

THE CANADIAN MINING JOURNAL

VOL. XXXIII.

TORONTO, June 15, 1912.

No. 12

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 - - - - - Montreal, 425 Coristine 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

Editor

J. C. MURRAY. B.A., B.Sc.

Contributing Editor

H. MORTIMER-LAMB

THE CANADIAN MINING AND EXPLORATION COMPANY, LIMITED.

The complaint of the Canadian mining man has been that the financial potentates of this country have rarely or never taken an interest in legitimate mining. The attitude of our larger bankers has been either that of scoffing indifference or of discreditable interestedness. The history of some Cobalt flotations, for instance, would hardly bear repetition. But, we are thankful to say, the order of things has changed. We have now the pleasure of seeing a definite and positive recognition of the mining industry by men who control our financial destinies.

The Canadian Mining & Exploration Company, Limited, is a privately underwritten syndicate. All the stock has been subscribed. Nothing is solicited of the public. This, in itself, is out of the ordinary. But what is more than usually a departure from modern practice is that the new concern has nothing to sell. Its stock is fully subscribed, and its financial arrangements are completed.

The nominal capitalization of the new company is \$5,000,000, half of which amount is paid up. The funds thus secured are to be invested in sound securities. The interest accruing annually will amount to about \$125,000. This sum is to be spent in investigating and opening mining properties. The capital is not to be touched. In fact, the capital subscribed is to be looked upon as an endowment fund. Only the income that it yields is to be used for the company's ordinary purposes.

The directorate consists of ten prominent Canadian men of affairs and ten well-known Americans. Of the ten Canadians all, with the possible exception of Sir Edmund Walker, have had direct experience in mining organizations. The American directors are also men of exceptionally high standing. The names of Corey, Converse, Rockefeller, De Lamar, Monell, Thompson, and Chadbourne are familiar to most of our readers. We have been informed that the Canadian holdings are practically equivalent to the American. Thus, a decent balance of power is preserved.

The activities of the new organization will not be confined to mining alone. The company's charter is broad enough to cover all enterprises incidental to the development of mining, such as the utilization of water powers, the manufacture of mineral products, etc.

Mr. A. D. Miles, one of the best-known mining engineers in Ontario, is to be the company's representative in Toronto. Mr. Miles has for some years been closely identified with the International Nickel Company. The

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."

CONTENTS.

	Page
Editorials.	389
The Canadian Mining and Exploration Company, Ltd.	389
Canada's First Rescue Car.	390
Oil Versus Coal.	390
The World's Copper	390
Dominion Holidays.	391
The Prospector and the Mining Law.	392
Editorial Notes.	392
Personal and General.	393
The University of Toronto and the Mineral Industry, by H. E. T. Haultain.	394
The Murray Laboratory of Mining Engineering, Halifax, N.S., by F. H. Sexton.	400
New Canadian Patents, J. C. M.	402
Tin Mining in Nigeria, Our London Correspondent.	403
The Electrical Equipment of a South Wales Colliery.	405
The Ore and Coal-Bearing Formation of the Yukon.	407
Book Reviews.	408
Dominion Steel Corporation Annual Report.	409
Special Correspondence, etc.	413

New York representative will be Mr. William Wallace Mein, now directing mining operations at the Dome mine, Porecupine. Long experience in responsible positions in South African gold mines and in Alaska, has qualified Mr. Mein for the office of guide and advisor. To him will be referred the examination, appraisal, and development of prospects and mines.

Not only is the new company a visible token of the growing importance of mining, but it is also definite evidence of the fact that the Canadian prospector will henceforward have a satisfactory possible purchaser for his claims.

Such an organization has long been needed. The interests of the honest prospector, of the mining engineer, and of the promoter demand that they be not forced to appeal to the cupidity of the public. The power of the Canadian Mining & Exploration Company is almost unlimited. If wisely directed, and we have no reason to believe that it will be anything else, it will do much for mining in Canada.

It is pleasant to note, incidentally, that the president, Mr. Ambrose Monell, is taking no salary. While it is probable that Mr. Monell will still be able to pay for his meals, there is no doubt that his new duties will make large demands upon his time. The absence of salary indicates a wholesome sporting spirit.

The *Canadian Mining Journal* has no hesitation in extending its best wishes to the Canadian Mining & Exploration Company, Limited.

CANADA'S FIRST RESCUE CAR.

Our readers will learn from our Nova Scotian special correspondence that a rescue car has been equipped and placed in commission by the Nova Scotia Steel and Coal Company. The Dominion Coal Company was the first Canadian mining corporation to establish a rescue station. It does not, however, possess a rescue car. Thus the two large eastern companies are pioneers in this admirable work.

The new rescue car is most completely fitted with the latest appliances. Twelve Draeger apparatus, oxygen supplies, electric hand lamps, portable telephone and a full surgical outfit are placed in it. At a moment's notice the car, fully manned, will be given right of way on the company's tracks.

This is a provident and humane step on the part of the Nova Scotia Steel and Coal Company.

OIL VERSUS COAL.

Some fear has been expressed that the recent recommendation of the Railway Commission requiring the burning of oil as fuel in place of coal on locomotives in forested sections of the Pacific slope, will, if acted on, seriously affect the coal mining industries of Alberta and British Columbia. So far as we are able to judge, however, there is no grave cause for alarm on this score. The collieries that will be affected chiefly by

the change are those of the Crow's Nest Pass and of Vancouver Island. The markets, other than railway demands, are in each case expanding. This is particularly true as regards the coast, where the rapid growth of the cities has resulted in a marked increase of coal consumption both for domestic and manufacturing purposes. The difference in cost between coal and oil while unimportant in Southern British Columbia, is very considerable in the north; and on this account alone it is more than probable that the Grand Trunk Pacific, possibly the Canadian Northern, would have decided to burn oil on locomotives over the Pacific section of the lines. Thus coal delivered at Prince Rupert costs at present \$7.50 a ton, whereas oil is obtainable at less than a dollar per barrel of 42 gallons. Since four barrels of oil (of 17½ Beaumé gravity) are equal for steam purposes to one ton of the best grade of steam coal, the economy in the use of oil in the instance cited is, of course, apparent.

THE WORLD'S COPPER.

According to statistics compiled by Aaron Hirsh & Sohn, Canada ranked tenth in the list of copper producing countries during 1911, with 21,000 long tons to her credit. The United States produced 487,300 long tons last year, more than half of the world's total, and Japan came next with 55,000 long tons, Spain and Portugal together producing the same amount. Mexico was fourth with 54,040 long tons. Australia fifth with 44,600 tons, and Germany, Russia, Chili and Peru, sixth, seventh, eighth and ninth respectively. Japan is the only large producer whose record since 1902 with the exception of a very slight drop in 1907, has been one of uninterrupted progress. In 1902, her output was 28,600 long tons; in 1911, 55,000 long tons. The United States produced in 1911, 56 per cent. of the world's output; Japan, 6.3 per cent.; Spain and Portugal, as noted above, the same; Mexico, 6.2 per cent.; Australia, 5.1 per cent.; Germany, 3.5 per cent.; Chili, 3.4 per cent.; Peru, 3 per cent.; Russia practically the same; and Canada, 2.9 per cent. In the years 1903 and 1907, Canada's proportion was 3.3 per cent. Canada, it would seem, is hardly holding her own as a producer.

The chief European consumers of copper during 1911 were Germany, 234,985 long tons; England, 159,736 long tons; and France, 106,408 long tons. The total European consumption was 640,009 long tons. North America took 316,791 long tons; and South America about 3,000. The world's consumption was 986,300 long tons; Asia, Africa, and Australia taking only 26,500.

Figures for December 31st, 1911, show that England had 42,104 tons on hand; the United States, 39,937 tons; and France, 5,254 tons. At Rotterdam and Ham-

burg reserves to the amount of 13,400 tons were reported. These amounts, aggregating 100,695 tons, constituted the bulk of available copper on hand.

At present, visible stocks are decreasing in the United States on account of the large exports to Europe. The current prices for electrolytic and lake hover round 16.50 and 16.60, as against about 12.40 cents in June, 1911. These are most favourable symptoms. It is also significant that exceedingly few new copper enterprises are being started. This leads to the hope that over-production will not for some time be a factor in depressing the market.

DOMINION HOLIDAYS.

In comparison with the incidence of holidays in Britain and other parts of the Empire, the arrangement of the statutory holidays of the Dominion could not well be bettered. In Great Britain the people's holidays are, with one exception, relics of saint's days and holy days, and their occurrence is erratic, taking no note of the weather or the seasons. The great church feasts of Easter and Whitsuntide are notable holidays in Great Britain, but sometimes they occur at a time of the year quite unsuitable for outdoor holiday making. From Whitsuntide to Christmas there is but one holiday, namely the first Monday in every August, sometimes known as St. Lubbock's day, in memory of the scientist whose efforts created it. Canadian holidays, in comparison, are well arranged—Christmas, Victoria Day, Dominion Day, Thanksgiving Day, are all well recognized and suitable holidays. There seems to be considerable misunderstanding and ambiguity in the public mind with reference to the observance of June 3rd, the King's Birthday, and employers of labour object with justice to the observance of three holidays so close together as May 24th, June 3rd, and July 1st, at the busiest time of the whole year. Victoria Day, originally established in memory of the greatest Queen who ever sat upon the throne of the Empire, the first Queen-Empress, has become an established part of the life of Canada. It is to-day associated with Empire Day, with the imperial idea. By all means let its observance be perpetuated and strengthened, so that round it may grow all the associations so dear to the Briton, be he from the homeland or from over the seas. But the attempt to make a regular public holiday of the King's birthday is a mistake, and will result in blurring the great memories bound up with Victoria Day, and but a half-hearted observance of the King's Birthday, which in the natural course of mortal events, will some other day yield place to the natal day of another King. In Great Britain, the observance of the King's Birthday, means merely the closing of the Law Courts, the trooping of the colours, and other purely formal observances connected with the King's position as the head of the Army and

Navy, and the embodiment of the supreme power of the realm. It would be a thousand pities to disturb the present most admirable arrangement of Canadian holidays—May 24th, the feast of our Imperial associations, July 1st, the natal feast of our national entity, and Thanksgiving Day, the very name of which signifies its own intent.

THE PROSPECTOR AND THE MINING LAW.

This is to be no dissertation upon a threadbare subject. Our intention is only to give expression to our wrathful surprise at an article published in *The Mining and Scientific Press*, May 18. Phenomenally misinformed as is the writer, Mr. T. F. F. Van Wagenen, it is still more a matter of astonishment that our admirable contemporary should give tacit assent to his statements.

In pleading for the retention of the outworn apex law, with its mischievous extralateral rights, Mr. Van Wagenen is responsible for the following: "In the Western United States and in Alaska, where the American law applies, there are thousands of prospectors in the field continuously. . . . But when the international boundaries are reached in either direction, where the American law gives place to that of Mexican or Canadian, they stop, as if at a dead line." After asserting that in five years he met not one prospector in Mexico, the writer continues. "British America may be searched from Labrador to the Pacific with little better results. There was a time when the province of British Columbia had an apex law, and while it was in force the rugged region hummed with explorers. When it was repealed they faded away like snow before a chinook."

Just how large a sprinkling of explorers and prospectors it takes to create a hum in a rugged region it is not for us to say. But to anyone who has even a superficial acquaintance with Canadian mining affairs it is apparent, beyond argument, that prospecting was never so vigorously carried on as at the present time. Northern Ontario is being traversed by the pioneer prospector as never before. Witness, for instance, the recent rush to Whisky Lake. Witness also widening circles of territory being examined in the regions centering in Porcupine and Larder Lake. And, as clearly controverting Mr. Van Wagenen's sweeping statements, consider the fact that some nine or ten parties have this spring started for Hudson Bay and one for Baffin's Land. The northern and eastern portions of Quebec are being more actively prospected than at any other time in our history. Prospecting parties in search of coal are numerous in Northern Alberta. In British Columbia, although there is no rush, the search for mineral deposits goes on merrily.

The prospector may have stopped humming, but he is still with us. In fact, prospecting is one of the salient

features of life in Canada. How Mr. Van Wagenen could arrive at his conclusions baffles our comprehension. He has evidently been carried away by his own desire to prove his case and has missed the whole philosophy of mining rushes. It would be interesting, by the way, for Mr. Van Wagenen to enquire of British Columbia prospectors whether they do or do not wish the apex law put in force in that province. He might at the same time take occasion to get a little first-hand information of this not insubstantial, but much misunderstood, Canada. Meanwhile, by all that is right and desirable, we adjure Mr. T. F. Van Wagenen to leave us alone.

EDITORIAL NOTES.

An editorial ambiguity in our issue of June 1st gives the impression that the International Geological Congress is to meet in Toronto in August of this year. This is, of course, not the case. August, 1913, is the month of meeting.

From the Pan-American Union headquarters at Washington we have received a copy of the mining laws of the Republic of Colombia. The translation is credited to Mr. Phanon J. Eder, a New York barrister. This translation is the first done in twenty years. We notice that the prospector is given a very free hand, and that in the main the laws are liberal.

More good Canadian money going to Mexico. A Canadian syndicate, of which Mr. W. D. Ross, general manager of the Metropolitan Bank, and Mr. Strachan Johnson are members, is reported to have arranged for the purchase of two gold mines in Northern Mexico. The mines in question are the San Patricio and the Santa Ana y Anexas, both in the State of Parral.

The annual report of the Tilt Cove Copper Company, a British undertaking operating in Newfoundland, has just been issued. The gross profit during 1911 is shown to have been £23,381 13s. 3d., and the net profit £15,072 0s. 2d. Half of this amount is retained by the Cape Copper Company working the mines under agreement. The Tilt Cove Copper Company paid an interim dividend of sixpence a share last December, and a final dividend of 9d. per share is now to be distributed. The total distribution to shareholders during the year is thus equal to 3½ per cent., which can only be regarded as a very moderate return on the year's operations.

A gold mining district in British Columbia that has never been given a fair opportunity is that of Bridge River. It is true that for a time prospecting in this field was reasonably active, and much territory was "blanketed"; but in no instance was development systematically and persistently undertaken. There was reason enough for this, in that the quartz veins or

masses, although frequently large, carried low value, probably not averaging \$5.00 a ton, and there was no inexpensive way of taking in supplies or machinery. It is likely, however, that railway extensions will make the Bridge River readily accessible in the near future, in which event some of the quartz veins in the district would be well worth further attention.

The Audit Act permits the Government to remit duties when such action is deemed to be in the public interest. In consequence of representations from contractors and others in the West that Canadian cement manufacturers were unable to supply present urgent market requirements. The Hon. the Minister of Finance, to relieve the situation, has provided for the remission of half the duties for a prescribed period. It is questioned in some quarters whether this provision will be particularly effective; but, in any case, the situation is not likely to continue. Cement is now being consigned to the West in large quantities and it will not be long before the conditions will be again normal. Meanwhile there is no better indication of the rapid industrial development taking place in Western Canada than the increased demand for cement, the consumption of which has more than doubled in four years.

The discovery has been made in Ottawa that the present system of collecting and publishing Canadian trade statistics is not as perfect as it might be. In other words, it is as bad as it could be. Since there has been no attempt at co-operation between the Dominion and Provincial authorities, and since in each case the method of compiling and presenting such returns is different, the enquirer endeavouring to reconcile the apparently divergent results, either is driven to desperation, or recognizes in time the hopelessness of the task. It is announced that the Trade and Commerce Department has appointed a Commission, with a view to correcting this needlessly foolish state of affairs. The Provinces are to be asked to co-operate and doubtless will do so. The opportunity is favourable to bring about a much needed reform to provide for uniformity of methods and results in respect of mining statistics, and we would direct the attention of the Federal Department of Mines to the desirability of following the example of the Trade and Commerce Department in inviting the Provinces' co-operation towards the attainment of this purpose. Now, moreover, that the annual mineral production of the Dominion exceeds a valuation of a hundred million dollars, it is surely time that provision were made for the publication of statistical returns at more frequent intervals. With the co-operation of the Provinces (which, however, is essential), the Federal Department should experience no difficulty in issuing quarterly returns. Such action would be of real advantage to the industry.

PERSONAL AND GENERAL

Mr. J. McEvoy left Toronto on May 30 for Alberta and British Columbia, where he will be engaged during the summer in professional work.

Mr. W. E. H. Carter, of the firm of Carter & Smith, has returned to Toronto from a visit to the Montreal River and Gowganda mining divisions, where he examined several properties.

Mr. A. B. Willmott, consulting mining engineer, Lumsden Building, Toronto, who is operating at Killarney, Ont., spent several days in Toronto in the first week of June.

Mr. Fred Connell, mining engineer, Royal Bank Building, Toronto, has returned from a visit to the Thunder Bay silver district.

Mr. Eugene Coste's permanent address is now 128 Seventh Street, Calgary, Alberta.

Mr. R. T. Bayliss, managing director of the British South African Company's Mines Development Company, and chairman of El Oro Mining Company, Mexico, is returning to England after a protracted journey in Rhodesia and the Congo.

Mr. H. G. Young, formerly manager of the Hudson Bay Mines, Ltd., has settled in Toronto. His address is 13 Russell Street.

Mr. William Frecheville, A.R.S.M., F.G.S., past-president of the Institution of Mining and Metallurgy, has been appointed Professor of Mining at the Royal School of Mines, London, England. Mr. Frecheville was born in Dartmouth, Nova Scotia. In the course of a most successful career he has visited nearly every important mining region in the world. For some years he has been a director of the Anglo-French Exploration Company. It may be mentioned that Mr. W. A. Carlyle, present Professor of Metallurgy in the same institution, was also born in Canada. Mr. Carlyle, it will be remembered, graduated from McGill in 1891, in 1895 organized the B. C. Development Mines, in 1898 became manager of Le Roi, in 1899 took over the management of the Rio Tinto, Spain, and in 1907 accepted his present position. Both gentlemen are well known in Canada.

Hon. Richard McBride, Premier and Minister of Mines for British Columbia, has returned to that province from a visit to England.

Mr. Wm. Graham McMynn, for years gold commissioner at Greenwood, Boundary district of British Columbia, has been transferred to Golden, Northeast Kootenay.

Mr. I. P. Merrill, president of the Hedley Gold Mining Company, lately paid one of his periodical visits to the company's mine and 40-stamp mill in Camp Hedley, B.C.

Mr. F. C. Greene, general manager of the Graham Island (B.C.) Coal and Timber Syndicate, Ltd., was in Seattle, Washington, from Queen Charlotte Islands, last month.

