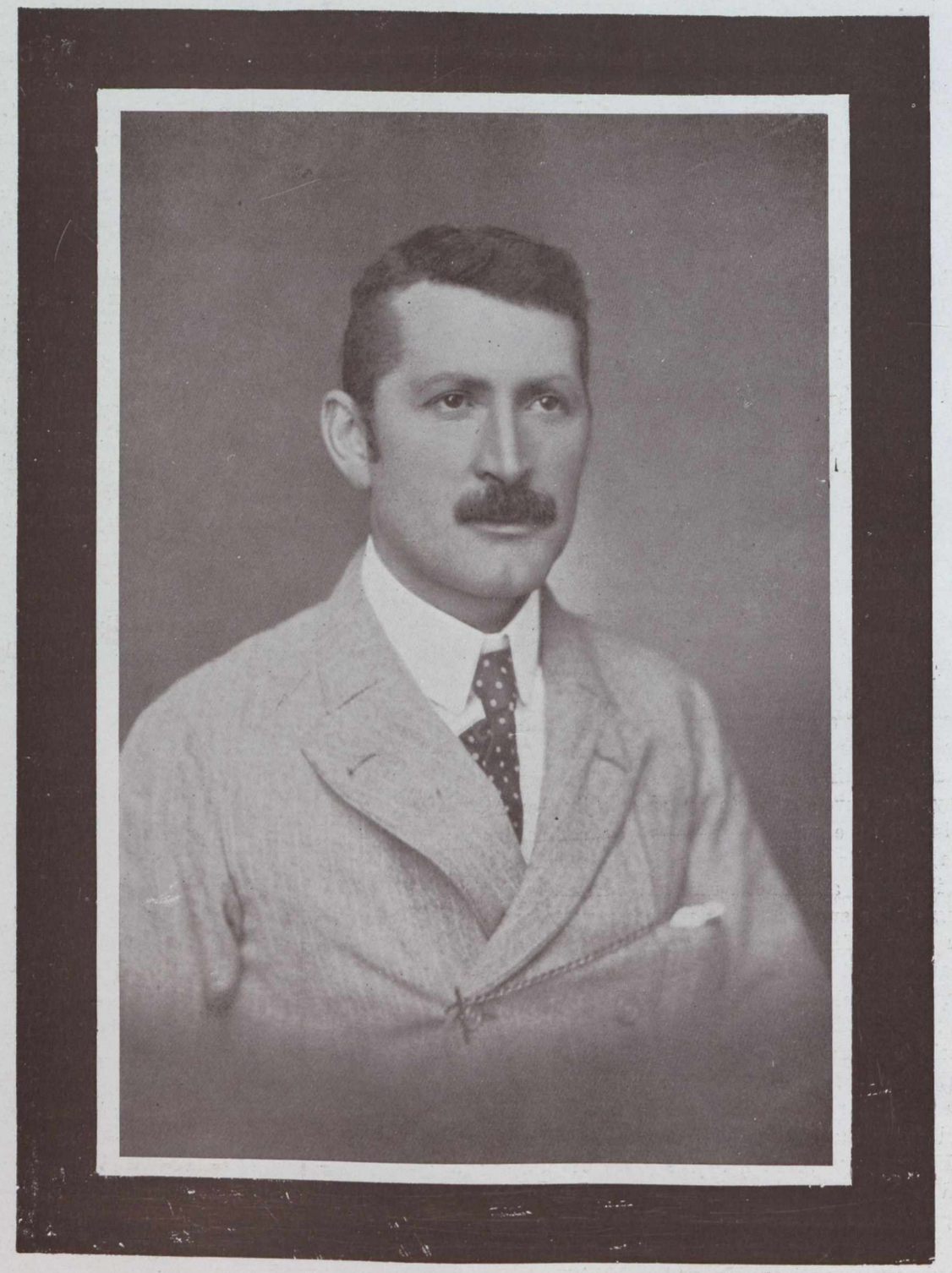
Unlike other professional societies, the Canadian Mining Institute is neither a close nor an exclusive corporation. Although to attain full membership the applicant must show that he has had ample experience in some branch of mining, and although these requirements have been made more rigid of late years, yet associate membership is open to the non-technical of all kinds and degrees.

Hence there exists in the ranks of the Institute, particularly as represented at the annual meeting, a very profitable variety of human types and human attainments. The lawyer, the investor, the prospector, the metallurgist, the organizer, the journalist, the geologist, the chemist, the mine manager, the government official, all will be present at the forthcoming meeting in Ottawa. This condition is, naturally, most desirable. The diversity of men and manners imparts zest to the proceedings.

It is obvious that the Canadian Mining Institute possesses, consciously or unconsciously, decided powers for good. That these powers are exercised wisely goes without saying. That they should be more profoundly felt is axiomatic. The Institute has achieved solidarity socially, but not yet in a political sense. The necessity for such solidarity is too apparent to require demonstration. While it would be destructive and futile to interfere with party politics, yet the Institute must be prepared effectually to face certain grave and critical situations. Such a situation exists at the present moment.

