

THE CANADIAN MINING JOURNAL

VOL. XXXIV.

TORONTO, February 1, 1913

No. 3

The Canadian Mining Journal

With which is incorporated the
"CANADIAN MINING REVIEW"

Devoted to Mining, Metallurgy and Allied Industries in Canada.

Published fortnightly by the

MINES PUBLISHING CO., LIMITED

Head Office - Room 36, Canadian Birkbeck Building, 10 Adelaide Street East, Toronto.

Branch Office - - - - - 34B Board of Trade Building

London Office - - - - - Walter R. Skinner, 11-12 Clement's Lane London, E.C.

U. S. A. Office - Ward & Smith, 931 Tribune Building, New York

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SUBSCRIPTIONS—Payable in advance, \$2.00 a year of 24 numbers, including postage in Canada. In all other countries, including postage, \$3.00 a year.

Advertising copy should reach the Toronto Office by the 8th, for issues of the 15th of each month, and by the 23rd for the issues of the first of the following month. If proof is required, the copy should be sent so that the accepted proof will reach the Toronto Office by the above dates.

CIRCULATION.

"Entered as second-class matter April 23rd, 1908, at the post office at Buffalo, N.Y., under the Act of Congress of March 3rd 1879."

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INTERNATIONAL GEOLOGICAL CONGRESS

Most impressive are the preparations being made for the Canadian meeting of the International Geological Congress. A large amount of money has already been carefully and judiciously expended, and much more will have to be disbursed before the delegates reach Canada. Private citizens are giving their time, energy and money for the cause. Strong and representative committees have been organized. The Provinces of Nova Scotia, Quebec, Ontario, and British Columbia have contributed handsomely to the general fund. So, also, has the Dominion Government. And it is not to be believed that New Brunswick, Alberta, Manitoba, and Saskatchewan will allow this rare opportunity to pass without giving tangible evidence of their appreciation of its importance.

Let us for a moment glance over the history of the Congress, first, however, touching upon its character and objects. To quote from a pamphlet recently written by Mr. H. Mortimer-Lamb, "the objects of the Congress may be briefly summarized in the general statement that by means of the periodical meetings the results of knowledge acquired in any one country are given a universal application and significance. The Congress endeavours to provide, for example, for the adopting of uniform systems of mapping, nomenclature, and classification of rocks, fossils and minerals; and in other directions broadens the boundaries and extends the usefulness of geological science." Such tremendous undertakings as the completion of a geological map of Europe have been successfully carried through, and it is possible that a geological map of the world may be forthcoming within a few years. These, however, while they are the most striking, are not the most beneficent results that flow from the Congress. The intercourse of trained thinkers, the contact with new types, the personal comparison of notes, and the unexampled facilities for seeing extensive tracts of country that most of the delegates have not seen before, are profitable alike to the members of the Congress and to the country visited.

The membership of the Congress comprises professional geologists and persons engaged in other allied professions. There is, however, no hard and fast line drawn, although the official delegates are always representatives of corporate bodies. Nevertheless, many foreign visitors will, no doubt, come in their private capacities.

The first meeting of the Congress was held in France in 1878. Including this gathering there have been

altogether eleven Congresses held at intervals of three years. The principal countries of Europe, the United States, and Mexico have been the scenes of action. For the first time Canada is now to be honoured.

The regular attendance has ranged between 140 and 703, and as many as thirty-six countries have been represented. It is estimated that the foreign contingent at the coming Congress will number at least 700, and may exceed this figure considerably. Of course, every local meeting, and every excursion will be attended by many Canadians. Thus it is possible that on such excursions as that to Cobalt and Porcupine the total attendance may run up to almost twice the first estimate.

The transportation companies have been so generous in their attitude towards the Congress, that no insuperable difficulty is expected in handling the excursions.

Fuller particulars of the coming International Geological Congress will be found on another page. The article is a transcript of a speech delivered by Mr. G. G. S. Lindsey before the Toronto Branch of the Canadian Mining Institute.

NEWSPAPER JOURNALESE.

The following is from a Toronto newspaper:

"They have dug up a Souraughulous in Southern Alberta. As the intelligent animal had been buried several thousand years there was every excuse for its having gone sour in the meantime."

As the intelligent humourist of the newspaper in question has taken on himself the duty of revising paleontological orthography, and as he has not the excuse of having been buried "several thousand years," and as his joke is based upon a profound and complete misconception, and as it is quite as archaic as the innocent misspelled monster, we therefore find him guilty of something far removed from humour.

MINE RESCUE WORK IN CANADA

The Commission of Conservation deserves commendation for its latest publication. For some time the subject has been before the public. The Commission has built up a strong system of publicity, and it is well that the vital topic of mine rescue work should be given the benefit.

The pamphlet, "Mine Rescue Work in Canada," has been compiled by Mr. W. J. Dick, the mining engineer of the Commission. It covers, very briefly, a comparison of death rates in Canadian and foreign collieries, a description of apparatus, legal requirements abroad, Canadian establishments, and the general work of organization.

Although in other countries coal mine operators are compelled by law to instal rescue apparatus, in Canada, where authority for such legislation is vested in the

Provincial Governments, the Province of British Columbia alone enforces their use. Nevertheless, owing entirely to private enterprise, Nova Scotian mine owners were first in this humane movement.

In addition to the four small stations equipped by the British Columbia Government, there are four privately-owned stations. Moreover, several companies are supplied with apparatus. In Alberta there are two, with a third under construction; and in Nova Scotia there are three exceedingly well equipped stations. Particulars of all these will be found elsewhere in this issue.

Whilst Canadian operators are following the lead of European mines, it is not out of order here to claim some credit for the Canadian Mining Journal. We were the first publication in Canada to advocate in any way the adoption of rescue apparatus and the subject has been repeatedly and emphatically referred to in these columns.

UNITED STATES GEOLOGICAL SURVEY

The thirty-third annual report of the United States Geological Survey has just been issued. In reviewing therein the work of the department during the past year the director, Mr. George Otis Smith, takes occasion to emphasize a point that is not properly appreciated even by mining men, certainly not by the general public, namely, that scientific investigations are inseparable from economic work. "In any field," he remarks, "economic work of the highest rank is impossible without full knowledge of the scientific laws and principles pertaining to the subject of the work; but as there is no application of geology that does not involve unsolved problems, some of them of the highest importance, the best knowledge available is nevertheless relative. It thus follows that the broad and searching observations which should accompany every piece of good economic work comprehend data that are eventually combined in the construction of new scientific hypotheses, some of which, as more observations accumulate, grow into established laws or principles that are in turn of the greatest practical consequence. Thus the detailed studies of the metalliferous deposits in one region or another bring to light evidence from which to determine the genesis of the ores and the modes or conditions of their occurrence, and the economic inquiry becomes more intelligent and successful when once this new principle regarding the mode of an ore occurrence is understood." Mr. Smith gives as an interesting illustration of the deduction of a principle from data gradually accumulated from investigations in several fields, the conclusions presented in the paper by Mr. W. H. Emmons on the enrichment of sulphide ores; while an illustration of scientific results based on a long period of field studies, is found in the pre-Paleozoic history of Central North America, as described in the monograph by Van Hise and Leith on the geology of the Lake Superior region.

As indicating the broad-minded policy by which the affairs of the United States Geological Survey are governed, it may be noted that many of the scientific results of the survey's operations are frequently first published either in technical periodicals or in the transactions of scientific societies. The director explains in his annual report that this practice presents an opportunity for the free discussion of scientific theories and problems that otherwise would not be feasible.

MARITIME PROVINCE IRON ORES

In our last issue we noticed editorially the excellent work that was done last year by the Nova Scotia Steel & Coal Company in its Wabana mines, Bell Island, Newfoundland. The Wabana ore, as our readers are doubtless aware, is shipped to the Scotia blast furnaces at North Sydney.

Encouraging as is the progress made by the above-mentioned company, it is even more encouraging to learn that the local iron mines of New Brunswick and Nova Scotia are to produce more ore during 1913 than ever before.

For various sufficient reasons, the Torbrook and Nic-taux mines (Nova Scotia) belonging to the Canada Iron Corporation produced only 30,000 tons of washed ore. As a matter of fact, the washing plant was in commission for only two months. Its capacity is about 18,000 tons per month. It will run steadily throughout the current year. Already orders for 100,000 tons of washed ore have been booked, and there seems to be a ready market for the product, not only in Europe but in the United States.

The mines are being equipped for an output of 1,000 tons per day.*

Near Bathurst, New Brunswick, where are situated the other Maritime properties of the corporation, a similar washing plant has been erected. After the completion of the plant, 90,000 tons of washed ore were shipped, late in 1912, to United States ports. Orders for 1913 have been booked to the extent of 200,000 tons. Additional equipment will bring the plant's capacity up to 1,500 tons per day. Stripping by means of steam shovel will much facilitate this year's quarrying. Tide water docks at Newcastle are distant about seventeen miles.

The bold, though sound, development policy of the Canada Iron Corporation will enable it to place upon the market about 300,000 tons of high-grade non-phosphatic magnetite and, roughly, 200,000 tons of excellent phosphatic hematite and grey calciferous magnetite. This, of course, implies that the mines will live up to expectations. That they will do so appears assured.

This being the case, Nova Scotia and New Brunswick will immediately leap into the forefront of Canadian iron-ore producing provinces. But more than

this will follow. No enterprises of this kind are successful without bringing in their train other new concerns, together with a general increase of the country's prosperity.

MINING AND RAILWAYS

Some very illuminating facts are contained in a recent Government blue book, the Annual Report of the Department of Railways and Canals for the fiscal year ending March 31, 1912. In a tabulated statement of the principal freight carried over the Intercolonial Railway, it is observable that the direct products of the mine supply almost 33 per cent. of all the freight handled. The commodities falling into this category are as follows: Coal and coke, ore, sand, stone, salt, slate and granite, and phosphate. Petroleum, all iron products, brick, lime, and cement come under the head of manufacturers. It is a notable fact that, even with this arbitrary classification, the products of mines furnish more than any other class of freight. Manufactures yielded about 31 per cent. of the total, as against the 33 per cent. mentioned above. Products of the forest, products of agriculture, and products of animals followed in the order indicated.

Tapping a region of immense mining possibilities, there is not the least room for doubting that the Intercolonial will depend more and more largely upon the products of the mine for any rapid growth in its freight traffic. The whole situation is worthy of study.

If this argument should be supposed to require further explication, it is only necessary to add that some of the largest items under the head of manufactures are the semi-finished or finished products of smelting and metallurgical establishments.

A thorough investigation of the situation would assuredly repay any reasonable expenditure.

INTERMITTENT CYANIDATION

A short article published on another page deals with this timely subject. It is claimed by the author that intermittent cyanidation has not had fair consideration at the hands of metallurgists. It is pointed out that, theoretically at least, the advantages are in favour of intermittent as compared with continuous cyanidation. Continuous treatment is not ideal. The finer pulp is treated too long, the coarser, since its transit is too rapid, is not treated long enough.

These conditions are corrected by the simpler system of intermitten decantation, which provides proper agitation as a part of the process.

We hope that some of our readers will send in their opinions on this matter.

EDITORIAL NOTES

The King Edward mine at Cobalt, as mentioned by our Northern Ontario correspondent, is showing symptoms of good ore. The King Edward is now being

* (See special N. S. issue, Sept. 15, 1912, p. 637 et seq.)

worked on a scale commensurate with probabilities. Formerly it was operated on florid hopes. The change is one of the benefits of the rational leasing system.

“Dios Nos Guie” is the motto over the entry to a well-known Mexican mine. Being translated, it signifies “God Guide Us.” Whilst there is a touch of pathos in this prayerful legend, it is most eminently opposite. Appropriate to many a mine would be the rendering “God Help Us.”

Canada now ranks seventh amongst the copper producing nations of the world. Last year its estimated production was 33,000 long tons. This slightly exceeded Germany's production, and was slightly less than that of Chili.

It is announced that the Indian Geological Survey has discovered the occurrence of asbestos of excellent quality in Idar State. The mineral is said to be of the amphibole variety, some of the fibre being as long as 8 inches.

The report of the Council of the Canadian Mining Institute for the year 1912, printed elsewhere in this issue, is a satisfactory record of progress. It is gratifying to note the steady increase in membership, which now is in excess of a thousand. The accessions during the year of 170 members, associates and student members, constitute an increase of nearly 20 per cent. on the membership returns of 1911. There could be no better indication that the value of the work of the Institute is both recognized and appreciated by the mining men of the Dominion. By the establishment of a branch in Southern Alberta last autumn the Institute is now represented by local organizations in all the principal mineral producing provinces, with the exception only of Nova Scotia, where, however, it is least necessary. The meetings last year were distinctly successful from every point of view, and the volume of transactions, which we understand, will be distributed shortly, will contain many papers of quite exceptional interest and importance.

A circular recently issued by the secretary of the Canadian Mining Institute contains the information that the next annual general meeting will be held in Ottawa. The provisional programme as published promises well. The subjects announced for discussion are for the most part of timely interest or have a practical significance. The meeting, we learn, is to be opened by H.R.H. the Governor-General, and the Rt. Hon. the Prime Minister has accepted an invitation to be the Institute's guest of honour at the “annual dinner,” at which he will speak.

RESIGNS OFFICE OF PROVINCIAL ASSAYER.

With the close of 1912, Mr. Herbert Carmichael, of Victoria, ended a long period of service with the British Columbia Government, having resigned the office of Provincial Assayer so that he may give his time and attention wholly to his private interests.

On September 21st, 1891, Mr. Carmichael was appointed Government Analyst, and in the spring of the following year received the appointment of Provincial Assayer, the duties of both offices thus devolving upon him. At that time there was not an organized Department of Mines in the Province, nor any separate clerical staff to attend to the work connected with mining. The Provincial Secretary or another minister of the day acted as Minister of Mines, and his staff attended to whatever clerical work was requisite in that connection. The only technical advisers in respect of mining the Provincial Government then had were Mr. Archibald Dick, of Nanaimo, Inspector of Mines, and Mr. Carmichael, Provincial Assayer. From the time the Hon. John Robson, then Premier, was as well Minister of Mines, until the present there has been a very large expansion of the mining industry of the Province, and with it of necessity the organization and development of the Department of Mines.

Prior to 1892 lode-mining was of very little importance in British Columbia, the total value of production up to that year, as on official record, having been less than \$300,000. The aggregate value to the end of 1912 is in excess of \$200,000,000, so that during his term of office Mr. Carmichael has seen the industry with which he has so long been officially identified make advances that, in so new a country, may fairly be described as tremendous. This is the aggregate value of lode minerals produced—not of all minerals—for the grand aggregate is now nearly \$330,000,000.

An Interesting Incident.

As an interesting incident of by-gone years, it may be mentioned that one of the first lots of ore Mr. Carmichael had sent to him was some from Slocan district, forwarded by Mr. Frank Fletcher, long identified with Nelson. This was found to assay more than 3,000 oz. in silver to the ton, and notwithstanding that he got similar results from each test he made, the new Provincial Assayer signed the certificate with fear and trembling, for such rich galena ore until then had been unknown in British Columbia. To-day, and for many years, such an assay return, would cause no surprise. The banner year for work in the Assay Office was in 1897; there was nothing like it before, nor has there been since.

Mr. Carmichael, among many useful duties performed, was largely instrumental in getting the Bureau of Mines Act, 1895, passed, which Act he drafted. Under that Act, Mr. W. A. Carlyle was the same year appointed the first Provincial Mineralogist for British Columbia, and these two officials in January, 1896, began the organization of the Bureau of Mines. Early in 1898 Mr. Carlyle resigned, and was followed in the office of Provincial Mineralogist by the present occupant, Mr. Wm. Fleet Robertson, who took office on June 1st, 1898.

During many years of zealous performance of his official duties, Mr. Carmichael has made numerous friends throughout British Columbia, and these, while regretting that the Department of Mines is losing the efficient services of so good a chemist and so capable an officer, will wish him abundant success in his enterprises, several of which will hereafter fully occupy him.

NOVA SCOTIA'S MINERAL PRODUCTION, YEAR ENDING SEPTEMBER 20th, 1912

Written for the Canadian Mining Journal
By H. B. Pickings.*

The year 1912 from a production standpoint has been for the mineral and allied industry of Nova Scotia a record year.

The coal production 6,800,000 tons was greater by half a million tons than the production of 1908 the previous record year. The large increase was due to a record production by the Dominion Coal Company and Nova Scotia Steel & Coal Co., in Cape Breton, and the resuming of operations at Springhill, when the Dominion Coal Company took over the mines of the Cumberland Railway and Coal Co. The Pictou County production was slightly less than in 1911, due to attention given by the Acadia Coal Co. to underground development and the changing of their power plant from steam to electricity, the electric power to be generated from coal at a central power station.

Since the closing of the Canada Iron Corporation mines at Torbrook in 1911 no iron ore has been mined in the Province. This company did, however, operate their concentrating plant, treating ore from their stock pile at Torbrook and they made a number of shipments. The iron-ore market has recovered from the low prices of 1911 and the Torbrook mines are being unwatered and will shortly be again in production.

The quantity of gypsum quarried was 350,000 tons, the greater quantity as in the past being from the quarries near Windsor, Hants Co. Extensive diamond drilling has been and is now being done on several of the gypsum deposits.

The gold production of 5,000 ounces falls far below the production of the previous year, and is many thousand ounces below the average yearly production of the Province, while the industry can not be said to be in a flourishing condition, the bullion produced does not do justice to the extent of the operations carried on, as at several districts serious attention was given to mine development and plant equipment, and no effort made to immediate production.

The production of 250 tons of manganese was all recovered from mine development by the Nova Scotia Manganese Co. at New Ross. This company directed all their efforts during the year to mine development, surface equipment and the construction of a road to tide water at the Avon River, the length of the road to be built being nine miles, of this seven miles has been completed. In the mine preparations have been

made to commence stoping, and mining and shipping of ore will shortly be undertaken.

Shipments of tungsten concentrates totalling 15 tons were made from the property of the Scheelite Mines, Ltd., at Scheelite, Moose River, the concentrates being of particularly high grade, running over 72% tungstic acid. Development work has been continued at this property during the year.

The Barytes, Ltd., at Lake Ainslie commenced operating their new mill and produced 1,000 tons of manufactured barytes, shipments were made as far west as Winnipeg. No other barytes was mined.

The steel companies of the province, the Dominion Iron & Steel Co., and the Nova Scotia Steel & Coal Co. produced 415,000 tons of pig iron and 465,000 tons of steel ingots, both record productions. Limestone quarried for flux purposes was 550,000 tons.

The amount of coke made was 600,000 tons, an increase of 55,000 tons over the amount manufactured in 1911.

The output of the brick yards, 23,000,000, is about the same quantity as during the previous year. Several of the larger brick yards have been merged under the name of the Nova Scotia Clay Works, Limited, and preparations are being made greatly to increase outputs.

Building stone at 10,000 tons, drain pipe tile, etc., at 1,000,000 feet are about same as the production of 1911.

Other productions were moulding sands 1,200 tons, and sulphate of ammonia 5,200 tons.

Prospecting has been engaged in on iron, molybdenite, lead-silver, copper, oil-shale and other deposits, but while promising finds have in some cases resulted, no ore has been mined during the year.

The amount of iron ore imported into the province and reduced in the furnaces of the Dominion Iron & Steel Co., and the Nova Scotia Steel and Coal Co., was 880,000 tons.

The figures given above are all for the 12 months ended Sept. 30th, 1912, the fiscal year of the Nova Scotia Department of Mines ending on that date, and the figures for the calendar year therefore not being available at this writing, while some of the individual productions will for the calendar year vary slightly, but taken as a whole the production will be about the same.

MINE RESCUE WORK IN CANADA*

By W. J. Dick.

In Canada as regulation of mines is a function of each province, the Federal Government has no authority to require operators in the several coal-mining provinces to make provision for mine-rescue apparatus. Neither has the Federal Government carried out any demonstration work in the use of such apparatus. Of the coal-producing provinces, British Columbia is the only one

*Mining Engineer, Halifax, N.S.

*From Report of Commission of Conservation.

that requires rescue apparatus to be kept at coal mines.

The following is a short account, by provinces, of the nature and extent of mine-rescue work in Canada:—

NOVA SCOTIA.

There are no government rescue stations in this province, nor is there any statutory provision for compulsory mine-rescue training and equipment at coal mines.

Nevertheless, a number of the most important mines have well equipped rescue stations and a large body of men trained in the use of breathing apparatus.