Mr. Howard W. Dubois, of Philadelphia, managing director of the Quesnelle Hydraulic Gold Mining Company, late in May left Vancouver, B.C., for Prince Rupert and Hazelton, intending to go thence along the Grand Trunk Pacific Railway route to Fort George, and from there south to his company's hydraulic mine in Quesnel mining division, Cariboo district.

Mr. J. M. Ruffner, of Cincinnati, manager of the North Columbia Gold Mining Company, returned to Atlin, B.C., a short time ago, and has since commenced

the season's hydraulicking operations on Pine Creek, Atlin, in which mining division his company has for years been placer mining extensively and with considerable success.

Mr. Charles Camsell, of the Geological Survey of Canada, went from Ottawa to British Columbia last month. In common with those of other members of the Survey field geological staff, Mr. Camsell's duties this year include making preparations to supply information to the International Geological Congress, that is to meet in Toronto next year, and afterwards to visit various parts of the Dominion.

Mr. R. G. McConnell, one of the senior geologists of the Geological Survey of Canada, who last year did field work in Portland Canal and Observatory. Inlet districts, British Columbia, is expected to this season investigate the geology of the Rainy Hollow district, in the northwestern part of Atlin mining division, B.C., where deposits of copper-silver ore are being opened preparatory to production.

Mons. Perrier de l'Abathie, of Paris, France, whom the Nelson Daily News has announced as managing director of the company operating the Blue Bell lead mine, on Kootenay Lake, British Columbia, has been visiting that property, which is again being worked under the direction of Mr. S. S. Fowler, the company's general manager. The Blue Bell is the oldest mine in British Columbia, its outcrop of lead ore having been discovered in 1825 by David Douglas, a Scottish botanist, who was investigating the flora of the Kootenay country. In connection with the mine there is a 200-ton concentrating mill, which was erected and equipped several years ago.

Mr. J. Dix Fraser, general manager of the Atikokan Iron Company, Port Arthur, Ont., has returned from a visit to Europe.

Mr. Lewis Stockett, formerly in charge of the Hosmer Collieries, B.C., is now acting as general superintendent of the Coal Mining Branch, Department of Natural Resources of the Canadian Pacific Railway, with headquarters at Calgary.

Mr. A. J. Beaudette, mining engineer of the Grand Trunk Pacific Railway, was in Montreal last week to confer with Mr. Chamberlain, who recently succeeded Mr. Hayes in the presidency of the Grand Trunk systems. Mr. Beaudette expects to spend the summer months in British Columbia.

It is satisfactory to learn that Mr. Eugene Coste, president and managing director of the Canadian Western Natural Gas, Light, Heat & Power Company, of Calgary, who suffered from ill-health in the spring, is now practically recovered.

Dr. W. A. Parks, of Toronto University, Toronto, has gone to St. John's, Que., to study and report on the building and ornamental stones in the surrounding districts. Dr. Parks has been retained by the Mines Department of the Dominion to prepare a monograph of the subject of the building and ornamental stones of Canada and has already completed his investigations of these resources in Ontario, in portions of Quebec and the Maritime Provinces.

Mr. Howland Bancroft, well known to many of our readers in the West, has resigned from the United States Geological Survey in order to engage in private practice as a consulting mining geologist. His present address is Suite 730 Symes Building, Denver, Colorado. Mr. Bancroft is a member of the Canadian Mining In-

stitute and has attended several of the meetings of the Western Branch.

Mr. Leland D. Adams, manager of the East Canada Smelting Company's McDonald mine at Weedon, Que., has returned from a business visit to the United States. The company is now installing a new power plant, a tramway and a sampling mill.

Mr. John E. Hardman has returned to Montreal from a visit to the lead mine on Calumet Island, Que.

Dr. J. Bonsall Porter, of McGill University, Montreal, sailed for England on June 13th by the S. S. Corsica. Dr. Peterson, the principal and Dr. Porter will represent McGill University at the Universities Congress, the first meeting of which will be held in Edinburgh on July 1st.

Lt.-Col. J. J. Penhale (liquidator of the Ling Asbestos Co.), of Sherbrooke, Que., is in command of the Seventh Brigade of the Sherbrooke unit, which has been ordered to Petewawa for the annual summer military training.

Prof. E. Dulieux, of L'Ecole Polytechnique, Montreal, has returned from a visit to Gowganda and Porcupine, and leaves on June 15th to continue his investigations of the iron deposits of Quebec for the Provincial Government.

Mr. J. Read, superintendent, and Mr. Fritz Cirkel, consulting engineer, of the Champs d'Or Rigaud Vaudreuil, engaged in hydraulic mining in Beauce County, Quebec, have resigned.

Mr. H. P. Gordon, an experienced Californian hydraulic engineer, has been appointed superintendent of the Champs d'Or mines in the Seigniorie Rigaud Vaudreuil, Beauce County, Quebec.

Mr. Charles Fergie left on June 13th on a visit of inspection of the Pacific Pass, Western Coal, and Lethbridge collieries, of which he is consulting engineer.

Mr. A. G. Bridger, of the Drummond Mines, Ltd., Cobalt, intends spending the summer in Europe. His address for the next few months will be 7 Hathaway Road, Croydon, Surrey, England.

THE UNIVERSITY OF TORONTO AND THE MINERAL INDUSTRY

By H. E. T. Haultain.*

Part I.

The Province of Upper Canada was founded under the Constitutional Act of 1791. During the preceding seven or eight years a United Empire Loyalist population had been settling on the banks of the St. Lawrence, on the shores of the Bay of Quinte, in the Niagara Peninsula and on the shores of Lake Erie, and the population of the Province at this time numbered about sixty-five thousand.

Seven years later, in 1798, a committee of the Executive Council, of the judges, and of the law officers of the Crown, recommended that five hundred thousand acres of land should be devoted to educational purposes, of which one-half should be reserved for the University, and that the University should be located at York.

In 1826 the Rev. John Strachan, M.A., Archdeacon of York, was commissioned to visit England and returned with a royal charter founding a university. The charter was dated the 15th of March, 1827, and, on the 3rd of January, 1828, the new lands for endowment already selected were conveyed by letters patent to the Corporation of King's College thus created. Shortly afterwards, the Council of the College purchased at one hundred dollars per acre, one hundred and sixty-eight acres of beautiful park lands, on which have subsequently been built both the Parliament and University buildings.

King's College was opened in 1843 with these seven professorships: (1) Classical Literature, Belles-lettres and Logic; (2) Divinity, Metaphysics and Ethics; (3) Experimental Philosophy and Chemistry; (4) Mathematics and Natural Philosophy; (5) Anatomy and Physiology; (6) Law; (7) Surgery. The salaries of the professors in Classics and Divinity were £500, and of the other Arts professors, £450.

A statute of 1844 provided for the establishment, as soon as funds should be available, of chairs in (1) Hebrew and Oriental Languages; (2) Political Economy; (3) Medical Jurisprudence; (4) Music; (5) History,

Geography and Antiquities; (6) Geology and Mineralogy; (7) Civil Engineering; (8) Architecture; (9) Painting; (10) Agriculture.

Little progress, however, was made in these appointments for want of sufficient funds, and much trouble seems to have been caused by disputes over religious matters. The Anglicans, Methodists and Presbyterians were active fighters. We are told that Bishop Strachan and his friends attacked the University as a "godless institution."

In 1850 King's College became the University of Toronto and again a special committee recommended the appointment of professors in Civil Engineering and in Geology, as well as in Agriculture and other subjects.

In 1853 the chairs of Natural Philosophy and Natural History were founded and John Tyndall was an unsuccessful applicant for the first and Thomas Huxley for the second.

In 1856 Professor E. J. Chapman was appointed Professor of Mineralogy and Geology, a position he held for forty-two years, retiring in 1898.

In 1858 the crowning stone of the beautiful Main Building was laid by the Governor, Sir Edmund Walker Head. The original plans for this building were curtailed for want of money, and, notwithstanding, the cost considerably exceeded the appropriation. This seeming extravagance in building was, as most friends of the institution now think, justified by the result. The Hon. Edward Blake, addressing, as Chancellor, the annual convocation in 1884, said, "We sometimes hear murmurs as to the wisdom of their erection, but those who know as I do—though I was but a young man at the time—all the circumstances of the University when that policy was adopted, know that these buildings were in a marked sense the sheet anchor of the institution in the storms which at one time threatened to subvert it." The new buildings were opened for academic purposes in 1859, and from this point dates an era of greater prosperity for the University; but it

*Professor of Mining Engineering in the University of Toronto.

was not until nearly twenty-years later that a further step was made towards the benefit of the mineral industry. The statute of 1844 provided for the establishment of a chair in Civil Engineering, but it was thirty-four years before this was carried out.*

In the Session of 1877 the Legislative Assembly, by Resolution, sanctioned the proposals for the permanent establishment of the School of Practical Science of the Province of Ontario. These proposals were in effect that the Government should utilize the teaching power of University College, which already existed for the like objects in four departments, and could be made applicable to the wants of this Science School; and in addition thereto should appoint a Professor of Engineering and such assistants in the several departments as might be required in supplementing the work of the College Professors.

†“The position which it is intended the School of Practical Science shall satisfactorily occupy in the Educational System may be indicated as follows:—

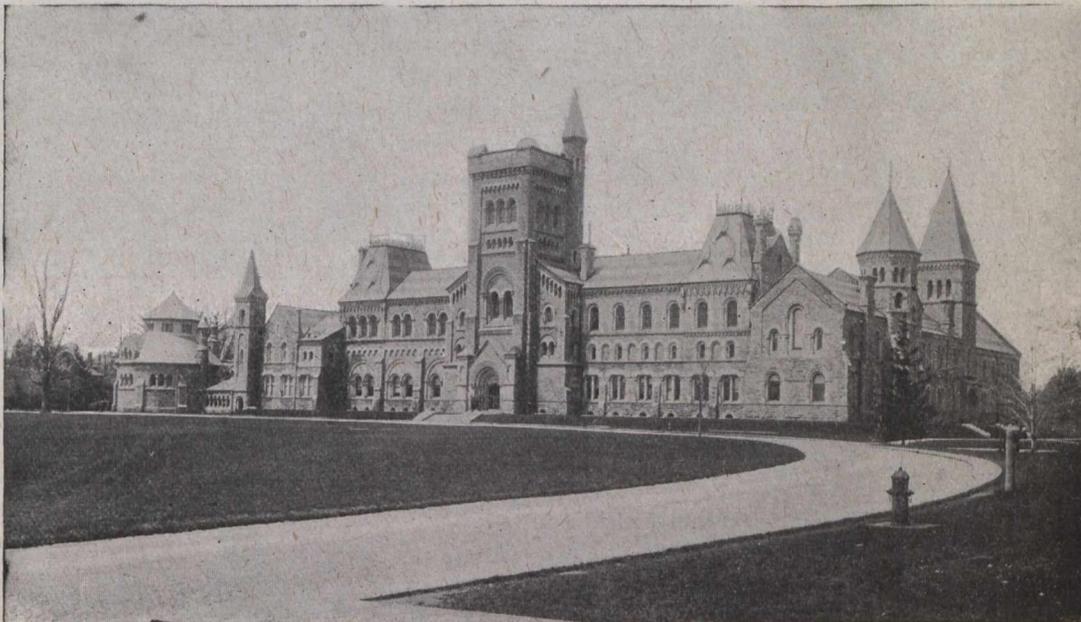
as well as the ability to report accurately on the composition and value of economic minerals generally.

The importance of the study of Chemistry is now fully recognized, and in Canada, through the Public Analysts and otherwise, protection is being secured to consumers, while the producers are necessarily brought to recognize its importance. The course in Chemistry will be such as to fit the student for the position of Public Analyst or of Consulting or Resident Chemist.

Secondly.—It is proposed to furnish preliminary scientific training for students entering the professions of Surveying and Medicine. The certificate to be granted in Surveying will be attainable by one year's study, and it is intended that this should entitle its possessor to appear one year earlier for his examination as Provincial Land Surveyor.”

The School so constituted was opened on October 1st, 1878, with the following staff:—

H. H. Croft, D.C.L., Professor of Chemistry and Chairman of the Board.



The Main Building, University of Toronto

Firstly.—Students who have passed through the regular courses of the School will be enabled to prosecute professionally, (1) Engineering; (2) Assaying and Mining Geology; or (3) Analytical and Applied Chemistry.

With this view the Diploma admitting to the standing of “Associate of the School” will be granted in each of these branches after due examination.

In Engineering it is intended that the instruction shall afford a thoroughly scientific basis for operations in the field. In the absence of a machine shop and of facilities for visits to mines during session, visits to workshops and excursions during the long vacation will be taken advantage of. The establishment of a Diploma for special qualifications in Assaying and Mining Geology, apart from the knowledge of these subjects incidental to the course in Mining Engineering is sufficiently called for by the necessity which exists for the development of the mineral wealth of the Province. Students who pass through the course necessary to obtain this diploma will have acquired the knowledge requisite for inspecting and surveying mineral lands,

E. J. Chapman, Ph.D., LL.D., Professor of Mineralogy and Geology

James Loudon, M.A., Professor of Mathematics and Natural Philosophy.

R. Ramsay Wright, M.A., Professor of Biology and Secretary of the Board.

J. Galbraith, M.A., Professor of Engineering.

W. H. Ellis, M.A., M.B., Assistant to the Professor of Chemistry.

The first four were professors in University College.

It will be seen from this that from the very start the “School,” as it was then known, was prepared to do much for the mineral industry. Not only was Engineering to include Mining Engineering, but there was a special course in Assaying and Mining Geology with a diploma attached equal in dignity to the diploma in Engineering. The Professor of Mineralogy and Geology was a remarkable and interesting man, a skilful fencer and a poet, as well as a scholar and teacher. He was educated mainly in France and partly in Germany, enlisted in the French Army, and served an actual campaign in Algiers. He was also Professor of Mineralogy

*Most of this has been taken from “The University of Toronto and its Colleges, 1827-1906.”—Edited by W. J. Alexander, Published by the Librarian, 1906.

†From the Prospectus of the School of Practical Science of the Province of Ontario, First Session, 1878-1879.



The Chemical and Mining Building



Main Engineering Building, The Old S.P.S.

in University College, London, before coming to Toronto. He was a voluminous writer on Canadian Geology, on Assaying, and on Blowpipe Analysis. This course in Assaying and Mining Geology remained in force until the session of 1892-93, when it was replaced by the department of Mining Engineering; but I can find no record of any student having earned a diploma in this course.

The course in Analytical and Applied Chemistry appeared to be unpopular, as the records show that no diploma was issued in this course until 1890, by which time seventy-nine diplomas had been granted in the course in Engineering.

This course in Engineering would appear to be the most remarkable development in the history of the University, remarkable alike in the rapidity of its growth and in the consistency of its development. The central figure, in fact an isolated figure, in this development, is that of the Professor of Engineering, afterwards Principal of the School and later when it was absorbed into the University, Dean of the Faculty of Applied Science and Engineering. It is probable that no other large department of any University in Canada has grown with such rapidity, nor has any other department of the University of Toronto with a live activity, departed less from the general direction laid down for its growth in its early stages. That the growth is so strong and so persistent is evidence of the closeness of the course to the needs of the country. This general engineering course is the backbone of the work that the University is doing for the mineral industry and will continue to be so.

John Galbraith graduated in Arts in the University of Toronto in 1868, winning, in his course, the Prince of Wales' Prize for General Proficiency, and the Gold Medal in Mathematics, besides other prizes. The following years were spent in a variety of engineering work in both the mechanical and civil branches.

He was appointed Professor of Engineering in 1878. For the first few years of the School's existence he did all the Engineering teaching, including drawing and surveying.

W. H. Ellis, M.A., M.B., who had been associated with the School from the start, was appointed Professor of Applied Chemistry in 1882. In 1889 L. B. Stewart, Ph.S., D.T.S., joined the staff as Lecturer in Surveying and the following year two of the School's own graduates returned, C. H. C. Wright as Lecturer in Architecture, and T. R. Rosebrugh as Demonstrator in the Engineering Laboratory.

In this year the School was affiliated to the University, the Professor of Engineering was appointed Principal and the management of the School was transferred to a Council, consisting of the teaching faculty of the School and not including the Arts professors who continued, nevertheless, to give instruction in their respective subjects to the School students. From this time on there was a steady growth in the staff until the present. There are now twenty-eight professors, associate professors and lecturers in the Faculty of Applied Science alone, besides a large number of demonstrators and fellows. This is in addition to the Arts professors in Mathematics and several other subjects who still teach the Engineering students.

The first prospectus of the School does not contain the name of the Professor of Engineering; he was appointed after its issue, but in time for the first session. The first syllabus of the course in Engineering is very different from the one drawn up after his appointment. The syllabus of the second prospectus remains to the

present the main framework of the department of Civil Engineering. It has grown, it grew continuously, it has been elaborated and to some extent modified, but the main lines have remained. The course to-day resembles the course of 1880 as the mature oak does the sapling. The latest change in the course, by some considered a radical departure, the addition of four lecture courses on business and finance is simply the blossoming of a bud that was shown to me many years ago and was probably a suppressed feature of a much earlier stage.

The main features of the course are, a groundwork of pure mathematics, a broad training in principles, followed by illustrations of the applications of the principles. The practice of Engineering is left to be learnt in the field. The exception to this is in surveying and draughting and chemistry, where the student is given sufficient of the practice to make him a useful man in these subjects immediately on graduating. Engineering is so wide and the time of the academic period so limited that very much that would be desired must be left out of the course. Everything has been made subservient to the idea of the application of principles. Mathematics is for the preparatory mental training. The heavy course in principles keeps their application always in view. To this is added facts, methods and processes sufficient for the course in the application of principles. As the time is so short only the application of main principles can be illustrated. The whole is designed to enable and cause the boy to go on after graduation with the training which has only been commenced in the University. "We do not make Engineers" has been the oft re-iterated statement for thirty years of the Professor of Engineering; "We prepare them to become Engineers."

Laboratories have been added, but not workshops, laboratories for the illustration and examination of principles. Only draughting, surveying, assaying and chemical analysis have their equivalent of shop work, but in each of these the elucidation of principles takes precedence over the practice. There has been a splendid and careful development of laboratories in every direction, of which the accompanying photos will convey some idea.

The duration of the course was three years and in each year there were twenty-five weeks of actual teaching time, the summers were to be spent at work in the field. Examinations were held at the end of each session and the diploma of the School was granted on the satisfactory completion of the course.