The functions of the Institute are many. It is called upon to express itself on questions of legislation and administration. It plays an important part in receiving and entertaining foreign delegations. In fact, the Institute is the only suitable organization for purposes of this kind. We have touched already upon its publications and its social aspects. These are all vital. But in themselves they are quite subordinate to the duty of safeguarding the mining industry. Occasions arise when it is imperative that the Institute be not only heard, but felt. Wise guidance, long deliberation, and dignified action are essential. Recognition of the fact that individually and collectively the members of the Institute can exercise large influence on the electorate is even more essential. That such influence, largely formative. and educational, should be exercised, implies nothing invidious. It were weak and foolish to blink facts. The Institute cannot confine itself merely to the formulation of protests. It should and must use every legitimate means to attain its legitimate ends. In fact, the

PORTRAITS, NEW AND OLD—MOSTLY OLD



THE LATE B. T. A. BELL,

Parent of the Institute. He made history. His works do follow him.

T. W. GIBSON,
Deputy Minister of Mines for Ontario.
This is from a Victorian Photograph.

HON. L. CODERRE, Minister of Mines.

A. P. LOW, Deputy Minister of Mines.

Paleozoic Picture of Mr. Low.

Institute must take itself seriously as a factor in the national life of Canada.

And this rests but in small measure with the Secretary and the Council. Every member must put his shoulder to the wheel. The thoroughly concerted action of one thousand responsible Canadian citizens should be adequate for the attainment of almost any object within the scope of the Institute's activities.

. . . . .

In both the territorial and the class sense the Institute is representative. Every Canadian province sends delegates to the annual meeting. The membership embraces men of all shades of opinion, of all grades professionally, and of many nationalities. Canadians form, of course, the preponderating majority. But Americans, Englishmen, Germans, and others, are sufficiently numerous to leaven the mass. In any movement of a serious nature, in any crisis, therefore, the Institute can count upon the disinterested advice of eminent outsiders. Thus the Canadian Mining Institute is most fortunately constituted. Its functions, while largely deliberative and social, are also administrative and executive. From its size and its composition it commands respect.

The time has arrived for the Canadian Mining Institute to undertake resolutely the solution of national problems. Closer identification with the industry and a more active participation in legislative affairs are crying needs.

. . . . .

I had really intended to make this short article a constructive appreciation of the work of the Institute. The editorial habit of mind, however, is painfully didactic. Apparently the editor lives, moves, and has his being in constant fault-finding and preaching. It is easy to be captious. It may not be amiss, therefore, to take this opportunity of expressing warm appreciation of the labours of our President, our Councillors, and, by no means least, of our Secretary. Our President and Councillors devote time, energy, and, often, money, to the performance of their regular duties—duties that are not in the least nominal. The Secretary, despite his passion for drawing on us for unpaid fees, meets the multifarious calls upon his time with tact and patience. He must, perforce, act like a regular "harumphrodite"—soldier and sailor too. He is editor, advance agent, treasurer, organizer, traffic agent, entertainer, and many other things to all men. Only once or twice a year is it permitted him to have a really good time. Not more than a baker's dozen of us can recall having heard the Secretary raising his voice in midnight, or matutinal song. His is not a cheerful life. Yet he smiles and smiles—and signs certificates, and argues with recalcitrant geologists, and bothers the life out of you and me for our perennial fees and our long-promised papers.

Verily we have a superfine lot of Councillors and an exceeding patient and decent Secretary. How they all get along with so few feuds and internecine wars is not for me to say. The roots of sin and the lust of battle are there. But the balance of power is rarely disturbed. Institute affairs come first, and personal ambitions a distant second.

. . . . .

In every natural organism there are forces at constant war each with the other. Our bodies are the battlegrounds of numberless bacilli, bacilli benign and bacilli malign. Much of the good that we accomplish is brought about by the antagonism of evil. The analogy carries. The Institute has in its time been rent asunder by factions and parties. Toronto and Montreal were at daggers drawn for years. Better feeling was engendered. Epics could be written of encounters between such doughty warriors as Coste and Brown, Haultain and Porter, and other equally warlike personages. Elections have often come within measurable distance of black eyes. Sectional fights to a finish were numerous. Whether because of lassitude, or of waxing dignity, or of a better general understanding, these disturbances appear to be things of the past. Such finished diplomats as Miller, Adams, and Smith, no longer think it worth while to stir the fighting blood of the Institute. It cannot be said, however, that there is any lack of pugnacity and good clean love of battle. Petty jealousies have disappeared. There remain many potent influences that require harnessing and direction. The leaders of the Institute will find no difficulty in utilizing these forces in constructive work for the good of the mining industry. A grand destiny awaits the Institute if we but wake in time.

. . . . .

A sister society, of which many of us are members, has just passed through a trying, and disturbing experience. That the Canadian Mining Institute has enjoyed several years of practically unbroken peace is much to the credit of our Councillors, our Presidents, and our Secretary. It speaks volumes for the manner in which the affairs of the Institute are administered.

THE PORTRAIT GALLERY

The portraits that appear herewith cover many years of the Institute's history. They include officials old and new. Reference to the Institute's published list will throw more light upon the standing of each. It may be added that the size of each portrait has been determined by quite arbitrary circumstances.

TO THE INSTITUTE

Such doggerel as this, I trow,
Should not be printed in the Journal;
It surely merits here and now
Condignest torment, sempiternal!