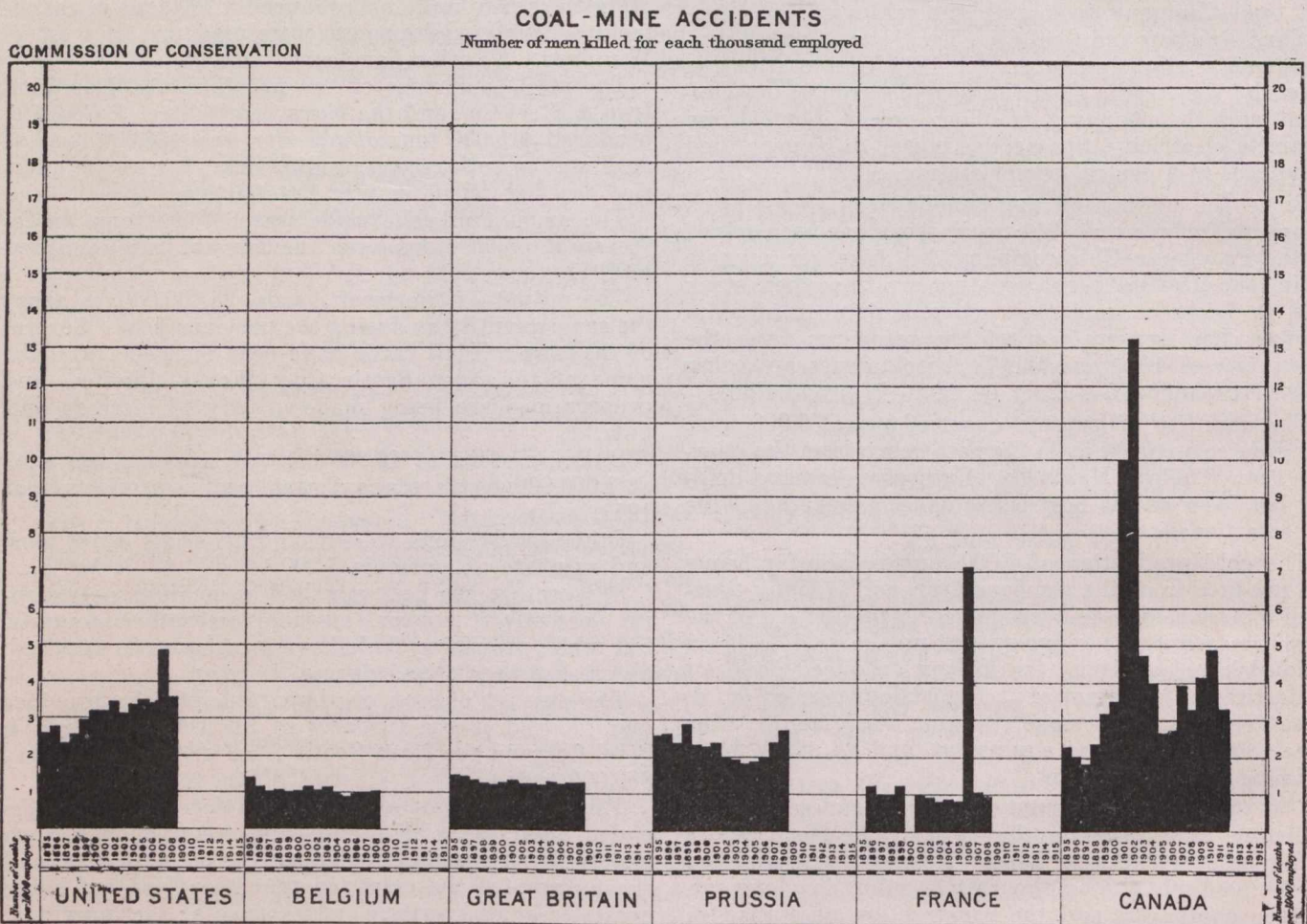
Dominion Coal Company.*—The Dominion Coal Company, have in the past, suffered severe losses through fire, both above and below ground. In 1903, a fire occurred in Dominion No. 1 mine, and, in 1906 a fire broke out in the pit bottom of the Hub colliery. In both cases, the mine had to be flooded before the fire could be extinguished. In order to guard against similar possible occurrences, an efficient fire fighting organization and equipment were established. Only that portion of the equipment and organization which relates to breathing apparatus will be considered in this description.

In 1908, the Central Rescue station was constructed

electric hand-lamps are charged at the station and kept always ready for use. The station is connected by telephone, with all the collieries and with the instructor's residence.

One end of the rescue station is fitted up as an emergency hospital and dressing room. It contains a wash-basin, spring couch, table and rubber sheet. First-aid requisites, blankets, stimulants, etc., are also kept on hand. In addition to the ordinary stock in the store-room, eight canaries are also kept available for the purpose of testing for carbon monoxide during mine-rescue work.

Adjoining the station is a smoke chamber where the men are trained to work in an irrespirable atmosphere. This is a rough, wooden shed, consisting of an observation corridor divided from the main building by a parti-



and equipped near No. 2 colliery. Its central position in relation to the surrounding mines, indicated it as the most desirable. When erected, this station was, with the exception of the United States Government station a Pittsburg, the only one of its kind on the North American continent. It is a substantial brick building with concrete floor, and contains four rooms, viz.: main or apparatus room, emergency hospital and dressing room, office and store-room.

The equipment consists of thirty-six Draeger apparatus, forty-two electric hand-lamps, one Bratt resuscitating apparatus, one pulmotor, one electrically-driven oxygen-refill pump and one hand-power oxygen-refill pump, one Koenig smoke-helmet, one wheel stretcher with oxygen flask and mask complete for bringing injured men out of an irrespirable atmosphere, and a sufficient supply of oxygen and potash cartridges. The

tion with glass windows. The smoke chamber proper has no windows, and has a fire grate in one corner in which materials are burned to make a dense smoke. For exercising the men during training, there are two weight lifting machines, consisting of a rope passing over a pulley and attached to a 45 pound weight.

Men training in the use of breathing apparatus, enter the smoke room wearing the apparatus and carrying electric lamps. After performing a certain amount of work, each man is examined as to his behaviour under physical strain and his suitability for this class of work is thus determined.

In addition to the apparatus at the Central station, auxiliary apparatus are kept at some of the outlying collieries. These are intended for use by the colliery rescue corps pending the arrival, if necessary, of a detachment from the Central station.

*In this description of the mine-rescue equipment of the Dominion Coal Company, free reference has been made to the article on "The Fire Fighting Organization and Equipment" of these collieries, written by F. W. Gray, Assoc. M. Inst. M.E., and published in the Canadian Mining Journal.

Each colliery has either two or three rescue corps, consisting of men who are resident at the colliery and acquainted with the workings. These men are chosen because of their knowledge of the underground workings, ventilation and position of their knowledge of the air roads, pipe lines and connections. A necessary preliminary to their selection is that they must be passed upon by the instructor as being suitable for the work. The names of the men composing the corps and the period for which they are detailed for duty are posted in the firemen's hall, near the apparatus. As far as possible, the corps are arranged in such a way that the trained men at one colliery shall not all be underground at the same time.

The instructor makes periodical visits to all the collieries having rescue apparatus and exchanges the colliery apparatus for others from the Central station. This is done in order that the apparatus may always be in good working order.

The company intends, also, to install a sub-rescue station at New Waterford to serve the Lingan collieries. This equipment is to consist of ten Draeger apparatus with spare oxygen cylinders, one hand power oxygen refill pump and one pulmotor. It is also the intention of the company to install a rescue station at the Spring-hill collieries. It will consist of ten apparatus, one refill pump and one pulmotor together with the necessary oxygen tanks and accessories.

tached; ten electric hand lamps, one oxygen-refill pump, one Bratt resuscitating apparatus, and a sufficient supply of oxygen and absorption cartridges.

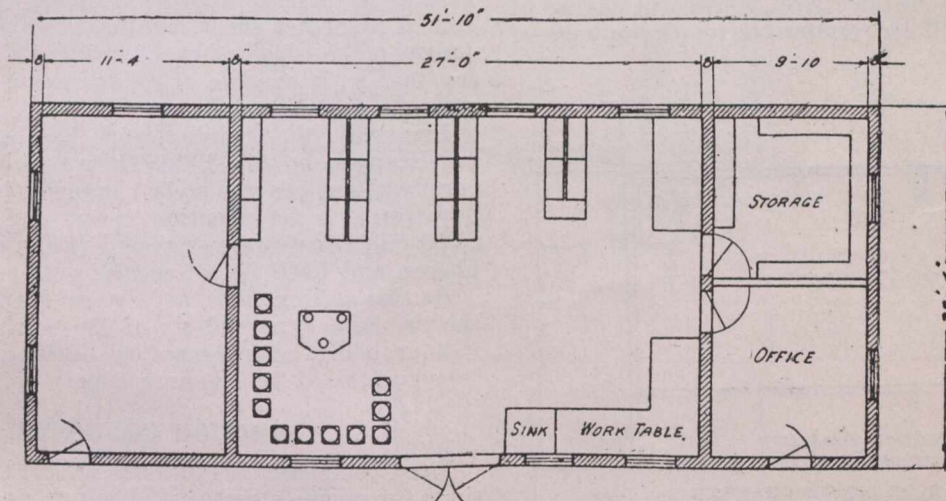
The rescue corps are made up of six men each. It is planned to give each corps a complete course of training—consisting of ten lessons—immediately after volunteering, and, then, have them meet once a month that they may be kept familiar with the apparatus and be able to answer a call instantly.

Nova Scotia Steel and Coal Company.—This company has a rescue, fire and first-aid station. It was formerly in a room in the general office building, but is now in a railway car. This car is always held in readiness to go to any of the collieries owned by the company or to any colliery in the province with which rail connections can be made. It is an ordinary passenger car and is divided into three sections.

Car Section No. 1.—This section is fitted and furnished for the accommodation of the rescue crew.

Car Section No. 2.—This section is fitted with:

- 16 sets of rescue apparatus.
- 24 oxygen cylinders.
- 2 oxygen-refill pumps.
- 1 pulmotor.
- 2 dozen electric safety lamps.
- 1 electric charging device for charging electric lamps.



PLAN OF CENTRAL RESCUE STATION, SHOWING APPARATUS ROOM AND EMERGENCY HOSPITAL

The company has now a large number of men trained in the use of the apparatus. It has been successfully used on several occasions, notably at Sydney Mines and at Stellarton. Apart from the rescue work, there are a number of men trained in first-aid and ambulance work, there being properly fitted ambulances to serve all the collieries.

Acadia Coal Company.—This company has a training station in which the men are instructed in the use of portable breathing apparatus. The station consists of a building 20 feet by 40 feet, in which the apparatus is installed and lessons are given in its use in a breathable atmosphere. The smoke room, where the men test the apparatus before going into the mine, is about the same size as the station. The company intends to place a number of obstacles in the smoke room to simulate the interior of a mine, so that the men may be trained under conditions similar to those that exist underground.

The equipment consists of ten helmet type Securitas apparatus, each with two hours' oxygen supply at-

- 1 Draeger oxygen reviving trunk.
- 6 ordinary respirators.
- Blue print plans of all the collieries.
- 1 set of portable telephones.
- Canaries for gas testing purposes.

Other accessories which are necessary in the event of a mine explosion, are also stored in the car. Section 2 also contains stretchers, splints, oil, restorators, and drugs of all kinds which might be necessary in case of accident.

Car Section No. 3.—This section contains fire reels, hose, fire buckets, ladders, axes, saws, fire extinguishers and all the necessary equipment for use in case of fire. The car is furnished with blankets, cooking stove, and all articles necessary to enable the crew to live on board the car for short periods of time.

The types of rescue apparatus used are, fifteen of the Draeger helmet-type and one of the Ever-Ready mouth-piece type. These have an oxygen capacity for about two hours' effective work.

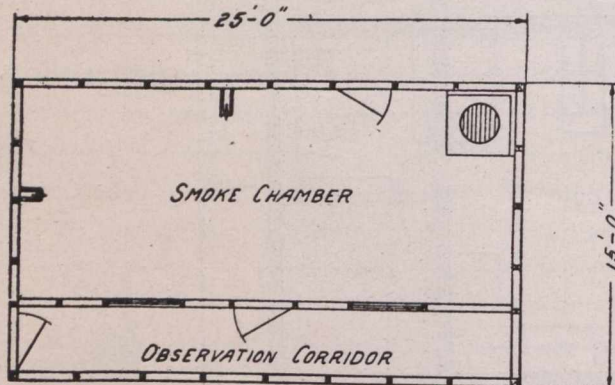
Of the twenty-four oxygen cylinders, only seven are carried in the car, the others being stored as an emergency supply. The capacity of these cylinders is 100 cubic feet of oxygen at a pressure of 125 atmospheres. In connection with the breathing apparatus, a smoke house is constructed for the purpose of giving the men practice in using the apparatus in an irrespirable atmosphere. The smoke house is centrally situated and is built in such a way that while they are at work in the unbreathable atmosphere, the men can be observed by the head trainer from the passage way.

There are at present about forty men, including all the officers in connection with the collieries, who are trained in the use of the rescue apparatus. In addition to this number, twenty-four officers of the company hold certificates of proficiency in giving first-aid to the injured, granted by the St. John's Ambulance Association.

In connection with this work there are also ambulances, stretchers and blankets at each colliery, while in the rescue car there is a first-class ambulance fully equipped with every convenience for the conveyance of injured men from the car to the hospital or their homes.

ALBERTA.

In this province, no statutory provision is made for compulsory mine-rescue training and equipment at coal mines. The opinion seems to be that it is better to have one or more central stations with officials in charge of the stations who will be responsible for the upkeep of the apparatus.



PLAN OF SMOKE CHAMBER

By Courtesy of F. W. Gray, Dominion Coal Company

At present, there is only one mine-rescue station in Alberta. This is a temporary station situated at Blairmore and is available for all the mines in the Crow's Nest Pass district. An additional rescue station is now being erected at Lethbridge, and, in a short time, a third will be established at Kipp. The Blairmore station has only been in operation since March, 1912. One-half of the cost of the equipment and operation of this station will be borne by the Government of Alberta, and one-half by the different operators in the district. It is expected that, within a short time, a railway car will be fitted up with rescue apparatus and moved from mine to mine.

The station in use at present consists of three rooms, each 24 feet by 14 feet; the apparatus is kept in one; another room is fitted up as an office and lecture room; and the third is a smoke chamber.

The station is under the charge of a superintendent holding a mine manager's certificate. The training, which occupies six days, is divided into the following sections:

First day—Description of apparatus by superintendent and taking apart and putting together of apparatus by persons being trained.

Second day—Lecture on apparatus for one hour and wearing of apparatus in smoke chamber for one hour.

Third day—Wearing of apparatus in mine for one and a half hours and further lecture on apparatus.

Fourth day—Wearing of apparatus in mine and in smoke chamber for two hours.

Fifth day—Wearing of apparatus in mine for two hours.

Sixth day—Wearing of apparatus in mine for one and a half hours, and in smoke chamber one hour.

This training is varied slightly according to the discretion of the superintendent. While in the smoke chamber, a considerable amount of work is done in sulphur smoke, such as building stoppings, putting up and taking down brattice, and general work as nearly as possible similar to that which would be required to be done in a mine during rescue work.

While in the mine, the wearers of the apparatus travel up a roadway pitching about 40 degrees, for a distance of about 450 feet and come out at the surface. The authorities have not yet decided upon the exact routine of training work and may vary this considerably. After a man has gone through six days' training, it is the intention to bring him back at the end of three months to undergo another training, and again, at the end of a further three months, after which he will, if judged to be satisfactory, be granted a certificate showing that he is capable of doing rescue work in a mine after an explosion.

Primarily, the training work has been considerably handicapped by the difficulty in obtaining a sufficient supply of oxygen and soda. In order to overcome this, however, it is the intention to carry on hand a stock of 3,000 cubic feet of oxygen at a pressure of 120 atmospheres, and 1,500 lbs. of caustic soda.

At this station there are eleven Fleuss apparatus of the two-hour type and six of the one-hour type. This will probably be increased to fifteen of the two-hour type and ten of the one-hour type.

BRITISH COLUMBIA.

The Coal Mines Regulation Act, 1911, makes provisions for rescue apparatus at mines, as follows:

"There shall be established by the owner, agent or manager of every colliery such number of oxygen helmets or some form of mine-rescue apparatus as may be approved by the Minister of Mines.

"Such mine-rescue apparatus shall be constantly maintained in an efficient and workable condition, and shall in all cases be so stored or placed in or about the mine as to always be available for immediate use.

"The Lieutenant-Governor-in-Council may from time to time establish mine-rescue stations for the purpose of supplementing, in case of need, the colliery installations of mine-rescue apparatus, and also for the purpose of training the holders of certificates of competency under this Act in the use of such mine-rescue apparatus as may be approved by the Minister of Mines; and it shall be incumbent on the owner, agent or manager of every operating mine to have all certificated officials who are physically fit, and not less than three per cent. of such number as the Chief Inspector of Mines may deem sufficient, of the workmen, trained in the use of such established mine-rescue apparatus:

"Provided that in cases of emergency such stations shall be available for the use of any trained corps of

mine-rescuers, duly qualified medical practitioners, or corps trained in the work of first aid to the injured, subject, always, to the order of an Inspector of Mines."

Although this Act has only been in force a little over a year, the operators, as well as the Government, are doing all in their power to lessen the number of fatalities incident to mine explosions and mine fires in so far as this can be accomplished by trained men equipped with suitable breathing apparatus.

The Government of British Columbia has secured sites for rescue stations at Fernie, in the Crow's Nest district, and at Nanaimo, Vancouver Island. Tenders have been called for the erection of the buildings and they will be completed at an early date. The illustration facing page 28 shows the plan and elevation of these buildings.

The Government owns the following apparatus:
12 sets of two-hour, 1910 model, helmet type Draeger apparatus.

Nanaimo—

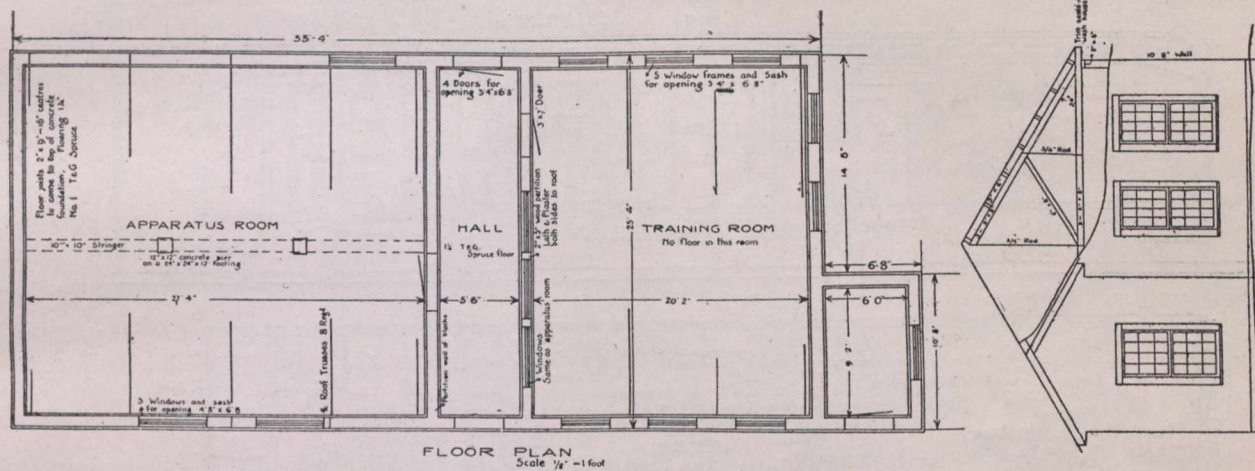
- 4 sets of two-hour apparatus.
- 2 sets of one-half hour apparatus.
- 1 pulmotor.
- 12 oxygen tanks.
- 1 oxygen pump.
- 4 electric safety lamps.

Cumberland—

- 4 sets of two-hour apparatus.
- 2 sets of one-half hour apparatus.
- 1 pulmotor.
- 12 oxygen tanks.
- 1 oxygen pump.
- 4 electric safety lamps.

Hosmer—

- 4 sets of two-hour apparatus.
- 2 sets of one-half hour apparatus.
- 1 pulmotor.
- 14 oxygen tanks.



Note: This Building to be built of 8x8x16 building blocks with cement mortar joints 1 part cement of approved brand 3 parts clean sharp sand—Blocks to be laid with glazed side out and true to line—All joints to be bedded in a thorough manner—Window and door frames to be fastened to blocks with wood fillers and blocks to have inside and outside Trim—well bedded in cement Roofed with Rubberoid or Paroid 3 ply roofing paper

ALBION MINE-RESCUE STATION
Scale 1/8" = 1 Foot
C.A.M.

PLAN OF ALBION MINE-RESCUE STATION, ACADIA COAL CO.

By Courtesy of the Acadia Coal Co.

8 sets of one-half hour, mouth-breathing type Draeger apparatus.

4 pulmotors.

42 oxygen tanks, of 100 cubic feet capacity each.

14 electric safety lamps, together with all necessary accessories and spare parts.