After a graduate had spent three years in the actual practice of his profession, two years of which must have been on the construction and operation of engineering works as distinct from surveys merely, he could become a candidate for the degree of C.E. of the University, which was granted after the candidate submitted a satisfactory essay with drawings and estimates. This regulation was afterwards enlarged to include the degrees of M.E. (Mechanical Engineer), M. E. (Mining Engineer), and E.E. (Electrical Engineer). These degrees have not been popular with the graduates, the trouble being that anybody can put these letters after his name, with the result that it is generally the imposter who does so. But the intention of the University is well worthy of notice.

A degree that called for three years of actual work in the field is something very unusual and it is a great pity that circumstances should have belittled the use of these letters.

In 1892 an optional fourth year was added to the three years' course, and on the satisfactory completion of this year the degree of Bachelor of Applied Science (B.A. Sc.) was granted to the candidate by the University.



Dean Galbraith

Some of the regulations governing the granting of this degree were as follows:

3. Each candidate shall prepare a thesis based on the results of his Fourth Year work in the said School of Practical Science for the approval of the University Examiners. This thesis is to be accompanied by all necessary drawings, specifications, tables and estimates.

4. Candidates will be required to select two subdivisions in any one of the following groups, and to pass such written and oral examinations on the sub-

jects selected as may be prescribed by the University examiners.

- A.—Astronomy.
Geodesy and Metrology.
- B.—Architecture.
Strength and Elasticity of Materials.
Hydraulics.
Thermodynamics and Theory of Heat Engines.
Electricity and Magnetism.
- C.—Industrial Chemistry.
Sanitary and Forensic Chemistry.
Inorganic and Organic Chemistry.
- D.—Mineralogy and Geology.
Metallurgy and Assaying.

As the laboratories in all departments have grown the work of this fourth year became largely laboratory work. The students had the opportunity to specialize along their own lines and it was a very satisfactory arrangement.

The three year course for the diploma has now been done away with and students commencing during the past three years have entered on a four-year course leading to the degree of B.A. Sc. This has permitted a re-arrangement of the curriculum and somewhat reduced the freedom of the fourth-year. This was necessary as the work of the first three years had become much overcrowded.

It is hoped that before long an optional fifth year leading to a higher degree will be added.

In 1880 the diploma of the School was granted in "Engineering" and the studies could be pursued along three optional lines, Civil, Mechanical and Mining. In the session of 1890-91 this was sub-divided into (1) Civil Engineering (including Mining Engineering), and (2) Mechanical Engineering (including Electrical Engineering). The following year Architecture was added. In 1892-93 Mining Engineering became a separate course and Civil Engineering "included" Sanitary Engineering.

At the present time the separate courses stand as follows:—

1. Civil Engineering.
2. Mining Engineering.
3. Mechanical Engineering.
4. Architecture.
5. Analytical and Applied Chemistry.
6. Chemical Engineering.
7. Electrical Engineering.
8. Metallurgical Engineering.

In 1880 the fees for the course paid by the student amounted to \$160. This has been raised from time to time until it now amounts to \$450. The standard of scholarship required for entrance has also been steadily raised. Despite these facts the growth in attendance has been rapid and steady.

The Government Blue-book covering the work of the University for the year ending 30th June, 1911, shows 779 students in the Faculty of Applied Science and Engineering, of whom 99 were in the department of Mining Engineering.

The distribution of the students in the different subdivisions of the University was as follows:

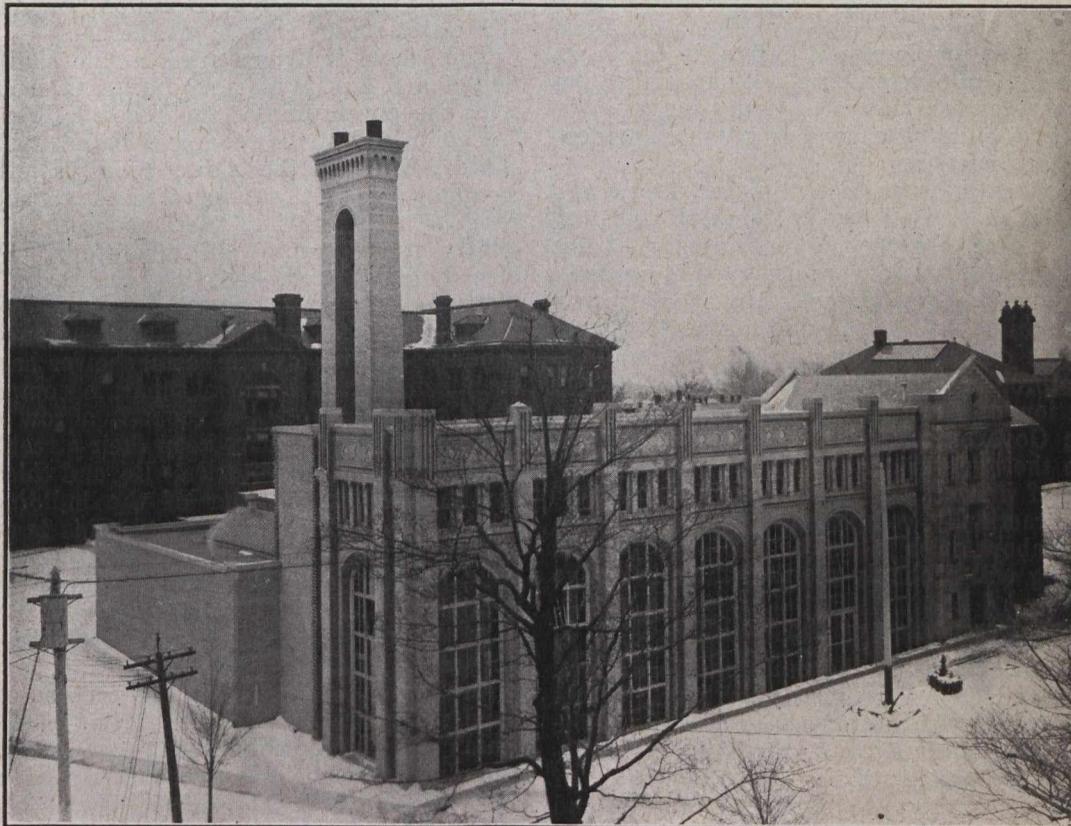
University College—Arts	1086
Victoria College—Arts	516
Trinity College—Arts	140
St. Michael's College—Arts	46
Medicine	567
Applied Science and Engineering	779
Household Science	101

Education.....	262
Forestry.....	46
University of Toronto—Candidates for Ph.D., M.A., Dentals, Vets., etc.....	576
Total.....	4112

Of this large number 1,018 were women and 3,094 were men. As there were 311 women students in University College there were more men students in the Faculty of Applied Science and Engineering than in any other subdivision of the University, though the combined group of Arts students in the various colleges would, of course, outnumber them.

same time, ceasing to develop its agriculture. The Agricultural College at Guelph is a splendid evidence of the good hope that lies before our farming population. For the other side of our life we also need leaders—in opening up new country by railways, in constructing large works, in developing mines. For producing men who will direct these activities there is the Faculty of Applied Science, formerly known as the School of Practical Science.

“A distinction must be kept clearly in mind. The aim of the Faculty of Applied Science is not to be confounded, as is sometimes done, with the work of technical education. The latter consists on the one hand of



The Thermo-Dynamics Building

President Falconer in an article contributed to the “University Monthly” in 1909, said: “Unless all omens fail the Faculty of Applied Science will soon become the second in size in the University and may creep up upon the Faculty of Arts though Arts has such a lead that it will probably hold the first place for many years. During the last two years, not including the present, the ratio of increase in the Faculty of Applied Science has been thirty-two per cent., a larger proportionate increase than in any other Faculty.

“This Faculty has developed healthfully and in conformity with the demands of the country. Ontario has become a great manufacturing province without, at the

giving artisans and the youth in school instruction in the scientific principles that underlie the various trades in which they may be engaged, and on the other hand of instruction in the principles and technique of the actual trades. Technical education is meant for the man who whether as foreman or skilled workman is engaged in some trade.

* * * * *

“In the Faculty of Applied Science, however, students are being trained, who will become the directors of the works in which the technically trained men will be employed.”

(To be continued.)

THE MURRAY LABORATORY OF MINING ENGINEERING, HALIFAX, NOVA SCOTIA

By F. H. Sexton.*

The most important construction work in connection with the Technical College during the past year, has been the building and equipping of the Murray Laboratory of Mining Engineering and Metallurgy, for the use of the mining engineering students of the college. It has been planned with the view of testing, in commercial quantities, any of the ores or coals of the province, with a view of establishing successful commercial treatments of the same.

The laboratory is situated in the rear of the main college building on Spring Garden Road and is constructed of concrete, plain brick, with steel frame and steel roof trusses.

The building is of simple classic design, in full keeping with the main college building. What timber has been used in the construction is of heavy design, thus making the whole building a good example of modern slow burning construction.

Most of the work in connection with the design and equipment has been carried out by the staff and students of the mining engineering department of the college. The steel roof trusses were designed by students of the civil engineering department. Mr. W. M. Brown designed the architectural details and has acted as consulting architect during the erection of the building. Prof. E. A. Holbrook of the college staff has had charge of the inspection of the building during erection on behalf of the Government. F. A. Ronnan & Co., of Halifax, were the general contractors.

At the time of writing, the walls and covering of the building are practically completed, most of the machinery in the laboratories is here or has been ordered, and early spring will probably see the whole in active use.

General Description of the Building.

The general dimensions of the building are 87 feet, east and west, and 89 feet 6 inches north and south, being almost square, with no projections or ell. The main part of the building is one storey high, approaching modern factory construction. The north half of the building is of two storeys and will be finished and divided into various rooms as needed in the work. Owing to the slope of the ground on which the building was erected, it was possible to have the floor in the north half of the building, 9 feet 6 inches higher than the floor in the south half. This will prove of great advantage in the handling of materials and in allowing the heavy crushing machinery to be placed close to the floor line, rather than high in the air, as unfortunately is the case in many college metallurgical laboratories. This difference in elevation also allows the passage of the coal or ore from one machine to another by gravity alone without the necessity of rehandling the material.

Rooms and Equipment.

The main entrance is in the north end, opening into a small hall, to the left of which is a supply room, 7 feet by 19 feet, equipped with ample shelf room, and intended to contain all spare parts and supplies needed in the laboratory. From this hall a flight of cement stairs leads to a large room in the basement, 16 feet by 30 feet, and intended for a general carpenter's workshop for the college as a whole. At the right of the

hall is a dust-proof grinding room, 19 feet by 22 feet. In this room is placed all the fine grinding machinery necessary to sample and reduce coal and ores to a suitable size and quantity as needed for assay or analysis. In the centre of the room is a large block of concrete, 10 feet by 10 feet, intended for a sampling floor. At the south end of the room is placed the following machinery:—

- 1 Braun Chipmunk Crusher.
- 1 Braun Disc Pulverizer.
- 1 Rotary hand grinder.
- 1 Allis-Chalmers type B sample grinder.
- 1 Gates rotary sample crusher.

The whole is driven from a line shaft to which is belted a 5 h.p. Westinghouse A. C. motor connected with the power line of the Electric Tramway Co. In the north end of the room are placed two iron bucking plates; while on the sides, room is left for various samplers and a closet for screens, brushes, etc. This room is a full unit in itself and can be run independently of the rest of the laboratory. From the hall already mentioned, one passes upstairs into another small hall. At the left of this upper hall is a small lavatory, 14 feet by 9 feet. It has a concrete floor and is equipped with a wash basin, shower bath, and closet, each being enclosed in a separate compartment with slate sides. Across the room is a row of lockers in which the students may keep their street clothes while working in the laboratories. Beyond this lavatory and in the northwest corner of the building is a small laboratory, 19 feet by 12 feet. This is at present not equipped, but will contain apparatus for testing coal mine gases, a sink and float machine for testing the availability of coal for washing, etc., etc.

At the left of the upper hall is a large space, 52 feet long and 19 feet wide. This will be finished into several rooms as needed. The present intention is to have the Professor's office at the east end, next to which will be a combined map-room, catalogue library, and drafting-room. Between this room and the hall, space is left for a class-room. Thus students at work in the laboratory below will be able to have their lectures and class-room work without going out of the building, and in the lavatory will also be able to wash and change their clothes before going to the regular college work in the other buildings. This completes the finished parts of the building. The rest is left with rough, unfinished walls, approaching, as has been before stated, the factory or mill type of construction.

In the main part of the laboratory in the northeast end of the building is a long, low room, 50 feet by 19 feet. Teams may drive through the doors into this part of the building, thus facilitating the unloading and storing of commercial quantities of ores and coal which the laboratory will handle. To the south of this is a long, open space, where the heavy crushers will be placed. Beyond this again, to the south, is a long concrete wall, extending the entire length of the building and giving a drop of 9 feet 6 inches into the south half of the laboratory.

The eastern end of this large south half of the laboratory approximately, 24 feet by 52 feet, will be devoted to thermometallurgy. It is the intention to erect in

*Director Technical Education for Nova Scotia.—This article is from official report.

this space a small laboratory blast furnace similar to the type adopted in other colleges, together with a small roasting furnace, a coke oven and furnaces to demonstrate heat treatment of steel and other metals.

To the west of this large space is a laboratory coal washing equipment. This complete coal washing equipment is of the most modern design, and was made by the Jeffrey Manufacturing Co., of Montreal. It is similar in every detail to the ones they have installed for the United States Government Coal Testing Laboratories. The description of the washer is as follows:—

The coal is shoveled into a 10-inch x 24-inch coal crusher, which has a capacity of about three tons per hour, and which can be adjusted to give a varied product from 5-8-inch cubes down. The coal is discharged into a chute, which delivers it into the boot of an elevator. A spiral jaw clutch is provided so the elevator may be cut out when it is not necessary to run. The coal is discharged from this elevator into a revolving screen, which is 2 feet 0 inches diameter x 5 feet 11 inches long. This screen is arranged to give three products: first, coal that will pass through 1-8-inch mesh; second, coal that will pass through 3-8-inch mesh, and third, the trailings, which will vary according to the adjustment of the crusher.

The three sizes of coal will each fall into a separate bin over the washer. A valve is provided for each compartment so that one product may be delivered to the bin over the washer at a time.

The bin over the washer has a gate, which may be opened to the necessary width and locked, thus giving the proper flow of coal to the jig. This jig is of the Lührig type, and is about 1-4 the size of the standard jig, is made of ship-lapped cypress lined with maple and caulked to make a good water-tight tank. When washing nut coal, the plunger is to be run at 80 strokes per minute, and when washing fine coal is run at 120 strokes per minute. Two pulleys of different sizes are arranged for this and belts can be easily changed from one set of pulleys to the other. The washed coal flows into a sludge tank, which is made of cypress. In this a partition is placed so as to form an elevator compartment and fresh water compartment. The fresh water and the clear water which has been cleared in the tank is pumped back into the jig and used over again. The settlings are scraped up by a Century bucket elevator, which delivers the coal into the washed coal bin. The washed coal bin is to have a storage capacity of about 1,250 lbs. and to be provided with a slide valve in bottom. This machinery requires about 10 h.p.

This installation will doubtless be of great advantage, not only to the students, but to the Nova Scotia coal mining fraternity as a whole.

To the west of this coal washing equipment is the ore crushing and concentration plant. In this section of the laboratory gold ores may be tested for amalgamation, concentration, or cyanidation. Ores such as copper, zinc, lead, tungsten, manganese, etc., may be tested as to the most economical and commercially profitable method of extraction.

The general equipment consists of:—

1—7-inch x 10-inch Blake rock breaker,
1—style O D Gates Gyrotory breaker, which will take the product already broken by the Blake crusher and reduce the same to a size suitable for stamping, crushing by rolls, or grinding in a Huntington mill. The remainder of the machinery will be mentioned in the general mill schemes below.

The general course of treatment of a concentrating ore might be as follows:—Broken first in the Blake crusher and the Gates breaker, above mentioned, then running by gravity to a set of 10-inch x 12-inch laboratory rolls, which are placed below the retaining wall, from these rolls the ore is elevated to the top of the mill and dumped into a set of three standard trommel screens. The elevator is a 6-inch vertical mill elevator, single head, equipped with malleable iron elevator buckets and rubber bucket belt, and is 26 feet centre to centre of pulleys. The trommel screens mentioned are complete with housings, receiver, and perforated metal covering. They will so size the ore that the coarse may be sent to the Huntington mill for regrinding, and the medium size may be sent to a two-compartment laboratory size Harz jig, which may make three products—concentrates, middlings, and tailings. The elevation of this jig is sufficient to allow the flow of either the middling or the tailing product back to the Huntington mill for regrinding. This section of the mill when complete, will also include one of the new types of jigs, viz., a Richards pulsator jig, in which there is great interest taken by mining men. This machine has been requested by several prominent mining men in the province. The products from this jig may be handled as has been described for the Harz jig. The finer products of the trommel screens pass either through a hydraulic cone classifier or else directly from the trommels to a laboratory size Wilfley concentrating table, and to a standard 4-foot Frue suspended vanner.

The slimes will pass to a James Slime Concentrator, which machine has been presented to the college by the manufacturer, The James Ore Concentrating Co., of Newark, N.J.

To the west of the concentrating unit comes the stamp milling unit. The gold ore to be treated can be coarsely broken in crushers above mentioned, weighed and dumped by gravity into the Hendy Challenge feeder, which feeds directly into a battery of 5 stamps. This battery is complete in every detail and is in all respects like the commercial stamp battery unit, with the exception of the weight, which is 300 lbs. per stamp. The crushed pulp issuing from the battery flows over an 8-foot amalgamation plate; thence to a trap, and from this trap the pulp is picked up by a standard Frenier spiral sand pump, which elevates the crushed gold ore pulp to the classifier before mentioned. From this machine the pulp can be concentrated by the same Wilfley vanner or James table as in the other mill scheme.

To the south of the concentrating and stamp mill units are steam dryers and a space about 20 feet x 40 feet, at present not equipped, which is left for the future growth of the laboratory as need requires. A small part of this space is taken up by an experimental cyanide plant and magnetic concentrator.

The space at the extreme west of the building, about 24 x 52 feet, is to be devoted to apparatus unique in the history of university metallurgical laboratories. This part of the laboratory is equipped with a 30 h.p. upright tubular boiler. Steam lines from this boiler lead to a 10-inch x 10-inch x 10-inch Ingersoll straight line air compressor with a capacity of 180 cubic feet of air per minute. With this compressor is a small air receiver. It is the intention to use this compressed air for the study of the many compressed air problems which constantly confront a mining engineer, and also to enable the student to familiarize himself with the actual work-

ing of rock drills, coal cutting machines, and other air-driven machinery. This type of machinery is sure to present itself to the student immediately upon beginning his first practical work, and it is hoped that the opportunity of familiarizing himself with the same while in college, will prove of great benefit to the young engineer.

