

JUNE 1, 1916

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CANADIAN



MINING JOURNAL

VOL. XXXVII

TORONTO

No. 11

In this issue :

Some of the War's Lessons.

*Helping the Prospector in British
Columbia.*

Recent Progress in Flotation.

Mining Enterprises in Canada.

*Placer Gold Mining in British
Columbia.*

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- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (Quebec). Vol. III. Report on, by W. A. Parks, Ph.D.
- The Bituminous Sands of Northern Alberta. Report on, by S. C. Ells, M.E.
- Peat, Lignite and Coal: their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Report of the Mineral Production of Canada During the Calendar Year 1913, by John McLeish, B.A.
- The Petroleum and Natural Gas Resources of Canada: Vols. I. and II., by F. G. Clapp, M.A., and others.
- The Salt Industry of Canada. Report on, by L. H. Cole, B.Sc.
- Electro-plating with Cobalt. Report on, by H. T. Kalmus, Ph.D.
- Electro-thermic Smelting of Iron Ores in Sweden. Report on, by A. Stansfield, D.Sc.
- Non-metallic Minerals Used in Canadian Manufacturing Industries. Report on, by H. Frechette, M.Sc.
- The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—
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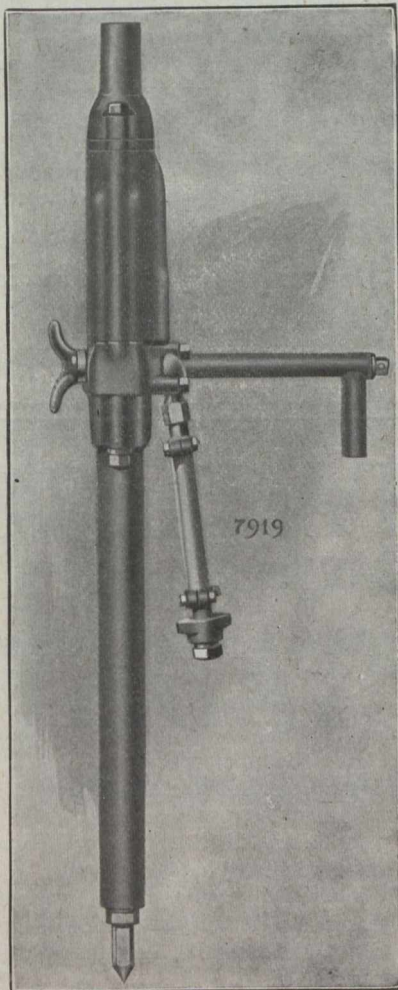
Recent Publications

- Memoir 34. The Devonian of Southwestern Ontario, by Clinton R. Stauffer.
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- Memoir 56. Geology of Franklin Mining Camp, British Columbia, by C. W. Drysdale.
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- Memoir 60. Arisaig-Antigonish District, Nova Scotia, by M. Y. Williams.
- Memoir 64. Preliminary Report on the Clay and Shale Deposits of the Province of Quebec, by J. Keele.
- Memoir 65. Clay and Shale Deposits of the Western Provinces (Part 4), by H. Ries.
- Memoir 66. Clay and Shale Deposits of the Western Provinces (Part 5), by J. Keele.
- Memoir 68. A Geological Reconnaissance Between Golden and Kamloops, B.C., along the Canadian Pacific Railway, by R. A. Daly.
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- Memoir 76. Geology of the Cranbrook Map-area, British Columbia, by S. J. Schofield.
- Memoir 77. Geology and Ore Deposits of Rossland, British Columbia, by C. W. Drysdale.
- Memoir 78. Wabana Iron Ore of Newfoundland, by A. O. Hayes.
- Memoir 79. Ore Deposits of the Beaverdell Map-area, by L. Reinecke.
- Memoir 81. The Oil and Gas Fields of Ontario and Quebec, by W. Malcolm.
- Memoir 82. Rainy River District of Ontario. Surficial Geology and Soils, by W. A. Johnston.
- Applicants for publications not listed above should mention the precise area concerning which information is desired.
- Maps published within recent years may be had, printed on linen, at the nominal cost of ten cents each.
- The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon. Letters and samples that are of a Departmental nature, addressed to the Director, may be Mailed O.H.M.S. free of postage.
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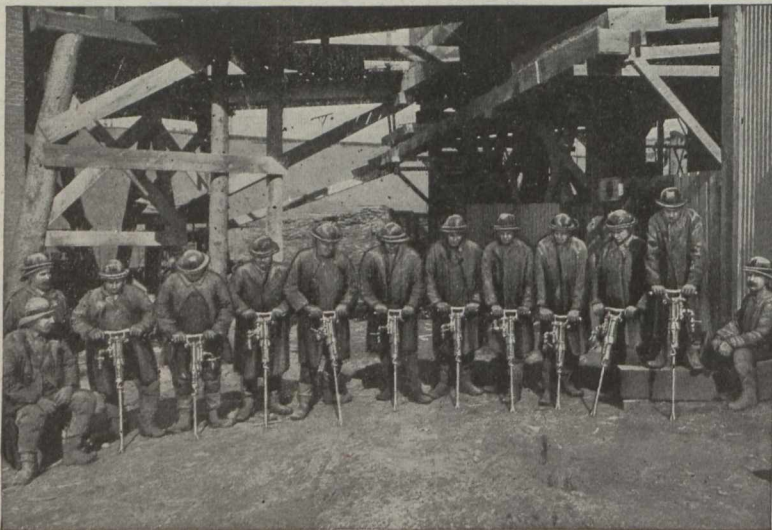
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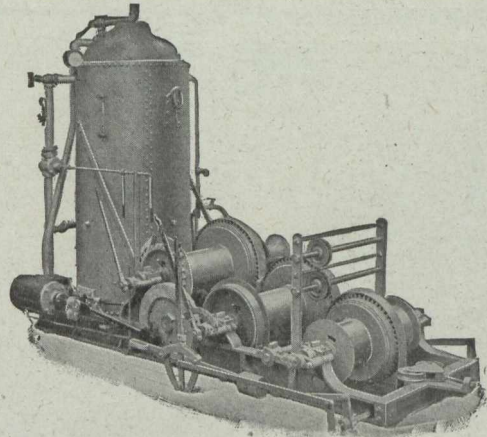
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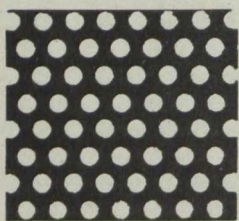
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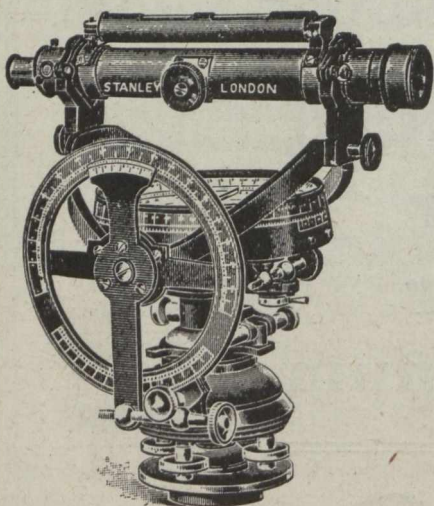
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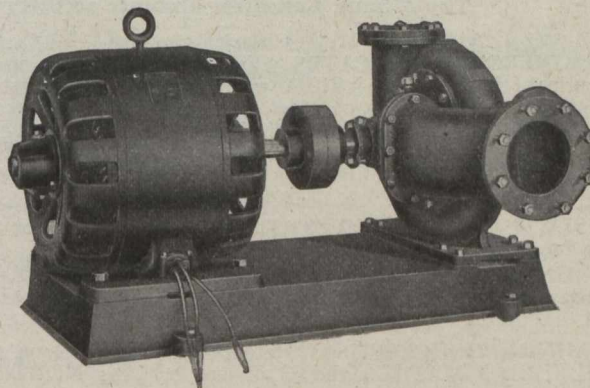
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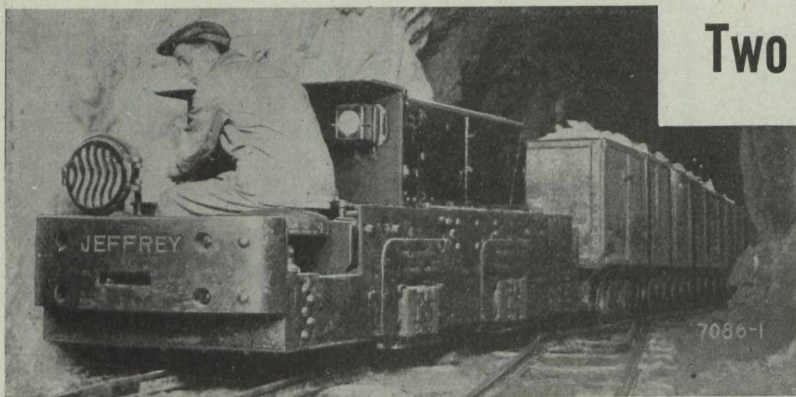
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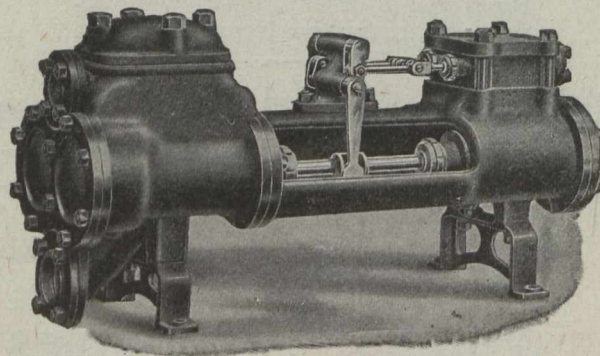
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THE CANADIAN MINING JOURNAL

VOL. XXXVII.

TORONTO, June 1, 1916.

No. 11

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 263-5 Adelaide Street, West, Toronto
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CIRCULATION

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

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THE DEVELOPMENT AND UTILIZATION OF OUR NATURAL RESOURCES

Sir R. A. S. Redmayne, in his presidential address to the Institution of Mining and Metallurgy, points out that the war "has emphasized one outstanding fact, viz., that we should and could approximate more closely to the ideal state of being self supporting; in other words, develop to the utmost our natural resources and put them to the most economical use at home."

Speaking in the House of Commons, in January, Mr. Runciman said: "There should be no essential article, either for the arts of peace or for the arts of war, upon which we cannot within the Empire lay our hands."

Such views find ready acceptance in Canada. Before the war the advantages of such a policy for the Dominion were not infrequently urged. The war has widened the view and made more clear the needs of the Empire.