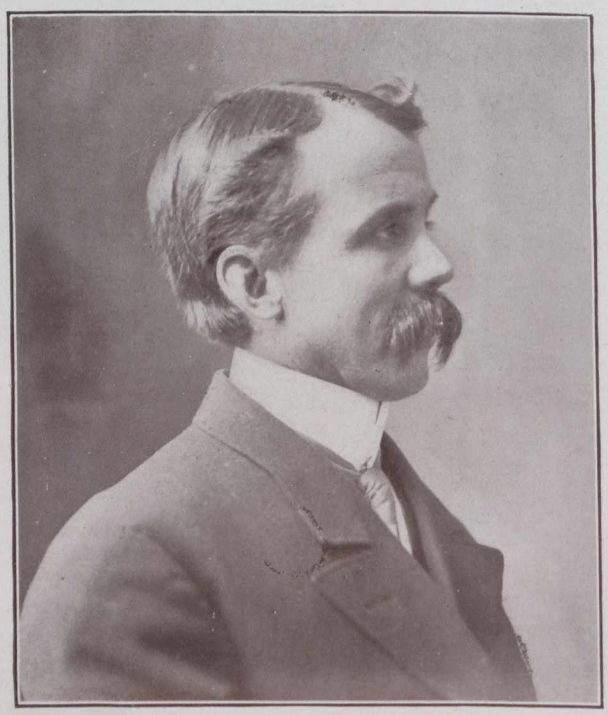
. . . . .

From many countries, many climes,
The sons of Martha hasten here,
Each big with much unspoken thought,
Each filled with much unspoken fear
That he will miss the smallest jot
Of what is done or what is not.

. . . . .

Here comes from the metropolis
The gladsome Barlow, who, surprised
And captured the acropolis
Of long ambition realized.
Comes also Miller from the west—
Observe the twinkle in his eye.
His pose of a misogynist
Is not convincing by-the-bye.
And who is this with suavest smile,
Restrained, impersonal, and bland,
As one that you might know long while
Ere you could diagnose his hand?
That, that is Adams of McGill,
The man who made hard marble flow,
And, though we cannot cherish ill,
He treated us precisely so.
And who comes next, dark-visaged, gloomy,
Unsmiling, capable, and cold,
His countenance presaging doom, he
Looks ripe for action swift and bold;
None other this than Bonsall Porter
That most resourceful child of guile,
In politics a rip-tailed snorter
With many a trick and many a wile.
Hard after him there follows smiling
A brisk and truculent confrere;
His manner sharp and not beguiling,
Like—well—a tiger in his lair.
Haultain it is, there's no mistaking
His attitude on anything;
His thirst (for rows) there is no slaking,
His praises students many sing.
There follows one with brow so high
It runs back nearly to his collar;
'Tis A. A. Cole, who's passing by,

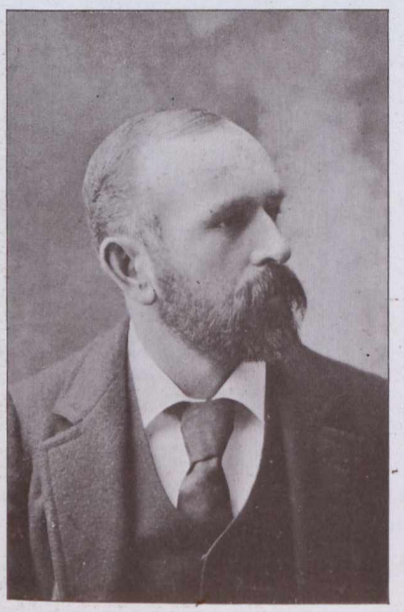
DR. W. G. MILLER.
Recent alterations give this picture merely historic value.
Mr. Miller has been ever the power behind the Throne.
Notice the Machiavelian expression.



DR. A. E. BARLOW.
A poor portrait of our respected President.

CHARLES FERGIE,
Pre-eminent in wrestling circles.
Not unknown as a coal
mining engineer.

FREDERIC KEFFER, Past-President.
A thoughful, benign and conciliating person.



R. R. HEDLEY,
who looks, and is, a good citizen.

A. B. W. HODGES,
lately returned from Cerro de Pasco.

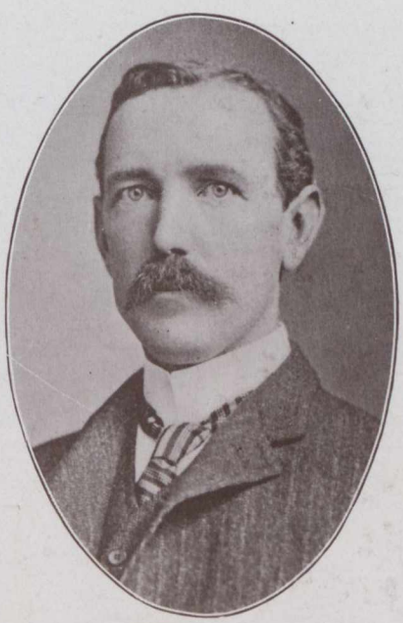
Calm, self-contained, when others holler.
Bull-throated Foghorn next I view,
A child of nature, surely;
Moreover, it is just and due
To state that most securely
Old Mac can handle more good Scotch
Than anyone we know, sir,
And he can kick up quite a splotch
When once he starts to go, sir.
The Colonel comes in Foghorn's wake,
A jaunty, cheerful figure;
A martial noise he seems to make
His style is quite *de rigueur*.
You'll see him later on, I ween,
Assisted by the Major,
Each is and each has ever been
An excellent old stager.
And now there bursts upon our view
A person most excited,
He looks at me and then at you
To see if we're invited.
He wears a harried worried air
As if the trump had sounded,
As if his woes he can not bear
He is so teased and hounded.
It is not hard to guess his name
A double-barreled label—
My muse has gone so cursèd lame
These lines resemble Babel.
'Twere quite unfair to many good
Substantial souls like Penhale
Who do their best, as heroes should,
When feeling ill or *when* hale,
To overlook their many claims
To be embalmed in verse.
Of Penhale be it briefly noted
He *seems* a sport, or worse,
Whereas, he's properly devoted
To abstinence and tea.
And Ferrier must not be missed,
A regular Ulysses, he
Is quite at home with tuff or schist.
A man of firm opinion,
Canadian to the core,
To none could he become a minion,
You could not ask for more.