The other steam line mentioned as leading from the upright boiler, goes to a small Lidgerwood mine hoist, equipped with double cylinders (5-inch x 6-inch), and with a 10-inch single friction drum and a reversing link motion. With this hoist it is intended to handle all heavy material moved in the laboratory, as well as to operate a model hoisting plant consisting of a small model mine cage and a small head frame. The necessity of students' correctly understanding this class of machinery is apparent.

With the exception of a few minor pieces of apparatus, this completes the equipment of the laboratory.

A part of the machinery needed for the installation described is on hand at the college, a part has been purchased from the mining laboratory connected with Dalhousie University in this city, and a part has been ordered from Allis-Chalmers-Bullock, of Montreal, who have equipped most of the mining laboratories in the United States and Canada.

It is not intended that the laboratory shall be complete in every detail at once, but provision has been made for the purchase of such new machines as are constantly making their appearance in the mining world, and which may be deemed of benefit for the instruction of students, and the general mining public.

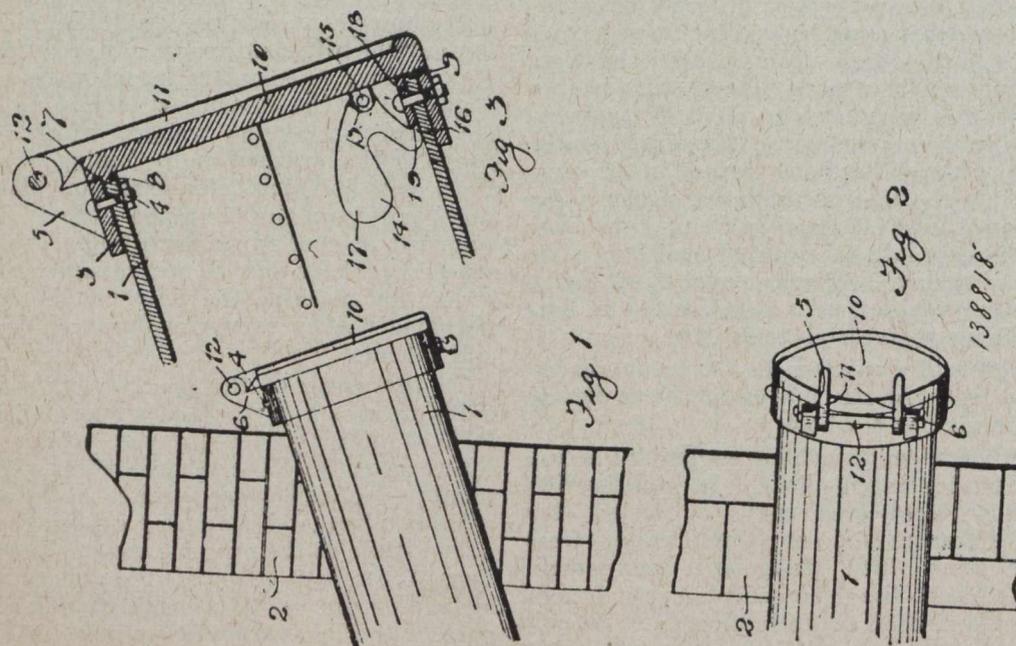
Part of the apparatus will be in working order for the second term of the present college year, and by the opening of the college year in the fall of 1912 the Technical College will offer to the mining student a laboratory not excelled in completeness by any college laboratories in the United States and Canada within our knowledge.

NEW CANADIAN PATENT RELATING TO MINING AND METALLURGY

The February Canadian Patent Office Record contains a number of very interesting new patent specifications. Herewith are presented a few:—

Patent No. 138,858 is taken out by Firman Thompson, Newark, N.J. It covers a process for obtaining

spar, five parts of sodium acid sulphate, and one and eight-tenths parts of sodium chloride, heating the mixture to bright red heat, cooling, reducing again to powder and leaching with water to remove the potassium and sodium sulphates. The heating lasts for from



No. 138,818 Coal Chute.

potash salts from feldspar. The process consists essentially in reducing the feldspar to powder, mixing therewith sodium acid sulphate and sodium chloride in the approximate proportions of five parts of feld-

one to two hours. The potassium sulphate is finally separated from the sodium sulphate.

Patent No. 138,818, granted to Lewis Carroll Gibboney, Portage la Prairie, Manitoba. As seen in the

accompanying illustration, it consists of a chute with a lid hinged to the upper end, a locking plate secured permanently to the inner face with its inner edge V-shaped and a catch-piece pivotably secured to the inner face of the lid. The long arm of the catch-piece forms a handle, and the short arm a tooth to pass behind the V-shaped edge of the plate and lock the lid against the end of the chute.

Patent No. 138,442 is granted to the Nichols Copper Company, assignee of John B. F. Herreshoff, New York. It is an ore roasting furnace consisting of a casing with superposed floors and a hollow upright shaft in the centre of the casing surrounded by a sleeve. Rabble arms are fixed to rotate with the shaft. The arms have interior channels communicating with the interior of the shaft and sleeve respectively. The driving mechanism is connected with projecting portions of the sleeve and of the shaft. The internal channels are for the purpose of cooling.

Patent No. 138,497 covers a process and apparatus for recovering gold. It is granted to James H. Alling, Columbia, California. The process consists in recovering gold from its ores by mixing the finely crushed

ore with a chlorine compound, immediately thereafter causing the mixture of solution and pulp to flow in succession freely in contact with a series of mercury cathodes, passing currents of electricity through the flowing mixture to said cathodes, the amount of chlorine compound and the magnitude of said currents being sufficiently great to liberate nascent chlorine in sufficient quantities to reduce the gold to a condition in which it is readily amalgamated, and recovering the gold from the cathodes.

Patent No. 138,432 is granted to the Northern Explosives Company, Limited, Montreal, assignee of Arthur Hough, Lavigne, Quebec. An explosion and the process of manufacturing it are covered. The explosive consists of sodium nitrate, coal, and sulphur, each in distinct granular, non-absorbent form, and a mixture of tri-nitro-glycerine and penta-nitro-tri-glycerine. The process of manufacturing consists in treating glycerine and converting a part thereof into tri-glycerine, nitrating, washing and rendering stable the product, and mixing it with sodium nitrate and coal in the following proportions: Penta-nitrate-tri-glycerine, 6 parts by weight, sodium nitrate 65 parts, and coal 25 parts.

—J. C. M.

TIN MINING IN NIGERIA

From a London Correspondent.

London, May 20th, 1912.

In these days of recurrent tin booms and a clear scarcity of material it is not to be wondered at that the search for new tin-bearing areas proceeds apace. Northern Nigeria has come along during the last twelve months as a proposed prominent source of supply, and has had to make its way in the advertising of strong views as to its value expressed in important quarters. With over one hundred companies, however, now formed operating on the London Stock Exchange and a perpetual stream of travellers between England and Bauchi, where the tin is, in Northern Nigeria, a quantity of information is to hand at last which serves to show that although caution is still required there is abundance of tin in that capacious portion of King George's West African dominions.

The great trouble so far has been transport, and the fresh and important development in this direction is the completion of the Baro-Kano Railway, a branch running from Zaria on the main Northern Nigerian line for a distance of about 100 miles to the Nigerian tin fields, and intended at present to terminate at the foot of the Bauchi Plateau upon which the tin claims are located. Hitherto the inaccessibility of the tin-bearing grounds of Northern Nigeria has been the great impediment in the way of development for transport, both of men and materials, has been a very troublesome and expensive affair. For instance, the transport of tin from the mines to Liverpool has cost upwards of \$150 a ton, natives carrying the metal in parcels of about 60 pounds weight on their heads to Loko, on the Benue River, where it was put into small steamers or barges, transhipped at Lokoja into the Niger boats, and taken to Forcados for ocean transit. With the completion of the Baro-Kano Railway and the con-

struction of a road from railhead to Bauchi, the cost is reduced to a little over \$90.

That Nigeria has a future as an important tin producer there is no doubt, and it is regarded as significant that the deposits of the district bear a striking similarity to those of the most prolific producer in the world, the Federated Malay States, which continue to supply considerably more than half of the world's requirements. The Nigerian deposits consist very largely of alluvial, although lodes are found in certain localities. Lode mining, however, has not been of much account in the Middle East, alluvial deposits providing the enormous preponderance of supplies. The first tin discovered in Nigeria was in the form of coarse and fine grains found in river beds, and the opinion was early formed that the metal had come originally from granite in the slopes and at the base of the foothills. In a primitive fashion, and in very limited quantities, Nigerian tin filtered through to Europe first in the early days of the Niger Company, reaching England in the curious form of small faggots. The method of production was interesting, none-the-less because, with the advance of European methods, it tends to become obsolete.

The natives were fully aware that the metal had a very distinct commercial value and for their purposes a party of them would walk into a stream, and after stirring up the gravelly bed with a kind of hoe would scrape it up in a calabash and wash the contents, thus, in a rough and ready way, concentrating the tin stone. This was then smelted in a furnace of very primitive character fed by charcoal, the blast being furnished by bellows made out of a sheepskin. When the tin melted it was caught and poured on to a clay bank

which had been perforated with holes made by the haulms of the Guinea corn. A bundle of faggot-like sticks of tin was thus produced, which were tied together, and eventually reached the coast.

The origin of this tin for a long time puzzled the authorities of the Niger Company, who decided thoroughly to investigate the source from which the metal was derived, and eventually Sir William Wallace, late acting Governor of Northern Nigeria, after subduing the Emir of Bauchi, managed to get messengers through to Naraguta, who returned with a small sample of alluvial tin. This was in 1902, and the directors of the Niger Company were so impressed that they very soon took out a prospecting license over a thousand square miles, and within a year or so several expeditions were despatched, with the result that tin was found in the Province of Bauchi, while subsequent examination located extensive tanniferous areas.

According to R. C. Nicolaus, the geology of the area is composed of granite, igneous intrusions of diabase, and porphyry, forming the prominent peaks of the Naraguta and Shere Hills. Near the river a coarse grey gneiss forms a contact with the granite, both of which rocks are traversed by lenticles and gash veins of quartz and several small igneous dykes cross diagonally the general strike of the country. Mr. Laws, the engineer in charge, was so satisfied with the investigations that upon his representations the Niger Company applied in 1905 for a number of mining leases, and since then the tin industry of the Protectorate has never looked back. Official reports upon specimens from the Zagi River, south of Bauchi, from Bula, Tilde, and the river beyond Joss, forwarded to the Imperial Institute were to the effect that the gravel was more or less rich in tin over the whole surface of the plateau, while tin stone was widely distributed throughout the province.

Alluvial mining, however, is in a general way somewhat precarious; but as regards tin, whatever may be the theory the practice has invariably that alluvial mining pans out better than lode mining. Still, the famous Dolcoath and other Cornish mines are lode propositions, and so also are the big deposits of Bolivia; but as mentioned already, the largest producer is the Federated Malay States, where practically all the tin is won from alluvial deposits. The fact, however, that lode mining in the East has proved disappointing does not necessarily justify pessimism regarding the lode formations of Nigeria; investigations made, indeed, leading to very encouraging estimates being formed as to the highly profitable character of the West African formations. It stands to reason that wherever alluvial tin is found it came from lode deposits somewhere or other, and with the discovery of these the enormous value of Nigeria as a tin producer should become established.

Tin is one of the few metals the production of which during recent years has increased very slowly, and the gravest apprehensions have been felt in the trade regarding the absence of new discoveries in face of the ever-increasing consumption. The tin market has always been the scene of active speculation, which for a long period has centred chiefly in the hands of a Continental group, and the erratic movements of prices brought about by their operations have frequently mystified and greatly worried consumers. Within the last few months, however, certain steps have been taken in connection with speculative contracts, calculated, it is

believed, to insure greater steadiness and stability in prices. At all events, there has been a notable diminution in the merely speculative transactions which have been opened up, while the price has remained firm in the neighbourhood of \$950. High though this price may appear to be, it in all probability fairly represents the approximate value, for consumption is ever increasing at a greater ratio than output; and unless considerably more tin is forthcoming, either from Nigeria or elsewhere, the time is approaching when even to-day's level of prices may appear reasonable.

Tin, as a metal, stands in a class almost by itself. In its pure form it is hardly used at all, passing into consumption as it does, alloyed with, or in close association with other metals. The most important branch of consumption is, of course, the manufacture of tinplates, thin sheets of steel coated with tin. Of a box of tinplates weighing one hundredweight net, about 110 pounds consists of steel and two pounds of tin. There are many makers who use less than two pounds of tin per box. It will be seen from this that the rise even of \$250 per ton in the price of tin can have no appreciable effect on the cost of the tinplate used in packing a box of sardines, a tin of pineapple, or a tin of tooth powder. Hence, it is that the inevitable tendency of high prices to restrict consumption operates far less injuriously upon tin than upon most other commodities. Equally also does this apply to the engineering trades where the metal is used to produce anti-friction compositions for use in bearings.

Having regard, however, to the prospects for an extended use of the commodity and the maintenance of high prices, there should, no doubt, be ample room for legitimate mining enterprises in Nigeria, always assuming that they are soundly and honestly conducted and are not over-capitalized.

COPPER-NICKEL DEPOSITS IN SOUTH AFRICA.

The occurrence of copper ores at Mount Ayliff, in the Susizwa Range, East Griqualand, has been known to prospectors for some years past; and some tentative, but not particularly successful exploration has been attempted. A recent report on the region by the Cape Geological Survey has, however, served to stimulate interest by directing attention to the similarity of the ores, and of their mode of occurrence to those of Sudbury. The ores, like those of Sudbury, can generally be separated into two groups, one consisting chiefly of chalcopyrite, and the other richer in pyrrhotite and pentlandite. The assays have shown the copper to average 4 per cent., nickel 3.8 per cent., and platinum, in the form of sperrylite, $2\frac{1}{2}$ dwt. per ton. The probable extent of the deposits has not yet been determined.

GRAPHITE IN THE UNITED STATES.

The United States production of graphite was 3,618 short tons for the year 1911. This represented a value of about \$300,000. The imports during the same year totalled 20,702 short tons valued at \$1,495,729. The greater part of the domestic production of crystalline graphite comes from the states of New York, Pennsylvania and Alabama.

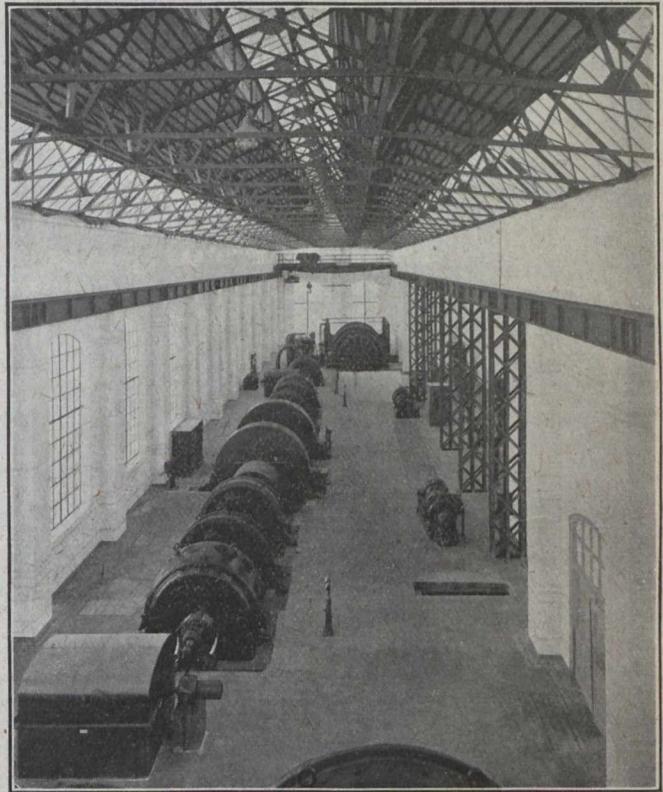
THE ELECTRICAL EQUIPMENT OF A SOUTH WALES COLLIERY*

From an electrical point of view, the most interesting of the group of collieries is the new Britannia colliery at Pengam, which is now in process of sinking, and is at present entirely without steam plant, as power is derived entirely from the Bargoed and Penallta generating plants, where a pair of the largest electric winding engines in the world are at work. As at Penallta, a prominent feature is the collection of all the machinery under one roof, but there is the important difference that the whole plant is electrical. The inclusion of winding plant in the same engine-room as other machinery is one of the points dealt with in the new Coal Mines Bill, and it is possible that, if the Bill in its present form becomes law, screens may have to be erected across the engine-room both here and at Penallta to isolate the winding-engines from the rest of the plant, although it may be that, in view of its quietness, electrical plant may be exempted from this requirement. A plan showing the arrangement of the plant is given in Fig. 3.

The sinking of these two shafts was commenced in June, 1910, with cranes, but when a depth of 185 feet was reached a pause was made till the completion of the electric winding plant, but sinking operations have recently been recommenced with the winding engines, which have been fitted with temporary drums for the purpose. The winding plants are on the Ilgner system, and were supplied by Siemens Brothers Dynamo Works, Limited. Almost the whole of the electrical plant was made at the Stafford Works, and the mechanical parts of the gear, such as the drums, brakes, etc., were made by Messrs. Fraser & Chalmers as sub-contractors. Indeed, it is notable that, with very minor exceptions, the whole of the new plant, both here and at Penallta, is of British manufacture.

The Ilgner system of flywheel storage, as applied to winding engines driven by continuous current motors with variable voltage control, is now well known, and is employed in a very large number of winding plants on the Continent as well as several in Great Britain. The present plant is an example of the modification in which the flywheel is attached to a motor-generator consisting of an induction motor of the slip-ring type driving a pair of continuous-current generators, which supply current to the two large slow-speed motors directly coupled to the winding drum. The speed and direction of motion by the winding motors is controlled, as in the Ward-Leonard system, entirely by operating on the field of the generators, the armature circuits never being broken. The capability of the flywheels to store and give out kinetic energy is rendered available for storage of energy in the following way:—When the set is running light the flywheel runs at its full speed, the induction motor having as little slip as possible, but when a heavy call is made for power the "slip regulator" comes automatically into action, and switches resistance into the motor circuit, slowing down the set and allowing the flywheel to give up energy. When the demand for power decreases the converse takes place, resistance is switched out, and the motor and flywheel rise in speed, drawing power from the power station. Thus, notwithstanding the enormous peaks in the load on the winding motors, the current drawn from the station can be reasonably constant—

and the plant capacity necessarily is far less than would be required were no such power storage available. Also it will be readily seen that the method of control by variation of the voltage applied to winding motors



renders regenerative braking possible, with a considerable saving in power consumption, as well as permitting of a single lever to accomplish the whole of the starting, stopping, speed regulation, and electric braking.