They have also under order two sets of two-hour, 1911 model, mouth-breathing type Draeger apparatus and sufficient material to convert the present 14 sets of 1910 model, helmet-type into mouth-breathing type. These apparatus will thus be available either as helmet or mouth-breathing apparatus. Two stretchers equipped with oxygen breathing apparatus and 16 trunks for storing and shipping the apparatus, are also on order.

The present distribution of this apparatus is as follows:

1 oxygen pump.

4 electric safety lamps.

Middlesboro—

- 4 sets of two-hour apparatus.
- 2 sets of one-half hour apparatus
- 1 pulmotor.
- 4 oxygen tanks.
- 2 electric safety lamps.

This apparatus is supplementary to the equipment of the coal companies and at present is taken care of by the Western Fuel Company, at Nanaimo; the Canadian Collieries (Dunsmuir), Ltd., at Cumberland; the Hosmer Mines, Ltd., at Hosmer, and the Nicola Valley Coal & Coke Co., Ltd., at Middlesboro.

Mining Companies and their Equipment.—All the operating companies own, or have on order, oxygen apparatus of some type, and some companies own very creditable stations for training purposes.

Western Fuel Co., Nanaimo.—This company erected the first station in the province. It was opened in the autumn of 1910, and, since that time, 62 employees of the company have taken a course of training in it and have been awarded certificates of competency. These employees have been formed into 12 corps.

This company's station is of frame construction on concrete foundation and is covered with corrugated iron. The inside is finished in hard wall plaster, its dimensions being 24 feet by 48 feet. It consists of a smoke room and work room, the latter containing the cases for the apparatus.

The apparatus consists of

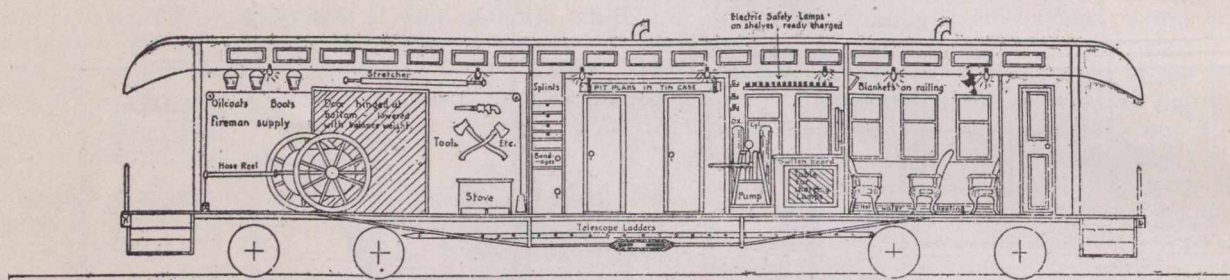
- 4 sets two-hour, 1907 model, helmet-type Draeger apparatus.
- 4 sets two-hour Fleuss (Proto) mouth-type.
- 3 sets one-hour Fleuss (Salvator) mouth-type.
- 1 pulmotor.
- 12 oxygen tanks.

3. Make 10 laps around the smoke room over the overcast and through the divided tunnel, take down the board and cloth brattice, placing it where found.

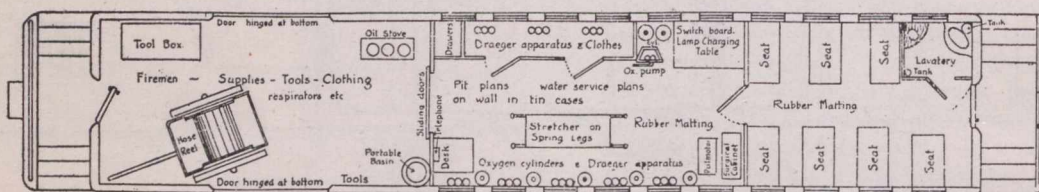
4. Each pair of men to carry a dummy on stretcher, weight 150 lbs., twice around the smoke room, over the overcast and through the tunnel, using both the Sylvester method and Draeger pulmotor for resuscitation purposes.

5. Erect a board regulator in the centre of the tunnel area 18 inches by 18 inches, each pair of men to take the dummy without the stretcher once around the room over the overcast and through the regulator; then each member of the corps to make 10 laps without the dummy.

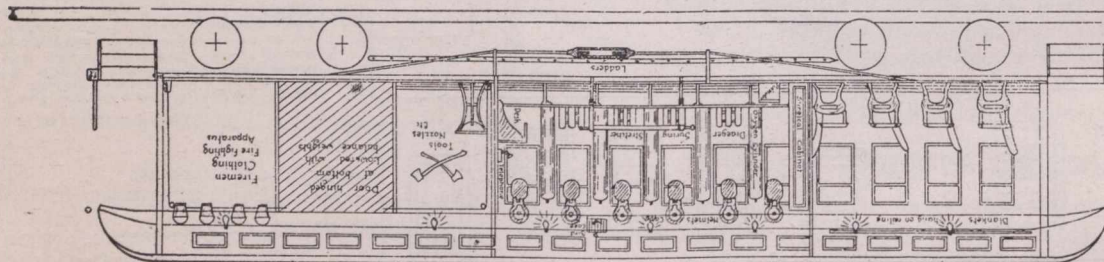
6. Take down the regulator and erect in the middle of the tunnel a brick stopping 1½ bricks thick, carrying all material over the overcast. Take down stopping, carrying material back to place where found and piling up neatly.



SIDE ELEVATION



FLOOR PLAN



SIDE ELEVATION

PLAN OF RESCUE CAR, NOVA SCOTIA STEEL & COAL CO.

Scale: 1/2 inch = 1 ft.

FLOOR PLAN & SIDE ELEVATION of RESCUE CAR

- 1 oxygen pump.
- 4 electric safety lamps (Draeger type).
- 6 electric safety lamps (Fleuss type).

The work necessary to obtain a certificate consists in becoming familiar with the principle and construction of the apparatus, in assembling and disassembling the same and in the use of the pulmotor.

Then a team of four men must perform the following two-hour schedule of work not less than seven times, in the smoke room filled with either sulphur or formaldehyde fumes:

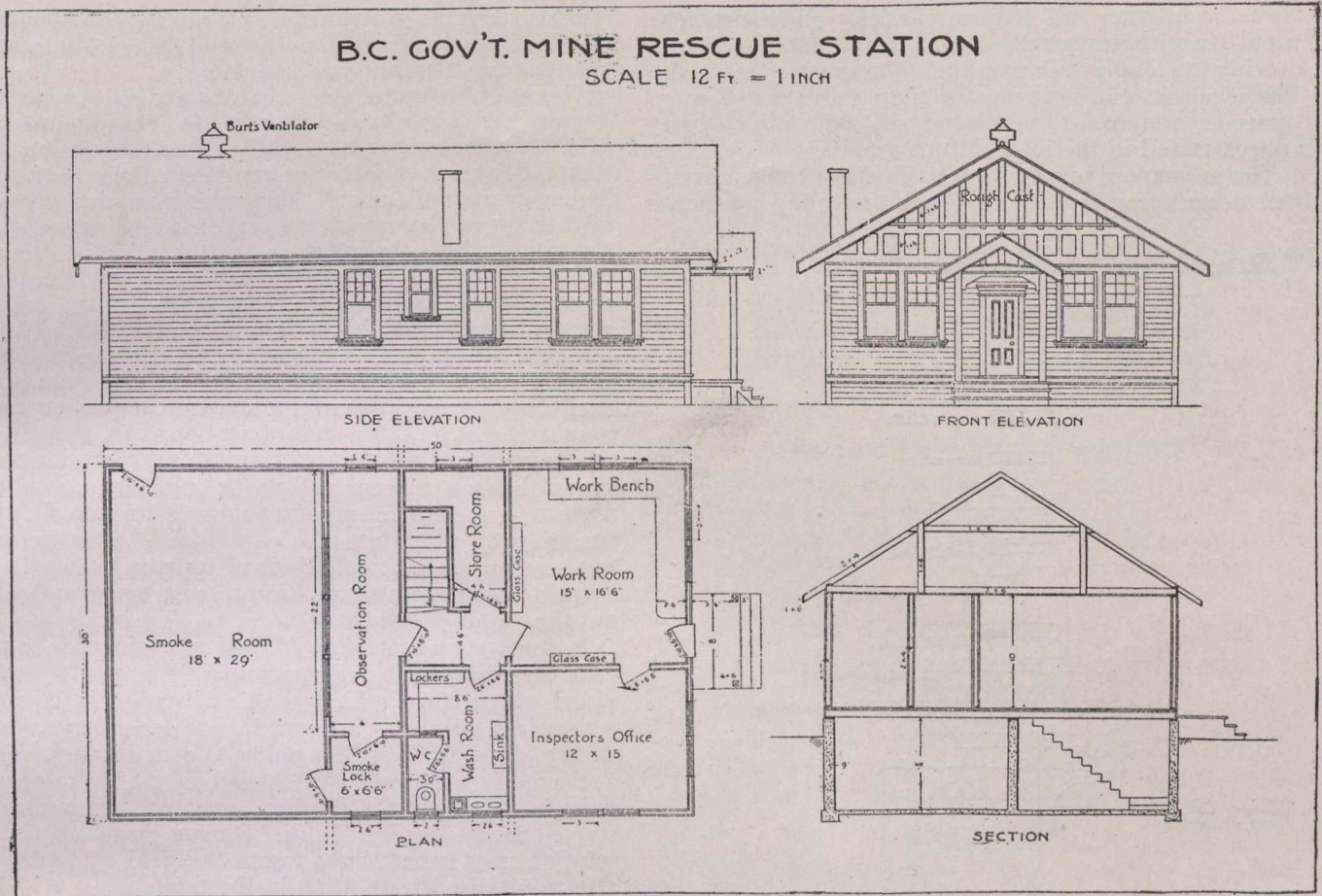
- 1. 15 laps around the smoke room, travelling over the overcast and crawling through the tunnel, which is 3 feet high and 4 feet wide.
- 2. Hang 8 yards of brattice cloth over the overcast, and erect 4 yards of board brattice in the tunnel, all material being brought over the overcast.

7. The top of the tunnel is then raised against the wall to prevent crawling, and as many laps made around the smoke room and over the overcast as can be made within the two-hour limit.

A record is kept of each man's work, including amount of oxygen upon entering, and upon coming out, length of time in the smoke room, and his general condition when he comes out.

The lamp used is either Wolf safety lamp or Electric safety lamp. Each person holding a certificate must report for practice once every month. An instructor is in charge of the station and in daily attendance. The illustration facing page 29 shows this station.

Canadian Collieries (Dunsmuir), Ltd., Extension Colliery, Extension.—This company has just completed a station of frame construction 25 feet by 53 feet, which



By Courtesy of B. C. Department of Mines

PLAN OF RESCUE STATION, GOVERNMENT OF BRITISH COLUMBIA.

contains a smoke room, observation room, work room and dressing room.

The course of training consists of preliminary work to give the candidates an introduction to the apparatus, and the method of wearing it, travelling through the various openings in the smoke room, without smoke. This is followed with such practical work as fixing brattice, both cloth and board, cleaning up caves, building stoppings, brick and board, and a stretcher drill in which dummy is rescued from place of danger and car-

ried to place of safety. Mr. J. H. Cunningham, who has taken a course of training at the United States Rescue station at Seattle, Wash., will be the instructor.

- The equipment at this station consists of:
- 4 sets, two-hour, 1910 model, helmet-type Draeger apparatus.
 - 1 oxygen pump.
 - 4 oxygen tanks.
 - 4 electric safety lamps (Draeger type).

THE INTERMITTENT SYSTEM IN CYANIDATION

By Leon P. Hills.*

The popularity of the continuous system in direct cyanidation is, I believe, an unfair verdict against the intermittent system. The former undoubtedly sprang from the difficulties encountered in the latter in promptly effecting a condition of suspension in the charge to be agitated, clogging of pipes, etc. All of these difficulties can be wholly obviated at present, one means being by the use of the agitator hereinafter described.

Theoretically, the charge system surpasses the continuous. The latter is, by its very nature, inefficient. Assume a series of 100-ton tanks, with a flow of 10 tons per hour. Consider the efflux from the first tank for any given hour. That 10-ton portion is composed of, approximately:

- 0.090 tons of the influx of the given hour.
- 0.825 tons of the first preceding hour.
- 0.751 tons of the second preceding hour.
- 0.683 tons of the third preceding hour.
- 0.621 tons of the fourth preceding hour.
- 0.565 tons of the fifth preceding hour.
- 0.513 tons of the sixth preceding hour.
- 0.466 tons of the seventh preceding hour.
- 0.424 tons of the eighth preceding hour.
- 0.386 tons of the ninth preceding hour.
- 0.351 tons of the tenth preceding hour.

the remaining 3½ tons in diminishing portions back to the initial inflowing 10 tons. The great bulk of the pulp receives exceedingly long treatment, the time of treatment of different portions varying between wide limits.

*Manager United Mines Co.'s Cyanide plant, Tuolumne, Cal. Article from the Colorado School of Mines Magazine.

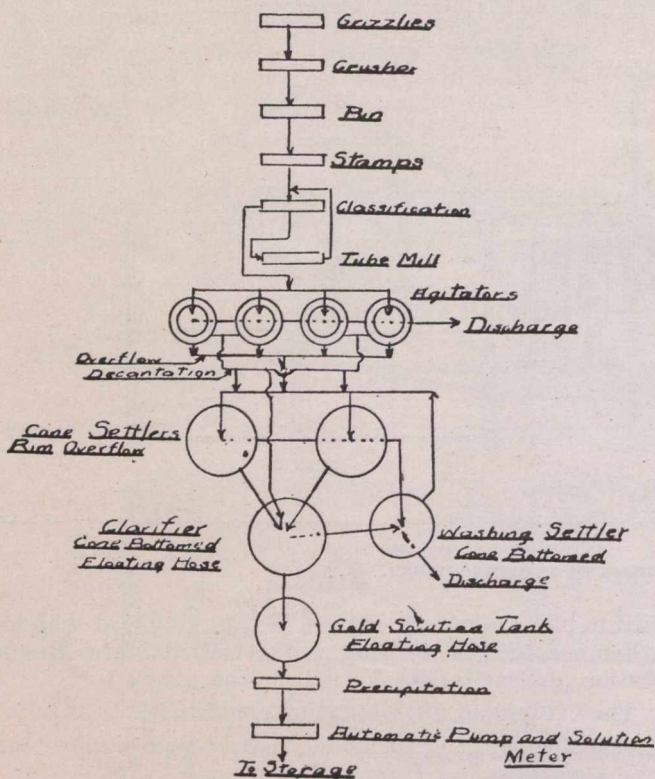
Also the heavier and coarser particles make the most rapid transit through the series, thus that portion requiring the longer treatment gets the shorter treatment. The ideal system, wherein the pulp receives the exact treatment required to perfect extraction, can be closely approximated in the intermittent system.

The accompanying flow sheet illustrates an intermittent decantation system for which the following merits

Intermittent Decantation System

Flow Sheet

No Filtration



can be reasonably claimed: Simplicity, cheapness of installation, economy of power and labor, low cost of maintenance, flexibility of operation.

The agitator is the chief feature of this system, and insures reliability of operation. It is a modification of the Pachuca, the central fixed column being surrounded by a vertically adjustable column of a few inches greater diameter. This outer column, by means of a screw at the top of the tank, may be moved from a position where the lower end of the column is in contact with the sides of the cone, to any predetermined point above that, the upper extremity of the column always being below the surface of the solution. During the time agitation is suspended and settling is taking place the outer column is in its lowest position, thus excluding the pulp from settling around the inner column and air jet. To start agitation turn the air on, which will institute circulation of solution down between the two columns and up through the central column, whereupon the outer column is raised, allowing the pulp to enter into the circulation. This agitator has been subjected to all kinds of tests and never failed to get the pulp into a condition of suspension and without the aid of additional air.

In the system under consideration a thickener to precede the agitators is not necessary. The agitator is provided with a baffle which gives a circumferential quiet zone when pulp is being run in and when agitation is taking place, the overflow going to cone settlers. When a charge is sufficiently thickened in the agitator, the pulp is switched to another agitator, and agitation started in the charged tank. During agitation barren solution may be run in to lessen the gold contents and also to vitalize the solution in the tank.

The extraction being completed, the outer column is screwed down, agitation suspended, pulp settled, solution decanted, and washes repeated as many times as is advisable, depending on the richness of the ore. The settlings from settlers and clarifier are drawn off intermittently to washing settler, or agitator, and washed.

In this system exists the condition that the finer pulp, in which the extraction is rapid, receives the short treatment and the heavier and coarser pulp receives longer treatment.

THE CANADIAN MINING INSTITUTE

THE COUNCIL'S ANNUAL REPORT

The following is a copy of the report of the Council of the Canadian Mining Institute for the year 1912, to be presented at the annual meeting at Ottawa on March 5th, next:

The Council has much pleasure in submitting the following report of the work of the Institute for the year ending December 31st, 1912:

MEETINGS.

The fourteenth annual general meeting, held in Toronto on March 6th, 7th and 8th, was notably successful, the large attendance of two hundred and seventy-four, or, approximately, twenty-five per cent. of the present membership, being a specially gratifying feature; while the presence also of a number of distinguished engineers and geologists from the United States, and one from Great Britain, many of whom took a prominent part in the proceedings, contributed materially to the interest and success of the occasion. At the close of the meeting the visitors were afforded the

opportunity of visiting the mines of the Porcupine and Cobalt districts, under the auspices of the Institute.

The first of what is hoped will be regular series of semi-annual, or Western meetings, was held in September in Victoria, B.C., and in Frank, Alta. The papers presented at these meetings were productive of interesting discussions, and the Council has every reason to believe that Western members both realize and appreciate the advantage of the innovation.

Other meetings under the auspices of the respective branches have been held at Sherbrooke and Montreal, in Quebec, Cobalt, Porcupine, Kingston, and Toronto, in Ontario; at Lethbridge, in Alberta, and at Vancouver, in British Columbia.

BRANCHES.

The organization was effected in September, of the Rocky Mountain Branch, and in December, of the Ottawa Branch. To the former, members resident in southeastern British Columbia and southern Alberta as far east at Medicine Hat, will be attached, although

provision is made that the British Columbia members shall as well continue to be associated with the Western Branch.

Proposals were under consideration during the year for the affiliation of the provincial mining societies of Nova Scotia with the Institute, and the President specially visited Halifax last spring to discuss the project. It was found, however, that satisfactory arrangements could not be made at the present.

PUBLICATIONS.

The aim of the Council is to raise the standard of the Institute's publications to the highest possible level, and to this end all papers submitted for publication have been critically scrutinized, and those only accepted that appeared to the Publication Committee to contain information of real value to members. Some additional expense, however, has been incurred in securing a better grade of paper-stock for use in the printing of the volume of the transactions, and particular care has been taken to ensure that the half-tone illustrations shall be satisfactory. In view, however, of the considerable recent advances in the cost of printing, the Council decided that economy might be best effected by discontinuing the practice of printing papers in advance form in the Quarterly Bulletin, and henceforward separates of papers will only be supplied upon direct application.

The Secretary has completed the compilation of a General Index of Volumes I to X, inclusive, of the Journal of the Institute, and has included therewith summaries of the papers contained in these volumes, the majority of which are out of print. This work is now in press, and will be ready for distribution early in the spring. It is proposed to offer it on sale to members at practically the actual cost of production.

MEMBERSHIP.

The Council would particularly direct attention to the gratifying fact that the membership, inclusive of

all classes, now numbers over one thousand, the actual number being 1,035. The accessions during the year were as follows:

Ex-officio	6
Members	127
Associates	34
Students	3
Total	17

The losses by death, resignations, and removal were as follows:

Deaths	5
Resignations	18
Removals	26
Total	49

LIBRARY AND READING ROOM.

The accessions to the library represent 136 volumes. The library and reading-room have been used freely during the year, both by members visiting headquarters and by strangers to whom the courtesy has been extended.

STUDENTS' COMPETITION AND AWARDS.

Ten papers were submitted by student members in competition for the Institute's awards. The judges have recommended that a prize of twenty-five dollars be awarded to E. Futterer for his paper entitled "The Champion Mine"; while Mr. J. C. Jones' paper on the "Joplin District," is given honourable mention.

GENERAL.

In conclusion, it is gratifying to be able to state that the affairs of the Institute are now in a more flourishing condition than at any previous time in its history. The membership, as already stated, is increasing steadily; organization by the establishment of branches throughout the country is being perfected; the publications are vastly more valuable than in the past, and, in general, the Institute is growing in strength and usefulness.