Obviously, if we are to be self-supporting, our first necessity is the development of our natural resources. Fortunately Canada is well endowed. We have agricultural lands, mineral deposits, forests, fisheries and water powers that are contributing great wealth and that are capable of extensive development. Such development should be encouraged. With the war's lessons before us, we may reasonably expect that our Provincial and Federal Governments will see to it that the way is made easy for those who would devote their attention to the production of basic materials.

Fully as important is the utilization of these materials to make in our own country finished articles, instead of exporting for manufacture elsewhere. We should at least manufacture what we need for our own use.

If our metals are to be utilized in Canada we must first refine them here. During the past year considerable advance has been made in this direction, and copper and zinc are now being turned out by Canadian refineries. For some time there has been produced in Canada refined gold, silver and lead, and recently small quantities of cobalt and nickel. Early in 1916 it was stated that a nickel refinery of sufficient capacity to supply the needs of the Empire would soon be established in Canada.

Up to date the erection of the proposed nickel refinery has not been started. There is, however, evidence that the problem of selecting a site is receiving attention. On April 24, for instance, the "Hamilton Spectator" published the following:—"According to information given out yesterday by H. M. Marsh, Industrial Commissioner, the only thing needed in order to secure a branch plant in this city of the Interna-

tional Nickel Refining Co., of New York, is the cancellation of the existing franchise held by the National Gas Company and the establishing of the proposed Semet Solvay Coke plant. Mr. Marsh, accompanied by P. P. Byrnes and John G. Gauld, K.C., of this city, and W. H. Blauvelt, consulting engineer of the Semet Solvay Co., Syracuse, spent three days this week in New York in conference with officials of the International Nickel Refining Company of that city in an effort to persuade the company to establish a branch plant in Hamilton."

An interesting feature of this search for a site for a nickel refinery is the evidence that the refining of nickel in Canada is to be accompanied by additions to our manufacturing industries. Manufacture in Canada of the chemicals to be used in refining metals in Canada is likely to be a result of the agitation for the nickel refinery.

Mr. Hugh Clark, chairman of a Committee on Public Printing, said in the House of Commons on May 18 of Government publications:—"The cost has gone up so tremendously that something has to be done in order to reduce it. The cost has more than quadrupled within the last fifteen or sixteen years. Something has already been done by the present King's Printer, Mr. Tache, and by his assistant, Mr. Cook. They have started out in a proper manner, and if you will look over some of the reports you will see how well the work has been done. Take, for instance, the blue-book of 'Unclaimed Balances,' and the blue-book containing a list of the shareholders of banks, and you will see that by an arrangement of the form and of the type they have put the same material in half the space, the size of the volumes has been greatly decreased and a considerable saving has been effected in that way alone.

"We recommend the creation of a board of editorial management, consisting of men already in the service, who will revise the copy that is sent, and blue-pencil it to some extent, so that the volume will not be so large. If ministers would tell their officers that in the preparation of copy of this sort, brevity would be considered a virtue, it might have a good effect in the meantime. We have recommended that this editorial board should revise all the copy and say whether or not certain copy should be published. There is a great deal of waste material in many of the publications."

We have in these columns called attention to the craze for volume in Government reports; to the printing of useless matter and to the lavish use of paper. We are glad to see that this matter is receiving attention.

MANITOBA MINING BOOM.

Incorporation of four new mining companies in Manitoba, and other evidences of a prospective boom in gold mining there, serve to draw attention to the difficulty which has been experienced in working this business in accordance with Manitoba's "blue sky" incor-

poration law, adopted three years ago. It is only at the last session of the Legislature that this law was amended to give mining companies an opportunity.

The object of this new law was not to prevent people from taking a chance, if they wish to do so. The Provincial Legislature did not want to do this. All that it undertook to do was to see that the people who took the risk got a run for their money.

Under the new law the mining company must go to the public utilities commissioner and get a special certificate. Under this certificate it can sell development stock. The money which is paid for the stock must be handed over to a trust company or trustee. A reasonable proportion may be spent on office expenses. The balance must go into the mine. The commission says that there will be no red tape about the matter, and that if the companies comply with the plain terms of the Act they will get special certificates immediately.

At the present time one of the troubles is to get a trust company to act. These companies, when approached, named terms which were not satisfactory to the mining companies. They wanted, as is alleged, to manage the mining companies, just as they would administer an estate. This was not satisfactory to the mining companies, and no progress could be made. It appears, however, that a trustee has now been found who is satisfactory to the commission, and it is possible that within a few days the sale of stock may begin.—Financial Times.

NEW MINERAL FOUND IN BRITISH COLUMBIA.

Newspapers published in Kootenay district of British Columbia recently printed the following:

After several months of work a new mineral, as yet unnamed, has been discovered, analyzed and classified by E. W. Widdowson, assayer, of Nelson, B.C., in association with Dr. T. L. Walker, professor of mineralogy at Toronto University, and curator of the Royal Ontario Museum of Mineralogy at Toronto.

The new mineral is a white, translucent formation with a yellowish cast. It was first found at the Hudson Bay mine at Salmo, Nelson mining division, last September, when a fair-sized body was struck during development work. At first it was supposed to be a hydrous zinc formation and was exhibited in Nelson as such. This assumption, however, did not satisfy Mr. Widdowson, who secured several samples and devoted much time to analyzing them, sending the results of his work to Professor Walker, together with samples for his own use.

Dr. Walker's analysis is as follows: Zinc oxide, 60.18; phosphoric anhydrid, 26.14; water, 13.32. Mr. Widdowson's results are: Zinc oxide, 60.05; phosphoric anhydrid, 26.74; water, 13.70. The theoretical analysis of the new mineral should, therefore, be: Zinc oxide, 60.32; phosphoric anhydrid, 26.32; water, 13.36.

HOLLINGER.

The general manager's report on Hollinger operations for four weeks ending April 21st, 1916, shows that gross profits for the period amounted to \$158,646.91. Expenditures for plant during the four weeks were \$17,540.

The mill ran 90.7 per cent. of the possible running time, treating 42,673 tons, of which 29,590 tons were Hollinger ore and 13,083 tons were treated for the Acme Gold Mines, Ltd. Average value of Hollinger ore treated was \$9.09. Milling costs on 29,590 tons were \$0.957 per ton.

SOME OF THE WAR'S LESSONS*

By Sir R. A. S. Redmayne.

To state that we are engaged in the greatest war of all time has become a platitude, but it is the fact that colors all our thoughts and affects all our actions at the present time. We are pouring out life and treasure as never before in the history of the nation; not to secure a material return, but to maintain our hard-won liberties and the rights of small nations to exist. War is the most wasteful of all human activities. The present prosperity that we witness in many industrial undertakings is a purely fictitious prosperity, and, in the true meaning of the phrase, is non-productive of wealth, for these industrial concerns are employed either directly or indirectly, to greater or less extent, in the production of the engines of war—War, the great destructor.

One result of the war is, I think, obvious: it will be followed by a period, longer or shorter, of industrial depression, amounting possibly to something like prostration, but I believe, also, that we have it within our power to remedy matters in a comparatively short period, and to put the nation on a stronger financial and industrial basis than ever before in its history. We must take time by the forelock and make our plans now.

In this connection, reference may be made to the opinion of so great an authority on matters of industry as the President of the Board of Trade, who, in a remarkable and inspiring speech delivered in the House of Commons on the 10th of January last, said:

"Recuperation is undoubtedly, and will be, one of the first necessities of the whole of Europe"; again, "The exhaustion from which all the belligerents will undoubtedly suffer will lead to a period of great effort and I hope in all of them—I say without distinction 'in all of them'—to a greater degree of recuperation"; and again, "I believe we have it within our capacity to make up for the vast losses which we have incurred in a shorter period of time than any other state."

The president spoke of industrial enterprise in general, but mining, which is our second greatest industry, for I suppose we must put agriculture first, should be made to contribute more to industrial regeneration and advancement.

The war has emphasized one outstanding fact, viz., that we should and could approximate more closely to the ideal state of being self-supporting; in other words, develop to the utmost our natural resources and put them to the most economical use at home.

Great Britain, and more especially England, is the most highly mineralized area in the world. No other country contains such a variety of mineral resources of use to mankind, not even the United States of America. Other countries may contain vastly greater quantities of one or more of the useful minerals, but no country so many and so varied. If we extend our view and take in the whole British Empire, there is no fuel, ore, stone, or clay which is not contained therein. Mr. Runciman has said:

"There should be no essential article, either for the arts of peace or for the arts of war, upon which we cannot within the Empire lay our hands." He said further:

"In the course of the afternoon, reference has been made to the production of raw material in this coun-

try. The control of metals passed to Frankfurt years ago. It was Frankfurt that really dictated the production of metals in many parts of the world. Even in our own Dominions, the influence of Frankfurt in Australia was so great, that the Australian Government went to the extreme length of cancelling by legislation every contract on the outbreak of the war in which the great metal organization of Frankfurt was concerned. We have control within the British Empire of some of the most valuable metals on which we now depend—manganese from India, tungsten from the Antipodes, zinc in large quantities from Australia, and nickel very largely from Canada. I should like to say, so far as these metals are concerned, that nothing could have been more whole-hearted than the support which has been given to us by the Dominions. Long ago, at the beginning of the war, we pointed out to them how largely we were dependent on them and how short our supplies might be if they were dissipated too widely, and they at once, without any hesitation, took the most drastic action, so that we have an abundance of manganese here; tungsten we can get now in sufficient quantities; zinc is being produced in increasing quantities every month."

It behooves us, therefore, to know exactly where we stand in respect of our mineral resources; where the different kinds of minerals occur, of what quality, and to what extent. A great deal of information exists on the subject in the transactions of various technical institutions, in geological memoranda, and in reports on mining properties, which, in the hands of a body of mining experts, could be summarized so as to form part of a large work resulting from further inquiry and investigation.

In respect of some of our ores there is room for improvement in the methods of extraction of the ore from the gangue or stone, and the economic reduction of the ore to the metal. The decision of the Advisory Council to the Committee of Scientific and Industrial Research of the Privy Council, to make a grant in aid of the Research which the Institution of Mining and Metallurgy and the Royal Cornwall Polytechnic Society are conjointly about to carry out in respect of the economic production of tin and tungsten, with special reference to Cornwall, is a welcome sign of the national awakening which is taking place as to the overwhelming importance of scientific and industrial research.

I will quote several expressions of faith from the Memorandum, setting forth the question of research, which was issued by the Board of Education on the 23rd July last.