This brief reminder of the general principle of the Ilgner system as applied by the Siemens firms will elucidate the relations between the ratings of the machines forming this equipment. Each winding drum is coupled to two motors, one at each end, and each is rated at a maximum horse-power of 2,160 and a normal output of 1,300 horse-power, they run at a maximum speed of 62.8 r.p.m., and the voltage at the armature terminals varies from 0 to ± 600 . They are separately excited from a 220-volt circuit derived from separate motor generators. They are 16 pole machines with interpoles as well as distributed compensating windings to perfect the commutation, and the commutators are built in two portions, with ventilating channels between them.

The two flywheel sets, one for each winding plant, consist each of an induction motor, two continuous current generators, and a 33-ton solid steel flywheel running at a maximum speed of 500 r.p.m., and capable of storing 30,000 foot tons. The two sets are placed in line, and can be coupled together, so that when both plants are winding coal each will assist in dealing with

*Reprinted from "Electrical Engineering," November 2, 1911.

the peaks of the other. Further couplings are provided between each motor generator and its flywheel, so that the set can be run in any one of the following ways:—Either motor generator alone with one or both flywheels or without a flywheel, both motor generators entirely without flywheels, or the whole coupled up together. The flywheels are cased in, and their bearings are water-cooled with ring lubrication, auxiliary pressure oil lubrication being provided for starting up and in case of emergency. At present, during sinking, only one motor generator is in use, each of its two generators supplying a single motor on each winder. Also the induction motors have their stator circuits temporarily connected in mesh, with current transformed down to 3,000 volts on their terminals, whereas when winding is in full swing they will be star connected and supplied at the full transmission pressure of 10,000 volts. When coal is being raised from the full depth of 2,190 feet at the full rate of one complete wind per minute, or 360 tons per hour, the maximum demand of the winding motors will be about 4,850 h.p., but the constant load put into each motor generator will not exceed 1,850 h.p. The two generators (one for each winding motor) on each Ilgner set are designed for 1,730 kw., or 2,830 amperes maximum, and 1,035 k.w. or 1,720 am-

peres normal, at 425 to 500 r.p.m., and work up to 600 volts. They are eight-pole machines with interpoles, compensating winding and double commutators similar to those of the winding motors. The excitation of the generators is drawn from separate motor-driven exciters, but a battery is provided as stand-by capable of allowing the winding engines to continue working after a cessation of supply until the energy stored in the flywheels is spent. The battery serves also as a stand-by for lighting.

The induction motors are designed for 10,000 volts, 91 amperes per phase, and an output of 1,750 h.p. continuously. The slip-ring voltage reaches 700 volts and the machines are of the enclosed self-ventilating pattern, drawing air from below the floor and expelling it through apertures around the stator frames. The slip regulators are of the liquid type, controlled by series transformers in the motor circuits, the secondaries of which supply current to a small induction motor unable to revolve, but arranged to cut in or out more or less of the liquid resistance, according to the torque on the motors.

The winding engines are provided with devices for preventing too rapid acceleration and overrunning by mechanisms which interlock the depth indicator and the control lever, thus making it impossible for it to be put over too rapidly at starting, and returning it to the zero position automatically at the end of the wind and applying the brakes, should the driver omit to do so. Excellently arranged mechanical working and emerging brakes are provided, actuated mainly by compressed air and electrically interlocked with the current supply, in addition to the provision for electric braking.

The main switchgear is of the Siemens pillar type, similar to that at Penallta. The 10,000-volt bus-bars are arranged in a ring with two sections. Each section has one incoming feeder from Bargoed or Penallta, and if there should be a failure on any part of the board, supply can be continued through another portion. The 3,000-volt gear is of generally similar construction, and a separate 500-volt board provides for the smaller motors and a continuous-current board contains the necessary connections and instruments for the winding engine circuits.

The duplicate overhead 10,000-volt line from Penallta is of 0.25 sq. in. copper, designed to transmit 2,000 kw. at 0.7 power factor with a 4 per cent. drop of pressure.

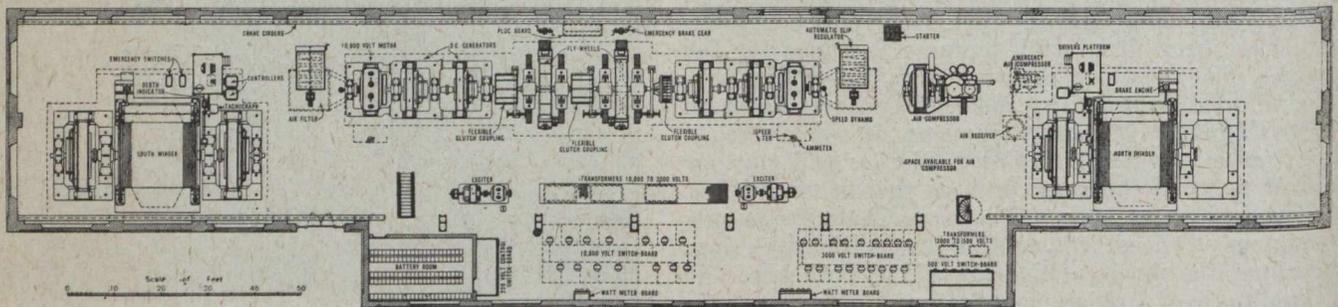


Fig. 3

Similar sized lines are brought from Bargoed, and the Merz-Price system of protection with Reyrolle relays is used for all the overhead lines as well as for the large transformers.

There is also in the main engine-room a Belliss & Morcom air compressor, driven by a 3,000-volt 400 h.p. motor running at 290 r.p.m., and other electrically driven plant at the colliery includes temporary hoists for the staging, etc., used in the sinking of each shaft, driven by 130 h.p. motors, and another temporary air compressor driven by a 130 h.p. motor

The plant at this colliery was visited on September 14th by a large party of members of the Institution of Mining Engineers and others on the occasion of the annual meeting at Cardiff, and the Powell Duffryn Company, who are justly proud of this example of up-to-date mining electrical engineering, showed much kind hospitality to the party. It is to the opportunity thus afforded and to the personal assistance of Mr. C. P. Sparks, under whose supervision as consulting engineer the work was carried out, that we are indebted for the material that has enabled us to compile this article, with the kind permission of Mr. G. Hann, the manager of these collieries.

The duplicate overhead 10,000-volt line from Penallta is of 0.25 sq. in. copper, designed to transmit 2,000 kw. at 0.7 power factor with a 4 per cent. drop of pressure.

Similar sized lines are brought from Bargoed, and the Merz-Price system of protection with Reyrolle relays is used for all the overhead lines as well as for the large transformers.

There is also in the main engine-room a Belliss & Morcom air compressor, driven by a 3,000-volt 400 h.p. motor running at 290 r.p.m., and other electrically driven plant at the colliery includes temporary hoists for the staging, etc., used in the sinking of each shaft, driven by 130 h.p. motors, and another temporary air compressor driven by a 130 h.p. motor

THE ORE AND COAL-BEARING FORMATION OF THE YUKON

Among the papers presented at the Fourteenth Annual Meeting of the Canadian Mining Institute, held in Toronto last March, was one by Dr. D. D. Cairnes, of the Geological Survey of Canada, on "The Ore and Coal-Bearing Formations of Yukon Territory."

This was a compilation of information concerning the economic geology of Yukon Territory, in which attention was drawn to the formations that have been found to be of economic importance, and their extent shown so far as known. The intention in preparing the paper may be taken to be an endeavour to assist in future prospecting and development of the mineral-bearing formations noticed. Particular attention was paid by Dr. Cairnes, in his paper, to coals of Yukon Territory, for the reason that they are not so well known as its placer-gold and lode deposits.

The following table shows the extent of the **known** Tertiary and Jura-Cretaceous beds in Yukon Territory; also the **probable** extent of such beds. Further, it indicates the probable amount of coal—lignite, bituminous and anthracite—contained in the beds mentioned.

Extent of Beds and Coal Contents.

	Square Miles
Extent of known Tertiary beds in Yukon Territory	2,090
Extent of known Jura-Cretaceous beds in Yukon Territory	4,110
Total	6,200
Probable extent of Tertiary beds in Yukon Territory	4,500
Probable extent of Jura-Cretaceous beds in Yukon Territory	19,700
Total	24,200
	Tons
Probable amount of lignite in seams exceeding one foot in thickness in Tertiary beds	3,134,770,000
Probable amount of lignite, bituminous coal, and anthracite in seams exceeding one foot in thickness in Jura-Cretaceous beds	190,520,000
Total	3,325,290,000

It will be observed that the **known** extent of beds is but 6,200 square miles, while the **probable** extent of beds in the area known to contain coal is nearly four times as large. This "probable extent" of known areas does not include any unexplored portion of Yukon Territory, but signifies only what is expressed, namely, the probable extent of areas known to contain coal.

Known Coal-Bearing Areas.

The coal fields of Yukon Territory have not yet been worked extensively, for the aggregate output of coal from these to date may be placed at approximately only 100,000 tons.

The Tantalus field is the most important Cretaceous area, and is one of the two in which most development work has been done and production of coal made. This contains a considerable amount of coking coal. Other

important Jura-Cretaceous areas are Whitehorse and the Braeburn-Knocks area, the latter a large area discovered by Dr. Cairnes, situated 50 to 60 miles north of Whitehorse.

The most important Tertiary area known is that of Rock Creek, the southern end of which area is just east of Dawson City; this area extends about 70 miles in a northwesterly direction from that point. Other important Tertiary areas occur on Indian River, Peel River, Porcupine River, and the Liard and Francis Rivers.

Coal has been found at different places on the Arctic Coast, explorers having brought in from that outlying region samples of coal discovered by them. It is known that the area of coal-bearing rocks is extensive up there; but it has not yet been determined whether they are Tertiary or Cretaceous.

Note.—Supplementary to the foregoing, the following information may prove of interest:

In his report for 1906 (See "Summary Report of the Geological Survey Department of Canada, 1906," pp. 28-30), Dr. Cairnes states that the Tantalus mine is situated on the west side of Lewes River, about 190 miles down the river from Whitehorse, being somewhat less than half way to Dawson. Three workable seams had then been found. The coal was worked by pillar and stall system; it was dirty, but could easily be sorted. "These measures are quite regular, and can be traced for more than 20 miles down the Nordenskiold River to the south, and more than 10 miles to the north, showing that there is an enormous amount of coal in this district; when the measures have been prospected they may be found to extend much farther. Only coal near the river is, at present, of economic value. The dips are to the east and vary from 24 to 40 degrees. Samples taken show the coal to be a bituminous coal that yields an average of about 75 per cent. of a firm coherent coke."

Brief reference is made to this field in the "Summary Report" for 1907, while in that for 1908 more information is given, an excerpt from which follows.

"There are two coal-bearing horizons of economic interest in this portion of Yukon Territory. An upper horizon occurs near the top of the thick assemblage of conglomerate beds forming the upper half of the group of Cretaceous sediments, and to this higher zone belong the seams at the Tantalus mine and on Tantalus Bluff. A second, lower coal-bearing horizon lies toward the base of the Cretaceous column as seen at the Five Fingers mine, situated about 8 miles north of the Tantalus mine, also at a point west of the 69-mile post from Whitehorse on the Whitehorse-Dawson Road and elsewhere.

"The seams of the Tantalus Bluff and the Tantalus mine doubtless extend a number of miles to the north and south of these places, but prospecting for coal is rendered particularly difficult there by the thick mantle of glacial and recent alluvial material which covers the greater part of the district. Beginning within a distance of two or three miles south of Tantalus, the Cretaceous sedimentary rocks are, for the greater part, covered with more recent Tertiary basalts, basalt tuffs, etc., so that although in the 20 miles immediately south of the Tantalus mine there is believed to be a great amount of

coal, it will, in most places, require very careful prospecting to find it suitably located for mining purposes."

It may be added that a few weeks ago there was printed in the Daily Alaskan newspaper, Skagway, information to the effect that the general manager of a company operating coal mines at Tantalus and Five Fingers had returned from "the outside," and that he

had purchased from The Jeffrey Mfg. Company, of Columbus, Ohio, a washery and screening and conveying plant to handle 400 tons per ten hours, which new plant is to be installed and ready for work by the middle of July. He also intimated that his company is providing for making coke, there being much copper ore in Whitehorse camp and other parts of Yukon Territory.

BOOK REVIEWS

INTRODUCTION TO THE STUDY OF MINERALS.—

A combined Text-Book and Pocket Manual, by Austin Flint Rogers, Ph.D., 522 pages, profusely illustrated, price \$3.50 net. McGraw-Hill Book Company, New York—Book Department, Canadian Mining Journal, Toronto. 1912.

Dr. Rogers' compact and substantial volume is planned to cover the requirements of a one-year course in mineralogy. While a great mass of detail has been omitted, the aim of the author is sufficiently comprehensive. The distinctive features of the book are these:

1. The description of the optical and microscopic properties of crushed fragments, cleavage flakes, and crystallized products.

2. Six new determinative tables.

3. A numbered list of the occurrences of each mineral, establishing paragenetic varieties.

4. A glossary of terms, synonyms and varieties.

Other departures are the emphasis laid upon symmetry, and dropping the idea of hemihedrism. Miller's indices are used exclusively.

The Canadian Klondike Company, Ltd., commenced operating with its small dredge during April, but it was not expected that its big dredge would be at work until early in May. This company owns the Boyle concession and other claims in the Yukon.

The Yukon Gold Company will work eight gold dredges this season. Its holdings include all the more important deposits of gravel on Hunker, Bonanza, and Eldorado creeks and their tributaries.

According to The Daily Alaskan, published at Skagway, Alaska, among other contracts for carrying freight from Skagway to Dawson this season the manager of the White Pass and Yukon Railway has closed are two, together of 5,500 tons—4,000 tons for the Boyle concession and 1,500 tons for the Guggenheims' camps.

The United States Smelting, Refining and Mining Company of Maine, a \$75,000,000.00 corporation operating mines, mills and smelters in various parts of the United States and Mexico, has established an exploration department with an engineer's office in Seattle, for the examination and purchase of meritorious metal mines in Alaska and the Northwest. Communications should be addressed to D. D. Muir, Jr., superintendent in charge, 1303 Hoge uilding, Seattle, Washington.

The text is prefaced with a select, classified, bibliography. The topical arrangement of the text itself is lucid. The form of minerals; their physical, optical, and chemical properties; their delimitation; description (200 species); their occurrence, association, and origin; and their uses, are the headings of successive chapters. The six new tables give, respectively, the arrangement of minerals according to crystal system or habit; according to structure and cleavage; according to colour; according to specific gravity; according to optical tests; and according to blowpipe and chemical tests.

The glossary is a particularly useful addition. It comprises 24 closely printed pages, and constitutes the most useful source of reference that has come to our notice. "Study of Minerals," inasmuch as it is a carefully arranged exposition of the elements of mineralogy, and is stripped of all superfluities, has a field to fill.

As to typography and general make-up, there is little to be desired.

The Butte, Montana, correspondent of the London Mining Journal, writing on April 13, contributed to that publication the following relative to the Peterson Zinc Process: "A zinc smeltery at Butte is among the possibilities, and the company likely to undertake the construction will be the Butte & Superior. Some time ago Captain A. B. Wolvin, president of the Butte & Superior, with D. C. Jackling, the big Utah mining man, and several experts, made a very thorough examination of the process for treating zinc concentrates invented by F. F. Peterson, a Butte man and graduate of the State School of Mines. The demonstration was such a satisfactory one that Captain Wolvin, after consulting with the directors of the Butte & Superior Company, decided to erect a small plant for experimental purposes, and it will be ready for operation in the course of the next two weeks. The heat in the furnace is to be supplied by electricity, and Peterson is positive that he will be in a position to show a saving of 95 per cent. in the zinc ore and about the same percentage in copper and gold. If the new process should be a success, it will undoubtedly prove a great saving, as at the present time it is costing the Butte & Superior Company \$40 a ton to have its concentrates treated at the Oklahoma smeltery. It is asserted that the cost for treating the concentrates under the Peterson process will be between \$13 and \$15 a ton. If it is demonstrated beyond doubt that the Peterson process is all that is claimed for it, the company will make arrangements for the erection of a smeltery at once to have a capacity of 500 tons of concentrate a day."

DOMINION STEEL CORPORATION, LIMITED—EXTRACTS FROM ANNUAL REPORT

Earnings of the Year.—The earnings of the Coal Company show a satisfactory growth, which there is every reason to expect will continue.

The Steel Company's earnings reflect the very unsatisfactory conditions of the iron and steel trade in the matter of prices, which, as a consequence of the depression in the trade in the United States, have marked the past year. The conditions as to bounties and duties have also affected the Steel Company, as a considerable portion of its product had to be sold in a depressed market in competition with duty-free imports from the United States.

Your directors have caused representations to be made to the Government as to these and other matters affecting the manufacture of iron and steel in Canada and are hopeful of an early removal of the serious anomalies in the tariff on these articles.

Production.—The increase in output has come up to our expectations. The figures for last year and for the twelve months preceding are as follows; but it is to be noted that the Cumberland figures for the earlier period were not normal, owing to the strike:

Coal Company.

	Year ending 31st March, 1912. Tons.	Year ending 31 March, 1911. Tons.
Cape Breton Collieries	4,063,395	3,752,298
Cumberland Collieries	342,868	109,863
Total coal	4,406,263	3,862,161

Steel Company.

	Tons.	Tons.
Wabana ore	602,168	544,792
Pig iron	290,588	248,715
Steel ingots	335,553	301,940
Rails	153,498	133,896
Wire rods	70,633	78,600
Blooms and billets for sale or stock	43,950	34,110

Extensions.—Capital Expenditure.

During the year they disbursed \$123,369.91 for amount expended on new collieries and other property of the Coal Company in Cape Breton amounting to \$1,576,931.70, and on the Cumberland property \$23,353.01. Full particulars of the work under way were given in the circular sent you on 4th January last.

The operations at all the collieries have been carried on very steadily and satisfactorily throughout the year. The new mines in the Lingan District are making an excellent showing, both in tonnage and in the quality of the coal. The coal from No. 6 Colliery has greatly improved since the deeper parts of the seam were reached. There continues to be a good market for all the coal which the mines produce.

Explorations on the Cumberland property during the past winter have proved the existence and extent of a valuable seam of coal (known as the six-foot-seam) not hitherto worked, close to the town of Springhill, and

the directors have under consideration the opening of at least one new colliery on this seam.