THE INTERNATIONAL GEOLOGICAL CONGRESS

On Saturday, January 18th, Mr. G. G. S. Lindsey, speaking before the Toronto Branch of the Canadian Mining Institute, gave a very interesting outline of the work of the Twelfth International Geological Congress, and of the preparations being made for the Canadian meeting next summer. The visitors, Mr. Lindsey pointed out, are to be officially the guests of the Dominion and Ontario Governments, of the Royal Society of Canada, and of the Canadian Mining Institute. In reality, however, other Provincial Governments and several transportation corporations will help to bear the large burden that the reception of such a number of distinguished visitors implies.

The founding of the Congress was inspired, continued the speaker, by the collection of geological maps and sections from various regions of the Continent, as well as from many countries of Europe, for display at the International Exhibition in Philadelphia in 1876. The advantage of such comparative study so deeply impressed visiting geologists that at the annual meeting of the American Association for the Advancement of Science, held in Buffalo, August, 1876, a committee was appointed to arrange for an International Congress of Geologists at the 1878 Paris Exhibition. It may be

noted here that Dr. T. Sterry Hunt was secretary of this first committee—the Comité Fondateur of 1876, and that at the first session of the Congress (1878) Messrs. A. R. C. Selwyn, F.R.S., T. Sterry Hunt, and Paul de Caze were the Canadian delegates.

The records of subsequent meetings, which are usually held every three years, are shown in the following table:

Number of Members, Delegates, Vice-Presidents and Countries Represented at Each Congress.

Country, Year.	Members.		Vice-		
	Enrolled.	Attdg.	Del.	Pres.	Rep'd.
France, 1878	310		7	18	23
Italy, 1881	420	224	23	19	23
Germany, 1885 ...	455	258	15	20	22
England, 1888	337	140	68	22	25
U. S. A., 1891	546	251	39	31	24
Switzerland, 1894 .	401	273	18	15	20
Russia, 1897	1037	704	139	40	27
France, 1900	1016	461	80	46	31
Austria, 1903	664	393	39	25	30
Mexico, 1906	707	321	83	27	33
Sweden, 1910	857	625	262	74	36

The members of the Congress are usually professional geologists, or persons occupied in an allied profession. Amateurs, however, are welcomed, and their work has often been of great importance. Delegates are members of the Congress who have been specially appointed to represent a government, university, or society. Vice-Presidents are members of the Congress, usually delegates, elected at the first meeting of each session to represent their country on the Council of the Congress.

Geologists from every quarter of the globe attend the Congress. The word "International" in the title was well chosen since a remarkable number of nationalities are represented at each Congress.

The members may be divided roughly into three classes:

1st. Professors and teachers from the leading universities, colleges, and technical schools.

2nd. Officers of government geological surveys or equivalent organizations.

3rd. Geologists and mining engineers in private practice.

The Congress is governed by a Council constituted as follows:

(a) Members of the Organization Committee to Twelfth Congress.

(b) Presidents of geological societies.

(c) Directors of important geological surveys.

(d) Members of the "Bureau" (i.e., Vice-Presidents of other office holders elected by the members at their first meeting).

(e) Members of the Congress whom the Council may add to its number.

The "Bureau" is made up of persons whose names, submitted by the Council, have been approved by the members at the first meeting of the Congress. It is charged with the arrangements of the orders of the day for the meetings.

An Organization Committee, or an Executive Committee, is appointed for each session by the Government or institution whose invitation for the ensuing session has been accepted at the previous session, and local arrangements are left to these local organizations. The General Secretary of a session is responsible for the management of Congress affairs until next session has met and his successor has been duly appointed.

The prime object of the International Geological Congress is the advancement of knowledge both in the field of pure geological science and in its application to the arts and industries. The principal means to this end are:—

1. Meetings. 2. Publications. 3. International Committees. 4. Excursions. 5. Prizes.

1. The meetings are held every three years in different countries, and are attended by members representing very civilized nation. The leading countries, societies, and universities are represented by specially appointed delegates. Papers are read and discussed bearing on topics of scientific or economic importance. These topics are selected in advance so that every member interested is given a chance to take part.

2. Publications.—The transactions of the Congress, containing the more important papers and discussions, and a general report, are published as soon after the session as possible. The Transactions of the Eleventh Congress contained 1,413 pages. Two quarto volumes and a large atlas on the iron ore resources of the world were also brought out, together with another large quarto.

3. The International Committee deal with such questions as the standardization of nomenclature, general geological maps, etc., etc.

4. Excursions have become the outstanding feature of the sessions. They are conducted at small expense to the individual and are under expert guidance. It were superfluous to dwell upon the value of these both geologically and from a mining point of view.

5. The Congress possesses the necessary powers for awarding prizes for special achievement in pure or applied geology. The Spendiarrow prize, founded by Mr. Spendiarrow, of St. Petersburg, in memory of his son, is awarded at each Congress for the most important work accomplished by an individual since the preceding Congress.

Referring again to the excursions, it may be that they will be conducted for the benefit of members of the Congress who are geologists, mining engineers, geographers, or are otherwise engaged in the study or application of some branch of geology. If possible, arrangements will be made to enable the wives of members to participate in the excursions. To reserve accommodation, application must be made in writing on the form provided, and must also be accompanied by the specified deposit. No deposit will be returned after the fifteenth day of June, 1913.

The International Geological Congress will hold its twelfth meeting in Toronto from the 7th to the 16th of August, 1913. Headquarters will be at the University of Toronto. Both before and after the Toronto sessions there are numerous excursions covering practically all Canadian territory available by railway and of interest to excursionists.

[Editor's Note.—The full schedule will be published in a forthcoming issue of the Canadian Mining Journal.]

The topics to be discussed at the sessions of the Congress are varied. First in importance is the subject of the coal resources of the world. Following the example of the Eleventh Congress, there is to be published (it is hoped in time for the Toronto sessions) a large compilation covering the world's known coal resources, and discussion will crystallize round this volume. Other subjects, such as differentiation in igneous magmas, the influence of depth on the character of metalliferous deposits, the origin of pre-Cambrian sedimentaries, and many other questions will be debated. As many of the most eminent authorities in the world will join in these discussions, there is no hyperbole in saying that history will be made.

The International Geological Congress has accomplished the magnificent task of compiling geological maps of the continent of Europe. In this work it has received the hearty co-operation of the various international governments and of many eminent men of science. The published volumes on the Iron Ore Resources of the World, and the forthcoming volumes on the Coal Resources of the World, will be lasting monuments to the fame of the Congress. To quote an apt sentence from an official circular: "The Congress serves in a sense as an international clearing house for geology." It consolidates and clarifies the results of current investigation, and raises the whole science to a better and loftier plane.

Other sessions have been held under the direct patronage of the King or President of the country where the gatherings took place. The Canadian Congress will be under the Presidency of the Governor-General, His Royal Highness the Duke of Connaught.

No one can measure the good that will accrue to Canada from the meetings and excursions of the Congress. Apart from the direct advertisement thus given our country, there will inevitably be given a strong impetus to education, research, exploration, and actual mining development.

[Editor's Note.—All the civilized countries of the world have sent in contributions with maps of their coal resources, and these with about one hundred pages of condensation and correlation will make up the three volumes dealing with this important subject. There

will be two quarto volumes of letterpress and a large volume of maps, published by Morang & Company, of Toronto, which is a guarantee that it will be well done. The volumes will be ready for distribution when the Congress meets, and we propose in a subsequent issue to give a detailed account of the countries contributing. An immense amount of information for the first time will be made public in these volumes. The system of classification which was adopted by the Coal Resources Committee met with universal satisfaction, not a single objection having been raised to it.]

THE HAILWOOD GAS-CAP OBSERVATION MACHINE*

By E. A. Hailwood.

The Hailwood gas-cap observation machine, which calls for no expert knowledge on the part of the operator, and requires no motor or similar auxiliary and expensive device, is made in two types, i.e., the drum-type and the gallery type.

In attempts at standardizing the apparatus, difficulty was experienced in arriving at a suitable method of fixing a constant pressure of the ingoing gas. Owing to the comparatively small quantities required to make mixtures of even up to 5 per cent., it was found to be practically impossible to properly control the pressure on the ordinary gas mains with valves, water-gauges, ordinary gas-pressure regulators and variable regulating valves. The regulation of ordinary gas-pressure regulators, to correspond with certain readings of the water-gauge, did not prove sensitive enough, because, in the first machine, on changing the nipples, the bore of which varied to represent varying percentages, it was found that the mixture did not always correspond, the results also varying from day to day. A reduction in the bore of the nipple apparently caused the gas to rush through at a quicker and uncertain velocity; possible the reduction of bore caused a back resistance, which created an accumulation of gas under pressure between the nipple and the water-gauge or ordinary pressure regulator, this accumulated pressure evidently causing the increased velocity, which upset the calculations of desired variations in the gas mixture for certain variations in the bore of the nipple. For most general purposes such a variation would have been of no moment, but for gas-cap observation, in which a variation of 0.5 per cent. is important, this uncertainty was a serious drawback, especially when the constant fluctuation in pressure of town gas is also borne in mind. In the gallery-type the difficulty has been overcome by allowing all surplus and back-pressure gas to escape through a water or glycerine seal, the supply of gas, in consequence, being received from a source always maintained at one definite pressure, and the mixture therefore now responds to the several variations in the bore of the regulating valve, which represents the various percentages of gas.

The very small quantity of gas consumed in these machines allows of their use in an ordinary room, in contrast to other apparatus, especially of the motor type, which require such a comparatively large quantity of gas that the outlet must be connected to the outside atmosphere, when, if the wind be blowing in a certain direction, the amount of air blown back into the apparatus, or the resistance to the free exit of the

gas-mixture, may possibly dilute or upset the percentage.

The lamps are not open to the ordinary atmosphere, and should therefore truly indicate the actual mixture in which they stand. In a test with a machine open towards the bottom, a distinct diminution in the cap was observed when the gas-mixture was driven at the lamp in a vertically descending direction, as compared with the cap obtained when the same gas-mixture was horizontally received. The gas-mixture escape was at the bottom of the chamber in the first set of tests, and at the opposite side in the second. The difference was particularly marked in the higher percentages, of say 5 per cent. upwards. This would seem to point to the possibility of inaccurate readings

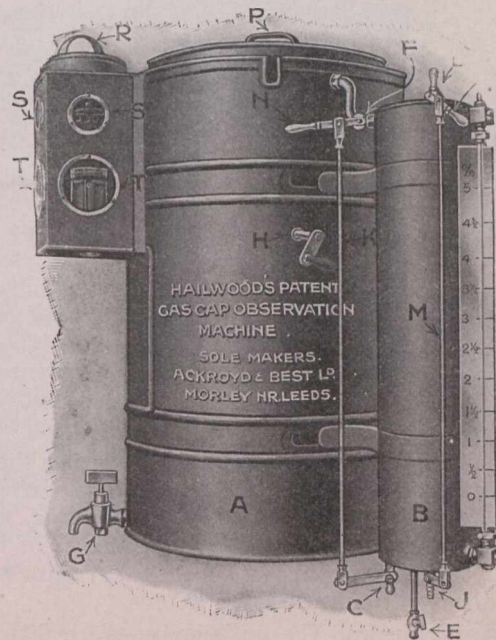


Fig. 1.

in the past, as if when sending gas downwardly at a lamp it requires more than 7 per cent. to give the "7 per cent. standard reading of the gauze being full of flame," it would seem to follow that, as the starting percentage is wrong, subsequent percentages obtained by the insertion of nipples of varying bore may also be wrong to a corresponding degree. In the gallery-type the great length of the gallery, the comparatively low velocity of the mixture, and the several mixing-plates, ensure a uniform blending of the mixture, which, the writer contends, is obviously better

*Abstract of paper read before the Institution of Mining Engineers.

than the method in which the gas is driven down at a high velocity on to the lamp. In the latter method, probably the great velocity, and the large open mouth of the chamber, admit of eddy currents of varying degree of dilution forming, and, therefore, the percentage of gas in different parts of the chamber may vary, and lamps of different heights may have their flames at other than the position at which such apparatus was calibrated.

In both types the lamp is completely enclosed in the gas-mixture, in the former the carbonic acid being absorbed as described, while in the latter the products of combustion from the lamp flame pass away through the chimney of the apparatus. Owing to the smallness of the usual testing-flame, the consumption of oxygen is comparatively low, and in any case the writer would suggest that his system apparently is better than one in which any part of the lamp is open to an atmosphere other than the gas-mixture, such, for instance, as the device in which the gas-mixture is sent into the middle portion of the lamp, apertures being left open at the top of the lamp for the escape of the consumed gases. In this case there is a great possibility of ordinary air, owing to its relatively higher specific gravity, de-

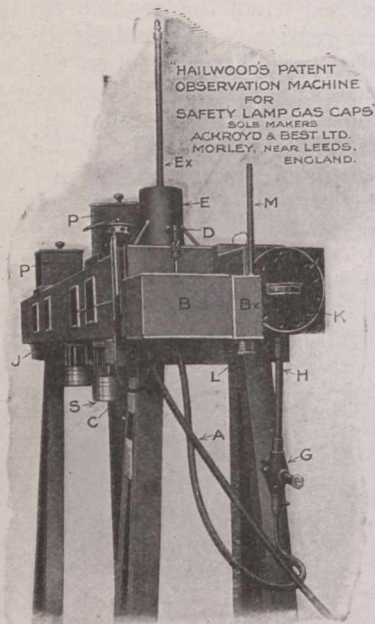


Fig. 2.

scending through such apertures and diluting the lighter gas-mixture as it enters the lamp. The writer is of opinion that any lamp open to atmosphere, or any observation apparatus open to atmosphere, in the vicinity of the lamp, is subject to eddy currents or dilutions, generally to an unknown extent.

Both the drum and the gallery types are calibrated in such a manner that when using town gas allowance is made for the non-combustible gases generally present in such.

By experiment the writer hopes to show that, so far as the visible effect on the flame is concerned, the gas-caps of equal percentages of town gas and air, and of fire-damp and air, are to all intents and purposes identical, and that whereas town gas usually contains some gases of high illuminating power, these, so far as gas-caps are concerned, are nullified or balanced by the lower illuminating power of the comparatively high percentage of hydrogen usually present, as compared with fire-damp. This, the writer thinks, proves

the error of recent arguments that it was wrong to employ town gas as a substitute for fire-damp in flame gas-cap testing by firemen. Town gas might give different results to fire-damp when platinum detectors, as in the Holmes Ralph gas-detecting portable electric lamp,* are employed, but there seems to be practically no difference in the effect on a flame-lamp.

The following are descriptions of the two types of apparatus:

The Drum-Type.

This type (Fig. 1) consists of a large drum, A, to which is attached a measuring drum, B, and an observation chamber for holding the lamp, which stands in a water-ring seal, so arranged that the pricker can be operated from the outside.

The machine is adapted for use with either ordinary town gas or with cylinders of compressed gas, and will, it is thought, prove of great utility at collieries which are not supplied with the former.

The mode of operation is as follows:

Tap C is opened and the measuring chamber, B, filled with water. The gas tap, D, being now opened, the water is allowed to escape from the measuring chamber, B, by means of the tap, J, gas entering and taking its place, water to the level of the zero mark being left to form a seal. The taps D and J are coupled together by a rod, M, to ensure their working in unison. The gas tap, D, should then be closed and tap E momentarily opened to allow any surplus gas in the measuring chamber, B, over and above atmospheric pressure, to escape.

Tap F in a pipe communicating between the measuring chamber, B, and the drum, A, is now opened, after which water is again allowed to enter the measuring drum, B, through the tap, C, until the level upon the water-gauge indicates that the desired quantity of gas has passed into the drum, A, which is normally full of air. The taps C and F are coupled together by a rod, K, to ensure their working in unison. Each division upon the water-gauge represents $\frac{1}{2}$ per cent., so that to pass 1 per cent. of gas into the drum it is only necessary to allow sufficient water to enter the measuring drum, B, to cover two divisions of the scale; $1\frac{1}{2}$ per cent., three divisions; 2 per cent., four divisions; and so on. To allow an equivalent quantity of air to escape from the drum, A, tap G is opened whilst gas is being driven in, and a handle, H, connected with a large mixer, is rotated from time to time to well blend the mixture.

To absorb any carbonic acid given off by the lamp a tray of caustic-soda or ordinary ground-lime may be placed in the drum, A, the lid, P, of which, resting in a water-ring seal, is detachable.

With this machine it is a simple matter to rapidly change from small percentages up to 5 per cent., at which the gas-cap reaches towards the top of the lamp gauze. If more than a 5 per cent. mixture is desired, it can readily be obtained by recharging the measuring chamber, B, with gas, and operating as already described.

In the observation chamber the lamp is accessible, and quite close to the eye of the observer. At very low percentages the gas-cap remains steady for 15 to 20 minutes, and at high percentages for a few minutes. An average of not more than 5 minutes for observations of each percentage is recommended, but if a longer period be desired larger chambers are made for this purpose.

*"The Holmes-Ralph Gas-detecting Portable Electric Lamp," by Geo. J. Ralph, Trans. Inst. M.E., 1911, vol. xlii, page 201.

Before using the apparatus care should be taken that the seals to the lid of the large drum and the lid of the lamp chamber are filled with water, as also the seal in which the lamp stands. The lamp seal may be filled through an aperture in the side of the observation chamber, but care should be taken to replace the screwed plug.

The Gallery-Type.

In the gallery-type (Figs. 2 and 3) the fundamental function lies in the velocity created by a gas-flame in the chimney of the apparatus.

The apparatus takes the form of what might be called a horseshoe gallery, J, about 5 feet 9 inches in length from end to end, the front portion (one side of the horse-shoe) being arranged to receive a lamp or lamps immediately in the rear of a glass observation window or windows. The lamp or lamps may be of any usual pattern or size, and are placed under covers, P, the lower end of which rests in a water-ring seat. The pipe, A, carries town gas to an accumulation box, B, to one end of which is connected a water-gauge, N, by the pipe, C. A tube, D, provided with a cock, is also carried from the accumulation box to the chimney, E, terminating in a gas-jet pipe, Ex. A regulator-box, Bx, is attached to the side of the accumulator-box, B, a pipe from the top part of the latter passing down to the bottom of the former through a glycerine regulating cup, L. The regulator box, Bx, is provided with an overflow pipe, M, at the upper end of which the overflow gas may be ignited. A tube, F, conveys the gas at a regulated constant pressure, through a measuring-valve, G, and a tube, H, to the extremity of the rear portion of the gallery, which is also provided with regulatable air-supply holes, K. At intervals along the gallery gauze mixing plates are arranged.

To operate, town gas is allowed to enter the accumulator-box, B, through the pipe, A, the glycerine regulating cup, L, being screwed up or down until the water-gauge reads at the correct figure, this being dependent upon the size of the apparatus supplied; in one size the water-gauge reads at $\frac{1}{2}$ -inch difference of level. The measuring-valve, G, is now opened, the area of the valve port-hole exposed fixing the percentage of gas passing into the apparatus, a pointer on the valve indicating the various percentages, such as, say, $1\frac{1}{2}$ per cent., 2 per cent., and so on, rising in $\frac{1}{2}$ per cent. Gas-jet, Ex, in the chimney, E, is then ignited, thereby creating a natural draught in the gallery, which draws in the gas at a uniform velocity, through the pipe H, and air through the supply-holes, K. The mixture is well blended as it passes along the gallery by gauze mixture-baffles, and of course passes through the lamps standing in the gallery, before reaching the chimney, E.

With this apparatus, by the simple operation of measuring valve, G, it is possible to very quickly change the percentage from zero to the explosive point,

and vice versa, and to check the skill of the student in reading caps.

The lamp-covers, P, which rest in water-ring seals, act as safety-valves in the event of an explosive mixture being ignited, and other similar, though smaller, covers are provided in the rear portion of the gallery as additional reliefs. Tubes can, if desired, be provided for the purpose of drawing samples from the gallery, in order to check and prove percentages.

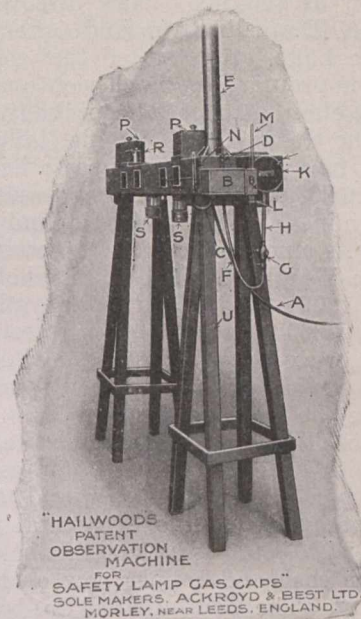


Fig. 3.

Amongst the advantages claimed for the gallery-type are the steady velocity of the mixture along the gallery, which conforms more to the conditions in an actual mine; the mixture arrives at the lamps in a thoroughly blended condition; and the lamps being completely enclosed are not so subject to eddy currents of gas, the caps therefore truly indicating the percentage of the mixture passing.