"There is a strong consensus of opinion among persons engaged both in science and industry that a special need exists at the present time for new machinery, and for additional State assistance in order to promote and organize scientific research with a view to its application to trade and industry."

Again: "It appears incontrovertible that if we are to advance or even maintain our industrial position we must as a nation aim at such a development of scientific and industrial research as will place us in a position to expand and strengthen our industries and to compete successfully with the most highly organized of our rivals."

*Extract from the Presidential Address, Institution of Mining and Metallurgy.

And again: "It is essential that the Advisory Council should act in intimate co-operation with the Royal Society and the existing scientific or professional associations, societies and institutes, as well as with the universities, technical institutions, and other institutions in which research is or can be efficiently conducted."

That these are no mere empty expressions of opinion is shown by the action taken by the Council of Scientific and Industrial Research in assisting our proposed scheme of investigation on tin and tungsten. And sentiment has been still further translated into action by a proposal to set up committees of experts in certain branches of industry to advise the Council for Research on matters relating to these industries. In connection with the industries of mining and metallurgy, it has decided to set up a committee to deal with (a) the mining of non-metals, (b) metalliferous mining, and a committee for metallurgy dealing with (a) the metallurgy of non-ferrous metals and (b) the metallurgy of iron and steel, and has requested our Council to nominate two members to serve on the Metalliferous Mining Committee and two to serve on the committee relating to the metallurgy of non-ferrous metals, a request to which we have very willingly acceded.

The action of the late President of the Board of Education in securing the appointment of the Advisory Council to the Committee of the Privy Council to ascertain the best methods of securing the organization and development of Industrial and Scientific Research marks a welcome development and may lead to great strides being taken in our industrial methods. But it is not sufficient to organize industry and inaugurate research if we have not the material in the shape of highly trained persons to undertake research work, organize and captain industry. Great improvements in our educational system have been carried out during the last twenty years. One has only to point to the rise of the provincial universities with their great Applied Science departments to instance this, but we are still behind some of our continental neighbors; the modern side of our public schools is not what it should be, and the cost of our higher education generally is excessive.

Sir James Dewar, in his presidential address to the British Association in 1902, said that "the really appalling thing is that the German population has reached a point of general training and specialized equipment which it will take us two generations of hard and intelligently directed educational work to attain. It is that Germany possesses a national weapon of precision which must give her an enormous initial advantage in any and every contest depending upon disciplined and methodical intellect."

But, as the editor of a well-known technical periodical in a recent article, in alluding to these words, pertinently asks, "Does the nation realize this? For not until it does, shall we be able to ensure that State recognition of science without which all the committees under the sun will be but ploughing the sands."

I think the nation does now realize the effectiveness of the weapon possessed by Germany. If this great war has not brought this home to us nothing else will.

I will conclude by quoting, and adapting to my theme the words of one who, if we accept the estimate of Lord Macaulay, was the wisest of mankind, Francis Bacon, who closed his essay on 'The True Greatness of Kingdoms and Estates' with these words:

"No man can, by creating, as the Scripture saith, add a cubit to his stature, in this little model of a man's

body: but in the great frame of kingdoms and commonwealths it is in the power of princes or estates, to add amplitude and greatness to their kingdoms. For by introducing such ordinances, constitutions, and customs as we have now touched, they sow greatness to their posterity and succession. But these things are commonly not observed, but left to take their chance."

HYDRAULIC GOLD-MINING PROBLEMS AT ATLIN, B.C.

The Mining and Scientific Press, San Francisco, recently printed the following:

"The Solution of Some Hydraulic Mining Problems on Ruby Creek, British Columbia,' is the title of a paper written for the Arizona meeting of the A. I. M. E. by Chester F. Lee and T. M. Daulton, of Seattle, Washington. This district is 17 miles east of the town of Atlin. Gold was found there in 1898, and the output to date from placer mines is \$4,518,000. The great width of the deposit (250 feet), flood-waters, poor pumping facilities, and large boulders were the difficulties. These were overcome by dividing the ground up the creek into two series of pits. First one was sluiced for 400 ft., then the other was started, working alternately. The boulders are blasted when the pits become too full of them. In the flood season only one pit is worked, an arrangement of sluices allowing the excess water to go to waste. The gold-saving sluice-boxes, 42 in. wide, are lined with carbon-steel (0.9 per cent. carbon) plates, in place of spruce blocks used previously. After a season's wear (150 days), when 67,940 cubic yds. of gravel flowed over them, the plates showed an abrasion of 1.32 in. In 1915, 6,380 boulders were drilled and blasted and 21,955 'bulldozed' without drilling. In two years the average was one boulder for every 2.5 yd. of gravel moved. Sullivan DA-19 40-lb. hammer-drills are used. All costs in 1915 totalled 47.6c. per cu. yd. The property is owned by the Placer Gold Mines Co., of Seattle, and Mr. T. M. Daulton is manager in charge of operations."

(Note—Our British Columbia correspondent, who sent the foregoing clipping, states that he believes Messrs. Lee and Daulton have inadvertently understated the value of the placer gold recovered from the Atlin field. Instead of \$4,518,000, as quoted above, it is \$6,540,000 for all years, 1898-1915, both inclusive. To end of 1914, the figures that have been printed yearly in the Annual Report of the Minister of Mines for British Columbia, total \$6,163,000; the output in 1915 was \$377,000, which last figures, however, have not yet been published by the department. The total of \$6,540,000 is that for all Atlin gold-bearing creeks for all years under notice.)

GOLD IN GAUTHIER TOWNSHIP.

New Liskeard, May 20.—Considerable excitement was created here a few days ago in mining circles over some gold samples brought to town from Gauthier township by Mr. Wm. Margarett.

The location of the discovery in this township is about three miles from the halfway house off the Crystal Lake road, on the property adjoining the Andrew's claims.

Messrs. Margarett, Elstone and Duncan, the owners of the claims where the discovery was made, returned north this week. It is said that the formation is Kee-watin schist and dolomite and quartz.—Cobalt Nugget.

THE PAS

The Pas, Manitoba, May 19.—Mr. J. E. Spurr, vice-president and advising engineer of the Tonopah Mining Company, is expected here on June 1st. Mr. Spurr has been in South America since his visit here last fall.

McMillan Brothers are hiring 475 men in The Pas to work on the last stretch of grading the Hudson's Bay Railway. Nearly 300 of the men went north on the Muskeg Wednesday, and the balance will be shipped out by special train on Sunday. It takes all the surplus labor out of the town. There are forty-five miles of grading to be done, and work will commence about June 15th.

Development work on the molybdenite claims of the Tonopah north of Herb Lake will be undertaken next week, when Geo. Bancroft will take up a gang of men. These claims were secured from R. Kerr.

Reports from the diamond drills at Flin-Flon and Schist Lake say the work is going ahead without a hitch. At Flin-Flon the drills are on their eighth set, and the orebody is considered fairly well proven up. The average vertical depth attained is put at 900 ft. That the body is lenticular is indicated at both places. The Schist Lake drill is at its third set of holes. Mr. Callinan says the ore is very heavy at Flin-Flon, only taking seven and a half cubic feet to make a ton. He thinks the permanency of the deposit is well established.

To make an examination of the gold district at Herb Lake, Messrs. Kerr, Nash and Hassett went up on a jigger Monday afternoon. Mr. Nash is the Alaska engineer acting for D. C. Jackling.

The deal for the Rex group, which was almost closed but a week ago, is now off altogether. Mr. Gordon, who was making the sale, left for the south on Monday, quite disgusted that his efforts were fruitless. Hassett refused to consider the alternative cash and stock proposition, and Moore wired his refusal also. Campbell, the third partner, is up at Reed Lake, but he left power-of-attorney here with the Union Bank. Thus, for the umpteenth time, the sale of the Rex tumbled down at the last moment. Whoever gets the properties will get a run for their money, but so far the buyers want to run in stock certificates, which are sold at the printeries at \$10 a thousand.

Bancroft and Callinan, between them, registered twenty claims staked in the sulphide area. Both men are in close touch with what the diamond drills are doing, and this sudden activity in claim-staking indicates their strong faith in the results obtained so far.

Tuesday's Ross boat carried away the "first families" of Flin-Flon. They were Mr. and Mrs. Callinan and sister, Mr. and Mrs. Woods and P. J. Maloney. The Callinans will live in a tent for a while, and the Woods have a shack. To Mrs. Snell belongs the distinction of being the first white woman resident at Flin-Flon. She went in in March, and is camped with her husband near the drills.

Recorder Barker set a record day for receipts on Monday, when he took in \$125.

Incorporation of three mining companies, with a small capital, is announced in the Manitoba Gazette. They are the Canadian Gold Pan, Chicamon Mining Ltd., and Hinterland Mines and Holding, Ltd. The total capitalization of the three reaches \$30,000 only. None of the companies are known locally, though the name of the Hinterland Mining Company suggests some connection with this district.

Mr. and Mrs. John Hammell are in New York after a two-weeks' holiday at Atlantic City. They expect to arrive in The Pas towards the end of the month, to spend the summer at Flin-Flon.

It is hardly likely there will be any considerable rush into the mining districts surrounding The Pas this summer. Normal activity in prospecting is now going on, and, unless a motherlode is picked up, the looked-for rush will be deterred until next spring. The results of the diamond drilling north of here will prove a determining factor in attracting Canadian-wide attention to the district.—The Pas Herald.

HOLLINGER IN 1915.

In his report for 1915 Mr. N. A. Timmins, president of the Hollinger, says:

"Underground developments during the year have shown most satisfactory results. Estimated ore reserves have been increased from \$13,358,420 at the beginning of 1915 to \$16,031,600 at the beginning of 1916. You will find in the General Manager's report, the statements, 'the entire volume of ore so far removed from the mine is the equivalent of approximately the first 160 feet below the surface,' and 'there still remains above the 300-ft. level a greater tonnage than has been removed from the mine,' and further, 'our entire production containing \$9,778,783 may be considered to have come from the equivalent of the first 200 feet of depth.' These facts, coupled with the discovery of new ore bodies, and the opening out at depth of the old ones during the past year, tend to reduce to a certainty our firm conviction that thus far we have only seen the commencement of operations. We congratulate those shareholders who have had the faith to retain possession of their stock, in spite of the opportunity to dispose of their holdings at a greatly advanced market valuation. Shareholders need not be in the least perturbed over the falling off in the grade of the ore shown in the estimate of reserves. The reduced working costs have made it possible to include in the estimates ore which could not be included three years ago. With working costs as they were, in the vicinity of \$6.00 per ton, it is evident that no profit could accrue from working \$6.00 rock, but with costs reduced to less than \$4.00 per ton, it is equally evident that \$6.00 rock may be worked at a handsome profit, and is rightly included with the higher grades of ore, in the estimated reserves.