The development of the older collieries at Springhill has steadily progressed. At No. 2 the seam is 10 feet thick and of excellent quality; No. 3 does not show quite as favourably in comparison, but is in active operation and producing good coal.

Dominion Iron & Steel Company, Limited.—The expenditures on Capital Account during the year amounted to \$2,714,539.56, in addition to which \$1,400,000 was paid on account of the purchase money for Dominion Coal stock, leaving the final instalment of \$350,000 still unpaid.

Particulars of the work in progress on the Steel plant were given in the circular of 4th January last. There have been still further delays, chiefly due to the inability of the contractors to finish their work in time; their delays were in some measure due to the large amount of work under progress in Canada. The wire and nail mills are very nearly completed and will be shortly in operation; No. 8 blast furnace and the new bar mill will follow during the summer.

Stock and Bond Issues.

In accordance with the arrangements sanctioned at the special meetings of the shareholders of the corporation and its constituent companies on 15th January, 1912, the corporation has issued 70,000 6 per cent. preference shares, amounting in all to \$7,000,000, and has received \$3,500,000 6 per cent. income bonds from the Dominion Coal Company, Limited, and a like amount from the Dominion Iron and Steel Company, Limited. These bonds will be held in the treasury of the corporation, as the primary source from which a revenue to provide for the dividends on the preference shares will be derived.

During the year your directors issued 2,500 shares of common stock for the purpose of acquiring the securities of a company which supplies lumber and other wood products to the Coal and Steel Companies.

Relief and Benefit Societies.

The affairs of these important organizations have steadily improved, and the scope of their operations have now been extended to include all employees of the Coal and Steel Companies at Springhill, Marble Mountain, and elsewhere.

During the year they disbursed \$123,369.91 for benefits, insurance, etc., and on 31st March, 1912, their combined reserve funds amounted to nearly \$180,000.

Staff.

The directors of the corporation and its constituent companies again desire to express their appreciation of the excellent service rendered by their respective officers and employees.

All of which is respectfully submitted on behalf of the Board of Directors.

J. H. PLUMMER,
President.

CONSOLIDATED PROFIT AND LOSS ACCOUNT.
For the Period of One Year and Nine Months from
Commencement of Business on July 1, 1910, to

March 31, 1912.

Net earnings, after deducting all organization, manufacturing, selling and administrative expenses, but before charging provisions for sinking funds and depreciation and interest		\$7,388,260.51
Deduct—Regular provisions for sinking funds, exhaustion of minerals and depreciation		1,624,805.86
		<u>\$5,763,454.65</u>
Deduct also—Interest on bonds and loans (less proportion chargeable to construction)	\$1,957,878.67	
Proportion of discount on bonds sold	115,426.01	2,073,304.68
		<u>\$3,690,149.97</u>
Net earnings for period		\$3,690,149.97
Less—Dividends:		
On preferred stock	\$ 979,999.99	
On common stock	1,225,204.00	
		<u>\$2,205,203.99</u>
Special appropriation for depreciation and renewals	700,000.00	2,905,203.99
		<u>\$784,945.98</u>
Surplus, March 31st, 1912		\$784,945.98

Note.—In consolidating these accounts, the amount of \$2,049,393.60 of the constituent companies' surplus as at July 1, 1910, has been deducted from the cost of properties in the balance sheet.

PROFIT AND LOSS AND SURPLUS ACCOUNT.

Year Ending March 31st, 1912.

Net earnings from operations, after deducting all mining, selling and administrative expenses, but before charging provisions for sinking fund and depreciation and interest		\$2,274,110.54
Deduct—Provision for sinking fund and depreciation		414,009.58
		<u>\$1,860,100.96</u>
Balance		
Deduct also—Interest on bonds and loans	\$375,897.55	
Proportion of discount on bonds sold	3,787.33	379,684.88
		<u>\$1,480,416.08</u>
Net profit for the year.		\$1,480,416.08
Add—Surplus at April 1st, 1912		668,530.99
		<u>\$2,148,947.07</u>
Deduct—Dividends:		
On preferred stock	\$210,000.00	

On common stock	600,000.00	
		<u>810,000.00</u>
Surplus March 31st, 1912		\$1,338,947.07

PROFIT AND LOSS AND SURPLUS ACCOUNT.

Year Ending 31st March, 1912.

Net earnings and income, after deducting all manufacturing, selling and administrative expenses, but before charging provisions for sinking fund and depreciation and interest		\$1,885,074.05
Deduct—Provision for sinking fund, exhaustion of minerals and depreciation		466,633.22
		<u>\$1,418,440.83</u>
Deduct also—Interest on bonds and loans (less proportion chargeable to construction)	\$704,042.34	
Proportion of discount on bonds sold	63,099.82	767,142.16
		<u>\$651,298.67</u>
Net earnings and income for year		\$651,298.67
Add—Surplus at April 1st, 1912		2,369,375.33
		<u>\$3,020,674.00</u>
Deduct—Dividends:		
On preferred stock	\$350,000.00	
On common stock	800,000.00	1,150,000.00
		<u>\$1,150,000.00</u>
Surplus 31st March, 1912		\$1,870,674.00

THE EMILY EDITH MINE, SLOCAN, B.C.

The Emily Edith group of six mineral claims, covering an area of about 150 acres, situated in Four-Mile Creek camp, near Silverton, Slocan Lake, British Columbia, being now owned by the Standard Silver-Lead Mining Company, will be further developed in connection with the Standard mine, one of the productive silver-lead mines of Slocan district.

In 1900 the Emily Edith group became the property of the Emily Edith Mines, Limited, a company promoted in England by the new British Columbia Development Corporation, Limited, to acquire these claims. The purchase consideration was £55,000, of which the sum of £2,561 was paid in cash and £52,439 in fully paid-up shares. The company's authorized capital was £75,000, in shares of £1 each. There was called up ten shillings per share on the 22,561 shares not issued to the vendor company. The head office of the company was at Leeds, England, and Mr. C. E. Hope, of Vancouver, B.C., was local manager.

The following is an excerpt from the 1901 report of the directors of the New British Columbia Development Corporation: "This company holds the principal interest in the Emily Edith Mines, Ltd., and your directors regret that developments have not yet brought any return to the shareholders. A large amount of work has been done on the property under difficult circumstances, and the results are as yet undecided. The

Emily Edith Company reports that the long-looked-for vein has been cut in No. 4 tunnel, and it is hoped that the ore bodies in the upper levels will also be found to extend to this level."

The official reports for several years give scant information concerning this property, but that for 1904 includes the following notes by the Provincial Mineralogist: "The Emily Edith, another of the well-known groups of claims in this (Slocan Lake) district, formerly shipped considerable ore, but for the past two or three years has been shut down, and was found to be in the charge of a caretaker only, who was temporarily absent in Silverton when the property was visited, and, as all the tunnel entrances were locked up, nothing was seen of the underground workings.

"The country rock is a hard brown shale, and is cut by a strong north and south fissure vein, containing argentiferous galena and zinc blende. The mine is developed by a series of adit tunnels run in on the lead (to judge from the size of the dumps, for a considerable distance), and of these No. 4 is evidently the main or working tunnel. About 10 tons of galena ore, about 60 per cent. lead, was still in the ore-sheds, and there were various piles of zinc blende ore, estimated at about 500 tons of 30 per cent. zinc.

"The mine is equipped with good buildings, ore-sheds, stables, office, and a bunk-house well worthy of being copied by other mines in the province, in which a well-planned attempt was made to give the men reasonable comfort and chances for cleanliness. The bunk-house is a frame building, two and one-half storeys high, with basement, lathed and plastered inside and clap-boarded outside, and was not an expensive building to construct. In the basement is a heating furnace for the whole building. The first floor contains changing-room, wash-room, sitting-room, and writing-room for the men, with a separate entrance, office, draughting-room, and rooms for foreman and clerks. The top storey is one large, well-lighted and ventilated room, provided with a single row of double bunks, well built of planed lumber. This is the 'ram pasture,' where men are provided with a bunk and mattress without extra fee beyond the usual charge for board. The second floor is divided up into small rooms, each with a window and door, some fitted up with two beds, and others, larger, with four beds, each bed being provided with a woven-spring mattress, etc. Beds in these rooms could be had at a small additional charge, said to be 75 cents a month for a bed in a 4-bed room, and \$1 a month in a 2-bed room. These charges, though small, paid splendid interest on the additional cost of construction, and the fact that they were always in demand proved that the men did not grudge the additional charge, which ensured them some privacy and a chance to keep clear of the dirty and undesirable element which, however small in proportion, is often to be found in a mine bunk-house. This bunk-house was planned and built by the then manager, Mr. E. Rammelmeyer."

The 1905 "Annual Report" contained the meagre information that "the Emily Edith is operated by Mr. M. S. Davys, under lease and bond, and it is reported that there is sufficient ore in sight now to pay for the mine." Apparently, though, that report was not well founded, for about this time, probably in the first half of 1906, it was stated that the Emily Edith was under lease to the Canadian Metal Company, which in that year made an attempt to smelt lead-zinc ores at Pilot Bay smeltery. However, the lease, if held by that com-

pany for a while, was allowed to lapse, for, in 1908, it is found, the property had passed to the possession of Messrs. John A. Finch and Geo. H. Aylard, owners of the adjoining Standard group, situated higher up the mountain-side. Since then, until early in 1911, only a very little work was done in one of the Emily Edith tunnels, and then for a while even that was stopped. Now the Standard Company has resumed work in the highest long adit tunnel, which is about 750 feet vertical depth below the lowest (No. 6) tunnel of the Standard mine.

As the Emily Edith may be expected to yet play an important part in connection with the further development of the property of the Standard Silver-Lead Mining Company, now one of the dividend-paying mines of the province, the following excerpts from a description, written by Mr. A. C. Garde, formerly manager of the Payne mine, for the Zinc Commission Report, 1908, will probably prove of interest and at the same time be useful for future reference as development in the lower levels of the amalgamated Standard-Emily Edith property shall be proceeded with.

"The Emily Edith mine is situated from 800 to 1,100 feet above Slocan Lake, and is three or four miles north of Silverton. It is reached over a good wagon road. The country rock in the immediate vicinity consists of shales and slates, and the Emily Edith lode impressed me as being a considerably crushed and widely mineralized ore zone in that formation. It shows much irregularity in its width, course, and dip. There are on the property, altogether, six adit tunnels, from which many drifts and cross-cuts extend in the direction of one or both of the walls. The total of work done is probably about 8,000 linear feet. I visited four of these tunnels and located the principal zinc ore-shoot of the mine in each of them, these representing a vertical depth of 173 feet, or about 250 feet, measured on the dip of the vein. The ore body is no doubt continuous for this distance, and of importance as a concentrating ore. Recently a mill test was made at the Wakefield concentrator on a 100-ton lot, and a representative sample of the zinc concentrate produced from the ore, was secured for experimental purposes.

"In the upper tunnel, No. 02, the ore body referred to above shows for a distance of 60 feet, averaging about two feet in width. In the next tunnel, No. 01, which is 57 feet below No. 02, the ore can be seen to better advantage, and measures in one place 6 feet in width. . . . The vein itself is of considerable width, and the pay-ore appears to lie on both walls, which are from 10 to 30 feet apart. . . . In tunnel No. 1, which is 53 feet vertically lower than No. 01, the same ore body can be observed immediately below its exposure in No. 01. . . . The ore-shoot has been exposed intermittently along the supposed footwall for 250 feet; also in a drift back of the supposed footwall for about 75 feet. The pay-ore in both drifts is from two to three feet wide, and fairly continuous. At one place along the level the ore body widens out to 6 feet 6 inches. . . . The next level, No. 2, is 63 feet vertically below No. 1, and exposes the ore-shoot for about 75 feet along the level. . . . In a cross-cut the ore body shows a distinct width of 10 feet. This showing, however, has not been followed up, evidently because the original company was not developing the property for zinc. The galena associated with the ore could evidently not be mined and sorted at a profit, and would require concentration. . . . While there is no tonnage of ore actually blocked out in this property, there

is undoubtedly a considerable quantity of concentrating ore to be relied on. I should estimate this roughly at 10,000 tons of ore, containing 22 per cent. zinc, 6 per cent. lead, and 6 ounces of silver to the ton. Systematic development is likely to increase this tonnage materially.

"In tunnels Nos. 3 and 4 there has been considerable drifting and cross-cutting done, but so far it has not proved successful in locating the above-mentioned ore body or any others. Tunnel No. 3 is entirely off the course, and must have been driven for other purposes than the one of showing up existing ore bodies."

The assay value of the samples taken by Mr. Garde have been omitted from the above excerpts, for the reason that development work in the lowest level of the Standard has proved the occurrence there of much ore of higher grade in silver and lead, and since it is expected that these ore-shoots will be found to continue downwards to the depth of some of the Emily Edith adits, those assays are not likely to prove fairly representative of what may be found in lower ground the Standard will open.

MACHINERY AND EQUIPMENT NOTES.

The Sullivan Machinery Company has put on the market a new rock drill—the "Lightweight." The "Lightweight," weight 155 pounds, can be readily set up and run by one man, and has larger capacity and greater drilling speed than the hammer type. The cylinder diameter is $2\frac{5}{8}$ inches. It drills holes nine feet deep for $1\frac{1}{2}$ -inch powder. The length of feed is 24 inches. The drill requires 70.5 cubic feet of air at 70 pounds pressure, 92.5 feet at 85 pounds, and 110.5 feet at 100 pounds. It is designed to be mounted on a $3\frac{1}{2}$ -inch mining column, but the trunnion will fit any standard tripod or column. Among the new features embodied in the "Lightweight" are: Automatic lubrication, counterored cylinders rifle bar with five plates, steel collar under ratchet head, front cylinder head of drop forged steel, external and internal dowels, reversible shell, and new style malleable iron throttle valve.

BRITISH COLUMBIA COPPER COMPANY.

The preliminary figures for April's production of the British Columbia Copper Company are placed at between 860,000 and 875,000 pounds, and the earnings, based on the billed price of copper at \$48,000. It is believed, when settlement is made for the month, that this last named figure will exceed \$50,000. The April production and earnings both show a falling off from those of March when the former amounted to 1,043,173 pounds and the latter to \$65,243.

The decrease shown in April was caused by a slide or cave in the ore at the Motherlode mines, which delayed production and interfered with the operation of

The Michigan College of Mines is to be congratulated on being the first among the mining schools of this continent to recognize that science graduates should be able to write a report in grammatical English. This important discovery has led to the establishment of a department of technical writing at the Michigan school, and a course in this subject will be included in the curriculum, commencing next year. Our Canadian mining schools might advantageously follow this excellent example.

PORTLAND CANAL MINING COMPANY.

Mr. W. J. Elmendorf in his report as manager states: There seems to be an opinion on the part of many that the mine is worked out and colour may have been given to this report by the cessation of operations and the failure to put the property on a profitable basis during the past year. The mine is by no means worked out. At the time we closed down it was producing 100 tons per day with about 30 men in the mine. The porphyry dyke is fairly well defined on the surface and future development in the mine can be away from it. Its extent and position are even better shown by the underground workings and, apparently, the faces of both No. 2 and No. 3 drifts are beyond it. Drifting to the south will probably disclose new ore and the completion of the Max raise to the surface at what is known as the Upper Open Cut will, in all probability, put more than 200 feet of ore in shape to stope. The fact of this raise is now in ore and there is eight feet in width of ore in the Upper Open Cut. I am as strongly of the opinion as ever that the mine is a good property and will be worked at a profit with further development. We have been unfortunate first, in the seemingly unwarrantable delay in the delivery of the machinery, and, second, in entering a low-grade ore zone at the time when it was, from every standpoint, most important to make a good showing."

After describing all the improvements on the property as of the best and in good order, Mr. Elmendorf continues: "Rather extensive exploratory work on the surface, done both by us and our neighbours, has demonstrated the existence of a main fissure zone, several hundred feet in width and perhaps five miles in length. Within this zone are included most of the ore deposits of the vicinity and more or less ore has been exposed on practically every claim through which it extends. As this zone is well defined where it crosses Glacier Creek at a point nearly 2,000 feet lower than our present workings, the question as to the advisability of developing the mine from that, or an even lower level suggested itself. This evolved the co-operation of several of the adjoining properties and steps have been taken to secure this with every promise of success. It now seems probable that the necessary financial assistance to properly carry on the enterprise will be forthcoming as soon as the weather conditions will permit of the careful examination of the surface and underground workings of the several mines.

With a larger basis of operations, extensive development of the vein, or veins, increased milling capacity and better facilities for mining, milling and transportation, it is reasonable to expect a successful outcome to this enterprise and ultimately a very large and profitable mine. All this depends, without doubt, upon the opening of large ore bodies of profitable grade, but I have yet to hear the first unfavourable opinion on this point from any competent engineer who is acquainted with the properties and many such, including the eminent men of the profession, have visited the mines."

A series of interesting experiments have been conducted recently at the University of Wisconsin to determine the effect of alloying iron with copper-nickel. The results, it is stated, indicate that the existing prejudice against the presence of copper in iron or steel is not warranted; and suggest a further utilization for monel metal in connection with steel making.

SPECIAL CORRESPONDENCE

ONTARIO

Cobalt, Gowganda and South Lorrain.—A development which will have marked effect upon the future possibilities of the Kerr Lake section has been carried out on the Crown Reserve within the past month. So far while the Crown Reserve has demonstrated unexpected wealth laterally above and at the 200-foot level, little addition has been made to the ore reserves by exploration in the keewatin or diabase below that point. Now a vein has opened up which appears to offer a very definite hope that exploration will be fruitful at depth in the Kerr Lake area. In the Silver Leaf shaft sunk by the Crown Reserve on the north shore of Kerr Lake a crosscut has been run towards the Crown Reserve line at the 500-foot level. Some weeks ago a vein a foot wide of calcite and quartz was cut showing a little native silver. To-day sixty feet of this vein has been opened up in Crown Reserve alone. The vein of quartz and calcite varies from six inches to two feet. In the centre of this gangue material is the pay streak four to six inches wide containing from a thousand to four thousand ounces in silver to the ton. Already severeral tons of this ore have been raised. The rock is, or appears to be, altered diabase and the silver is associated with copper pyrites, galena and zinc blende. There is no trace of a vein on the surface. A crosscut is being run now to endeavour to pick up the same vein on the 200-foot level. The Silver Leaf from which the exploration work which has resulted in the discovery of the vein, was conducted, is under option to the Crown Reserve Mining Company, the contract taking effect from October 4th, 1909, for a period of five years, with option of renewal for another five years. The royalty for the first period is 25 per cent.; for the second 35 per cent. The Crown Reserve spent \$20,000 on the property for the first year of the option and is disbursing \$10,000 a year now and as long as the option lasts.