It is thought that an apparatus provided with a chimney, as in this, and so pulling the mixture past and through the lamps, gives an infinitely superior result to when the current is driven at the lamps. In the latter method the gas seems to advance in layers, waves or eddies, and when it reaches the lamp may not be thoroughly blended; therefore, lamps placed in different positions in the testing-chamber of such a machine may give varying unknown percentages, which do not correspond with the indicator.

Care should be taken to see that all the water ring seals are full of water or glycerine, and if rubber pipes are used to convey the gas that such hang free of kinks.

Fig. 2 illustrates the principal end of the apparatus, with the chimney, E, removed so as to expose the gas-jet pipe, Ex, while Fig. 3 shows the apparatus conveniently placed on trestles U.

MINING IN BRITISH COLUMBIA

By E. Jacobs, Victoria, B.C.

Having been requested to prepare some notes on Mining in British Columbia for use as general information on an occasion when progress in the Province was to be reviewed, I supplied the following. It appears to me probable they will be of sufficient interest to

warrant their being printed in The Canadian Mining Journal, so I submit them:

Notes on Districts.

Taking the various mining districts of British Columbia in the order used in publications of the Pro-

vincial Department of Mines, progress is noted as follows:

Cariboo.—Mr. John Hopp and the Quesnelle Hydraulic Gold Mining Co., are both equipped for a big recovery of placer gold whenever conditions admit of long season's gravel washing.

Cassiar.—Mr. J. M. Ruffner, manager of North Columbia Gold Mining Co., estimates Atlin yield of placer gold in 1912 at \$275,000 to \$300,000. Official estimate placed recovery at \$250,000. New discovery of gold in benches of O'Donnell River and others in creeks south of Teslin Lake. It is stated that developments on the Engineer group show much rich quartz.

Skeena.—Hazelton district will probably soon ship ore now that the Grand Trunk Pacific Railway is open to Hazelton. The Granby Co. claims to have between 5,000,000 and 6,000,000 tons of ore developed at its Hidden Creek mines; diamond drilling indicates much more, probably as much again. The following is an excerpt from President's circular to shareholders under date Nov. 19, 1912: "The Board has authorized the completion of a 2000-ton smelter and power plant, and the work will proceed with all possible despatch, in the hope that we may be shipping copper from this property before the close of the year 1913. The final estimates are not all in, but it is believed that the smelter and town with its buildings and equipment can be completed, the power plant installed, and the development work kept up meanwhile by a total further expenditure of \$2,000,000. This means about \$900,000 in excess of the cash and copper now on hand."

East Kootenay.—The Consolidated Co. has acquired the Sullivan mine and 14 adjoining mineral claims. Most of the new development is being pushed ahead into new ground. When the company commenced operations in the Sullivan there was very little ore developed; now there is more than one year's supply at the present rate of output of 100 tons a day. Much new machinery, plant, and building here.

Kootenay Central railway is now open from Crows Nest line to Fort Steele; construction south from Golden and north from Fort Steele is in progress. This should lead to a resumption of lode-mining in the Windermere division.

West Kootenay.—Ainsworth Division—The Bluebell mine was worked nearly all 1912 after a year's idleness. The Consolidated Co. is now operating in old Ainsworth camp, so the outlook is better for the camp now that capital is available for development and equipment.

Extension of C.P.R. line from Bear Lake to Whitewater has induced Rotallack & Co. to continue mining at Whitewater mines.

Slocan.—Construction of railway from Three Forks to Bear Lake is most important to eastern part of Slocan division. Lucky Jim resumed shipment of zinc ore in the autumn. Rambler-Cariboo, which has much silver-lead ore developed, erected a concentrator alongside the railway and constructed an aerial tramway from mine down to mill, and commenced milling in December. Will now be able to get some return for its extensive development (first deep-level development of importance in district) commenced in 1904 and continued ever since.

Deep-level development is in progress at the Payne and Slocan Star mines. At the Surprise, near Cody, good ore is being opened after several years' of difficult development work. The Noble Five is shipping after years of non-productiveness. Near Silverton there is the most productive and promising camp in Slocan, the Standard, Van-Roi, and Hewitt mines give much

prominence of permanent profitableness. Standard has lately opened important ore bodies in addition to those previously being worked. At the Van-Roi during the year there was found new and valuable ore bodies. Hewitt (Silverton Mines, Ltd.), also made valuable finds and is now putting in modern concentrating plant to include an advanced flotation method for recovery of zinc as well as other saleable contents of ore.

Nelson.—The British Columbia Copper Co. is developing, under option of purchase, the Eureka copper mine, and has bought outright the Queen Victoria copper mine; both are situated within a few miles of Nelson City. The Consolidated Co. has acquired a three-quarter interest in the Silver King and Dandy groups, near Nelson, and has commenced work there. These companies including Nelson district in their field of activities is one of the most important occurrences of the year connected with the mining industry there.

At Ymir, the Wilcox and Dundee are both developing encouragingly, and the Yankee Girl is being worked by a Spokane company in good financial standing.

At Salmo, the Emerald lead mine is continuing productive. At Sheep Creek camp the Motherlode Company operated its new stamp mill during the latter half of the year, and the Queen had important developments in the deep of its mine, with large oreshoots opened.

Rossland.—An excerpt from Consolidated M. and S. Co.'s last annual report read thus: "Our Rossland mine show an increase in the amount of ore developed, with, we believe, a higher average value." The assistant general manager recently said: "The development in our Rossland mines has been very satisfactory, especially so in the lower levels where large bodies of ore of very good grade have been developed. The tonnage of developed ore is larger than it had been for some time past, and the grade is considerably better. The company has kept up its usual policy of doing very extensive development work." The manager of the Le Roi No. 2, Ltd., said: "Beside the discoveries of numerous ore bodies in the better-known veins in the upper ground, the most important development is that of an ore body on the 1650 (Le Roi) level. This is the deepest ore known in our ground and is of good metal content, size, and character, and augurs well for the future of this part of the property in depth. Development is in progress here."

Many changes and improvements were made at the Consolidated Co's smelting works and refinery at Trail, these making for the more expeditious and economical handling of materials, and better working conditions for the men employed in the works.

Boundary.—Output of ore in 1912 was in excess of 1,900,000 tons, as compared with 1,187,000 tons in 1911 and 1,654,000 tons in 1910. At the Granby mines, costs for the first six months of 1912 were at the rate of 74.4 cents a ton of ore mined (less than 75 cents). During five months, February-June inclusive, cost of smelting and converting into blister copper was \$1.264. Together, cost of mining, smelting and converting was \$2.008, or a small fraction more than \$2 per ton of ore mined. Estimated ore in sight in Granby mines on July 1, 1912 (beginning of new fiscal year), 6,433,418 tons, or five years' supply working at full present capacity of smelting works.

Similkameen.—In 1912 the Hedley Gold Mining Co. crushed 70,000 tons of gold ore, recovered \$762,718; made a profit of \$407,505 for the year's work, and bought for \$150,000 adjoining property on which a large body of ore of good grade was first found.

The British Columbia Copper Co. had more than 100 men working in and near Voigt's camp, ten miles from Princeton, practically all the year; it also employed six diamond drills. Negotiations for purchase of this property are being continued.

Railway has extended from Princeton to Coalmont, on Tulameen River.

Promising new silver-lead camp has been opened at Summit, in Tulameen district.

Nicola Valley.—The Nicola Valley Coal and Coke Co. found a new seam of coal and proved that its other coal deposits are extensive. Railway building is active in district.

Lillooet.—Developments in quartz mines are most promising. Railway building is active in district.

Coast.—The Britannia Mining & Smelting Co. mined 193,000 tons ore and recovered between 14,000,000 and 14,500,000 lbs. of copper. It has bought much surrounding property; is doing much underground development work; providing extensive power and transportation facilities, installing modern concentration plant, and employing 600 to 700 men. There is here every indication of the permanent establishment of an important copper-mining industry within 30 miles water distance of the City of Vancouver.

The Marble Bay mine, Texada island, is now being developed at thirteenth level, 1,160 ft. deep. It has added to its waterfront shipping facilities during the year—it now has capacity for shipping 1000 tons daily. It has put in new plant and had up to 120 men employed.

Negotiations for purchase of the big iron deposits on Texada Island are still being carried on.

Vancouver Island.—No metalliferous mining of importance was done in 1912. Three new coal mines are being opened—one by the Pacific Coast Coal Mines, Ltd., between South Wellington and Boat harbour; one by the Western Fuel Co. at mouth of the Nanaimo River; and one in the Comox district by the Canadian Collieries (Dunsmuir) Limited. All should be mining coal before the close of 1913. The Pacific Coast Coal Mines, Ltd., is also continuing development of Suquash a practically new mine. The Can. Colls is developing a

hydro-electric power system and constructing a new railway in Comox district. It will probably put in coal briquetting plant there shortly.

Miscellaneous.

There is a much enlarged demand for structural materials—building stone, lime, cement, clay products, etc.

The Provincial Mineralogist gives the year's values as \$4,450,000.

Summary of Dividends Paid in 1912.

		Rate per annum.
British Columbia Copper Co., Ltd.	\$1 177,512.70	6%
Consolidated Mining and Smelting Co.	232,208.00	4
Hedley Gold Mining Co.	360,000.00	30
Le Roi No. 2, Ltd. (1s. a share on 120,000 shares)	29,400.00	1
Standard Silver-Lead Mining Co., Ltd.	425,000.00	21¼
<hr/>		
Total for year of distributed profits	\$1,224,120.70	
B. C. Copper Co's dividend declared in December, but payable January 15, 1913	88,756.35	
Granby Consolidated Co.'s profits, approximately	1,500,000.00	
<hr/>		
Total	\$2,812,877.05	

The president of the Granby Co. stated at the annual meeting that the company's net profits for the first half of the year had been nearly \$600,000. In the second half, the company announced that profits had been about \$140,000 a month. As it was generally understood that for November and December profits were higher, it seems fair to place Granby Co.'s net earnings for the calendar year at \$1,500,000. Then there were known net earnings of other companies apart from dividend distributions, so that the net profits of metalliferous mining companies for 1912 were probably \$3,500,000, in addition to which one or two of the coal mining companies also made profits.

BRITISH COLUMBIA COPPER COMPANY

By E. Jacobs, Victoria, B. C.

The British Columbia Copper Co., Ltd., had a full year of mining and smelting activity in 1912. Its operations were profitable, too, for it paid two dividends—Nos. 4 and 5—each of 15 cents a share on its 596,709 issued shares, making a total distribution for the year of \$177,512.70, and in December dividend No. 6, at a similar rate, was declared payable on January 15, 1913. Including the last mentioned, the aggregate of dividends paid by the company is \$615,399.88.

Exact figures for December have not been received, but including an estimate for that month, the following shows the ore receipts at the company's smeltery at Greenwood from its own mines: Mother Lode, 384,190 tons; Rawhide, 267,349 tons; Wellington Group mines (3), 11,055 tons; Emma, 4,436 tons; Queen Victoria, 1,066 tons; Lone Star and Washington (U. S.), 1,946 tons; Napoleon (U. S.), 17,214 tons; total 687,256 tons.

The metals recovered from these ores were: Gold, 25,643 oz.; silver, 141,222 ozs.; copper, 11,267,681 lbs.

Some notes of the company's mining operations last year follow:

Mother Lode Mine.

At this mine, from which more than 2,500,000 tons of ore has been mined in all years to date, operations throughout 1912 were practically nothing but ordinary mining. For the most part this consisted of drilling in advance of breaking down pillars and benches of ore, and this drilling was kept far in advance of ore-breaking requirements, preparatory to blasting with electric-fired charges. The method followed was to drill and load from 1,500 to 2,500 holes, averaging about 12 ft. in depth, connecting them up in groups of twenty-five to a group. All were provided with electric fuses, and fired simultaneously. Each of these blasts broke down

many thousands of tons of ore, in some cases enough to last for shipping over several months. The average number of men employed at the mine the year through was between 100 and 110, working six days a week for about half the year, and seven days the other half. There were not any important additions to machinery, plant, nor buildings in 1912, the existing general equipment having been sufficient for all needs. The power plant was operated chiefly by electricity—the big hoist by compressed air, and the compressor by electricity, with auxiliary steam when required.

Other Boundary District Properties.

The Emma mine, in which the company holds a three-fourths interest, was worked only in January and February, for the power plant at this mine was badly damaged—almost destroyed—by fire on February 27th, since which date the mine has been idle.

The Wellington Group mines were worked until June, when they were closed, and nothing more was done on them afterward. The company plans to do considerable exploratory work on this property next season.

Mines in Washington.

The company owns two mines in the neighbouring State of Washington, namely, the Lone Star and Napoleon.

The Lone Star is situated immediately south of the International Boundary, and is connected with the Canadian Pacific Railway near Boundary Falls, three miles from the company's smelting works, by an aerial tramway five and a half miles long. Notwithstanding that this tramway crosses three mountain summits, it has been operated successfully from the time a commencement was made to convey ore over it.

The Lone Star was worked only during a part of the year. Owing to its high silica content it was eventually deemed inadvisable to endeavour to smelt the ore from this mine with that from the company's other mines. For some time past concentration tests have been carried out with the object of determining how best to eliminate the excess of silica. The ore presents somewhat unusual resistance to concentration, but notwithstanding this, the problem is now in a fair way toward being successfully solved. There is in this mine a large quantity of ore available, so the results of endeavors to make it suitable for smelting will have an important bearing upon the question of ore supply for the company's smelting works. In value the general tenor of the ore is higher than that of the average Boundary ores.

The Napoleon mine has worked practically all the year. The sulphide ore was sent to the smelting works at Greenwood, while the oxide ore was milled at the company's concentrating mill situated near the mine. The sulphide ore from the Napoleon is used at the smelting works, on account of its sulphur content, to regulate the grade of the copper matte. It is not, however, a barren flux, for it contains copper, gold, and silver in considerable quantity.

Operations in Kootenay District, B.C.

The company's mining operations in Kootenay district are under the general charge of Mr. H. Johns, superintendent in Kootenay.

The first property the company took under bond was the L. H. group, situated about six miles southeast of Silverton, Slocan Lake. Development work was commenced here in the latter part of 1911 and continued through the winter until February, 1912, when

the snow was too deep to allow of communications being kept open, and conditions generally were unfavorable for work, so nothing was done for four or five months. In July exploratory work was resumed with eleven men employed, and to date results have been, on the whole, fairly satisfactory. Two levels are being opened, these being about 90 ft. apart in vertical depth. The ore has a very siliceous gangue and contains little economic mineral other than gold, which is in iron and associated arsenical sulphide. Concentration before smelting will be necessary, to get rid of the excess of silica. The upper workings are at an altitude of about 5,600 feet above sea-level and approximately 3,840 feet above Slocan Lake. The Provincial Government granted an appropriation towards the cost of building a wagon road a distance of, roughly, three and three-quarter miles, to connect with an existing wagon road from Silverton southward, and this work has been finished to within 2,000 feet of the mine, when snow fell and compelled completion to be deferred until next season.

The Eureka, which was bonded at the end of last July, is situated about nine miles from the city of Nelson, and ever since then up to 25 men have been employed at this mine, doing development work. The ore contains copper, gold and silver, in a gangue of altered limestone. Buildings have been erected for the accommodation of the men, and a route surveyed for an aerial tramway from a proposed new tunnel site to the Canadian Pacific Railway across Kootenay River, a distance of about 12,000 feet. The construction of the tramway, however, will not be commenced before next spring.

The Queen Victoria group, near Beasley siding, on the north side of Kootenay River and about nine miles west of Nelson, was acquired by purchase at the beginning of November. This mine is fully equipped for operation, having all requisite mine buildings, water supply, electric-driven compressor, and an aerial tramway down to the Canadian Pacific Railway below. The development work done by previous operators consist chiefly of three adits from which raises have been made to the ore, which is an altered lime, similar in general character to the prevailing copper ore of Boundary District. About a dozen men were set to work in November, and the number increased as matters became favorable for employment of a larger number. Arrangements have been made for transportation of the ore over the Canadian Pacific Railway to the company's smeltery at Greenwood. It was intended to ship from 500 to 1,000 tons a week; the quantity is dependent upon the capacity of the aerial tramway, which was not known when these particulars were obtained.

Voigt's Camp, Similkameen.

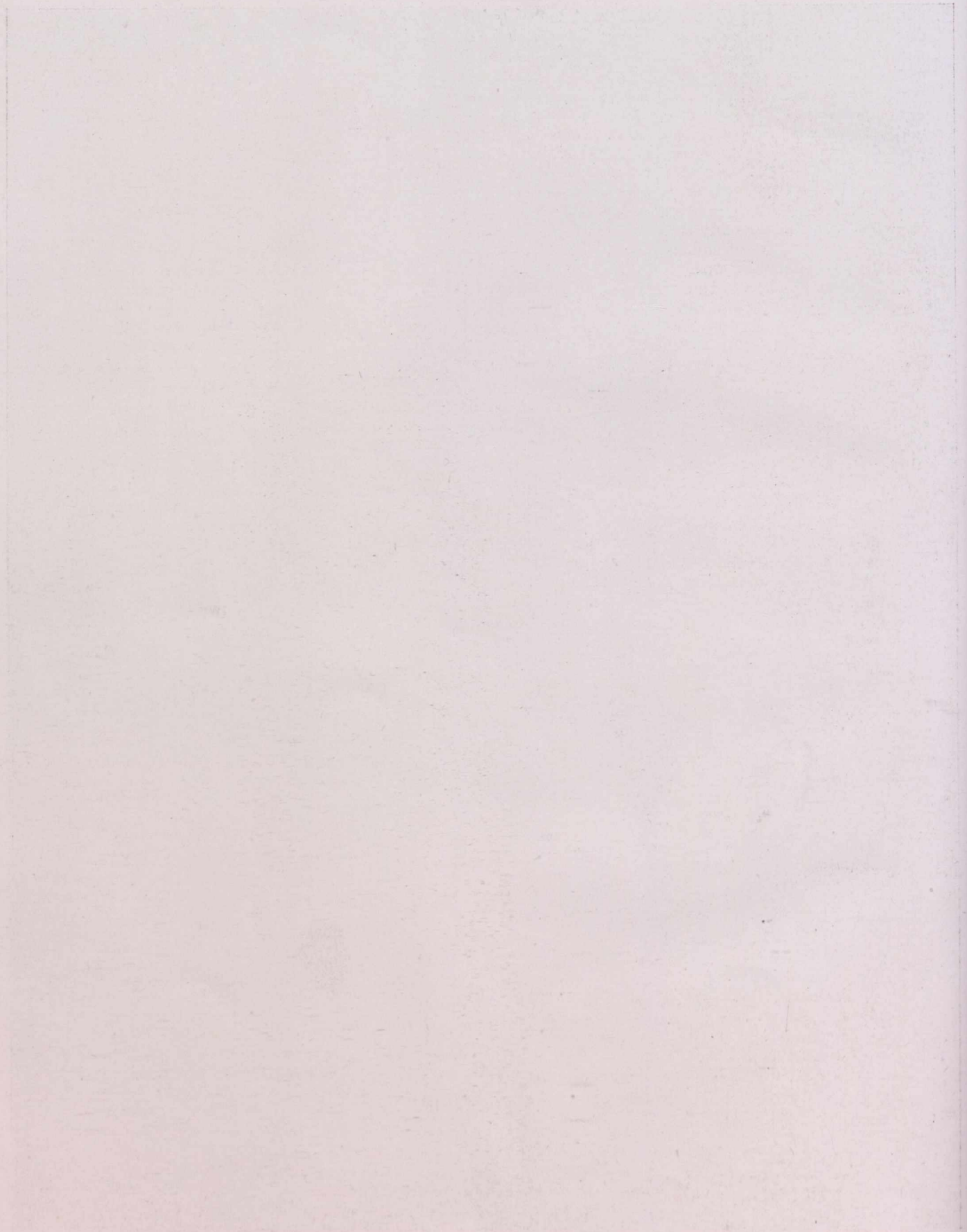
Two groups of mineral claims, situated about ten miles south of Princeton, east of Similkameen River, and along Wolf Creek, were being developed by the company under option of purchase. The larger of these, known as Voigt's group, comprises 55 claims and fractions; the smaller, known to the company's officials as the "upper camp," includes the Ada B group and several individual claims, eight in all. Development work was commenced by the company on these properties in October, 1911, and was vigorously carried on until late in 1912.

A great deal of exploratory hand work was done on the Voigt group, and much diamond-drilling as well. Commencing with 16 men and two diamond drills, op-



*Courtesy of R. P. Rogers, Esq.,
Manager Coniagas Mine.*

2nd LEVEL CONIAGAS MINE—SHOWING PILLARS
(NOTE THREAD OF LIGHT FROM MOVING CANDLE ON LEFT.)



erations were enlarged until six drills were in use and upwards of 60 men employed. In addition to doing about 1,500 feet of underground hand work—cross-cutting, drifting and shaft-sinking—and many thousand feet of diamond drilling, several thousand feet of surface trenching was done. As yet no information is available for publication relative to results of this work, for at the time of writing no statement had been made public as to whether or not the company will make a comparatively large payment on the bond that was due in December. Judging by the statements of those who have for years been engaged in prospecting on the Voight property, there are large showings of ore on various parts of this big group of claims, and it is hoped that the company will have found the ore deposit big enough and of sufficiently good average grade to warrant it in taking up its bond.