"An interesting feature of the General Manager's report is the comparison between what has been accomplished since milling operations were first started, and what was presaged in the first Annual Report, issued in January, 1912. It is very evident that the promise made in the First Annual Report will be more than fulfilled during the coming year, and all who are interested in the progress of the company will, we feel, be disposed to join in congratulations to Mr. Robbins and his able assistant, Mr. Globe, that they are able to now prove the accuracy of their estimates and deductions, which at the time of publication may have appeared to those unacquainted with the facts to be unwarrantably bold."

BOSTON CREEK.

According to information received from Boston Creek, Messrs. J. P. Bickell & Co., of Toronto, have exercised their option on the Giovanazzo claim at Boston Creek. The sum involved is understood to be \$10,000, which amount, it is said, was paid over on Thursday.—Cobalt Nugget.

ENCOURAGING PROSPECTORS IN BRITISH COLUMBIA

Victoria, B.C., May 11.—The vote to cover the expenses of the parties of mining engineers who are to be sent out by the Government to make detailed reports upon mineral resources in different parts of the province is contained in this year's estimates. Hon. Lorne A. Campbell, Minister of Mines, announced soon after his appointment to the portfolio that he proposed to have this work carried out and with that purpose had an appropriation placed in the estimates.

It is the intention that the engineers shall make investigations of promising mineral areas and prospects and that their reports shall be available to the prospector and others who may be interested. Through these reports, it is pointed out, the prospector will be informed as to whether it is worth while to proceed with work and in cases where he is endeavoring to secure capital he will be able to use them as a reliable basis upon which to approach the capitalist. A prospector who can back up his representations to capitalists with a Government report upon his property will, it is pointed out, be in a much better position than if no such report were available. The engineers' reports are thus expected to be the means of bringing in new capital.

The whole province will not be covered in one year or two years, but a start will be made this summer with four parties of engineers who will commence work directly they can be engaged and the weather conditions are favorable.

Mr. Campbell has received numerous letters, congratulating him upon the decision to give two free assay certificates to prospectors with each certificate of work. Prospectors who have written welcome the opportunity to secure free Government assays. Arrangements are now being made to provide for this extension of the Government's program to assist prospectors and others in the development of the mineral resources of the province.

Free advice to prospectors from Government engineers is another move toward developing mining which Mr. Campbell is inaugurating. This year such advice will be given by the engineers who carry out the investigations and make reports upon various mineral areas. From them the prospector will be able to get many valuable hints concerning his property and the best method of proceeding with its development. This plan of giving free advice will be extended as Mr. Campbell further develops his plans.

The bill to provide for the leasing of reverted crown granted mineral claims has met with general approval. For \$25 a prospector may secure for one year a lease upon a mineral claim which has reverted to the Government for non-payment of taxes. During the year the prospector can do sufficient work to enable him to decide if the property is worth taking up. If he is undecided at the end of the first year he may lease it on the same terms for another year but a limit of two years is placed on the lease period. If the prospector decides he wishes to secure title to the claim all he has to do, provided he has worked the claim during the lease period, is to pay up the taxes due up to the time he took the lease. He is charged no taxes during the lease period, if he has worked the claim. He secures crown grant for the overdue tax charges only, no fee being charged for the crown grant, which is considered to be covered by the \$25 he pays for the lease.

This figure was decided upon because it is the amount of the crown grant fee and because it is necessary to make some charge to provide against claims being tied up and held for speculative purposes. Because no crown grant fee is charged the \$25 is in effect remitted at the end of the lease period if the prospector decides to take title to the claim.

Under this new system the prospector is able to work on a reverted crown granted claim with the assurance that if he discovers anything that is worth while he will be protected against having the claim taken away from him by some more wealthy individual or corporation who might, under the old plan, outbid him in the public tenders which were formerly called for. No person may take a lease or an interest in a lease on more than two claims in any one mining district, so that the new Act will benefit the prospector and the small man.—Nelson Daily News.

LA BELLE KIRKLAND.

At the 270-ft. level the La Belle Kirkland mine at Goodfish Lake is drifting on the same vein as has been followed down the shaft all the way. Drifts are being run east and west on the vein, one machine being run in each drift. Each drift is between 40 and 50 feet long now and the foot wall streak is carried in the face of both drifts. Crosscutting has just been started to cut other streaks of high-grade ore which were followed in the shaft and at upper levels. Three or four of these streaks are shown to exist by the shaft and the cross-cutting down at the 100-ft. level. They are very consistent both in width and value. Between these streaks the rock is not of very good grade, but the streaks themselves are high grade enough to make a good milling average across the drift.

The fault, which developed in the shaft below the 200-ft. level, was easily disposed of. The drift at the 270-ft. level cut the foot wall streak 27 feet from the shaft so that it was quite unnecessary to cross-cut for it. The shaft is down 350 ft. and will be sunk still further when the work in the drift is a little further advanced.—Northern Miner.

ON WEST DOME.

Cobalt, May 20.—A strike of the utmost importance has been made on the West Dome Consolidated mine. In the course of diamond drilling at an angle of 60 deg. an orebody approximately 5 ft. wide has been cut at a depth of 515 ft. The core shows that across this width the values were \$45 a ton.

The shaft is down to about 200 ft. on the incline. The vein there is showing considerable free gold and is heavy in fine sulphides, making a good grade across two to three feet.

It is believed that the ore cut with the diamond drill is the same as in the shaft. If this is so, the future of the property appears to be very bright. The diamond drill has been removed to another point on the property, set up, and is now working again. The plant, which had deteriorated a good deal while it was lying idle, will have to be replaced by a larger and better equipment as soon as sufficient depth has been attained in the present shaft. The recent discoveries will certainly hasten the installation of this plant, as the property now warrants much increased expenditure.—Northern Miner.

RECENT PROGRESS IN FLOTATION*

By Robert J. Anderson.

One of the most marked and revolutionary advances of recent years in the art of concentrating ores is the advent and application of the flotation process. Although the basic and essential principles of flotation had been disclosed by the early work of Haynes, Everson, and the Elmore brothers, it is only within the last decade or so that the process has been a commercial success. Historical considerations point out the fact that the installation of the Delprat process, in 1903, at the Broken Hill Proprietary mine in Australia, was probably the first important commercial application of any flotation process; some other installations were also made at or about the same time. Flotation as practised to-day is the result of the diligent labor of many men, and the present state of development cannot be ascribed to any one individual. In its early stages the flotation process of concentration was decidedly uncertain of success because of certain inherent difficulties which were to be overcome. At present every mill owner in the country is considering its applications. The froth flotation process is markedly efficacious in extracting the mineral sulphides from slimes, and, in the main, is more or less restricted to the treatment of extremely fine material.

In a general way, there are three divisions into which the flotation processes may be separated: namely, (1) film flotation (2) bulk-oil flotation, and (3) froth flotation. Further, these three classes blend into one another gradually, according to the patents secured for the different processes. Technical distinctions are based on such points as these, viz., acid, neutral, or alkaline pulp solutions; mill temperature or hot solutions; various secondary apparatus employed for the introduction of air or the production of gas bubbles; amounts of oil; and other minor differences almost ad infinitum. The more important processes which have so far survived elimination by litigation or other means include the following: Minerals Separation process; Potter-Delprat process; De Bavay process; Callow pneumatic process; Hyde process; Janney process, and the Macquisten tube process; and, further, the preferential processes—Murex, Lyster, and Horwood. These processes have been described at length in the patent literature, in the scientific press, and elsewhere, and further comment would make this writing unnecessarily cumbersome.

Strictly speaking, the subject of flotation naturally falls into two divisions, to wit, legal disputes and technology. Litigation has undoubtedly been the most active, as well as destructive, movement in the field, for the development of the process has been constantly attended with an unwholesome amount of legal differences among the contending interests. Probably there was never a technical achievement so hotly contested in the courts as this one. All these involved disputes have so distinctly retarded progression in this process that, charitably speaking, flotation is today in a chaotic state.

Regarding present operations, although there are so many flotation plants at work, there is a decided dearth of available data. In short, actual results have not found their way into the literature devoted to mining and allied subjects, presumably on account of the veil of mystery which is supposed to, and actually does,

hang over the process. Practice varies with the locality, and, as a whole, the methods are in no sense standardized. Development at the present time is being retarded on account of certain cases pending in the courts, which involve the Minerals Separation, Ltd., and others. For, with these cases still to be adjudicated, many operators seem to hold that any attempt at development and standardization would be folly, which would incur a certain waste of time and money, should the decision be rendered in what is considered the unfavorable way.

To all intents and purposes Australia is in the van in flotation at present, and has been since the advent of the process. The first important flotation installation was that of the Delprat process, as mentioned in the foregoing; this mill operated successfully from its inception and has continued to do so. The joint Potter-Delprat process was also applied to the treatment of ore at the Broken Hill Proprietary Block 14 Company's mine in 1903, but ceased operations in 1905; whether this particular plant ever recommenced operations is not known to me. These installations, however, mark the beginning of the remarkable growth in the zinc industry of Australia, which country now produces one-fifth of the world's supply of spelter. The Potter-Delprat process is peculiarly adapted to Broken Hill ores, and this fact is the main reason for its marked success; on other ores it may not be as efficient as some of the other processes.

The Minerals Separation process, licensed by the Minerals Separation, Ltd., and the Minerals Separation American Syndicate, Ltd., was first employed about 1904-05 by the so-called Sulphide Corporation of Australia. In brief, the process then was an adaptation of the Cattermole patent, the principle of operation being the coagulation and sinking of the mineral sulphides with a large amount of oil. The original idea of Cattermole was abandoned in 1905 and true froth flotation adopted. The Minerals Separation process was practised in 1907 at the Central mine at Broken Hill, and has operated successfully to date, producing zinc concentrates. At the same time the Minerals Separation, Ltd., by right of purchase secured a large tailing dump from the Sulphide Corporation; the Minerals Separation process was applied to the concentration of the material, and the mill was an immediate success, producing good concentrates. During this time flotation was subjected to rigid experimentation throughout the Broken Hill district, and the practicability of the process was satisfactorily demonstrated. Minor improvements made from time to time have brought it to its present state of perfection.

The importance of the zinc industry of Australia today is due in great measure to flotation, for in less than a decade Australia has risen to the position of furnishing one-fifth of the world's supply of zinc. No mining camp in the world produces so much zinc as Broken Hill. The first shipment of zinc concentrate in 1903 from that place was 50 tons; in 1911, 470,000 tons of 47 per cent. grade zinc concentrate were produced by flotation methods.