Exploration work on the La Rose has reached a very interesting stage. Crosscutting 380 feet below the surface and 280 feet from the top of the winze is in progress, and both faces are in good coarse conglomerate, and development on the Meyer vein of the Nipissing near the Keewatin contact gives hope of a successful conclusion to the hunt for further ore on the La Rose.

The Princess was, last month, the mainstay of the La Rose group, it producing \$40,000 net, while the Lawson showed some falling off. The latter mine, with its short, but marvellously rich, ore shoots, produced over 2,000,000 ounces last year. The No. 9 vein has held out surprisingly well and many rich pockets have been developed on it.

At the Fisher Eplett, the South Coleman property of the La Rose Consolidated, two promising veins of calcite and quartz have been cut, one of which is a foot wide. As all the ore in this district occurs in lenses the probability of running into similar rich ore shoots along the extension of these veins appears very favourable. Further development of the Violet by the La Rose has not led to any favourable re-valuation of the property which was worked in the very early days of the camp, but shut down long before the La Rose Consolidated acquired it. It is in the diabase adjoining the Silver Cliff and the Colonial.

Strong pressure is again being made to have the royalties on some of the Cobalt mines reduced, notably, the

City of Cobalt, the Chambers-Ferland and the O'Brien. The City of Cobalt has ceased paying dividends for two years now and the Chambers-Ferland never has made a disbursement and it is felt that all the profit now being made goes to the government in royalties. The City of Cobalt pays 25 per cent. net to the T. & N. O. Commission, the Chambers-Ferland, 25 per cent. net to the Ontario Government and the O'Brien 25 per cent. gross to the Ontario Government.

Taking into consideration the awful condition of the road between Elk Lake and Gowganda, work proceeds with success in the Gowganda camp. In addition to the Millerett and the Miller Lake-O'Brien which have been regular producers for some time now, the Mann can now be definitely classed as a mine. A good ore shoot has been opened up at the 100-foot level. This company has also taken over the Boyd-Gordon and is now pushing a drift in ore to the line. The head of the drift is now within thirty feet of the line. The South Bay Mining Company, which has taken over the O'Brien-Jacques claim, has also obtained control of the Remy properties and is doing considerable development work.

At Hangingstone Lake the Temiskaming and Hudsons Bay Company has recently cut two good veins in the drift. This company now has a good plant installed and is working steadily. All supplies for the camp still go in by Latchford and up the Montreal River to Elk Lake. The right of way on the T. & N. O. branch from Earlton has been cleared and grading is in progress all along the line. The line will cross the Montreal River near the old Hitchcock property and run up the west shore of Elk Lake to the settlement.

Last month the McKinley-Darragh produced 306,000 ounces. The management believes that the production this year will amount to over 3,000,000 ounces, as it can now be stated with considerable confidence that the production for the first six months will reach 1,500,000 ounces. This will be a considerable increase as total ounces last year amounted to 2,640,177 only.

The increased production may be attributed to two new veins that have been discovered under the swamp this year. The Savage is also making new records.

The Coniagas is now making preparations to open up the southern end of their property. To attain this end a crosscut is being run from the 225-foot level under the centre of the town to a point below the corner of the Hunter block. A raise will be put through to connect with the old shaft sunk some years ago at the corner of Silver street and Prospect avenue, but which has never been used so far.

As a result of the annual meeting of the Peterson Lake Mining Company, the present directorate, headed by Sir Henry Pellatt* is more firmly established than ever. The balance sheet showed that there was \$44,022 cash in the bank at the end of the year. The operating account for the year showed a loss of \$1,463, total receipts being \$8,757 and expenses \$10,220. All the leases were cancelled with the exception of the Kerry now worked by the Seneca Superior Company and the Gould. The plant of the Little Nipissing Company was purchased for \$2,400, and the company is now developing that lease itself.

Porcupine and Swastika.—Concurrently with the formation of the Canada Mining and Development Company many exploration parties have left by way

of Cochrane for the discovery of mineral in or near the east coast of Hudsons Bay. The new company is by far the best equipped so far for the examination and exploitation of properties in the initial stages and they already have some of the best prospectors in the North country in the field. Sir William Mackenzie who is in the new company has had a man in the Hudsons Bay field for almost two years now. It is probably this region that will receive first attention by the new company.

Two other expeditions have started during the past month, both heading for the East Main River as the base of their operations. The Donaldson party financed by a Montreal syndicate has taken up seventeen men, two gasoline boats and eight tons of provisions. They will stay in the country four months. Some of the men will be left on Clark's Island to develop an iron deposit which has already been staked by a member of the syndicate, and the remainder will be split up in two or three parties proceeding up the East Main River. Their objective is placer gold.

J. D. Grant, who has been mainly responsible for the many stories of diamond finds on Hudsons Bay has also taken in a small party. They are going in by the Not-taway River to Ruperts House and so to East Main River. A visiting South African who was shown some of the stones which were said to have come from Hudsons May declares that they are not diamonds at all, but white sapphires, and so of not any great commercial value.

The troubles which have attended the operations at the Dome mill ever since stamps commenced to drop at the latter end of March, now appear to be over. The one source of trouble has been the tube mills. These cylinders went through the heat of the July fire, and when they came to be tested out the "heads" on three of them broke repeatedly. Production was cut down by more than one half. Now all the forty stamps are dropping and three of the tube mills are in commission and from 200 to 300 tons per day are being treated.

The staff at the McIntyre Porcupine mine has been very materially reduced, the management feeling the necessity of economizing. Mr. F. P. Swindler, who has for the past two or three months been in charge of operations has left the camp with W. Cooper, who has been in charge of underground operations. The mine will now be operated by C. B. Flynn. The object of the reduction is to make the mine self-supporting, the little ten stamp mill to provide running expenses until such time as the larger mill is completed.

The Pearl Lake Mining Company has resumed operations under the charge of Col. Stevenson, the representative of a syndicate of Pennsylvania railroad officials, who have become interested in the Porcupine district. The shaft at the Pearl Lake is to be sunk directly to the 800-foot level while at the same time the crosscut which had already been commenced at the 400-foot level to find the ore body is continued. The syndicate is to spend \$250,000 on the property under the terms of the agreement and is going conservatively to work.

The Vipond mill will be running before this appears in print. The machinery has all been installed with the exception of one ten horse power motor which has been lost en route. The mill can be started up twenty-four hours after this piece of machinery arrives.

Under the direction of Mr. W. Janitsch, the position at the Standard appears more hopeful. In the drift at the 100 foot level another rich ore shoot has been en-

countered in a crosscut opened up from the main vein. An adequate plant is now being installed on the property.

At the Moneta a body of quartz some fifteen feet wide has been crosscut at the 180-foot level but so far values have been so low as not to warrant the hope that it would make pay ore. A contract has now been let to diamond drill from the drift.

NOVA SCOTIA

Port Hood Commission of Enquiry.—The Government of Nova Scotia during the Easter Session appointed the Deputy Commissioner of Mines, and Messrs. McEachern and McKenzie, of the Dominion Coal Company's staff, as a Commission of Enquiry into the flooding of the Port Hood Colliery. These gentlemen spent the week ending the 1st of June on the ground at Port Hood.

A New Rescue Car.—The Nova Scotia Steel & Coal have recently equipped a rescue car to serve their collieries, which possesses many novel features. It is designated somewhat on the lines of the rescue cars of the United States Mines Bureau, but has unique improvements. The car is fitted at one end with hose and reel, and other fire-fighting appliances, and the end of the car will drop so as to form a platform on which to run out the hose reel. In another section of the car are 12 Draeger apparatus, complete with oxygen refill pump, oxygen reserve. Electric hand lamps are provided, together with a charging station for the accumulators of the lamps. Sleeping accommodation and blankets are provided for the rescue teams, and the car is provisioned. A full equipment of surgical bandages, splints, antiseptics and restoratives is also provided. The car is fitted with a portable telephone attachment, and it can be connected with the nearest telephone circuit immediately. A system of fire whistles has been arranged, and the locomotive driver nearest to the car has instructions to attach his engine upon hearing the alarm in readiness to convey it to the required place.

Dominion Coal Outputs.—The Coal Company again exceeded all previous production figures in the month of May, the output from the Glace Bay mines totalling 388,536 tons. This is the largest tonnage yet hoisted in any one month, the highest previous production being 387,927 tons in August, 1911. The figures for the individual collieries were approximately as under:

No.	Tons.
1	52,204
2	73,770
3	12,014
4	37,486
5	24,658
6	26,332
7	16,558
8	13,709
9	37,386
10	18,190
12	27,752
14	25,969
15	9,021
16	9,773
21	2,113
22	1,601

388,536

New records were established by No. 2 Colliery and by No. 12 Colliery, and Nos. 15 and 16 Collieries appear as fairly large producers. Both these mines are now averaging an output of 500 tons daily. During the four closing days of the month, i.e., from the 29th to the 31st inclusive, the output totalled 67,357 tons, or an average of 16,600 tons per day.

The output for the first five months of the year compares with previous years as follows:

	Tons.
5 months ending May 31st, 1908...	1,585,364
5 months ending May 31st, 1909...	1,273,676
5 months ending May 31st, 1910...	1,196,919
5 months ending May 31st, 1911...	1,524,539
5 months ending May 31st, 1912...	1,732,610

The increase for the five months over the corresponding period of last year amounts to 208,000 tons, and is almost 150,000 tons greater than the figures of 1908, which up to the present time were not equalled.

The Springhill collieries produced during May 37,800 tons, making a total for the five months ending May of 180,800 tons, an increase over 1911 figures of nearly 130,000 tons.

The combined increase in the output of the Glace Bay mines and the Springhill mines over 1911 tonnages amounts to over 336,000 tons to the end of May.

Notwithstanding the large output actually obtained, the production should have been much greater, and would be, but for the excessive amount of time lost by the workmen after the mid-monthly pay-day. The "blind pig" is an institution often referred to in connection with the mining camps of the Cobalt and the Porcupine, and the mining companies of Cape Breton know to their sorrow that the species is to be met with in Cape Breton also. Eventually perhaps the well-meaning legislators who enact our laws may come to recognize that it is better to have a properly regulated and legitimized liquor traffic, rather than the illicit sale and manufacture of the appalling mixtures which the miners of Cape Breton are compelled to drink should they wish to indulge in a "nip." Every little while criticisms are heard of the alleged lawlessness of European immigrants to the mining districts and the community is shocked by some murder or stabbing affray. In almost every case these troubles are traceable to liquor, to bad liquor, and the flask habit. Is it to be wondered at that the European immigrant, newly arrived in this country, with vague and grotesque notions of its wildness and dangers, should fail to appreciate the majesty of the law, when he begins to appreciate the Gilbertian situation which exists in Cape Breton where the sale of liquor is concerned? He comes from a country where the sale of liquor is legal and conducted under certain restrictions which no one dreams of attempting to violate openly. When he arrives in Cape Breton he finds that the sale of liquor is illegal, that its transportation is illegal and that the statutes are full of prohibitions connected with liquor and its sale. Nevertheless, it is an open secret that liquor is sold and sold in large quantities. The man who all his life has been accustomed to drinking his innocent lager in public and among his friends, is driven to partaking of the vilest and most maddening concoctions in a secret dive, which he probably will leave with a flask of the same mixture in his pocket, often ending up with a tragedy. Yet the smug public conscience says: "But the sale of liquor is against the law." So far in Cape Breton prohibition has not pro-

hibited, and has merely succeeded in making an outlaw of a traffic which surely of all traffics needs proper legal regulation. When a traffic is illegal it is impossible of regulation, because the law cannot recognize its existence at all. Would it not be far better for all concerned to recognize the danger to our most cherished institutions and to all constituted authority which is fostered by this false position? Better by far to face the wild beast and shackle him, than to shut one's eyes and say the beast does not exist because he has been declared extinct by act of parliament. Oh, the pathetic faith of some people in an act of parliament!

BRITISH COLUMBIA

The following review and forecast of mining operations and mineral production in British Columbia in 1912, has been prepared by Mr. E. Jacobs, of Victoria.

"The outlook for mining in British Columbia for the current year is more promising than has been the case at the corresponding period of any of several recent years, as the following summary will indicate:

"Hydraulicking operations for the recovery of placer gold give promise of being larger on the whole than for some years, for, in addition to those in Atlin division of Cassiar district and Cariboo division of Cariboo district, there are those of the Quesnelle Hydraulic Gold Mining Company in Quesnel division, Cariboo, which company has not heretofore been a producer of gold.

"Lode gold mining has had the addition of the operations of the Motherlode Sheep Creek Mining Company, which commenced crushing early in May; beside which the Hedley Gold Mining Company may be expected to considerably increase its output this year, its tonnage for the first three months of the year having shown an increase of fully 35 per cent.—16,974 tons this year, as compared with 12,559 tons to April 1, 1911—and an almost proportionate increase in net profit, the average of which, in 1911, was \$5.34 per ton of ore milled.

"Silver and lead, also, will probably show an appreciably large increase, for the Sullivan mine, in East Kootenay, promises to in considerable measure compensate for the loss of output of lead caused by the closing of the St. Eugene mine, while in Ainsworth division, the Blue Bell and some smaller mines also non-productive in 1911, are on this year's list of producers, and the Slocan will have the Rambler-Cariboo, Rio, Slocan Star, Standard, and several others, to increase its production of both silver and lead.

"Then, the larger copper mines,—namely, Granby, British Columbia, Copper, and Britannia,—are expected to make an enlarged output of copper, and will also add their quota of silver and gold, which is associated with copper in the mines of the first and second of these, and in smaller degree in the last-mentioned. The Centre Star group and Le Roi No. 2, in Rossland camp, are well maintaining their production of gold-copper ores; indeed the former, now that the Le Roi has been added to it, is gradually increasing its output. In the Coast district, the Marble Bay mine, owned by the Tacoma Steel Company, and situated on Texada island, is the only noticeable producer in addition to the Britannia; its ore yields gold, silver, and copper, and its production continues to be satisfactory.

"Zinc is the only other metal produced in commercial quantity in the province. The provision of railway transportation facilities for the Lucky Jim mine, which has been without them since July, 1910, will allow of

shipment of crude zinc ore from that property as soon as the branch line from Three Forks, on the Canadian Pacific Railway Company's Nakusp to Sandon railway shall be completed—probably during the ensuing summer. There may not be much, if any, silver-zinc concentrate shipped this year from the concentrating plants near Sandon, Slocan, though both the Ruth and Slocan Star mills are equipped for making a zinc as well as a silver-lead concentrate, but it is not at present known to the writer whether or not these will be operated this year. Production of silver-zinc concentrate has been in progress at the Van-Roi Mining Company's mill on Four-mile creek, near Silverton, Slocan Lake, and it may be that the Standard mill at Silverton will also shortly be in a position to ship a zinc as well as a silver-lead product.

“Of course, there are other metalliferous mines than those mentioned above that will contribute considerably to the sum total of production of mineral. For instance, the Arlington, Granite-Poorman, and Queen, all in Nelson mining division, have for years been among the steady producers of lode gold, while the Emerald, in the same division, has shipped much lead and the Molly Gibson silver-lead ore. Then, in Ainsworth division, No. 1, Highland, Utica, Whitewater of Retallack Co's group, and several smaller shippers, may be expected to do their share in making up a goodly total production this year. In Slocan the Reco, Noble Five, Richmond-Eureka, Hewitt-Lorna Doone, and Eastmont, beside probably a score of smaller producers, will also be on the year's list of shippers. Then there will be some ore from the Silver Cup mines, in Lardeau, and from the Blue Bird and, possibly, several other Rossland South Belt properties; while there is likely to be a resumption of shipping in a small way from claims up the West Fork of Kettle River. Still others will produce ore, for the before-mentioned properties by no means exhaust the list, yet enough have been named to support the statement that the outlook is generally promising for an enlarged production of metalliferous minerals.

“Turning to coal, there seems good reason for concluding that prospects are much improved, for working conditions are normal in the Crow's Nest district, South-east Kootenay; the Princeton colliery is better equipped for handling coal than in past years; the Nicola Valley Coal and Coke Company's production should show further increase and two or three of the smaller coal mines in Nicola Valley be in a position to make production in larger degree than last year, while on Vancouver Island the number of mines from which coal is being extracted and the quantity available for mining, together suggest a record output for 1912.

“The demand for coke should be larger this year than last, for, with copper at a higher average price, as has been the case over the five expired months of the year, several smelteries of the interior may be expected to be operated at about full treatment capacity—at any rate those at Grand Forks and Greenwood, if not at Trail, which last may not find its supply of copper ores equal to the requirements of all its copper furnaces.

“Last, as to building materials, etc.: Statistics for the production of building stone, rock used in road and footpath construction, cement, lime, and clay products, make it evident that in late years the estimates for building materials have been less than the actual value of the output. Building and other construction work

is proceeding at such a rate that a total value for 1912 of about \$4,000,000 seems quite a reasonable estimate, for the demand for materials of these kinds in the larger cities of the coast, and in smaller degree in the interior, is increasingly active, while other construction work is also requiring much material.

“Altogether, then, conditions would appear to make a liberal estimate of the value of the current year's mineral production well warranted. Of course, it must be conceded that the approximate estimate outlined below cannot be realized if there shall happen any serious interruption to output or a decrease in average prices below what now prevail. Assuming, then, that neither contingency will arise to prevent promise being realized, the following rough guess at the value of the several classes of mineral may be ventured upon:

Appropriate Estimate of Mineral Production in 1912.

Mineral.	Value.
Gold, placer	\$ 700,000
Gold, lode	6,000,000
Total gold	\$ 6,700,000
Silver	1,500,000
Lead	1,500,000
Copper	6,500,000
Zinc	300,000
Total metalliferous	\$16,500,000
Coal	\$10,000,000
Coke	1,200,000
Total	\$11,200,000
Building materials, etc.....	3,800,000
Total non-metalliferous	15,000,000
Estimated total value	\$31,500,000

“If this estimate shall be realized, the value of the year's mineral production will be \$8,000,000 higher than that of 1911, and \$5,123,000 higher than that of 1910, which latter was the highest in the history of mining in the province, and it will bring the aggregate value of production in all years on record up to more than \$429,000,000.

“Knowing how risky it is to make a forecast thus early in the year, I must again mention that the estimate has been made on the assumption that present promise as to both amount of production and average prices throughout the year, will be well maintained, for, if either or both of these shall not be, then the value of the year's production will be proportionately less.”

RAND OUTPUTS.