The "upper camp" adjoins the Voigt group on the south. The underground development work done consists of some 700 feet of shaft-sinking, cross-cutting, and drifting, while fully 1,500 feet of diamond-drilling has also been done. On the surface, several thousand feet of trenching has been part of the exploratory work. There were in November two diamond drills being used, and the working force included in all, about 30 men.

The ore met with in this camp varies as a whole, from heavy hematite containing copper and iron sulphides with gold and silver, which ore is base, to ore containing a high percentage of silica with similar economic minerals. The geology of the camp has not yet been thoroughly worked out, but as a rule the tendency of mineralization is along fracture zones extending in a general direction from the southwest to-

ward the northeast, the surface mineralization being extensive. Details concerning the ore bodies, however, are not yet made known.

The company erected in the lower camp numerous temporary buildings, while in the upper camp a substantial bunk and boarding house has been built. The plant put in included one 80-h.p. steam boiler connected to two 3-drill compressors, half a dozen small boilers for operating diamond drills, small hoists, etc., and pumps, piping, tram rails and cars, and all other equipment requisite for doing the work that has for months been in hand. Part of the diamond drill plant is owned by the company, and the remainder by contractors, the drilling being done by contract.

New Dominion Copper Co.'s Mines.

The British Columbia Copper Co. holds a controlling interest in the New Dominion Copper Company, which owns several mines in Boundary district. The only one of these mines that has been operated on a large scale last year was the Rawhide, situated near Phoenix. Work was continued all the year, and much development—new adits and raises, chiefly—was done, besides which a large quantity of ore was mined and shipped to the company's smelting works at Greenwood.

Included in the new work was a branch of the lower tunnel, connecting with the ore-shipping bins. An electric haulage system was put in, to take the place of hauling with horses. The footage of development work done in 1912, including an estimate for November and December, is placed at 2,656 feet, some 2,116 feet of raises and drifts to October 31, and 540 feet estimated for the two remaining months.

COBALT AND ADJACENT AREAS

By Willet G. Miller.*

The invitation of the editor to write a short paper on Cobalt for this review number of the Journal has been accepted not because I feel that I can add anything new to the description of the silver areas, but because I am willing to try to assist in the review. Stocktaking is valuable. A consideration of the successes and failures of the past, together with a description of present conditions, should be of service in planning for the future. While I have not the time, even had I the inclination, to attempt a systematic review, other writers in this number will doubtless have rendered it unnecessary.**

Production and Extent of Territory.

Cobalt proper, or the area about six miles in extent in the township of Coleman, has produced approximately 154,000,000 ounces of silver since the end of 1904. When, however, it is considered that the geology of this area is similar to that of numerous other areas, in several of which either cobalt, or cobalt and silver, have been found, it may reasonably be expected that in a region approximately 5,000 square miles in extent, important discoveries will be made in localities that at present are unproductive. The success that has been met with in Casey, South Lorrain, and Gowganda will encourage more systematic and intensive work in other areas than has hitherto been performed.

Characteristic cobalt ores have been found as far south as Rabbit Lake, which lies south-east of Tema-

gami, as far north as Wendigo Lake to the north of Casey, as far north-west as the township of Langmuir south-west of Porcupine, and as far west as Shining Tree. Surely within this region, productive areas, as yet undiscovered, will be developed!

In the earlier years of prospecting and mining at Cobalt it was the rule to look for quick returns, either from mining rich ore or in selling properties. Much territory, for instance, lying on either side of the line between Cobalt and Elk Lake, had little systematic work done on it. It contains many six-mile areas that cannot be said to be barren. The same can be said of other non-productive areas in the 5,000 square mile region.

Structural Relations.

Whatever may be thought of its being helpful in theology, dogmatism should have small place in the natural and physical sciences. Hence, in the papers and reports I have written on Cobalt I have tried to avoid being dogmatic. I have not felt, for instance, that all is known concerning the origin of the cobalt-silver ores. Indeed, the more I see of the cobalt and certain other ore deposits, the less reason there is, it seems to me, for any person being dogmatic concerning the origin. If there is anything more complex than the origin of certain ore deposits it probably is only animated nature. We can never hope to know much concerning the interior of the earth, or even of

*Ontario Provincial Geologist. **The wording in this paragraph, and the general character of the paper, are due to the paper having been written with the object of using it as an introduction to a review number of the Journal.

that part of it two or three miles below the surface. We may dogmatize and propose attractive theories and hypotheses, but we have few facts and are almost helpless when it comes to the consideration of the effects of combination of causes that are represented by certain ore deposits. Superman may solve the riddle!

While we may not claim to know all about the origin of the ores at Cobalt, there are certain facts and inferences therefrom that are helpful at least in a utilitarian sense. We know, for instance, that in every area in which cobalt or cobalt-silver ores have been found throughout the 5,000 square mile region, the Nipissing diabase is present. Hence we can conclude that this diabase played an important part in connection with the origin of the ores. Whether, however, the impure waters that accompanied and followed the diabase intrusion and deposited their metallic con-

by erosion, that veins will not be found in certain rocks. In the notes accompanying the first map published of the Cobalt area prospectors were advised to give special attention to the conglomerate. This did not mean that no veins were likely to be found in the diabase or Keewatin, but that veins were likely to be much more numerous in the conglomerate. Prospecting and mining during the last eight years have proved this early advice to have been sound, over eighty per cent. of the production having come from the conglomerate.

Geological History.

The "great stone book", the crust of the earth, especially if a restricted area or district on the surface of the globe is considered, has been compared to a volume in which pages and even chapters are missing. It is well, we may repeat, not to be dogmatic and affirm that the complete geological history of any area is

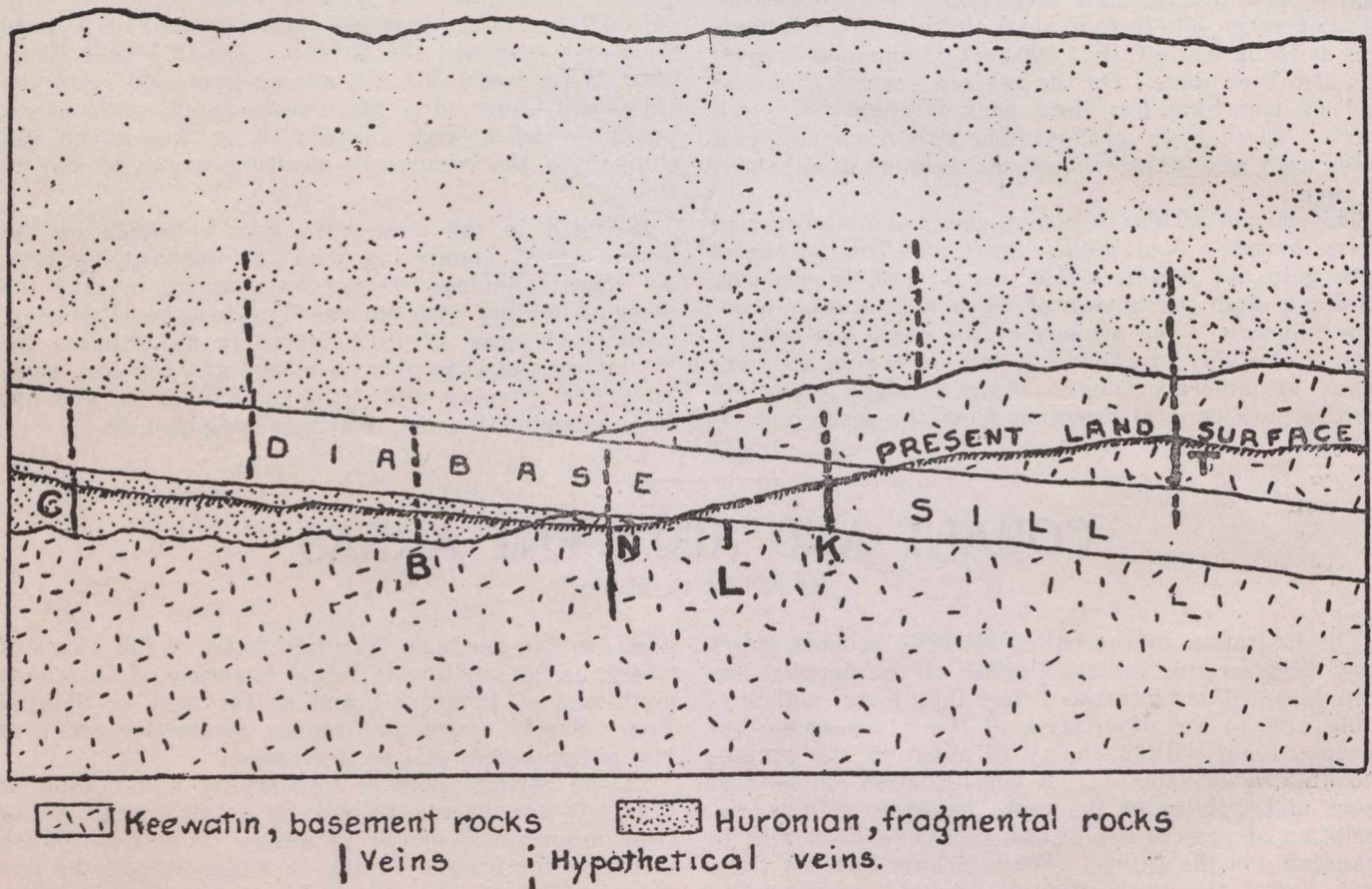


Fig. 1.

CROSS-SECTION, IDEAL RESTORATION OF ROCKS AND VIEWS AT COBALT.

tents in the cracks and fissures, giving rise to the veins, received all of their contained metals from the diabase magma, or whether some of the metals were derived from rocks through which the diabase was intruded is conjectural. Then the normal order of the deposition of the various ores in the veins is fairly well known. But too hard and fast lines should not be drawn. Moreover, because native silver in certain deposits in other parts of the world can be proved to be of secondary origin, resulting from the decomposition of ores or minerals, it should not be said without reservation that all the native silver at Cobalt is of such secondary origin. From observation on a few veins it should not be said that physical-chemical influence of the country rock played an important part in ore deposition. Nor should it be said, of areas in which Nipissing diabase is present or has been removed

known. What author has been able to write a history of a people that is complete? Characteristics of an age, or of a people, may have been preserved in the writings of certain contemporary authors that may afford the later historian material for a true account of a limited period. But the data on other ages or periods are incomplete. Similarly in working out geological history, data are sometimes discovered that make the history of restricted periods clear and distinct. An unconformity or a good contact may throw as much light on the physical history of a period as does, for instance, Pepys' diary on a period of British history. But such contacts or diaries or other records are not always available, and the complete history cannot be written.

At Cobalt and in the surrounding region data are found that make clear part of the complex geological

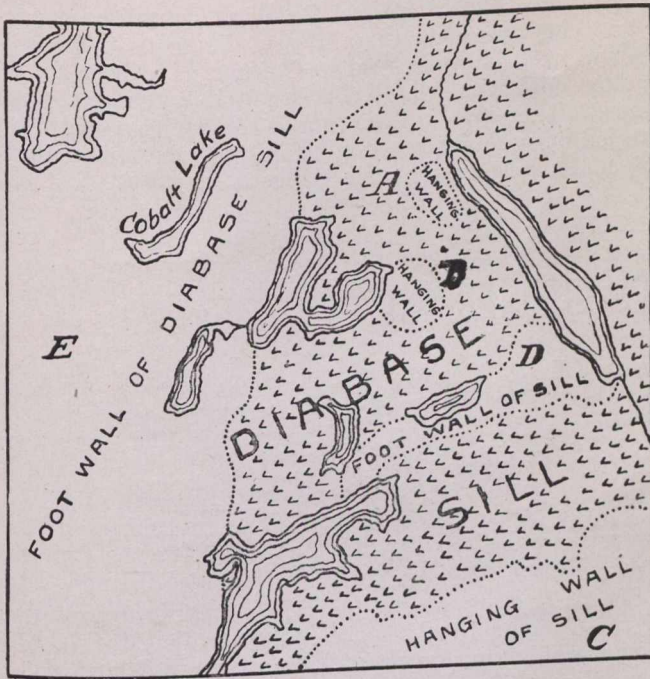


Fig. 2.

history. While a complete history of the pre-Cambrian period, to which the rocks of Cobalt belong, may never be written, enough is known to be of value for economic purposes.

In the productive Cobalt area there are three great groups of rocks, each representing an important epoch in the history of the region, that are of interest from the miner's point of view. These are from the youngest to the oldest: (1) The Nipissing diabase; (2) Cobalt conglomerate and other fragmental rocks, and (3) the Keewatin complex of essentially volcanic rocks, with a minor quantity of sedimentary material.

The accompanying generalized cross-section of the Cobalt area shows the relationship of these three groups of rocks, and characteristic modes of occurrence of the veins, (Fig. 1).

The Cobalt conglomerate and associated fragmental material are the erosion products from the Keewatin and other early series of rocks of the district. The Nipissing diabase has intruded both the Keewatin and Cobalt series. It is believed that the cracks and fissures now occupied by the cobalt silver veins were formed on the cooling and contraction of the diabase. The vein minerals or ores are believed to have been deposited, as already said, from the impure waters that accompanied or followed the diabase intrusion. The parts played respectively by meteoric and what are called magmatic waters are conjectural.

The diabase, as is well known, is in the form of a great, almost horizontal sheet, or sill. Its upper wall, consisting of rocks both of the Cobalt series and of the Keewatin, has now for the most part, in the productive area at Cobalt proper, been removed. (Fig. 2). The veins in the conglomerate are in the foot wall of the sill. There are some veins in the Keewatin foot wall (Fig. 1), and in the sill itself, while two or three are in the Keewatin of the remnant of the upper or hanging wall.

Faults.

As in many other mineral areas, faults are important features in the Cobalt area. The one which passes through the workings of La Rose mine south-west through Cobalt Lake, and the McKinley-Darragh mine is the best known, the mine workings along and on either side of it having afforded facilities for study. Fig. 3, from a cross-section by Mr. Cyril W. Knight, shows the structure at LaRose mine. Faults such as this have brought about the preservation of veins, or

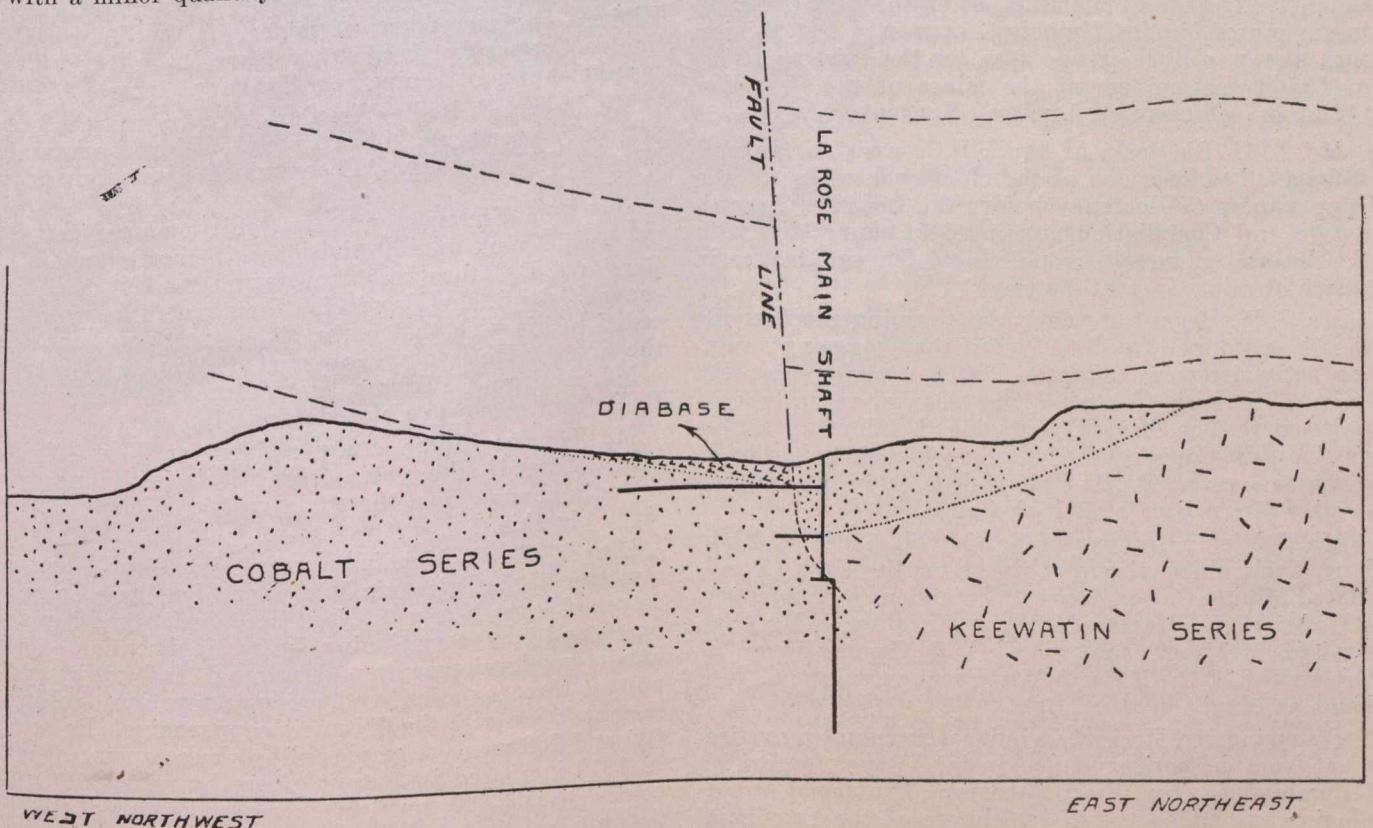


Fig. 3.

parts of veins, that otherwise would have been removed by erosion. It is probable, as I have said in another paper, that a great fault extending through Lake Temiskaming accounts for the absence of productive silver veins on the east side of the lake.

Owing to the economic importance of faults at Cobalt, careful search for similar structures, in other

mineral areas of Northern Ontario, should be made. While, for instance, certain gold deposits that have been worked in years past in Ontario have been found to have no great depth, it is possible that in other areas, owing to faulting, parts of veins have been carried down and preserved from erosion, thus affording much larger workable deposits.

PERSONAL AND GENERAL

Mr. R. J. Flaherty has returned to Toronto from Port Arthur.

Mr. J. B. Tyrrell returned from London last week. During his visit to England he examined several mines in Cornwall and elsewhere.

Mr. W. E. Segsworth was in Toronto on the 22nd and 23rd ultimo.

Messrs. W. F. Stanley & Co., Ltd., manufacturers of surveying and mathematical instruments, have taken new office accommodation at 286 High Holborn, London, Eng. They still retain the old premises at 4-5 Great Turnstile.

Mr. Robert Bryce is in Cobalt.

Mr. Geo. F. McNaughton, late manager of the Trethewey mine, Cobalt, is in Nova Scotia.

Mr. G. G. S. Lindsey spoke before the Toronto Branch of the C. M. I. on the 18th of January, an account of his speech will be found on another page.

Mr. Melbourne Bailey, manager of Mr. John Hopp's several hydraulic placer-gold mines in Cariboo district, B.C., is spending the winter at his home in Tacoma, Washington.

Mr. Wm. Blakemore, of Victoria, B.C., in the course of evidence he recently gave at a sitting of the British Columbia Labour Commission, after speaking strongly in favour of Trades Unionism, expressed the opinion that there was little or no cause for the existing strike of Union coal miners at the mines of the Canadian Collieries (Dunsmuir), Limited, Vancouver Island.

Mr. S. G. Blaylock, of Trail, B.C., assistant general manager, has been one of the chief spokesmen for the mine owners of Kootenay before the Board of Investigation and Conciliation appointed in connection with the demand of metalliferous miners for an advance in wages at mines in that district.

Mr. J. W. Bryant, formerly chief mining engineer for the Tye Copper Co., Ltd., when that company's mining activities were important in the Pacific coast districts of British Columbia and Alaska, recently contributed to The Mining Magazine, London, an article on "A New Copper District," in which information is given concerning Rainy Hollow district, in the extreme north-western part of British Columbia.

Mr. C. Victor Brennan (B.Sc., McGill, 1908), of Bingham, Utah, chief mining engineer for the Utah Consolidated Mining Co., on January 7 married, at Vancouver, B.C., Miss Alice Graeme McMynn, daughter of Mr. Wm. Graham McMynn, for years Gold Commissioner at Greenwood, B.C. Mr. and Mrs. Brennan will have their home at Bingham.