. . . . .

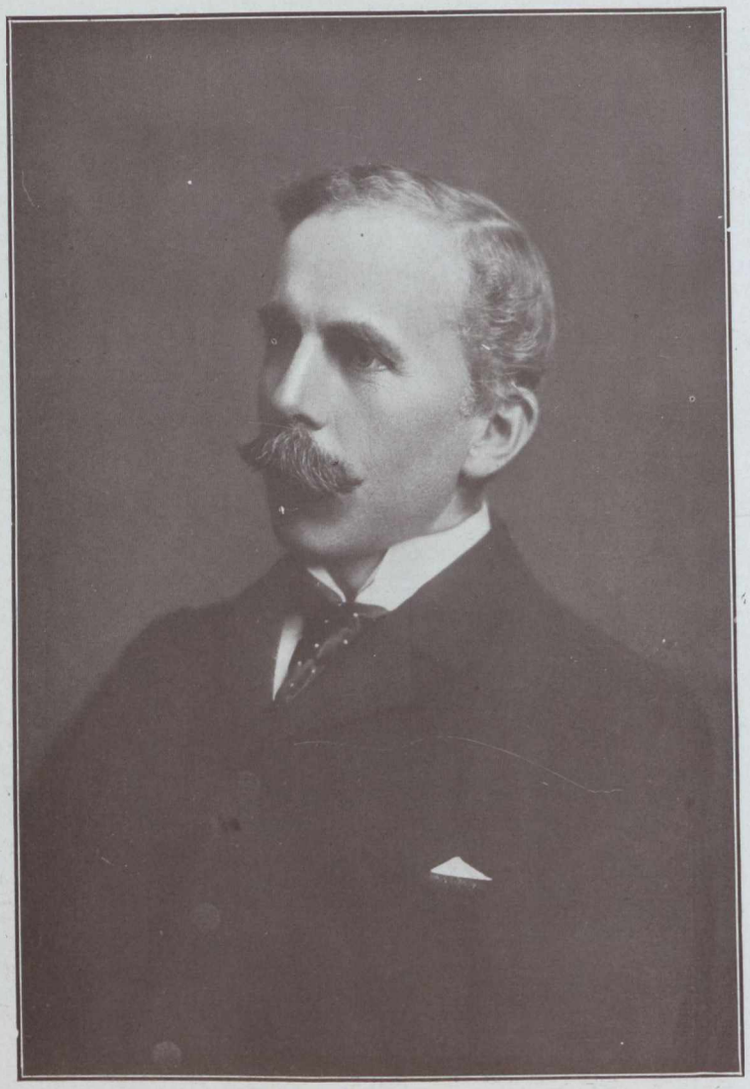
I wander farther than I ought to
Much farther than at first was planned
Much farther than I ever thought to—
My subject's rather out of hand.
So I shall simply say adieu!
Here's "How" to every one of you!

GEORGE R. SMITH, Past-President,
and past-master in politics and prestidigitation.

E. T. CORKILL,
Inspector of Mines for Ontario. Strong on explosives. Has put the fear of God into more than one operator.



JAMES McEVOY,
Coal Protagonist of Pontonie—academic controversies on burro back over the Rockies a specialty.



DR. F. D. ADAMS, Past-President.

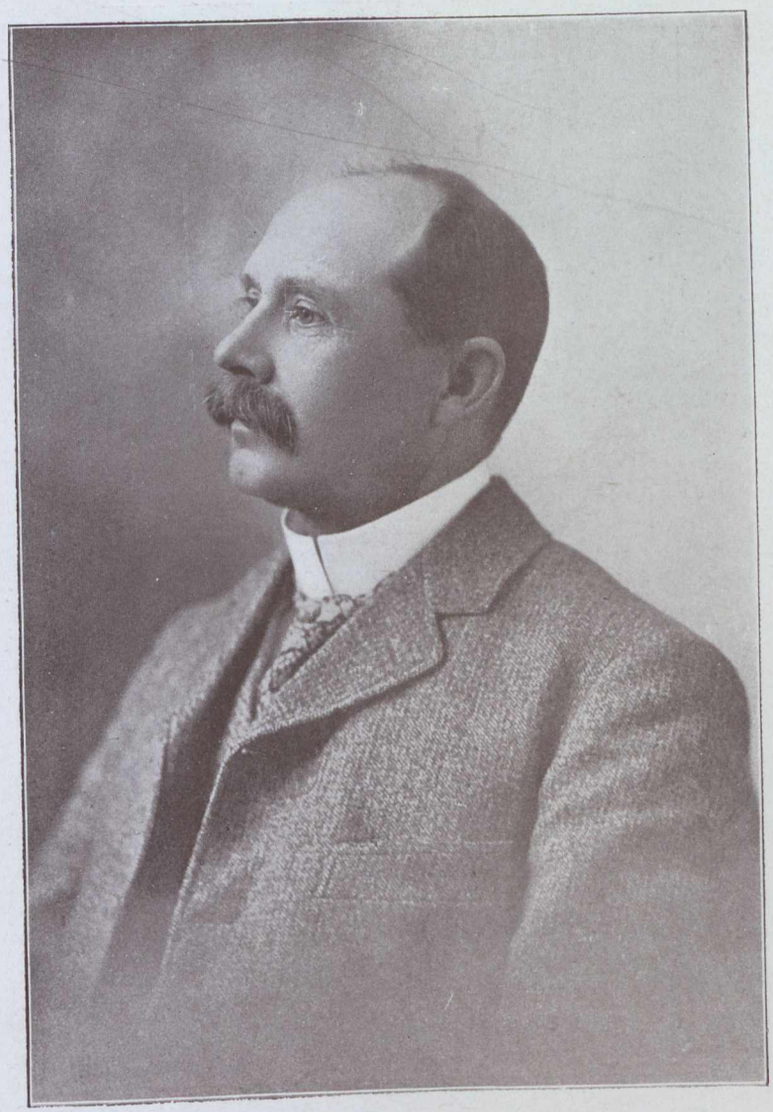
Star witness in famous breach of promise case at our Quebec Meeting, 1911.