Flotation has gone forward rapidly in Arizona in the last few years, and there is at present great activity in that state because of recent large installations. A

*Extracts from a paper published in the Journal of the Franklin Institute, May, 1916.

noteworthy flotation plant is that of the Inspiration Copper Company, near Miami, Ariz. At this place there are available some 100,000,000 tons of a 1.63 per cent. copper ore, the copper being mostly in the form of chalcopyrite and containing about 0.20 per cent. copper as silicate and carbonate. A large amount of experimental work was first performed previous to the erection of the present mammoth mill.

The Inspiration process was designed by the metallurgists in charge and was intended to embody the best features of the other machines without infringing on any of the patents except those of the Minerals Separation, Ltd. The Inspiration Company is licensed to operate under the patents of the latter. The present new mill has a capacity of 7,500 tons daily, and when the entire plant is in operation will have a capacity of some 14,000 to 15,000 tons. In addition, the experimental unit is still operating.

Flotation has become an important metallurgical process in the Coeur d'Alenes and elsewhere in Idaho. The Callow pneumatic process was applied to the treatment of ores at the mill of the National Copper Company at Mullan, Idaho, the plant being started April 10, 1914. This was the first Callow plant ever erected and was an instantaneous success. Since that time the pneumatic process has been adopted by nearly all the other mines treating lead and lead-zinc ores in the Coeur d'Alenes, notably the Caledonia, Bunker Hill and Sullivan, Gold Hunter, Morning, Hercules, and others. The plant erected by Callow for the National Copper Company had eight regular rougher cells and two cleaner cells, treating some 500 tons in 24 hours with a consumption of as low as 0.13 pounds of refined pine oil per ton. The Callow scheme finds favor in the district for the flotation of slimes and fine sand.

One of the most remarkable and efficient flotation plants in the United States is that of the Butte and Superior mill at Butte, Mont., operating on a lead-zinc ore. The early experiments of James M. Hyde, conducted at Basin, Mont., led to the introduction of flotation at the Butte and Superior mill. A 1,000-ton-per-day plant is working on the treatment of a zinc middling product as an adjunct to concentration with tables and other mill apparatus. The original recovery was only 60 per cent., but with the flotation end of the scheme operative this has been increased to 91 per cent. and more. This mill now uses the so-called Janney frothing machine, and for that reason the company is involved in legal controversy with the Minerals Separation, Ltd., the latter holding that the Janney cells infringe the Minerals Separation patents. No decision has as yet been rendered.

In this flotation process the pulp passes through agitators and thence to a bank of five flotation machines operating in parallel. The first rough concentrates are re-cleaned, and also the first tailings; a system of clean and re-clean operates with the production of clean concentrates, a middling product, and tailing; the middling is returned to the system. The 55 flotation machines are supplied by six agitators through a distributing system. The frothing is performed in mill temperature solution with pine oil as the collecting element; copper sulphate and sulphuric acid are also added.

Another plant, in partial operation, is the 800-ton-per-day plant of the East Butte Copper Mining Company. The Janney type of frothing machine is in use for the treatment of second-class ore and dump tailings.

The large plant recently constructed by the Anaconda Copper Mining Company at Anaconda, Mont., is a noteworthy development in this state. The old mill is being remodelled and the flotation process being added to each of the mill sections; each section has a capacity of 2,000 tons of feed per day. Each section of the flotation plant has four Minerals Separation machines, 15-cell type; the froth from these machines was cleaned in six Callow pneumatic cells, but the pneumatics have been abandoned and only one clean concentrate is now made. The reagents used in the flotation are: about 6 to 8 pounds of 50 deg. B. sulphuric acid per ton of feed, plus 2 to 3 pounds of kerosene-sludge acid, and 0.5 to 1 pound of wood creosote. Part of the wood creosote is added to the Hardinge grinding mills, and the remainder to the Minerals Separation units. The pulp is heated to about 70 deg. F. The flotation concentrate is thickened in Dorr tanks and dried in Oliver filters.

The flotation work in Utah centres about the United States Bureau of Mines and the General Engineering Company in Salt Lake City. The experimental work at the Bureau of Mines, under the direction of Mr. Dorsey A. Lyon, has contributed much to the scientific knowledge and working technic of the process.

In California the plant of the Engels Copper Mining Company is operating under Minerals Separation patents and licenses. This plant is interesting, as it is the only one in which no other process than flotation is used. The ore was not amenable to ordinary wet concentration, but is being successfully treated by flotation.

That flotation has penetrated the Orient is shown by the plant of the Mitsui Mining Company at its Kamioka mine in Japan. This mine has a yearly output of some 10,000 tons of an ore averaging 10 to 16 per cent. Zn and 3 to 4 oz. Ag.

The main amount of work with flotation in Nevada has been experimental and has been done at the mill of the Nevada Consolidated Copper Company, embodying mainly the practice of the Inspiration and Ray Consolidated plants.

Flotation has been an active factor in the mining industry of Colorado for a few years, and flotation plants are in operation at such places as the Hudson mill and Newton mill at Idaho Springs, the Sunnyside mill at Eureka, Gold King Leasing Company at Silverton, and others too numerous to mention.

A Minerals Separation process has been practised at Britannia Beach, British Columbia, by the Britannia Mining and Smelting Company.

The plant of the Braden Copper Company at Sewell, Chile, South America, is an 8-cell Minerals Separation process floating copper sulphide.

Oils in Flotation.

The importance of oils in flotation work can scarcely be overestimated, since most or all of the different processes have come to the use of oils. Since almost any kind of oil may be used to effect a separation of the finely-divided sulphides from the gangue, it is not surprising that the number of different oils, which have been tried experimentally and commercially, is almost without end. The present tendency is to determine by trial a suitable oil mixture for a given ore. It is found that the coal-tar products are particularly efficacious in the flotation of copper ores, but are not so good for lead and zinc. In the flotation parlance, oils are divided into two kinds, namely, (1) frothing oils and (2)

collecting oils. There may be a further classification of each of the above into such types as mineral oils, animal oils, and vegetable oils. One oil in itself may combine both the properties of collecting and frothing, so that at times there may be difficulty in stating whether an oil is a frothing oil or a collecting oil.

1. Frothing Oils.—A number of oils have been successful frothing oils, and these include the pine oils—steam refined and crude—cresylic acid, and turpentine and other pyroligneous products from the distillation of woods. The coal-tar phenols and most or all of the essential oils are efficient frothers. The essential oil of the Eucalyptus globulus finds wide application as a flotation oil in Australia on account of low cost; it would be prohibitively costly to use it in this country. Pine oil is unquestionably the best frothing agent known, but has recently become prohibitively costly, and the same is true of cresylic acid. In general, the essential oils give a coherent froth and satisfactory extraction.

2. Collecting Oils.—The mineral and tar oils have a marked selective action on the mineral sulphides and are generally poor frothers. The mineral oils used in flotation include crude petroleum, refined oil, gasoline, kerosene, creosol, and coal tar and coal-tar creosotes. Oils derived from the destructive distillation of wood, such as wood creosotes, pyroligneous acid, and similar products, are good flotation oils from the standpoint of cost and efficiency. Coal tar has the property of stiffening a weak froth, and may be employed as a mixture with 10 per cent. pine oil.

Recent commercial practice demonstrates that acid may be eliminated from the pulp solutions if a suitable oil mixture be determined. The same results can evidently be obtained in an alkaline or neutral pulp as in an acid one. The flotation experts employed in the erection of plants have come to the practice of using, in the work at hand, the oil available. An instance is given where power is generated at a certain plant using Deisel engines, and the practice has become so fixed now that the same oil is used for flotation as is used in the Deisel equipment. Evidently no given oil or combination of oils will perform effective work on all ores; it is a particular problem for each ore to find the most suitable oil mixture.

It is the conviction of at least one large company supplying oils for flotation consumption that there are too many oils on the market, and that a medium-price oil (20 cents per gallon in tank cars) will be the frothing element which large consumers will favor. It is the consensus of opinion that pine products are essential to the production of good froth, and are also good selective oils. Considerable difficulty is experienced by the consumers in the duplication of orders, for it seems as though the oil companies cannot or do not furnish the same oil on repeated orders. Why this condition of affairs should obtain is not apparent.

Grinding.

The present practice favors the ball mill for grinding the tailings or other material to be floated, as the bulk of the feed is thus reduced to slime, which is the ideal feed for froth flotation. The use of Dorr thickening tanks for thickening the pulp, placed in closed circuit with the grinding mill, seems to be a present tendency for a future standard practice. The fact that flotation can and does work best on slimes has removed the old dread of mill operators for making slimes in the wet concentration; this will result in some minor changes in mill practice.

Dewatering.

Before shipment to smelter or other market, flotation concentrates must be dewatered by filters to a moisture content of about 8 to 10 per cent.; otherwise, heavy freight bills are incurred which might consume the profits. The moisture content cannot be too low in the case of long shipments, or heavy dusting losses will take place. The so-called Oliver filter will reduce the moisture to 8 per cent. or less, and is preferable to the pressure type of filter on account of the excessive operating cost of the latter.

Smelting Concentrates.

In smelting flotation concentrates for the recovery of the values therein, the ordinary practice is adhered to, pendent on the nature of the values—zinc, copper, lead, etc. The best practice recommends drying the concentrate before charging into a reverberatory or other furnace, i.e., it is best to charge a hot calcine. If it is desired to reduce the sulphur content, calcines can be made in the ordinary McDougal or Wedge multiple-hearth furnaces.

Application of the Process.

Generally speaking, the mechanically or air-agitated machines require fine material for successful performance, i.e., 60-mesh or finer. In other words, most of the flotation processes are pre-eminently suited to the recovery of slimes. It would seem as though the flotation process should be used as an accessory unit in wet concentration, as an all-sliming plant, with few exceptions, is not an economic possibility in this country. The matter of rougher and cleaner cells is strictly a local consideration and must be determined separately for each individual plant. Two cogent factors enter into the solution of this problem; to wit, richness or leanness of the slime feed and proximity or remoteness from smelters. The dual, clean and reclean method, was tried at Anaconda and finally abandoned in favor of the single cleaning method.

Broadly, flotation has now reached a stage so as to find wide-spread commercial application. It is a noteworthy fact in the history of milling that such an apparently simple process should have such a ramified development in such a short time. There can be no question that flotation in due time will be a necessary adjunct in all the mills in the mining industry. Already the process has added greatly to the world's wealth. From its inception to date it has produced about \$20,000,000 in silver, \$1,700,000 in copper, \$612,000,000 in spelter, and \$19,800,000 in lead.