Following Mr. Herbert Carmichael's voluntary retirement from the position of Provincial Assayer for British Columbia, Mr. Wm. Fleet Robertson, Provincial Mineralogist, has added the direct charge of the Provincial

Assay Office to his other duties. The Assistant Assayer, Mr. D. E. Whitaker, will continue to give the whole of his time and attention to the assaying and analytical work of the office.

Mr. Kenneth B. Carruthers (B.Sc., McGill, 1908) is in charge of the Molly Gibson silver-lead mine, in Nelson mining division, British Columbia, for the Consolidated Mining and Smelting Company of Canada, Ltd.

Mr. A. F. Eastman, manager of the mining department of the Tacoma Steel Co., which owns the Marble Bay copper-gold mine at Van Anda, Texada Island, B.C., was taken seriously ill at the mine early in December. Later he was removed to his home at Tacoma, Puget Sound, Washington. After about five weeks' illness, he is convalescent.

Mr. Thos. Gough, manager of the Kootenay Gold Mines, Ltd., operating the Granite-Poorman gold mines and 20-stamp mill near Nelson, B.C., has been in Victoria on a short business visit.

Mr. Alexander Grant, for a number of years manager of the Marble Bay mine, Texada Island, B.C., both when it was owned by Messrs. Christie and Palmer, of Toronto, and after its sale to the Tacoma Steel Co., is spending the winter at San Diego, California.

A Boundary district newspaper states that Mr. E. Hibbert, superintendent of mines for the British Columbia Copper Co., is about to leave British Columbia to take charge of a mine near Sudbury, Ontario.

Mr. Robert R. Hedley has during recent months been active in promoting the interests of the Chamber of Mines, of Vancouver, B.C., of which institution he is chairman.

Mr. John Kirkup, for years Gold Commissioner for the Trail Creek mining division, with headquarters at Rossland, B.C., has been transferred to Alberni, Vancouver Island, the Provincial Government having acceded to his wish that he be given an appointment on the Coast. He is now Government Agent at Alberni.

Mr. Andrew G. Larson has returned to Vancouver, B.C., from a trip to Colorado and Montana.

Mr. Thomas Kiddie is now resident at West Alhambra, California, the state of his wife's health necessitating a change from the colder winter climate of British Columbia.

Mr. J. W. D. Moodie, vice-president and general manager of the Britannia Mining and Smelting Co., has returned from a trip to New York and other eastern parts, and is now continuing the active direction of the important developments underground, and additions to power, transportation, and ore-concentration facilities in connection with the Britannia copper mine. Between 600 and 700 men are employed by the company, which in 1912 increased its output of ore by nearly 100 per cent (to 193,000 tons) as compared with its 1911 output.

MINING INVESTMENTS

(Written by a Mining Accountant.)

Preliminary.

What are the prospects as regards the payment of a fair rate of interest and the ultimate return of capital, and what are the risks? are the two vital questions which should be satisfactorily answered before entering into any mining investment.

Unfortunately, the average investor does not possess the necessary knowledge of mining or the experience in mining investments to enable him to size up or review all the demerits usually so much in evidence with this, the most hazardous of all investments; and, moreover, except in cases where the mine has been sufficiently developed, even a mining engineer would not be justified in arriving at any definite conclusion regarding the possibilities ahead of the mine.

That it is possible, however, to draw a line of demarcation between what might be termed "a fairly sound investment with reasonable prospects of success," or "a rank gamble," cannot be denied; otherwise this article would not have been written in the best interests of those who, as a result of inexperience, are apt to invest their money where the prospects of the return of capital, let alone the payment of a fair rate of interest, appear anything but favourable when denuded of the glowing reports and misrepresentations which are sometimes made in good faith, but more often as a lever for unseupulous promotions.

Investments in mining stocks at par or before the mine has reached the producing stage, while offering the chance of realizing larger profits, must, for obvious reasons, be more or less of a gamble, but in cases where the mine has been reported on by a reliable engineer and systematic sampling of the surface showings reveals a continuity of payable values over an appreciable length and width, and the indications are such as to justify expert contention that the pay shoot will not diminish in length, width, and value at depth, the acquirement of an interest in the mine can justly be considered a fairly sound investment, if it has not been over-capitalized, or, in other words, the surface indications or showings will obtain at depth, it appears evident that a large enough tonnage can be mined and treated to show a return of 20 per cent. per annum on the original capital.

If, on the other hand, however, the mine has not been sufficiently developed to justify a definite expression of opinion by a reliable engineer as regards its possibilities as a dividend earner, then the mine is still in the prospecting stage and intending investors would do well not to participate in any flotation in connection therewith, unless they are looking for the very worst kind of a gamble where the chances as evidenced by the formidable array of "wild cats" are less than those on the race course, and that, even to those who know as much about a horse as a cow does about a side pocket.

Apart from the necessary assurance on these salient points, intending investors should also satisfy themselves that the flotation involves men of high standing, who, as promoters, consulting engineers, and directors, cannot afford to risk their reputation by statements which cannot be theoretically or practically demonstrated, that the concern has not been over-capitalized, and that the working capital is sufficient to develop and bring the mine through to the producing stage, and does not indicate that either the purchase price is con-

siderably in excess of the actual value of the property, or that the promoters' profits are unusually excessive.

A careful perusal of the memorandum and articles of association or by-laws, is also advisable, as the answering of such questions as: What are the directors' fees? How many shares must the directors hold to qualify? and what are their powers, etc., etc.? often expose conditions which are anything but favourable in the best interests of the shareholders.

A great deal more could be said on this very knotty question of sizing up the merits or demerits of mining propositions in their infancy. This, however, when dealing with the geological conditions, favourable or otherwise, to gold deposits with permanency at depth, the evils of mismanagement, and unfavourable working conditions, etc., etc., would be unintelligible except to those having the necessary technical knowledge and experience. Moreover, that which has already been written is sufficient in itself to make it apparent that without instituting rigid inquiries and obtaining expert opinion as regards the possibilities ahead of the mine investors when relying solely on the statements of the promoters and stock vendors, are incurring risks, which, when brought to light, would cause even the most reckless speculator to fight shy of the venture.

It naturally follows that by only entertaining propositions where the risks are apparently reduced within reason, the opening up of the mineral resources of the country would be seriously retarded by such cautious proceedings. This, however, outside of the common loss thereby sustained by each and every member of the community, does not effect the individual, and is, therefore, beside the question, especially as the consistent turning down of everything in which the element of speculation predominates, would gradually force promoters to realize that without risking something to develop the mine to the point of establishing its position as a dividend earner, their chances of realizing the enormous profits (at present usually out of all proportion to the outlay) are as remote as those which under existing conditions, the average shareholder is expected to carry.

The foregoing deals with the acquirement of shares in any mining company at its inception, and although the risks are in proportion to the prospective gains, this, for reasons set out herein, appears the most favourable period in the life of the mine to become interested therein.

For example, let it be assumed that a company capitalized at \$600,000, showed a profit of \$200,000 over all charges, including plant depreciation and development redemption as a result of operations during the first year after reaching the producing stage, and that the positive ore reserves were such as to assure a similar profit for a further period of four years. Now, under the present methods this profit would be paid out in the form of a dividend representing 33 1/3 per cent. on the par value of the shares which, everything being favourable, would then rise in consequence until returning, say, 15 per cent. when maintaining this profit. This would represent a sound investment if the life of the mine and similar profits were assured for twenty years, but in view of the possibilities as regards the pay shoots not continuing at depth, etc., etc., it certainly could not be considered safe with only four years' ore

in sight, to take such an extremely optimistic view. As a matter of fact, it would be somewhat risky to double the prospects as revealed by the actual ore in sight, or, in other words, figure on the profits being maintained for eight instead of four years. Even then the shares would not be worth their par value with only the return of capital and 2½ per cent. interest per annum reasonably assured.

This now brings us to the question of inflated stock values, and it does not require much figuring to show that the shares, when standing at a price returning only 15 per cent. on the annual profit of \$200,000, would be more than double their actual value and that, whereas, when taking the precautions referred to herein, the investment at par offers a good fighting chance, the purchasing of shares as an investment after payment of the first dividend, is very much more of a gamble, as there is then no doubt that on such an inflated valuation the mine is very much over-capitalized on the showings, even when making very liberal speculations thereon in the manner suggested. The undeniable fact that it needs to be a very good mine, indeed, which after ten years, let alone twenty years, does not at least reveal conditions necessitating a reduction in the grade of ore milled, further supports the contention that until a healthier tone is imparted to mining as an investment by adopting methods more in keeping with sound business principals, the acquirements of stock in any mining company at its inception offers better prospects of success when taking reasonable precautions such as already suggested herein.

That such should be the case clearly shows that there is something "rotten in Denmark," and in our next issue we will attempt to demonstrate that mining, which at best can now only be considered in the light of a speculation, can be made more of an investment after the mine has reached the producing stage, by distributing the surplus over revenue expenditure (now erroneously called profit) in such a manner as to keep the shares at their true value.

(To be Continued.)

MACHINERY NOTES

Model New Plant of H. W. Johns Manville Co.

The completion of the new plant of the H. W. Johns-Manville Co., at Manville, N.J., marks another important chapter in the history of this concern.

Beginning with the consolidation of the H. W. Johns Manufacturing Co. and the Manville Covering Co., in 1901, the H. W. Johns-Manville Co. has grown by leaps and bounds until to-day it ranks as the largest concern in the world engaged in the manufacture of asbestos and magnesia products.

Branch houses are established in practically every city of prominence in the United States and Canada, and representatives in almost all foreign countries. Manufacturing plants are located in Brooklyn, N.Y.; Milwaukee, Wis.; West Milwaukee, Wis.; Hartford, Conn.; Nashua, N.H.; Lockport, N.Y.; Jersey City, N.J.; and an asphalt refinery at South Amboy, N.J. The company's asbestos mines at Danville, Province of Quebec, Canada, are the largest in existence, and produce the finest grade of asbestos.

The new Manville plant consists of nine buildings, which, together with their products, are classified as follows: A, textile and packing; B, rubber plant, electrical specialties and printing department; C, pipe coverings; D, paper mill; E, magnesia; F, roofing; G,

mastic and waterproofing; H, roofing coatings; power plant and pump house.

These buildings represent the most advanced ideas in fireproof construction, being of brick, steel and concrete, with roofs of J-M Asbestos Roofing. They are planned not only for safety, but to afford the best operating conditions for the employes. The "daylight" form of construction which is employed throughout permits a flood of light to enter the buildings through large triple-unit windows placed close together. Artificial illumination is provided in the form of J-M incandescent lamps and Frink reflectors.

The hygienic conditions of this plant are ideal. Ventilation is furnished by means of steel ventilating sash which provide a constant supply of fresh air without causing drafts. Owing to the judicious arrangement of the machinery, there is an entire absence of crowding and confusion which, in many factories, serve to hamper the operators in their work.

Each building has an average length of 1,000 feet, and is a separate factory in itself capable of being operated as an independent unit without relation to the other buildings in the group. The total combined floor area of all the buildings is about 1,000,000 square feet.

Power is furnished by the company's power plant which consists of the latest type of General Electric turbo generators, six Babcock & Wilcox high-pressure water-tube boilers aggregating 5,000 horse-power. All steam pipes are insulated with J-M Asbestos-Sponge Felted Covering in order to effect a maximum saving of fuel. The power and lighting cables, instead of being strung on overhead poles, as is generally the case in factory installations, are led underground through J-M Fibre Conduit, thereby eliminating cable trouble for all time.

The new plant is situated on a picturesque tract of 320 acres, divided by the Raritan River, in the town formerly known as Findern, N.J. The name has since been changed to "Manville." The company's private railroad system, comprising five miles of tracks, connects directly with the Central Railroad of New Jersey, the Lehigh Valley, and the Philadelphia & Reading Railroad, thereby insuring excellent shipping facilities.

About 3,000 men will be employed at this new plant, making a total of about 7,000 who are now employed by this company.

During the month of December the Elmore Vacuum plant at the Sulitelma mine, Norway, produced 650 tons of copper concentrates.

Danger signals for mines are being manufactured by the Stonehouse Enamelled Steel Mine Signal Co., of Denver. The signals are so designed as to attract immediate attention. The significance of the sign is perceived even by foreign labourers.

The Siemens Company, of Montreal, has received an order for a 5000 K.V.A., 3-phase, 60 cycle, 1800 r.p.m. turbo generator from the corporation of Edmonton. The generator is to be provided with the Siemens systems of axial ventilation so arranged that the hottest temperature in the machine can be measured. The Siemens Company has already supplied Edmonton with two generators and one induction motor.

Pile Hammers.—The McKernan-Terry Drill Co., New York, is putting on the market both heavy and light pile-hammers. To the former has recently been added

a new accelerating device in form of an accelerating piston. Steam or air is conducted into the internal cylinder of the main piston through a small port in the accelerating piston, and is held against escape by

a check valve. Entering on the downward stroke, it is highly compressed on the upward stroke. By this means not only is acceleration attained, but a positive cushion is provided.

GOLD ON VANCOUVER ISLAND

In his recently-issued Memoir on South Vancouver Island, published by the Geological Survey of Canada, Mr. Charles H. Clapp, of that department, who began a geological examination in 1908 and continued it the following years, under the head of Economic Geology says that there are in southern Vancouver Island mineral deposits valuable, or possibly valuable, for gold, copper, iron, fluxes and pigment; also important structural materials including lime, and cement, clay, sand and gravel, and stone. Concerning gold, Mr. Clapp reports:

Placer-Gold Deposits.—Placer-gold deposits are the chief source of gold in southern Vancouver Island, and the only source which has here produced gold in paying quantity. Gold is reported from a large number of rivers and creeks on southern Vancouver Island, and "colours" can doubtless be obtained by panning in most of the streams. With two or three exceptions, the principal deposits all occur, however, in the streams which flow for a considerable part of their course over the Leech River formation. The gravels and sands near the mouth of Sombrio River have been known as a source of gold since the Spaniards explored the Pacific coast in the latter part of the eighteenth century. In the sixties the deposits in the Leech and Jordan rivers were discovered and worked the yield being estimated at between \$100,000 and \$200,000; and, somewhat later, coarse gold was found in the upper part of the San Juan River. For a number of years Chinamen have worked on Leech River, and one or two more extensive attempts have been made recently to obtain gold from Leech River and its north fork. At present, a partnership has been formed to work a large deposit of sand and gravel near the mouth of Sombrio River. Beside these deposits, which occur in the belt of the Leech River slates, small amounts of gold have been obtained from China Creek and Franklin River, emptying into Alberni Canal, and also from Nanaimo River.

Virtually all of the streams which occur in the belt underlain by the Leech River slates contain more or less coarse gold. With the exception of the two large valleys which occur along the northern and southern boundaries of the formation, the San Juan valley, and the valley which has been called Leech River valley (but which is occupied by several streams beside Leech River, notably Jordan River and its tributaries Bear Creek and Y Creek, and Lost River), the valleys are narrow and the grade steep. The amount of gravel in these streams is, therefore, small. It is very possible that relatively large amounts of auriferous gravel may be found on the wide, comparatively smooth, inter-stream areas. These inter-stream areas are, as a rule, drift-covered and heavily timbered, so that prospecting is carried on with considerable difficulty.

The amount of gravel, even in the Leech River valley, is not large throughout the greater part of its extent, but special conditions have existed in certain portions, which have caused its accumulation in large amounts. The conditions are not at present well understood. The largest known deposit occurs in the lower part of the

valley, extending to the coast near the mouth of Sombrio River. Lost River, which occupies the western part of the Leech River valley, does not cross these gravels, but turns abruptly to the south more than a mile from the shore, and finds its way to the sea through a narrow canyon. The gravels are underlain by Tertiary conglomerate and sandstone, which are exposed at the shore and at the bend of Lost River at 320 ft. above sea-level. Near sea-level the Tertiary rocks are directly overlain by a sandy clay of indefinite thickness, but probably not more than 10 or 15 ft., which contains marine Pleistocene fossils. The overlying sand and gravel is from 300 to 500 ft. thick, and the deposit is one-quarter to one-half mile wide, and extends inland beyond the bend of Lost River, for a distance reputed to be more than two miles. On top of the gravels is a yellow garnet-bearing sand, 10 to 20 ft. thick, occurring at elevations of from 450 to 500 ft. above sea-level, although near the shore it occurs much lower, probably on account of local slips in the deposit. The sand consists largely of rounded quartz grains, and resembles a beach sand. Mr. R. S. Gallop, one of the partners who own the deposit, in a recent letter to Mr. Clapp, states that the mining engineers who have examined the deposit estimate the amount of gravel at 155,000,000 cubic yards, and the gold content at 12 cents a yard.

The origin of the gravels is not at present clear. A large part of the gravel contains pebbles of many different rocks, and appears from its heterogeneous character to be composed of glacial detritus. It seems probable therefore, that the gravel was deposited by a large, post-Glacial river flowing westward in the Leech River valley before the recent uplift. This uplift diverted the river into its present course, that of the Lost River. The gold, if deposited under these conditions, was probably derived from a much larger quantity of glacial gravels.

A large amount of gravel occurs also in San Juan valley, but is probably low grade, as it is chiefly of glacial origin, and any gold that it contains does not appear to have been especially concentrated, except very locally.

The gold in the above-mentioned gravel deposits has doubtless been derived from the quartz veins which occur in the Leech River slates. These quartz veins, or more correctly small stringers and lenses, are very numerous, but they seldom attain any great size. The quartz of the veins is associated with a little albite, which in the sheared veins has altered to sericite. The only metallic minerals are a little pyrite or chalcopyrite, and free gold. The veins are, as far as known, very low grade, and are too small and barren to be profitably mined, and all attempts which have been made to work the veins have been unsuccessful.

The only development of the gold deposits of the Leech River belt going on at the present time is that of the large deposit of sand and gravel occurring along the west coast, near the mouth of Sombrio River. Messrs. R. S. Gallop, D. W. Hanbury, and W. H. Kirkbride have nearly finished the construction of a

hydraulic plant to work these gravels. It is possible that other gravel deposits, sufficiently large to pay for the establishment of a plant, occur in other parts of the Leech River valley. As far as known these deposits are small, but the western portion of the valley has never been explored. Although the deposits of the San Juan valley are low-grade, thorough examination may reveal enough gravel to warrant the establishment of a plant designed to work large quantities of low-grade material. Thorough prospecting of the gravels on the upland between the two major valleys is also advised.

The upper parts of the Franklin River, China Creek, and Nanaimo River flow in a mountainous district formed of the Vancouver meta-volcanics, with intercalated lenses of limestone, both of which have been invaded by large granitic batholiths. Considerable mineralization has taken place near the contacts, and it is probable that the small amount of gold in the above-mentioned streams has been derived from mineral deposits of the character. As far as seen, the gravel deposits of these streams, which are likely to be gold-bearing, are very bouldery and restricted in amount.

Along the west coast of Vancouver Island, except where fringed by the Tertiary deposits, black sands which contain gold occur in the beaches. The gold, however, is quite flaky and would probably be saved only with considerable difficulty, as has proved to be the case farther north along this coast. The actual amount of black sand in the beaches of southern Vancouver Island does not appear to be large. Mr. Gallop, who has prospected the gravels and sands in the vicinity of Sombrio River, reports the occurrence of native mercury in the sands. The mercury was probably derived from such deposits as are known to occur on Cinnabar Creek, near Sechart, on the northwest side of Barkley Sound.

Vein and Impregnated Deposits.

Continuing, Mr. Clapp states that in the southeastern part of Vancouver Island many of the quartz-feldspar veins, which were probably formed during the intrusion of the upper Jurassic granitic rocks, have been prospected for gold entirely without success. The true nature of these veins, or apophyses, has apparently not

been recognized; for since the feldspar has altered to sericite, it resembles on the weathered surface white milky quartz, and the veins have, therefore, the appearance of ordinary quartz veins. The veins also contain pyrite, which altering to limonite has stained the exposed surfaces, still further hiding the true character of the veins. On microscopic examination, feldspar is always seen to be present, and usually in excess. Such veins as these have not been shown elsewhere to be gold-bearing, and it is not likely, therefore, that they contain gold in commercial quantities in southern Vancouver Island, and their prospecting should be discouraged.