JOHN E. HARDMAN.

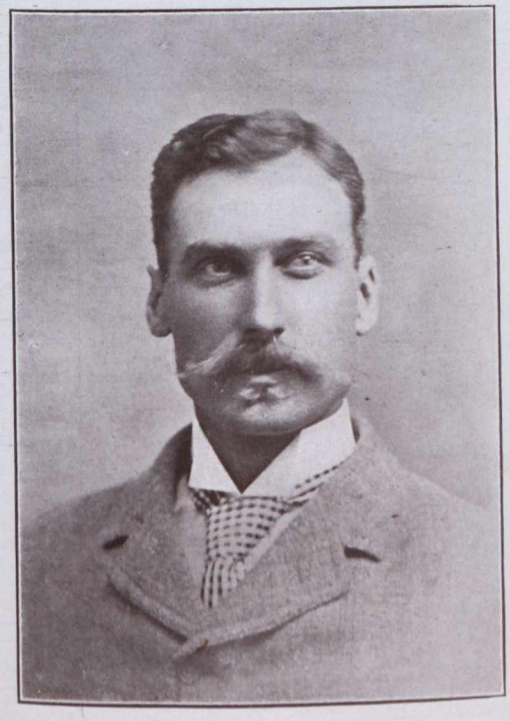
Forest fires have destroyed the spinach. Not now so godly of visage. An after-dinner artist and a true blue sport.

EUGENE COSTE,

The stormy petrel of the Institute. Mr. Coste has enlivened proceedings more than a little.

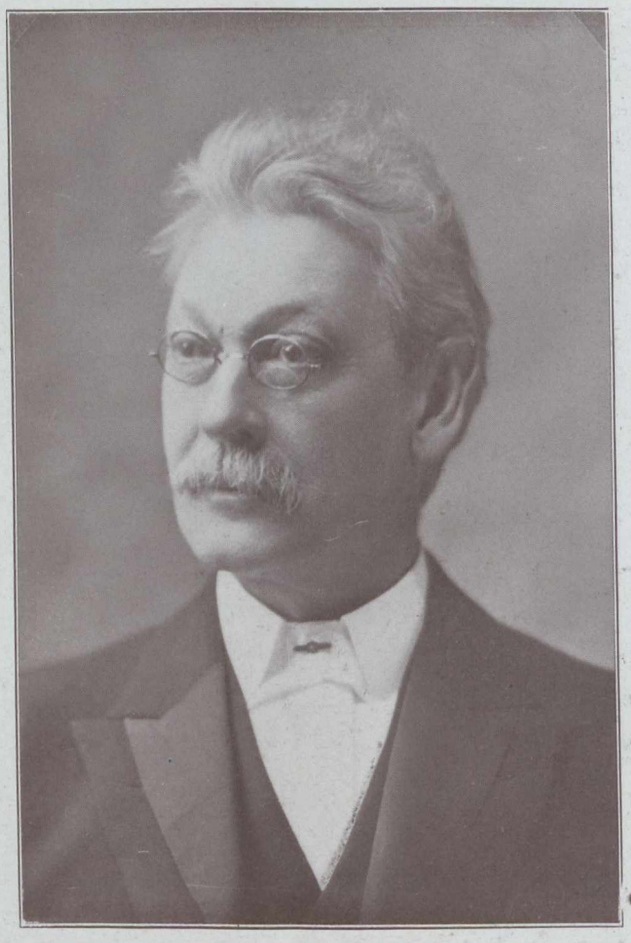


THOS. CANTLEY, N. S. Steel & Coal Co.,
(these are synonyms).