The B. C. Portland Cement Co. (in liquidation), with works at East Princeton, Similkameen, British Columbia, has been given authority by a Supreme Court judge to lease to the British Columbia Copper Co. the steam-generating electric power plant which is part of the equipment of the cement manufactory established two or three years ago east of Similkameen river below Princeton, from which town it is distant about four miles. The B. C. Copper Co. is constructing a pole line from its mining properties on Copper mountain, down to East Princeton, a distance of about twelve miles. Much underground development is being done by the mining company on Copper mountain, including driving a tunnel 2,000 feet to further develop large orebodies already prospected. With power provided for running a compressor and other machinery on Copper mountain, underground work will be much expedited, and the big orebodies be much more extensively opened than by hand-drilling.

HOLLINGER MINING COSTS IN 1915

The costs per ton milled are not absolutely correct in all details, as they include the cost of breaking 35,170 tons of excess ore and 42,424 tons of waste in de-

The price of explosives has advanced steadily, and this advance has increased the cost of mining by fifteen cents per ton over what it would be with normal prices ruling.

The following table shows the distribution of the costs of mining at the Hollinger in 1915—

Account.	Labor.	Stores.	Totals.	Per ton of ore milled.
General mining charges.....	\$6,970.91	\$3,871.65	\$10,842.56	\$0.032
Superintendence	12,785.25	.....	12,785.25	.038
Diamond drilling	5,792.24	7,676.22	13,468.46	.040
Crosscutting	10,490.19	13,728.63	24,218.82	.072
Shafts	8,006.43	6,433.99	14,440.42	.043
Drifting	27,355.66	31,454.96	58,810.62	.176
Raising	8,239.00	6,672.23	14,911.23	.045
Winzes	8,469.69	5,222.07	13,691.76	.041
Back-filling	302.79	291.59	594.38	.002
Timbering and repairs, shafts...	6,511.29	12,339.67	18,850.96	.056
Stoping	109,359.07	116,911.60	226,270.67	.676
Sealing	8,552.34	.....	8,552.34	.026
Timbering and repairs, stopes ..	24,629.77	13,053.57	37,683.34	.113
Track laying	6,267.32	7,232.71	13,500.03	.040
Trammig and mucking	103,685.66	1,256.16	104,941.82	.314
Pipe-fitting underground	3,639.17	7,010.37	10,649.54	.031
Mine drainage	3,570.97	6,679.39	10,250.36	.031
Hoisting	37,065.77	15,641.93	52,707.70	.158
Landing and dumping	4,424.63	749.69	5,174.32	.015
Drill repairs	2,471.67	15,729.49	18,201.16	.054
Sharpening Steel	16,947.50	6,758.55	23,706.05	.071
Collecting steel	10,057.37	93.94	10,151.31	.030
Mine sampling	5,152.50	.....	5,152.50	.015
Assaying	1,117.40	670.57	1,787.97	.005
Change house	994.71	2,523.53	3,518.24	.001
Surveying	4,505.06	1,255.93	5,760.99	.017
Mine lighting	326.31	5,117.33	5,443.64	.016
Electric haulage	4,441.99	582.42	5,024.41	.015
	\$442,132.66	\$288,958.19	\$731,090.85	\$2.183
Less credit for excess ore and waste rock broken.....			95,800.00	.285
Net cost of mining			\$635,290.85	\$1.898

velopment. A deduction of \$95,800.00 from the total cost of mining is therefore shown, to cover these items.

The following unit costs are given as a matter of interest:

Diamond drilling, including power, diamonds, labor, per ft.	\$1.60
Cross-cutting, including power, explosives, labor, per ft.	6.40
Shaft sinking, including power, explosives, labor, per ft.	42.32
Drifting, including power, explosives, labor, per foot	10.10
Raising, including power, explosives, labor, per foot	16.17
Winzes, including power, explosives, labor, per foot.	39.20
Stoping, including power, explosives, labor, per ton . . . . .	.70
Mucking and trammig, power and labor, per ton . . . . .	.28

During the month of April, 1915, an electric locomotive haulage system was started underground. The result has been a saving of seven cents per ton in trammig costs. This amounts to a total of \$26,389.58 saved.

HOLLINGER MILLING COSTS

Commenting on results of milling operations, General Manager P. A. Robbins says:

"During the year there were stacked for re-treatment 9,500 tons of concentrates, having gross gold contents amounting to \$81,763.00. We have now altered our concentrate treatment plant so that it is no longer desirable to stack this product for future treatment, and we shall as rapidly as possible reclaim those concentrates which have been conserved during the past two years. The cost of treating Hollinger ore amounts to almost exactly \$1.00 per ton and it is expected that the present year will record a somewhat lower cost. All milling costs have been charged to the ore treated, and no reductions in costs have been made on account of profits made by milling Acme ore, these having been credited to General Charges. The alterations reported last year as being in progress were completed in April, since which time 100 stamps have been in regular operation.

"We are now installing extra tube mills and screening plant, by means of which it is proposed to relieve the stamps from the duty of further crushing on that portion of the ore which comes from the crushers in

a condition fine enough for direct tube milling. The continuous decantation plant is being increased by the addition of two rows of 40-ft. tanks. Six Dorr agitators, 26 feet in diameter by 18 feet deep, have been installed to secure a longer period of treatment for the ore. The concentrating plant has been rearranged to make room for the agitators, and a tube mill has been installed in circuit with two smaller agitators for treating concentrates. It is expected that by means of these alterations the capacity of the mill will be raised to 1,900 tons per day; and that a slightly improved extraction will be obtained owing to the increased agitation provided."

The average number of men employed by Hollinger Gold Mines, Ltd., during 1915 has been 735, starting with 698 at the commencement of the year, and ending with 685. The men were engaged upon the following classes of work:

Miners—Exploration, 5; development, 83; production, 315.

Mechanics—Operating, 32; maintenance, 78; construction, 84.

Millmen, 98; refinery, 5; engineering staff, 10; clerical staff, 8; miscellaneous, 17.

The following table shows the distribution of milling costs of the Hollinger for 1915:—

Account.	Labor.	Stores.	Totals.	Per ton of ore milled.
General milling charges	\$7,115.83	\$8,662.16	\$15,777.99	\$0.036
Superintendence	10,183.89	.....	10,183.89	.023
Tailings disposal	3,364.23	2,356.81	5,721.04	.013
Lighting	263.54	2,781.30	3,044.84	.007
Heating	1,594.35	8,200.72	9,795.07	.022
Shoveling in bins	3,444.55	.....	3,444.55	.008
Crushing	14,124.04	13,038.12	27,162.16	.062
Conveying	10,659.67	8,484.97	19,144.64	.043
Stamping	13,906.04	34,669.22	48,575.26	.110
Classification and tube milling..	11,142.92	77,709.27	88,852.19	.202
Concentration	10,662.40	4,821.65	15,484.05	.035
Handling concentrates	1,389.89	1,763.40	3,153.29	.007
Treating concentrates	1,231.21	1,246.66	2,477.87	.006
Handling pulp	4,621.18	6,420.08	11,041.26	.025
Thickening	2,471.40	1,803.66	4,275.06	.009
Agitation & continuous decantation	8,055.10	2,258.76	10,313.86	.023
Filtration	10,082.30	10,037.87	20,120.17	.046
Neutralizing	1,334.33	4,533.17	5,867.50	.013
Clarifying and precipitation	2,796.04	29,283.96	32,080.00	.073
Refining	6,584.66	11,304.81	17,889.47	.041
Pumping solutions	5,168.51	6,211.36	11,379.87	.026
Cyanide	6.92	63,352.18	63,359.10	.144
Cleaning mill	6,245.94	.....	6,245.94	.014
Alterations	5,337.98	4,386.53	9,724.51	.022
Assaying	3,067.82	1,825.57	4,893.39	.011
Maintenance of buildings	474.39	147.31	621.70	.001
	\$145,329.13	\$305,299.54	\$450,628.67	\$1.022
Less cost of treating 106,486 tons Acme ore			116,079.21	1.090
Cost on 334,750 tons Hollinger Ore			\$334,549.46	\$0.999

GILLIES LIMIT.

The following is a copy of an Order-in-Council approved by His Honor the Lieutenant-Governor the 10th day of May, A.D. 1916.

Upon the recommendation of the Honorable the Minister of Lands, Forests and Mines, the Committee of Council advise that those portions of the Gillies Timber Limit on the Montreal River, hereinafter described, being lands of the Crown heretofore withdrawn from prospecting and disposal for mining purposes be on and after the first day of June, 1916, reopened for prospecting and staking out and sale or lease under the Mining Act of Ontario, and further that the said lands be added to and form part of the Temiskaming Mining Division, such lands being described as follows:

Being all those portions of the said Gillies Timber Limit still in the Crown, bounded on the south by the south limit of Block No. 58; on the east by the east limits of Blocks Nos. 58, 48, 37, 27, 19 and 11 and the

Montreal River; on the north by the Montreal River and the Township of Coleman; on the west and south west by the Town of Latchford, and the right of way of the Timiskaming and Northern Ontario Railway, as shown on plan of survey by J. H. Smith, O. L. S., dated November 25th, 1908, of record in the Department of Lands, Forests and Mines, said portions being more particularly enumerated and described as follows, that is to say:

That part of Block 4 south-west of the Montreal River; part of Block 5 lying south-west of the Montreal River; Blocks 11, 12, 13, 19, 20, 21, 27, 28, part of Block 29, Block 37, part of Block 38, part of Block 39, Block 48, parts of Blocks 49, 58 and 59, having a total area of 7,932 acres, more or less.

Reserving therefrom a road allowance one chain in perpendicular width along the right bank of the Montreal River through Blocks Nos. 4 and 5.

PLACER GOLD MINING IN BRITISH COLUMBIA

By E. Jacobs

The estimate of the Provincial Mineralogist of British Columbia of the value of placer gold received in that province last year, as shown in the recently issued "Preliminary Review and Estimate of Mineral Production, 1915," makes it appear that there was an increase of \$180,000 as compared with the total for 1914. Further, the 1915 total is larger than that of any other year since 1907, which fact has occasioned some favorable newspaper comment in the province.