The gold output for April of the mines on the Witwatersrand amounted to 706,763 ounces of fine gold, and from the outside districts 30,897 fine ounces, total 737,660 ounces, valued at £3,133,383, as against 830,723 ounces, valued at £3,528,688, in March. This is a decrease of 93,063 ounces, or £395,305, on the month, but it will be remembered that the March total included 70,143 bullion reserves extinguished, while, moreover, April was, of course, only a thirty days' month. The daily average for April was 24,589 ounces, against 24,535 ounces (excluding the bullion reserves extinguished) for the previous month, and thus constitutes a record.

STATISTICS AND RETURNS

B. C. ORE SHIPMENTS.

May 24.—With last week's shipments the ore production of the Kootenay and Boundary district for the year to date topped the nine hundred thousand-ton mark and from now onwards this total, which is considerably higher than that for the same period last year, is certain to gain at a rapid rate over the figures for 1911 for the reason that the Molly Gibson mill and the Mother Lode mill are commencing operations, the Silver Hoard mine at Ainsworth and several other properties in that camp are expected to be on the producing list early next month and increases are looked for in the production of the Slocan mines.

Last year the week ending May 26 saw the last production of the Granby mines for some five months on account of the Crow's Nest coal strike.

Three Mines Show Heavy Gain.

Three mines which this year have contributed most heavily to the increased ore production are the Granby, the Mother Lode at Greenwood of the British Columbia Copper Company and the Le Roi at Rossland. To this date last year the Granby had produced 458,982 tons, compared with 489,339 this year; the Mother Lode 138,049, against 154,452 this year, and the Le Roi 5,099 tons, compared with 19,282 this year.

The big Mother Lode mill at Sheep Creek is expected to be in operation within the next week or ten days. A 24 hours' trial run was made with satisfactory gold output, but a minor mishap to some machinery caused a breakdown which necessitated some delay in resuming operations.

The Standard mine, the big Silverton dividend payer, is keeping up its heavy shipments, sending 183 tons to Trail smelter last week.

For the week the ore production was 47,250 tons; for the year to date 903,026 tons. The smelter receipts for the week were 44,791 tons; for the year 857,190 tons. The shipment from the Silver King is from a clean-up at the Hall mines smelter. In detail the figures are:

East Kootenay.

Sullivan	850	11,728
Monarch, milled	200	3,800
Other mines	...	1,028
Total	1,050	16,650

Nelson.

Arlington	29	699
Queen	39	149
Molly Gibson	104	931
Silver King	20	20
Granite-Poorman, milled	250	5,500
Queen, milled	300	4,800
Molly Gibson, milled	300	600
Other mines	...	2,798
Total	1,042	15,497

Slocan and Ainsworth.

Standard	183	13,501
Van-Roi	92	1,418
Rambler-Cariboo	24	521
Standard, milled	300	6,000
Van-Roi, milled	800	16,500
Other mines	...	6,182
Total	1,399	34,122

Rossland.

Centre Star	3,745	62,384
Le Roi No. 2	516	11,701
Le Roi	889	19,282
Le Roi No. 2, milled	300	6,100
Other mines	...	69
Total	5,450	99,536

Boundary.

United Copper	38	73
Granby	25,218	489,339
Mother Lode	6,808	154,452
Unnamed	392	3,890
Rawhide	5,699	75,731
Jackpot	154	7,066
Other mines	...	6,664
Total	38,309	737,215

Granby Smelter Receipts.

Granby smelter receipts, Grand Forks, B.C.:		
Granby	25,218	489,339

B. C. Copper Co. Receipts.

British Columbia Copper Company's receipts, Greenwood, B.C.:		
Mother Lode	6,808	154,452
Unnamed	392	3,890
Rawhide	5,699	75,731
Jackpot	154	7,066
Other mines	...	5,003
Total	13,053	246,142

Trail Smelter Receipts.

Consolidated Company's smelter receipts, Trail, B.C.:		
Sullivan	350	11,728
United Copper	38	73
Le Roi No. 2	516	11,701
Le Roi	889	19,282
Centre Star	3,745	62,384
Rambler-Cariboo	24	521
Van-Roi	92	1,418
Standard	183	13,501
Silver King	20	20
Molly Gibson	104	931
Queen	39	149
Arlington	29	699
Other mines	...	9,301
Total	6,520	121,709

COBALT ORE SHIPMENTS.

The ore shipments of the week amounted to 12 cars, all of which, with the exception of two cars sent from the Nipissing, were of high-grade ore. The Coniagas headed the list with three cars, and the Temiskaming appeared this week as an ore shipper, while it also sent out a consignment of bullion. The Chambers-Ferland made another of its infrequent appearances in the list of shippers, and the Buffalo also sent out a car of concentrates.

The shipments for the week and year, in tons, to date are as follows:

	Week June 7.	Total.
La Rose	32.29	1,491.55
Coniagas	76.32	889.82
O'Brien .....	.....	263.24
Right of Way .....	.....	148.60
Chambers-Ferland	32.00	225.60
McKinley-Darragh	68.64	1,209.00
Nipissing	76.10	901.28
Hudson Bay .....	.....	312.62
Buffalo	32.80	475.52
Crown Reserve .....	.....	210.26
Cobalt Townsite .....	.....	536.78
City of Cobalt .....	.....	14.84
Trethewey	33.65	241.04
Colonial .....	.....	41.60
Kerr Lake .....	.....	319.66
Cobalt Lake .....	.....	207.41
Drummond .....	.....	318.77
Temiskaming	32.00	416.87
Beaver .....	.....	187.80
Wettlaufer .....	.....	11.21
Provincial .....	.....	22.22
Casey Cobalt .....	.....	24.50
Totals	389.71	8,577.77

Only two mines appeared amongst the bullion-shippers of the week, these being Nipissing and the Temiskaming. Campbell & Deyell sent out the shipment of bullion from Temiskaming ore. The shipments for the week were as follows:

	Ounces.	Value.
Nipissing	73,378	\$46,092.34
Temiskaming	2,331	1,421.91
Totals	75,709	\$47,514.25

The bullion shipments for the year to date are as follows:

	Ounces.	Value.
Nipissing	1,661,141.75	\$966,984.52
Crown Reserve	207,203.00	115,951.19
Temiskaming	2,331.00	1,421.91
O'Brien	88,433.01	50,964.00
Nova Scotia	49,010.00	31,800.00
Buffalo	38,938.00	22,714.54
McKinley-Darragh	10,327.00	6,069.37
Kerr Lake	7,240.25	4,381.21
Trethewey	5,703.60	3,238.00
City of Cobalt	1,618.40	1,000.00
Colonial	1,698.00	1,018.00
Miscellaneous	10,268.81	10,798.64
Totals	2,146,778.88	\$1,250,146.34

EL ORO (MEXICO) FOR APRIL.

The following despatch by cable to London gives El Oro April returns:—

“Mill ran 26 days; crushed 17,810 tons of ore; tailings retreated, 15,270 tons; producing a total of U.S. \$169,340; less working expenses U.S. \$90,510; development expenses U.S. \$24,740—U.S. \$54,090. Profit from the railway for the month, U.S. \$8,420—U.S. \$62,510, or £12,502, less estimated monthly expenses, London and manager's salary, £700—£11,802. The sum of U.S. \$950 was expended during the month on permanent improvements (not included in the above expenses).”—(March profit, £11,722.)

ECONOMIES AT THE GOLDEN HORSESHOE MINE.

By the installation of new stamps, tube mills and concentrating tables and sand vats, treatment costs have been reduced at the Golden Horseshoe mine at Kalgoorlie. In his report for last year, recently issued, Mr. J. W. Sutherland, the general manager, states that the treatment cost for 1911 was 10s. 0.27d. per ton, and he adds that “on last year's tonnage this shows a saving of £28,798; of this total £14,021 represents economy in power and £14,777 is on account of the greater efficiency of the treatment plant.” Apart from the great economy effected, the installation of new plant was necessary, as without it the tonnage treated and the development work would have had to be considerably curtailed; besides this, the company has the necessary margin of power and plant available to treat the further expected increase in tonnage raised, it having been found that the tube mills allow of crushing with a much coarser screen than was anticipated, thus increasing the capacity of the plant. The extraction last year at this mine was 85.53 per cent., excluding the gold from the re-treatment of tailings.

SAND TREATMENT AT THE WAIHI GRAND JUNCTION.

At the Waihi Grand Junction Mine (New Zealand) the treatment of the sand by merely washing it by percolation has given such satisfactory results that two more hydraulic sizing cones are being installed, so that the whole of the sand produced can be separated and similarly treated. The percolation treatment is stated to cost 4d. per ton less than agitation and vacuum filtering, and there is an additional gain inasmuch as the vacuum filters are relieved of the filtering of the sand, and are thus free to deal with an increased tonnage of slime. The fineness of the sand averaged:—

Retained on 100 mesh.....	8.3 per cent.
Retained on 150 mesh.....	28.4 per cent.
Retained on 200 mesh.....	27.5 per cent.
Passed through 200 mesh.....	35.8 per cent.

and the battery superintendent states that percolation through it has been remarkably fast and even, the washing being almost perfect.

QUEENSLAND GOLD RETURNS.

The following are the April gold returns of Queensland:—

	Tons crushed.	Yield in ozs.	From Copper ores, ozs.
Charters Towers	11,600	9,100	100
Croydon.....	1,000	1,200	...
Gympie.....	11,300	3,100	...
Mount Morgan	7,200	3,600	8,100
Ravenswood.....	4,100	2,800	...
Other sources*	3,700	1,000	1,500

* Alluvial 200 ounces.

Total yield in ounces, 30,700. Dividends, Croydon, £1,200; Gympie, £1,000.

The following cable was sent to London, Eng., on May 14th:—

Casey Cobalt—Cable:—“Total length drift vein 6, approximately 220 feet, ore chute approximately 180 feet; average width is 4 inches; average value, approximately 6,000 ounces; ore bagged, 34 tons.”

TORONTO MARKETS.

June 11.—(Quotations from Canada Metal Co., Toronto)—
 Spelter, 6.50 cents per lb.
 Lead, 5 cents per lb.
 Antimony, 8 to 9 cents per lb.
 Tin, 50 cents per lb.
 Copper, casting, 17¾ cents per lb.
 Electrolytic, 17½ cents per lb.
 Ingot Brass, 7 to 12 cents per lb.
 June 11.—Pig Iron—(Quotations from Drummond, McCall & Co., Toronto)—
 Summerlee No. 2, \$23.50 (f.o.b. Toronto.)
 Midland No. 1, \$19.75 to \$20.50 (f.o.b. Toronto.)
 Midland No. 2, \$19.75 to \$20.50 (f.o.b. Toronto.)

GENERAL MARKETS.

Coal, anthracite, \$5.50 to \$6.75.
 Coal, bituminous, \$3.50 to \$4.50 for 1¼-inch lump.
Coke.
 June 7.—Connellsville coke—(f.o.b. ovens.)
 Furnace coke, prompt, \$2.20 to \$2.30 per ton.
 Foundry coke, prompt, \$2.35 to \$2.50 per ton.
 June 7.—Tin, Straits, 47.50 cents.
 Copper, Prime Lake, 17.50 cents.
 Electrolytic, Copper, 17.25 cents.
 Copper Wire, 18.25 cents.

Lead, 4.20 cents.
 Spelter, 7.00 cents.
 Sheet zinc (f.o.b. smelter), 8.65 cents.
 Antimony, Cockson's, 8.00 cents.
 Aluminium, 21.00 to 22.00 cents.
 Nickel, 39.00 to 40.00 cents.
 Platinum, ordinary, \$45.50 per ounce.
 Platinum, hard, \$47.00 per ounce.
 Bismuth, \$1.80 to \$2.00 per lb.
 Quicksilver, \$41.00 per 75-lb. flask.

SILVER PRICES.

	New York	London
	cents.	pence.
May 22	61½	28½
May 23	61	28½
May 24	60¾	28
May 25	61½	28½
May 27	61	Holiday
May 28	61	28½
May 29	61	28½
May 30	..	28½
May 31	61	28½
June 1	60¾	28
June 3	60¾	27½
June 4	60¾	28½
June 5	60¾	28
June 6	60¾	28

SHARE MARKET

(Courtesy of J. P. Bicknell and Company, Standard Bank Building).

June 5, 1912.

New York Curb.

	Bid.	Ask.
Braden	.07½	.07¼
B. C. Copper	.05¾	.06
Giroux	.05¾	.05¾
Greene Cananea	.10½	.10½
Inspiration	19.25	19.50
Yukon Gold	.03¾	.03½
Goldfield Con.	4.37½	4.50
Nevada Con.	22.75	23.00
Miami	26.75	27.00
Ray Con.	20.00	20.12½
Chino	33.62½	33.87½
United Copper	¾	1.00

Cobalt Stocks.

	Bid.	Ask.
Bailey	.02½	.02¾
Beaver Con.	.44½	.46
Buffalo	1.30	1.55
Chambers-Ferland	.17	.18½
City of Cobalt	.15	.17
Cobalt Lake	.24	.25
Coniagas	7.00	.....
Crown Reserve	3.00	3.25
Great Northern	.07½	.08
Gould Con.	.02½	.03
Gifford	.02	.03½
Green Meehan	.01¼	.01½
Hargraves	.05	.06
Kerr Lake	2.80	2.90
La Rose	3.30	3.70

McKinley-Darragh	1.74	1.80
Nipissing	7.75	8.00
Ophir	.09	.02
Otisse	.01¾	.02
Peterson Lake	.06¼	.07
Right of Way	.09	.10
Silver Leaf	.04	.05½
Silver Queen	.02	.04
Temiskaming	.41	.12
Trethewey, ex div.	.45	.49
Wettlaufer	.57	.60

Porcupine Stocks.

	Bid.	Ask.
Apex	.03	.04¼
Dobie	.30	.50
Crown Charter	.14¼	.14¾
Dome Extension	.32½	.33
Eldorado	.03	.06
Foley-O'Brien	.19	.22
Hollinger	10.60	10.80
Jupiter	.29	.30
Moneta	.08	.10
Nor. Ontario Exp.	2.00	3.00
North Dome	.25	.....
Pearl Lake	.20	.22
Porc. Imperial	.02	.03
Porc. Tisdale	.02	.02¾
Preston East Dome	.04¼	.05
Rea Mines	.30	.37
Standard	.02¾	.03¼
Swastika	.14½	.15¼
Vipond	.37	.39

West Dome .....	.17	.25
United .....	.01½	.02½
Sundry.		
	Bid.	Ask.
Island Smelters .....	.03	.04
Can. Marconi	5.25	6.00
Amer. Marconi	9.25	9.50

According to the revised statistics of the Mines Branch for 1910, the following figures represent the gypsum production of Canada:

	Tons.	Value.
Nova Scotia.....	400,455	\$458,638
New Brunswick.....	90,236	213,579
Ontario.....	15,055	67,229
Manitoba.....	19,500	195,000
Total	525,246	

The method of valuing evidently varies. In the case of Nova Scotia the gypsum is appraised as crude. Imports of crude were valued in 1910 at \$12,137; ground at \$17,402; and plaster of Paris at \$123,965. Crude is duty free into Canada; ground carries at duty of 15 per cent.; and plaster of Paris a duty of 12½ cents per hundredweight.

The following cable was sent to London, Eng., early in May.—

Cobalt Town Site Silver—Mining results for week ended 11th May:—"Value of production, £3,518; operating expenses, £1,270; weekly profit, £2,248. Tons to mill, 580; enhanced expenses principally heavy mill tonnage. Canadian directors declared special bonus 5 per cent. payable with regular quarterly dividend August next."

The Guggenheim interests have sent an automobile up to Dawson, Yukon territory, to be used in connection with their mines in that distant part of Canada.

THE ANALYSIS OF TIN ORES.

The ore is roasted, extracted with hydrochloric acid, and the residue melted in a Hessian crucible with potassium cyanide. The heating is continued for a short time at a low temperature. The regulus is weighed, dissolved in hydrochloric acid, the tin precipitated with aluminium, and then dissolved in hydrochloric acid in an atmosphere of carbon dioxide. The solution is then titrated with ferric chloride solution, using potassium iodide and starch as an indicator.

The complete British Columbia plant is again in commission and operating entirely satisfactorily. From May 1st to May 15th inclusive, production amounted to 300 tons of copper which, if maintained, would indicate an output of 1,240,000 pounds for the month,—a record production for the company.

The mica industry of India gives employment to about 14,000 people. The wages paid are from 4 to 20 cents per day. The employees pay for their own board and lodging. The total annual output is valued at about \$275,000. Very little machinery is used.

NOVA SCOTIA STEEL AND COAL.

The Nova Scotia Steel and Coal Company's annual report, considering the depression which has prevailed in the steel trade during the past year as a result of the chaotic business conditions in the United States is much more favourable than was generally looked for. Profits for 1911 amount to \$1,019,393.51. With the exception of the year 1910 the figures are the largest in the company's history, exceeding those of 1909, which was a record year, by \$112,000. That a new record was not established was due to the exceedingly poor prices which have prevailed, every department of the company's operations, excepting coal mining, having shown the largest outputs yet secured.

While no change is made in the six per cent. dividend on the common stock, the various accounts are placed in a much stronger position.

During the year, \$1,101,145.31 has been expended on capital account at the company's various plants. The property and mines account has been reduced \$100,000 by the sale of the Ferrona Railway.

Following out its policy of building up strong reserves, there has been added to the general reserve fund, in addition to the sinking fund payment the sum of \$96,124.25, nearly \$20,000 more than the previous year. The fire insurance fund has also been materially increased.

After making ample provision for depreciation by writing off \$73,880 for betterment and improvements to plants, the balance of \$508,544.81 is carried forward, a slight increase over that of 1910.

Of the submarine iron ore areas at Wabana, the directors report that the past year's experience has confirmed and strengthened their views as to the extent and value of this property.

Brief mention is made in the report of the successful sale of \$1,040,000 worth of the company's bonds a few weeks ago, which has put its finances in good shape.

NIPISSING DIVIDENDS

The dividend record of the Nipissing now reads as follows:

1906	6	2½	\$480,000
1907	12	2	840,000
1908	12	.	720,000
1909	16	6½	1,350,000
1910	20	15	2,100,000
1911—Jan. 20	5	2½	450,000
April 20	5	2½	450,000
July 20	5	2½	450,000
Oct. 20	5	2½	450,000
		—	—
	91	38	\$7,740,000
1912—Jan. 20	5	2½	450,000

The production of china clay in the Province of Quebec may prove the basis of a flourishing industry. An article in the next issue of the Canadian Mining Journal will describe the Quebec operations fully. Nearly every other important feature of growth in the exploitation of Quebec's minerals will be touched upon by special contributors.