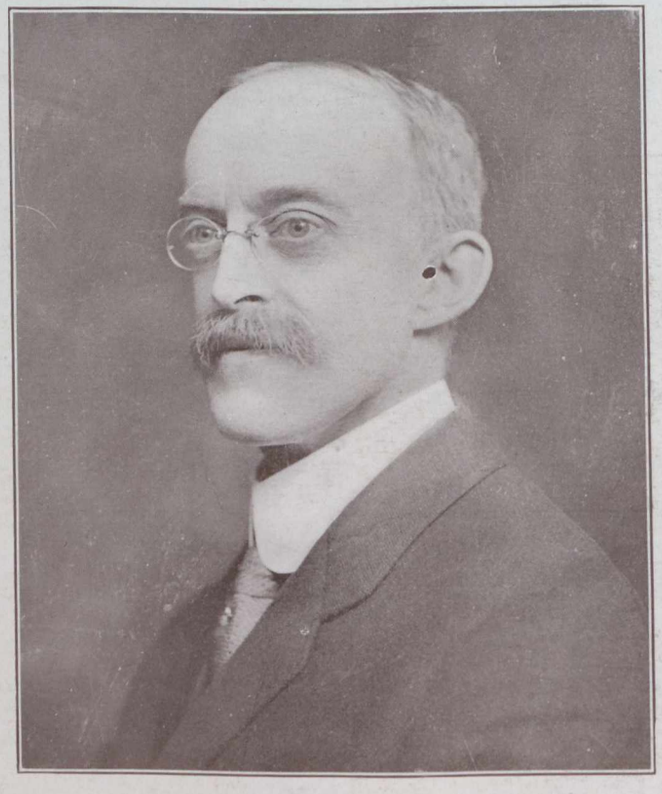


MAJOR R. W. LEONARD.
Beloved of G.T.P. contractors.

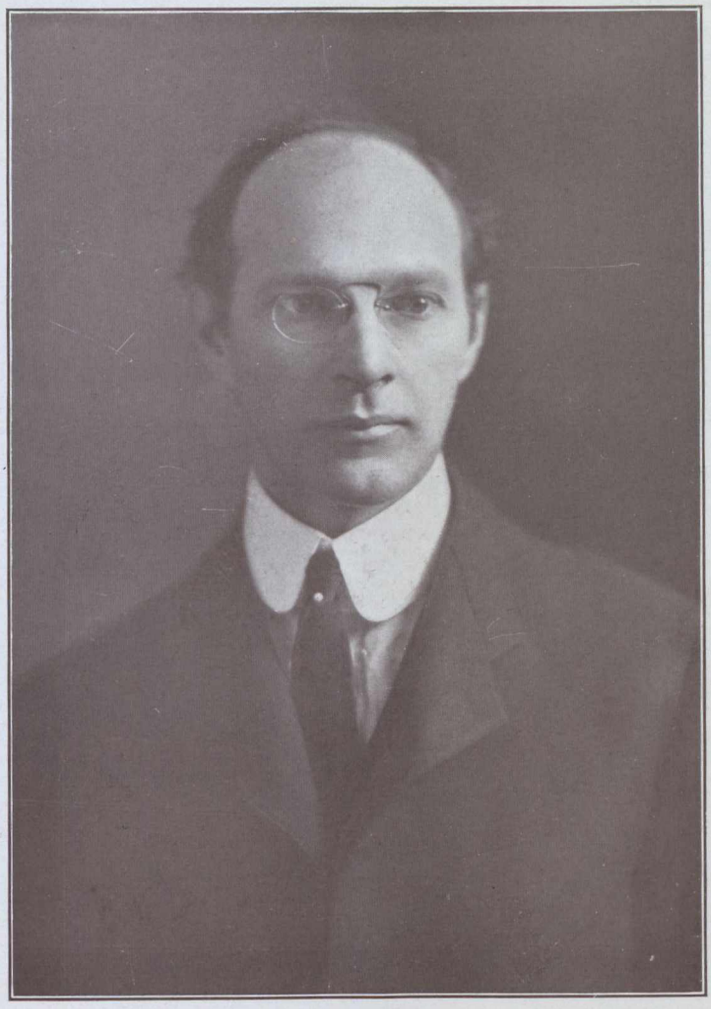
A. A. COLE,
Mining Engineer T. & N. O. Railway. Dry nurse to many Cobalt excursionists.



DR. EUGENE HAANEL,
Director of the Mines Branch. Savant, specialist and administrator.