The commencement of production of placer gold in British Columbia dates back to 1858, for which year a yield valued at \$705,000 is on official record. The maximum production of any one year was that of 1863, with a recorded value of \$3,913,563, followed in 1864 by a total of \$3,735,850, and in 1865 by \$3,491,205. The only other year in which production exceeded \$3,000,000 in value was 1868, when the total was \$3,372,972. Placer-gold mining was at its best in the province during the period 1860-68; thereafter the value of the production of any single year only once exceeded a total of \$2,000,000, and that was in 1875, when Cassiar district contributed substantially to the total of \$2,474,004, which was the value of the yield for that year. The decrease in production was gradual until the early eighties, and after that rapid until, in 1893, the minimum total of production in any year during the history of placer-gold mining in the province was reached, with an output for that year of only \$356,131. Thenceforward there was a steady increase for half-a-dozen years, to which Atlin district contributed materially in 1899, in which year the yield was valued at \$1,344,900. Production was fairly well maintained until 1905; then followed a decreasing annual yield. The total for 1911 was only \$426,000. Since then the annual output has been greater, having reached \$745,000 in 1915, while present prospects are that further improvement will be experienced this year.

During the years 1858 to 1915, inclusive, the aggregate value of the placer-gold recovered is stated in official records to have been \$74,014,603. The production in short periods is shown in the following table:

For eight years, 1858-1865.....	\$21,012,252
For ten years, 1866-1875.....	20,662,663
For ten years, 1876-1885.....	11,218,896
For ten years, 1886-1895.....	5,366,116
For ten years, 1896-1905.....	9,512,776
For ten years, 1906-1915.....	6,241,900

Aggregate value of placer-gold.. \$74,014,603

In connection with the expectation that placer-gold mining may again become of considerable importance in British Columbia, it has lately been again pointed out that such an expectation is quite a reasonable one, for it is known that, as stated in a leading provincial newspaper, "there is a vast auriferous area in the province concerning which practically nothing is known."

In the "Annual Report of the Minister of Mines, 1902," the Provincial Mineralogist gives much information relative to the placer-gold estimated to be contained in "the great low-grade gravel deposits, which have received their chief development about Quesnel Forks, Cariboo district." He said in part:

"Mr. John B. Hobson claims for his company that he has leases of 500,000,000 cubic yards of auriferous

gravels, and it is quite safe to say that he has not in those leases one-fifth of the available gravels, so that in this section alone there must be from 2,500,000,000 to 3,000,000,000 cubic yards of auriferous gravels, which there is every reason to think will be as rich as the Consolidated Cariboo Company's deposit. The immensity of these figures is hard to grasp, but to illustrate—if ten cubic yards yield \$1 in gold, then there is in the Quesnel section alone \$300,000,000 worth of gold. This vast amount of gold is so 'diluted' with sand and gravel that the only possible means of extracting it is by the use of immense volumes of water under pressure, in other words, by hydraulic mining."

Placer-Gold Mining in 1915.

In the "Preliminary Review," above-mentioned, the Provincial Mineralogist makes the following comment:

Placer Gold.—The estimated recovery of placer gold for 1915 is \$745,000, of which practically all is obtained in the Cariboo and Cassiar districts, only about one-tenth of the total coming from the other districts. An approximate apportionment is as follows: From Cariboo district, \$312,000; Atlin division of Cassiar district, \$355,000; Stikine and Liard, \$30,000; remaining parts of the province, \$48,000. It may be that a larger yield will be shown, but this cannot be definitely stated until after the final returns of the season's operations shall have been received.

The output of placer gold is larger this year than it has been since 1907, and will probably be about \$180,000 greater than that of last year. This comes as an agreeable surprise, for the snowfall of the winter of 1914-15 was unusually light, and, as this is the principal source of the water-supply, it was expected that the quantity of water available for hydraulicking would fall short of the usual quota.

In hydraulic mining it has been pretty well demonstrated that the gold output is in direct proportion to the number of days in which water was available for piping, hence there seemed little hope for even a normal production of placer gold during the season of 1915.

The Weather Bureau, however, as though in compensation for the niggardly amount of snow provided, so arranged the spring weather that the snow melted very gradually—not much faster than the water could be used—while the absence of spring freshets prevented the great waste of water usual at such times. Subsequent summer rains in Cariboo district also very much assisted in keeping up the water supply.

The shortage of work general throughout the province during the early summer caused a greatly increased number of men, both whites and Chinese, to undertake small placer operations; this was particularly noticeable in the districts adjacent to Quesnel and Quesnel Forks.

During the summer months the unusually low water exposed bars on the Fraser and Thompson rivers which are seldom accessible, and these were worked in numerous places by Indians and Chinese, with good results.

In the Barkerville section of the Cariboo district the larger hydraulic companies made a greater output than usual, while an increased number of individuals appear to have been working in a small way; this is also true of the Quesnel and Quesnel Forks sections,

which report much larger amounts of gold recovered than has been the rule for some years past.

This is accounted for by the general shortage of other work throughout the northern part of the province, which caused many men to once more take up placer-mining, even if it only produced wages.

No authentic news has as yet been received from the Omineca district, where considerable work has been going on, most of which, however, is of a preparatory nature, and it is not expected that any great output has been made this year, probably not more than about \$12,000 all told.

In the Atlin district the shortage of water was very noticeable, some of the companies being so short as to be only able to work effectively for half the season. On the other hand, some of the companies were evidently working in richer ground; it is not known whether this was by good luck or by intentionally attacking only the richer parts, in an attempt to compensate for the water shortage.

Very little summer rain fell and its absence was much felt during the latter part of the season. Notwithstanding these drawbacks, it would appear that a somewhat increased production was made in this district.

In the Liard-Stikine district the Boulder Creek Hydraulic Mining Company had a successful season, taking out about \$20,000 from its ground on Thibert creek. Ball and Finn and Mitchell Bros., working in the same vicinity, made small outputs.

Four different partnerships were at work on Dease creek, with success enough to at least pay wages.

Some gold was taken out of the Tahltan river by Indians and others working in the river-bed.

It is to be noted that two or three parties were working down the Liard river, at McDame creek, and on Rosella creek, a section that has been practically abandoned of late years.

The Similkameen and Tulameen rivers produced more gold in 1915 than for some years back and give promise of again being a factor in the placer-gold industry.

Vernon district also yielded some gold from hydraulic operations in Siwash creek.

Yale mining division made an unusually good output, owing to the very low water in the rivers exposing the bars.

The Fort Steele mining division made a better output than for some years past.

CARIBOO DISTRICT.

Three mining divisions are usually included under the general head of Cariboo district—namely, the Cariboo, Quesnel, and Omineca divisions. In the first two divisions mining operations are restricted almost entirely to placer-mining, there being little, if any, other productive mining, but in the Omineca division lode-mining is now more important, due to the advent of railway facilities in the southern portion of the division.

The conditions affecting placer-gold mining in this district have already been referred to under the sub-head of "Placer Gold," and, while the conditions were not particularly favorable this past season, it would appear that the gold-output was materially larger than it had been for some years past.

Quesnel Mining Division.

The hydraulic properties operated by Mr. John Hopp, which include Stouts Gulch, Lowhee, and Mosquito Creek are reported to have done exceedingly well this past year, better than ever before.

Loo Gee Wing's Point claim, on Slough creek, was operated under the management of Joseph Wendle, and is reported to have taken out more gold than in any previous year, thus justifying the more up-to-date equipment installed in 1914.

The company's water-storage facilities are not as good as might be desired, so that the melting of the snow gradually, as it did last season, was a very material assistance.

No information has been received regarding the Lightning Creek Hydraulic, and it is believed the property made no serious output; the manager, Mr. Bonner, has been out of the country all the season.

Cariboo Mining Division.

In the Quesnel division none of the larger companies that formerly made large outputs worked last season.

The old Hobson property at Bullion, which has been the subject of disputed ownership for a couple of years, was prospected last season by one of the claimants—Mr. Ward. Since then the stakings of John Hopp et al, have been recognized by the Government, and the chances are that next season will see the property working again.

In the vicinity of Quesnel and around Quesnel Forks an unusually large number of individual miners have been working in a small way, and the bank at Quesnel reports having bought nearly \$80,000 worth of gold in small lots.

About the usual amount of work was carried on around Keithley creek, but no large amount of gold was taken out.

During the season there was a stampede into Swamp river, which flows southward into Cariboo lake; subsequent investigation, however, did not confirm reports brought out by the first prospectors and the excitement died away.

Omineca Mining Division.

Placer-mining is not now very important in the Omineca mining division, the production for last year being estimated at about \$12,000.

In the Omineca River region, so far as is known, only one placer-mining company was working. This was the Kildare Mines, Limited, on Slate creek, which employed 33 men during the season, presumably mainly on development work.

The Cassiar Hydraulic Mining Company, Limited, on Kleanza creek, also carried on operations with 17 men and made a small clean-up.

On Lorne creek the Dry Hill Hydraulic Mining Company continued work with 23 men, and it is supposed the erection of a long flume-line was proceeded with.

CASSIAR DISTRICT.

The extensive area known as Cassiar district includes the following mining divisions: Atlin, Liard, Stikine, Skeena, Queen Charlotte, and Portland Canal.

(There is little, if any, placer-mining done in the latter three divisions.—Ed.)

Atlin Mining Division.

The Atlin district during 1915 maintained the rank which it has enjoyed for some years past as the chief producer of placer gold in the province, and is estimated to have produced \$355,000 worth of gold, which represents about 47.7 per cent. of the provincial output.

Pine Creek.—The Pine Creek Power Company—a company organized and operated some years past by Mr. J. M. Ruffner—was the largest operator on this creek during the past season; the mining was chiefly

confined to hydraulicking on the ground known as the Guggenheim claims on Tar flats, which the Pine Creek Power Company has been working for some years back on a lease from the owners. Mr. Ruffner, who was the organizer of the company and manager since its incorporation, retired during the season of 1914, and was succeeded by Mr. Frank Breeze, formerly book-keeper and assistant to his predecessor, who continued in the management during 1915.

Moshannon and Besbrook worked some 31 men throughout the season, but no details of the work done, nor of the amount of gold recovered, have as yet been received.

Three or four properties on this creek were very profitably worked by "laymen."

Spruce Creek would appear to have been one of the busiest creeks in the division this past season, and is credited with an output of gold approximating \$110,000, produced by some 23 companies or partnerships. Of this, the largest contribution came from the Joker and Poker leases, worked by 38 "laymen," followed, in order of importance of output, by the Gladstone lease, the Chicago Bill, Peterboro', Bloomfontein, Hardscrabble, and Polar Star.

Boulder Creek saw seven small properties being worked by the owners or "laymen," with fair success in a small way.

Ruby Creek.—Three concerns operated here throughout the season, the chief operations being on the Rose, where some 17 men were at work and are expected to have produced nearly \$70,000.