Mineralized shear zones occur throughout the limestone and meta-volcanics of the Vancouver group, but are best developed near the contacts with the intrusive granitic rocks. Similar mineralized shear zones also occur in the granitic rocks themselves, especially near the contacts. Deposits of this character are usually more important as possible sources of copper, but they also contain small amounts of gold. A typical example is the deposit on the Alfreda claim, situated on the east slope of Gordon River valley, three miles above the mouth. Here the diorite has been tremendously sheared, forming a shear zone about 25 ft. in width, which strikes N. 50 deg. W. The sheared diorite has the appearance of a chloritic or amphibole schist, but its true nature is readily recognized on microscopic examination. Although traces of the original minerals and texture are maintained, the sheared rock is composed chiefly of secondary minerals, which include sericite, uralite, biotite, muscovite, chlorite, and a little epidote. In the shear zone quartz lenses have been developed partly by replacement. The quartz of the lenses occurs in irregular, usually very small, grains, up to 2 or 3mm. in diameter. Associated with the quartz is a very little plagioclase feldspar and sericite. The quartz contains disseminated grains of pyrite and magnetite, which have altered somewhat to limonite, and is cut by later veinlets of quartz and calcite. The quartz rock is said by the owner of the claim, Mr. T. M. Baird, to assay \$2 a ton in gold and 5 oz. of silver. Unless considerably larger bodies of higher-grade are found, these deposits are of little or no commercial importance.

SPECIAL CORRESPONDENCE

ONTARIO.

COBALT, ELK LAKE AND GOWGANDA

The discovery of some high-grade ore on the old King Edward mine at Cross Lake now being operated by the York Ontario under a five year lease, is of some interest. Too much importance can easily be attached to the discovery in as much as the King Edward has always yielded pockets of high grade ore and very rich wall rock, but general values were too small to make much profit. The new vein reported is at the adit level running parallel to the No. 5 vein which was always the strongest in the mine. The mine in former days was always staffed and mined on the scale of a big property, now that it is being operated on the basis of a prospect with a small force of men and at a minor expense it may be made to yield a profit.

It is understood that the Beaver Consolidated which secured the property of the Erie Cobalt as a water reserve, may try to find some silver there. The Erie was once famous on the Cobalt stock market, but as far as can be ascertained never produced an ounce of silver. The condition of the Cobalt market is now such however that it appears worth while to revive even such faint hopes as the Erie.

Application has been made to the Mining Commissioner for permission to pump out Kerr Lake in order that the silver that undoubtedly lays under its waters may be mined. According to the plans filed it is proposed to place a raft on Kerr Lake and pump the water into Giroux Lake, but these are probably only provisional, and other means of emptying the lake may be adopted. Which ever way is taken there appears little doubt that the famous lake will be made accessible to mining operations this year.

Kerr Lake has an extent of forty acres, and is possessed by the Crown Reserve, 32 acres; the Drummond, 6 acres, and the Kerr Lake 11 acres. At least one-third of the great Carson vein on the Crown Reserve between the bottom of the lake and the first level is intact and contains millions of ounces that will be liberated when the lake is drained. In addition all the other vein systems since found on the Crown Reserve in all probability come to the surface and can be mined. It is an extraordinary fact also that sixty per cent. of the total area of the Crown Reserve has not been prospected yet. Some of this sixty per cent. is in the fecund conglomerate though not much of it, and therefore in that respect its undeveloped territory is not as great as it would seem. As to the Kerr Lake the last annual report states that of 6,660,091 ounces total ore reserves, 2,781,400 ounces are under the lake. Thus the Kerr Lake have in a known ore body over a million dollars to mine under Kerr Lake. The Kerr Lake early in its history blasted into the bottom of Kerr Lake and had to close up the hole with a concrete dam and abandon the working. They were mining bonanza ore when this occurred too.

Large shipments of bullion continue to be made to England. In the middle of the month one hundred and twenty bars of silver worth \$78,000 left on one day for Liverpool. The Buffalo and Nipissing were the principal contributors, the Cobalt Townsite and the Casey Cobalt despatching but 5,000 ounces between them. The high grade plant at the Buffalo is now running smoothly and henceforth all silver will go out in bars.

Mr. Thomas W. Gibson, Deputy Minister of Mines for Ontario, in a preliminary review of mining for the past year estimates the production of Porcupine at \$2,000,000, four times the total output of Ontario for any previous year. It is probable that Mr. Gibson made his estimates before the scope of the strike at Porcupine was realized, and the output will be somewhat less than that. Also he based his estimates on Cobalt at 30,000,000 ounces before the returns for December from some of the mines had begun to be known and it is likely that it will be nearer 31,000,000 ounces than 30,000,000 ounces.

Minority stockholders of the Wetlaufer silver mine in Buffalo are not satisfied with the manner in which the present management is dealing with the situation and they are soliciting proxies for the annual meeting which occurs on Jan. 27. Since the resignation of Mr. H. Lindsley as manager, Mr. Robert Livermore, manager of the Kerr Lake, has assumed the direction of affairs.

The annual statement of the Temiskaming Mining Company just issued to shareholders goes to show that profit on the year's working was \$413,615 against \$271,423 in 1911. The same amount was paid in dividends, namely \$300,000, but the extra profits were utilized in liquidating the debt on the purchase of the North Dome on Porcupine. The cash surplus shown at the end of the year was \$590,591. The returns from ore shales and shipments amounted to \$762,653, while there is \$13,980 due from smelters and \$48,010 of ore on hand.

The old Alexandra mine on the top of Diabase Mountain is being pumped out, and operations will commence from the 300-foot level soon. The success of the Bailey has been the prime factor in inducing this company to resume operations and they hope to pick up the Baileys leads. A small plant has been installed for immediate work.

The Northern Customs concentrator have thrown out their four Nissen stamps and replaced them with ten stamps of the ordinary type. This brings the total number of stamps dropping in the customs mill up to 120, and about 400 tons of ore are being treated daily. According to its contracts the mill has from four to five years' work ahead of it. The mill is at present treating ore from the La Rose, the Cobalt Townsite, and the Drummond. The La Rose has just renewed its contract with the Customs Company on the basis of a hundred tons of ore per day for the next four years.

Porcupine, Swastika.

It seems most probable that the shareholders of the Crown Chartered Mining Company will lose the Davidson property, their only claim of real value. Mr. C. F. Dike, who came from Cripple Creek, Colo., to look after Crown Chartered operations in Porcupine has severed his connection with the company, and has been retained by the General Assets Company of Montreal, to act in their interests. The General Assets control the Dome Lake mine in Porcupine and the Cochrane in Cobalt.

Excellent progress is being made with the erection of camp buildings on the Tough claims at Kirkland Lake, and Mr. C. A. Foster who holds a controlling interest in the properties will soon be in a position to make a real start at mining. So far mining operations have consisted in open cutting for 36 feet by 10 feet deep and taking out a carload of high grade ore.

There are now far more prospectors working in the townships surrounding Kirkland Lake than in any other portion of the Northern Ontario mining field. The discovery on the Tough claims and some others has made a very lively interest in this section. The township of Morissette Lebel and Teck are being staked in very largely. An hotel is being built at Kirkland Lake for the accommodation of travelers between that point and Swastika.

COMPANY NOTES

CROWN RESERVE REPORT.

The Crown Reserve has a surplus now of \$821,000, compared with \$764,000 at the end of last year. This is a very encouraging increase.

The cash on hand now amounts to \$352,000, while there is also \$251,000 due from the smelters, which is virtually cash. The total assets stand over \$3,000,000.

The following statement presented to the shareholders is as follows:

	Credit.	
By ore production		\$1,692,060.76
	Debtor.	
Mining expenses, development, depreciation, etc.	\$343,387.88	
Smelters' charges and deductions	53,869.18	
Bonus to employees	10,882.96	
Royalty, Ontario Government, accrued and accruing	147,910.03	
		556,050.05
Profit		\$1,136,010.71

Profit and Loss Account.

	Cr.
By balance from 1911	\$ 764,851.76
By profit operating for 1912, as above	1,136,010.71
By interest from bank	9,083.74
	\$1,909,946.21

Dr.	
To prospecting, explorations and operations, Silver Leaf Issue, etc.	\$ 27,264.91
To dividends, 1912:	
Nos. 24 to 35, inclusive....	1,061,288.40
	1,088,553.31
Surplus	821,392.90
Mining lands, minerals and mining rights, building plant and equipment, etc..	\$2,076,102.72
Stores and supplies	11,667.13
Ore on hand	50,000.00
Due from smelters	251,528.11
Cash on hand and in bank...	352,896.62
McEnaney purchase price payments, and development, etc.	269,080.97
	\$3,011,275.55
Liabilities.	
*Capital stock	\$1,999,957.00
Royalty accrued and accruing, Ontario Government..	72,018.96
Accounts payable	29,465.99
Dividend due Jan. 15, 1913..	88,440.70
Surplus	\$ 821,392.90
Assets	
	\$3,011,275.55

GRANBY MEETING.

A special meeting of stockholders of Granby Cons. Mining and Smelting Co., Limited, has been called for February 25th, to authorize an issue of not more than \$5,000,000 bonds convertible into ordinary shares at not less than par.

Of the proposed new issue, Granby plans to promptly offer \$1,500,000 to shareholders, pro rata, at par and interest.

In order to provide for the conversion of these bonds, capital stock will be increased from 15,000,000 to 20,000,000.

The Directors have also ordered the resumption of dividend payments by declaration of 1½ per cent., payable March 1st to stock of record February 4th. For purposes of dividend and special stockholders' meeting transfer books, close February 4th, and re-open February 25th.

The proposed immediate issue of \$1,500,000 has been underwritten by bankers for a reasonable commission.

The last dividend on the stock was 1 per cent. and was paid on December 30th, 1910.

HOLLINGER'S HALF-YEAR.

The six months' statement of Hollinger Gold Mines with the fourth dividend shows that for the half-year up to the end of 1912 it produced gold to the value of \$970,340, and made a profit of about \$750,000 from the 43,227 tons crushed, the detailed figures being:

Gold bars	\$859,475
Precipitates on hand	24,498
Slags on hand	13,500
Gold in solutions	24,500
Bullion in hand	12,000
	\$933,973
Value of gold recovered	\$933,973
Lost in tailings	36,367
	\$970,340

*231,143 fully paid-up shares of \$100 each, of the above amount are held by the Trustees for the benefit of the company.

Ore milled—	
From development, tons	23,404
From stopes, tons	19,822
	43,227
Total	43,227
Average value of ore, per ton	\$22.45
Percentage of value recovered	96.3

The estimated profit for the period being \$750,000, although final figures may alter this to some slight extent.

The labour troubles brought down the net profits considerably.

LA ROSE FOR 1912.

With the end of 1912 closed a successful year for La Rose mine, the December figures of which are as follows: Shipments during December, \$106,604; income for month, \$163,128; operating expenses, \$67,826; net profit for December, \$95,301.

The total income for the year 1912 was \$1,796,880, and the operating expenses \$779,916, leaving a net profit for the twelve months of \$1,026,663.

The actual cash surplus to December 31, 1912, was \$1,667,104, which, with \$199,526 in outstanding shipments and ore on hand, brings up the total surplus to \$1,866,631.

KERR LAKE.

Application has been made to the Ontario Mining Commissioners by the Crown Reserve Mining Company and the Kerr Lake Mining Company for permission to pump out Kerr Lake. Drummond mine is also interested.

The proposal is to pump the water out into the Giroux Lake, or if that is not practicable Gelin Lake, whence it will flow into the Montreal River.

It is estimated that 2,781,400 ounces would be made available by the draining of the lake.

JUPITER MILL.

The installation of the mill at the Jupiter property will, it is reported, be started about the first of April. It is decided that cyanide treatment will be adopted for the ore, but other details of the mill remain as yet indefinite. These details will be worked out and the plans perfected within a short time.

TEMISKAMING PROFITS.

The net profits of the Temiskaming Mining Company for 1912 were \$413,615, as compared with \$271,423 in 1911. Total receipts were \$776,075, of which \$762,653 was from ore sales and shipments. The profit and loss account showed a balance of \$477,441 from 1911 and \$413,615 net profits in 1912. Dividends paid in 1912 amounted to \$300,000, and a balance of \$590,591 is carried forward for the year.

SENECA SUPERIOR DIVIDEND.

The directors of the Seneca-Superior Company have declared a 10 per cent. dividend, payable on February 15th, to shareholders of record February 10th. The career of the company, which was only organized in January, 1912, has been remarkable in the extreme. The company has now been shipping ore regularly for some time and the stock has made rapid advances on the market and yesterday stood at as high as 1.85 bid at the close.

Chambers-Ferland Circular.—A circular has been sent out from the office of the Chambers-Ferland Mining Company, notifying the shareholders that an agreement has been obtained from the Ontario Government whereby the royalty heretofore payable to the Government has been cancelled and released, subject to a provision that in case any large or valuable body or bodies of ore be found whereby the company makes in any calendar year, beginning with the first day of January,

1912, such a net profit from its mining operations as will enable the company to pay to its shareholders out of the net profits for such year a dividend in excess of ten per cent., then in such event after making allowance for payment of such dividend, the Minister of Lands, Forests and Mines may require the company to pay a royalty not exceeding the 25 per cent. royalty payable under the agreements therefore in force.

STATISTICS AND RETURNS

COBALT ORE SHIPMENTS.

For the week, 11 mines were on the shipping list, sending out 14 cars of ore, of which 11 cars contained high grade ore. A shipment of high grade was made from the Bailey mine, while the Casey-Cobalt also appears sending out 30 tons of high-grade from New Liskeard. The Drummond has shipped a car of concentrates to Thorold this week. A car of low grade came from the Seneca Superior. La Rose, with two cars of high grade, including one car containing 55 tons, headed the list for the week.

Four mines contributed in bullion during the week, the entire list being shipped on Tuesday of this week, Nipissing, Buffalo, Townsite and Casey-Cobalt were the shippers.

The shipments in pounds for the week follows:

La Rose, 2 high	174,855
Dominion Red. Co., 2 low	119,785
Cobalt Townsite, 2 high	147,863
Cobalt Lake, 1 high	64,535
Trethewey, 1 high	58,600
Bailey, 1 high	40,000
Peterson Lake (Seneca Superior), 1 low	84,299
Temiskaming, 1 high	62,087
Casey-Cobalt, 1 high	60,000
Drummond, 1 high	40,000
McKinley-Darragh, 1 high	83,600
	937,974

The bullion shipments were:

	Ounces.	Value.
Nipissing	63,641.36	\$39,777.26
Buffalo	54,712.00	35,000.00
Townsite	2,770.00	1,750.00
Casey-Cobalt	2,394.00	1,520.00
	123,617.36	\$78,056.26

For the year to date the bullion shipments from the camp are:

	Ounces.	Value.
Nipissing	114,760.66	\$72,301.91
Buffalo	54,712.00	35,000.00
Trethewey	5,077.00	3,223.00
Cobalt Townsite	2,770.00	1,759.00
Casey-Cobalt	2,394.00	1,520.00
Miscellaneous	2,637.00	1,575.00
	182,450.66	\$115,378.91

B. C. ORE SHIPMENTS.

Week ending Jan. 11, 1913.

Production of ore in the Kootenay and Boundary district for the week ending January 11 was 51,246 tons

and smelter receipts were 42,222 tons. For the two weeks ending in the new year the production totals 101,789 tons and the smelter receipts are 87,835 tons. Output in detail was:

Slocan and Ainsworth.

Standard, milled	400	800
Van Roi, milled	1,100	2,200
Bluebell, milled	1,200	2,400
Kilo, milled	100	200
Rambler-Cariboo, milled ..	300	600
Richmond-Eureka	27	27
Colonial	21	47
Standard	390	390
Bluebell	153	387
Ruth	38	79
Eastmount	27	27
Black Prince	6	6
Other mines	309
Total	3,762	7,472

Nelson.

Molley Gibson, milled 	300	600
Granite-Poorman, milled ..	250	500
Second Relief, milled	150	300
Queen, milled	400	800
Mother Lode, milled	500	1,000
Yankee Girl	100	252
Hudson Bay	109	291
Emerald	42	78
Queen Victoria	234	478
Total	2,095	4,299

East Kootenay.

Sullivan	1,408	2,116
St. Eugene	59	59
Total	1,467	2,175

Boundary.

Nickel Plate, milled	1,500	3,000
Jewel, milled	200	400
Granby	23,116	47,237
Mother Lode	6,900	13,875
Rawhide	5,224	10,610
Napoleon	757	1,459
Unnamed	110	201
Knob Hill	47	199
Ben Hur	112	149
Snowstorm	56	169
United Copper	34	95
Total	39,056	77,390

Lardeau.

Ajax	36	36
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Rossland.		
Le Roi No. 2, milled	300	600
Inland Empire, milled	90	180
Centre Star	2,710	6,296
Le Roi	1,162	2,414
Phoenix	14	14
Le Roi No. 2	554	881
Other mines	...	32
Total	8,830	10,417

Consolidated Co.'s Receipts.
Trail, B.C.

Richmond-Eureka	27	27
Colonial	21	47
Standard	390	390
Bluebell	153	387
Ruth	38	79
Eastmount	27	27
Black Prince	6	6
Yankee Girl	110	252
Hudson Bay	109	291
Emerald	42	78
Sullivan	1,408	2,116
St. Eugene	59	59
Knob Hill	47	199
Ben Hur	112	149
Snowstorm	56	169
United Copper	34	95
Ajax	36	36
Centre Star	2,710	6,296
Le Roi	1,162	2,414
Phoenix	14	14
Le Roi No. 2	554	881
Other mines	...	341
Total	6,115	14,453

Granby Smelter Receipts.
Grand Forks, B.C.

Granby	23,116	47,237
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B. C. Copper Co.'s Receipts.
Greenwood, B.C.

Mother Lode	6,900	13,875
Rawhide	5,224	10,610
Napoleon	757	1,459
Unnamed	110	201
Total	12,991	26,145

Cobalt Bullion for 1912.

The year's bullion shipments to date are as follows:

	Ounces.	Value.
Nipissing	3,929,954.28	\$2,391,357.31
Crown Reserve	451,770.87	256,905.50
Temiskaming	38,782.00	23,165.10
O'Brien	222,538.94	134,045.61
Nova Scotia	49,010.00	31,800.00
Buffalo	186,489.50	115,014.54
McKinley-Darragh	80,327	6,069.37
Kerr Lake	27,706.46	17,057.95
Trethewey	20,637.08	12,416.16
City of Cobalt	5,659.94	3,133.20
Colonial	1,698.00	1,018.00
La Rose	69,849.00	41,030.38
Wettlaufer	3,280.62	2,003.14
Cobalt Lake	5,256.88	2,989.75
Right of Way	505.50	273.00
Cobalt Townsite	8,582.55	5,362.00
Drummond	3,513.54	2,169.42
Casey Cobalt	940.00	574.00

Dom. Red. Co.	75,972.46	46,760.03
Miscellaneous	16,672.56	14,050.14
Bailey	14,050.50	8,816.65
Penn-Canadian	445.00	272.69
Miller Lake	946.00	788.00
Totals	5,311,476.49	\$3,117,984.45

German Copper Consumption.

L. Vogelstein & Co. report the following figures of German consumption of foreign copper for the eleven months,—January-November—1912:

	Tons.
Imports of copper	191,993
Exports of copper	9,050

Consumption 182,943

During the same period of 1911, the quantity of 168,096 tons was consumed. Of the quantity reported for 1912, a total of 166,307 tons was imported from the United States.

YEARLY SILVER AVERAGES.

	New York.	London
	cents.	pence.
1910	53.486	24.670
1911	53.304	24.592
1912	60.835	28.042

YEARLY COPPER AVERAGES.

	Electrolytic.	Lake.
1911	12,376	12,634
1912	16,341	16,560

SILVER PRICES.

	New York	London
	cents.	pence.
January 9	63 5/8	29 5/8
" 10	63 5/8	29 5/8
" 11	63 5/8	29 5/8
" 13	63 1/2	29 1/4
" 14	63 1/8	29 1/8
" 15	63 1/8	29 1/8
" 16	63 1/8	29 1/8
" 17	63	29
" 18	63	29
" 20	63 1/8	29 1/8
" 21	63	29

GENERAL MARKETS.

Coal, anthracite, \$5.50 to \$6.75.
Coal, bituminous, \$3.50 to \$4.50 for 1 1/4-inch lump.

Coke.

January 21.—Connellsville Coke (f.o.b. ovens).

Furance coke, prompt, \$4.00 per ton.

Foundry coke, \$4.25 to \$4.50 per ton.

January 21—Tin, Straits, 50.20 cents.

Copper, Prime Lake, 16.25 cents.

Electrolytic copper, 16.00 cents.

Copper wire, 18.00 to 18.25 cents.

Lead, 4.35 cents.

Spelter, 7.25 cents.

Sheet zinc (f.o.b. smelter), 9.00 cents.

Antimony, Cookson's, 9.60 to 9.70 cents.

Aluminium, 26.25 to 26.50 cents.

Nickel, 45.00 cents.

Platinum, ordinary, \$46.00 per ounce.

Platinum, hard, \$51.00 per ounce.

Bismuth, \$2.00 to \$2.25 per lb.

Quicksilver, \$40.00 per 75-lb. flask.