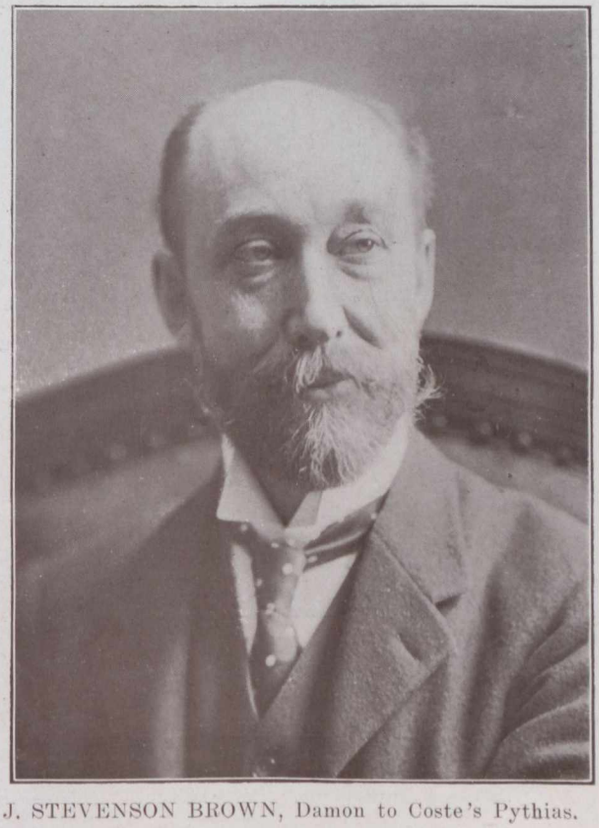


W. F. FERRIER.
Lately arrived from the States. A vehement Canadian. Discoverer of Canadian corundum.

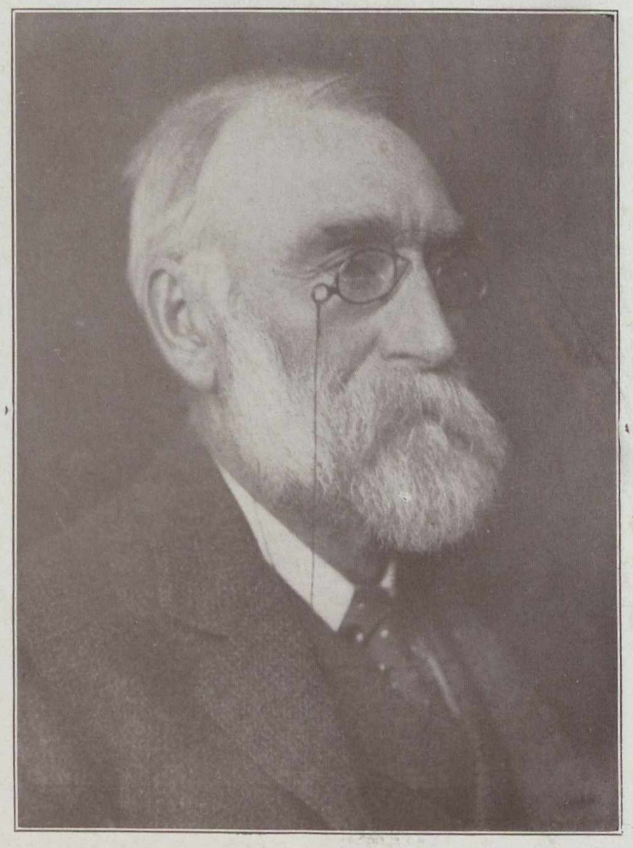


H. MORTIMER LAMB, Secretary of the C. M. I.

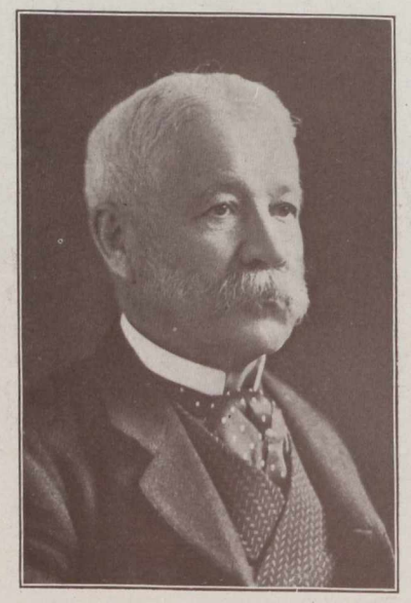
G. G. S. LINDSEY,
An indefatigable official, organizer and entertainer.
Classified under the category of corker.



J. STEVENSON BROWN, Damon to Coste's Pythias.

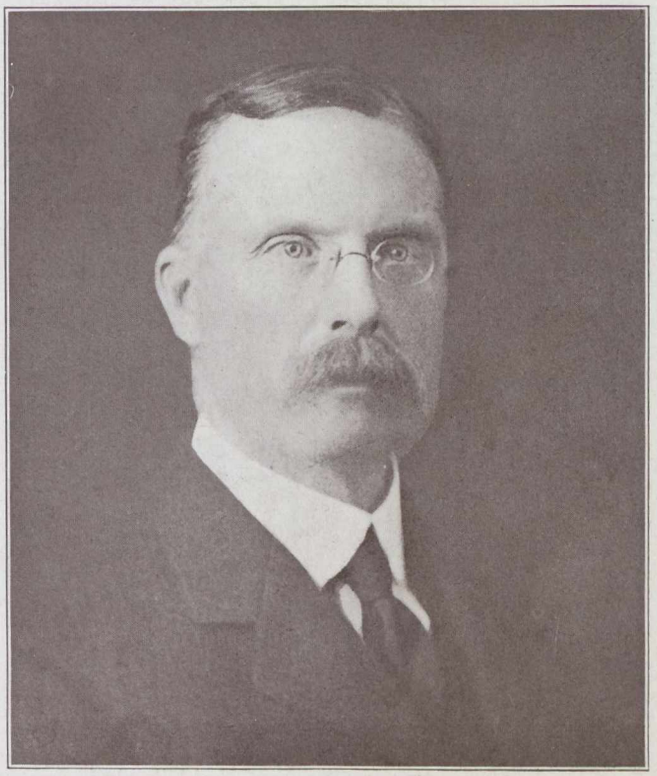


DR. JAMES DOUGLAS, Scientist, Metallurgist and Author.

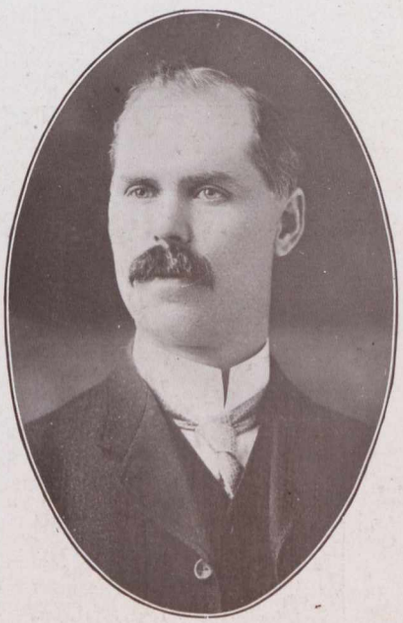


MAJOR R. G. LECKIE,
the Cock o' the North and the Best of the Bunch.

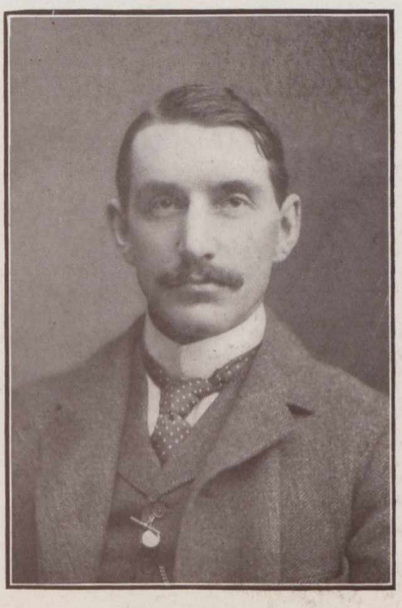
J. OBALSKI,
the former Superintendent of Mines for Quebec.



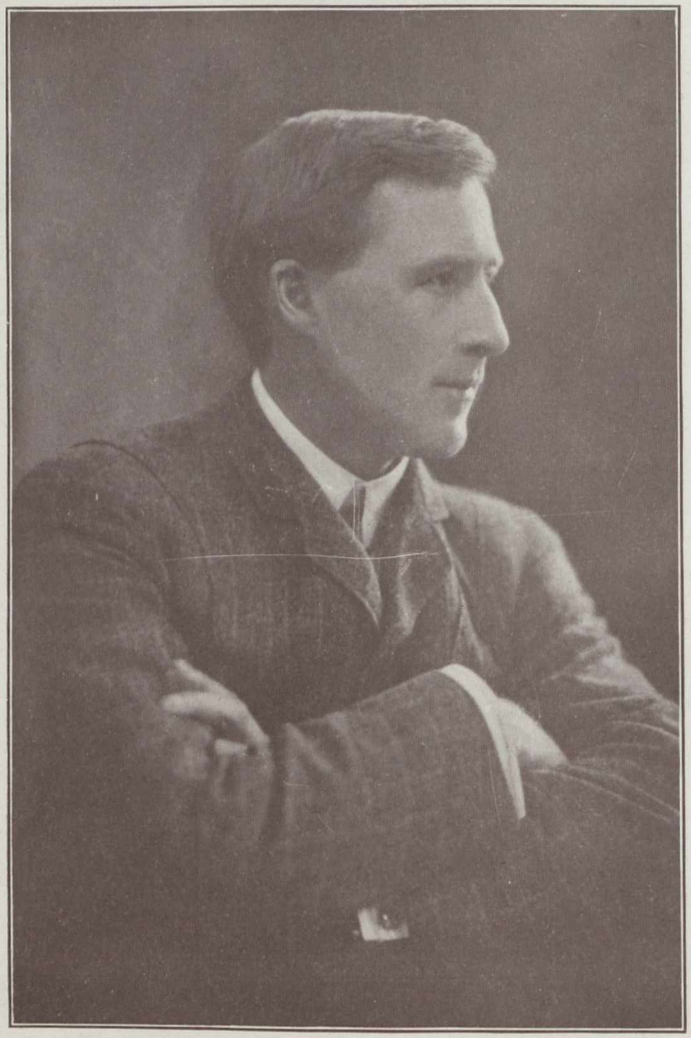
J. B. TYRRELL,
Explorer, geologist and author. Capable of unbending.



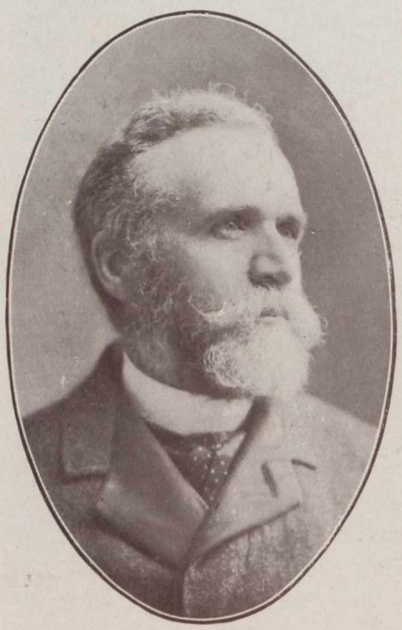
A. B. WILLMOTT.
Not now a partner of Julian Hawthorne.



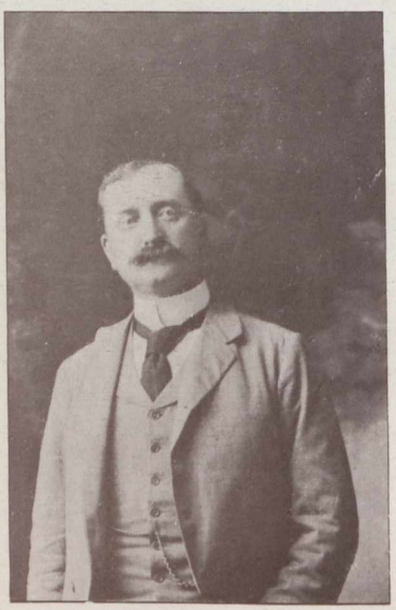
J. C. GWILLIM,
Professor of Mining, Kingston.



R. W. BROCK, Director Geological Survey.
Much in need of a patriarchal beard. Otherwise beyond reproach.



DR. W. L. GOODWIN,
Director Kingston School of Mining. One of the Old Guard. Capable yet of staying up till after midnight.



COL. A. M. HAY,
without whom the Institute would cease to interest us.