McKee Creek.—The Delta Gold Mining Company operated on this creek during the season, employing about 18 men and taking out, it is estimated, approximately \$35,000 in gold. No particulars of the work done have yet been received.

Birch, Otter, and Wright Creeks.—On Birch creek three properties were worked—the Romance, Forks, and Long Walk—employing eight or ten men and producing somewhere about \$10,000 in gold. On Otter creek nine men were at work on the London, chiefly on preparatory work, while five men were at work hydraulicking on the Raven with fair results. On Wright creek hydraulicking was carried on by four men on the Jasper lease, while the Southern Cross claim was worked by the owner. No returns have as yet been received as to the results of the work.

Various Creeks.—A couple of leases on Volcanic creek were prospected and one on Graham creek, but no returns have been received from them.

On Rose creek two claims were worked by the owners, and on Wilson creek three claims.

On Gold Run two properties were worked by "laymen," who were drifting.

On Bull creek a number of leases were prospected, but with what result is not yet known.

O'Donnell River.—The O'Donnell Placer Company operated on this stream drifting and hydraulicking, employing some 15 men, but, as far as can be learned, with anything but satisfactory returns this season. Prescott and partners—some five men in all—worked one of the Gold Hill leases, taking out a fair amount of gold. Some seven or eight individual miners also worked on their leases, but no returns were received from them.

Stikine and Liard Mining Divisions.

Mining in the Stikine and Liard divisions consists entirely of placer-mining, and most of this is within

the boundary of the latter division. On the Tahltan river, in Stikine, Indians worked the bars for a short time, but with indifferent success.

In the Liard division the principal placering operations are carried on by the Boulder Creek Mining Company, which operates an hydraulic plant on Thibert creek. Owing to the extremely dry summer, this company was held back considerably by a shortage of water, only getting in 29 days' work during August, September, and October. Richer ground than usual must have been worked, as the output for the season was about the same as in the previous year.

Ball and Finn, drifting about a mile above the Boulder Creek Company's property, struck ground which was fairly rich in coarse gold, but spotted, and while their progress was slow on account of boulders encountered, still they managed to make a grub-stake.

Mitchell Bros. did some prospecting on Deloire creek and also Adsit and Calvert on Mosquito creek.

On Dease creek four small operators were at work, but the returns were not very large. Two outfits were at work on McDame creek, merely engaged in prospecting.

Nothing further has been heard regarding the drilling operations on the flats at the mouth of Dease creek.

The production for the division is estimated at \$30,000.

LA ROSE.

The ninth annual report of the La Rose Consolidated Mines Co. shows combined surplus of holding and operating companies at the end of the year at \$937,490.

President D. L. McGibbon says: Exploration and development work have been continuously carried on during the year. Several properties were examined and two are still under examination, on which options have been acquired.

Results of 1915 operations compare with previous years as follows:

	1915.	1914.
Net selling prize per oz (cents)	50.88	53.92
Production silver, oz.	1,135,142	1,368,247
Net value	\$526,996	\$637,555
Cost production per oz. (cents)	31.64	37.2
Net profit	\$230,662	\$217,979
Dividends	299,725	749,313
Surplus	937,490	1,040,380

A year ago the total silver in sight under ground and in the dumps was estimated at 860,000 oz. During the year the production amounted to 1,135,000 oz. The only high grade ore in sight at present is a small amount contained in pillars in the La Rose mine; but in the extraction of this ore and in the general cleaning up of the mine, it is probable that other small bodies will be discovered.

The mill ore, of which there was 44,000 tons at the beginning of the year, has been reduced to about 10,000 tons. In addition to this, there are certain portions of the dumps which, while lower grade, may yield a small profit.

The net profit of \$230,662 for 1915 year is considerably better than was anticipated a year ago. On a smaller production the profit was larger than in the previous year, and the cost per oz. was less. This larger proportion of profit was because of less money spent in exploration.

The price of silver went as low as 46¼ cents per oz., and the average received during the year was only 50.88 cents—the lowest record in the company's history.

MINING ENTERPRISES IN CANADA*

By Mr. J. B. Tyrrell.

It is difficult for most men living in cities or thickly populated centres, not only in Great Britain but in Canada itself, to realize the vast extent and possibilities of that country. A journey in a railway carriage across its southern portion from Montreal to Vancouver may give the traveller who will use his eyes a glimpse of its vastness, but it is only a glimpse of the most settled and thoroughly explored areas where its natural resources are being actively developed and used. Country similar to that seen extends for a thousand miles or more beyond the horizon, and holds potential wealth of many kinds waiting to be discovered and utilized—I sincerely hope by people of our own race. The Dominion of Canada has a length from east to west of about 3,500 miles, a width from south to north of about 1,400 miles, and an area of 3,729,665 miles, which is about twenty times the total area of the British Isles. At the present time it has a population of, roughly, 8,000,000 people, about the same number as the population of England at the beginning of the last century.

The early settlers of Canada, both French and British, were agriculturists who settled on the rich farming land beside the navigable lakes and streams that formed the only highways through the country, though in the wilderness beyond there were vast areas of similar rich land which at the time could not be reached. Later on highways and railways were built through or near the more settled parts of the country and between the Great Lakes, but people did not seriously begin to move into the great interior country until about 1884, when the northern part of the Province of Ontario and the Provinces of Manitoba, Saskatchewan, Alberta and British Columbia were rendered accessible by the building of the Canadian Pacific Railway from Montreal along the north shore of Lake Superior and across the plains and mountains to Vancouver. Up to this time the attention of the people had been occupied with agriculture, forestry and fishing, and but little thought and energy had been devoted to mining. In 1886, the first year in which an accurate official report on the mineral production of the Dominion was compiled and issued, the total output of useful minerals of all kinds, metallic and non-metallic, had a value of only £2,100,000, or 9s per head of the population.

The building of the Canadian Pacific Railway opened a new era in mining in Canada. It furnished means of easy access to a new and previously inaccessible country; it opened up new mining districts, and in a rock-cutting on the railway itself there was exposed for the first time the vast nickel deposit near Sudbury. A new interest in mining was stimulated, and as a result the mineral production rose in 1890 to a value of £3,450,000, or at the rate of 14s per head of population. During the next five-year period development and production progressed slowly but steadily, and in 1895 the output of the country had reached a value of £4,200,000. In the following year the gold-bearing placers of the Klondike district were discovered, and by 1900 the mineral output of Canada had jumped to £13,250,000, or 50s per head of population. In five years the mineral production of the country had been trebled. About one-half of this increase, or a third of the total production, was derived from the gold of the

Klondike, but the other half of the increase was attributable to a general development of the mineral resources of the whole country, and to the keen interest which the people were taking in all mining enterprises. After 1900 the production of the placer mines of the Klondike began to decline, and by 1905 it had decreased from £4,600,000 to £1,600,000 a year, but notwithstanding such a heavy drop in the output of that extraordinary camp in far Northern Canada, mining had been so active throughout the Dominion that the total mineral production had nevertheless increased to a value of £14,200,000 a year.

Shortly before the close of this last five-year period a new silver-bearing field had been discovered in a rock-cutting on a new railway line in the midst of the pine forests of Northern Ontario, but as yet its influence had been only slightly felt on the statistics of the mineral production of the whole country. The centre of this district is now the town of Cobalt, and up to the end of December last it had produced 234,000,000 ozs. of silver, and is still going strong. Considering the richness of its silver-bearing veins, and the small area of country in which these veins are distributed, the Cobalt district is undoubtedly one of the richest silver-producing areas in the world.

In 1910, at the end of the succeeding five-year period Canada's annual mineral production had increased by £7,800,000 to a total of £22,000,000; £3,000,000 of this increase was due to the output of silver from Cobalt, while £4,800,000 was due to a general acceleration of mining activity throughout the whole country from the Atlantic to the Pacific. During the five years just past the mining industry has been making steady progress, and in the year 1915 Canada yielded mineral wealth to the value of £28,500,000, or 74s per head of the population, consisting of metallic products of the value of £16,000,000; chiefly nickel, gold, copper and silver, in the order here given, and non-metallic products of the value of £12,500,000, somewhat more than half of which was coal. The average annual increment of increase in mineral productions for ten years from 1905 to 1915 has been £1,400,000. I have presented these figures as evidence of Canada's steady and uninterrupted growth in mineral production, but, at the same time, I would emphasize the fact that as yet its population is small, and is distributed somewhat irregularly near its southern border. Most of the knowledge possessed of the country has been acquired by people who live in that southern border region, and the great part of such knowledge refers to the border region itself or to the country immediately contiguous to it.

Within or near this southern border are the great nickel mines of Sudbury—the chief source of the nickel supply of the world; the silver mines of Cobalt—the richest individual silver-bearing area in the world; the gold mines of Porcupine, which are making good their original promise of great wealth; the copper mines of Quebec, and most of those of British Columbia; the asbestos mines of Quebec, where most of the asbestos of the world comes from; and the great coalfields of Alberta, which have recently been shown by officials of the Canadian Government to be among the largest coalfields in the world.

*From report of meeting of Anglo-French Exploration Co., London April 28, 1916.

Beyond the populated and partly-developed southern border land is a vast area, which is still untenanted and unprospected. The means of transportation into it are imperfect, and no local supplies of food are available, so that even if men should penetrate into it they would be unable to live and work in it until they could obtain a regular supply of provisions from the settled country to the south, which they might supplement later by clearing the land of its forest growth and raising provisions for themselves. But transportation facilities are being gradually improved all the time, and with these improvements the men who are scattered along the borders of civilization, and have begun the development of the country behind them, continue to push on farther into the wilderness.

In this way, through the enterprise of restless but experienced men, inured to every kind of hardship, the unknown lands are explored and prospected, while the fuller development of the mineral and other resources of the country behind them is left to others drawn from the larger centres of civilization.

The three processes of discovery, development and production have been going on steadily for a generation, and as more men are being trained for the work from year to year, and since the natural conditions for discovery are favorable, development and production will undoubtedly continue in increasing ratio for generations to come. The useful minerals and metals of Canada have already added largely to its wealth, and incidentally to the wealth of many of those who have assisted in extracting them from the earth and converting them to the uses of mankind, and there is no doubt but that in the future, as in the past, they will continue to yield wealth to those who take an active and intelligent interest in them.

In the reorganization of the resources of the Empire which is certain to take place after the war this wealth taken from Nature's storehouse should be secured as far as possible by citizens and supporters of the Empire, and I trust that the name of the Anglo-French Exploration Company, combining as it does the names of two of the greatest of the Allies who are fighting the battles of civilization against primeval barbarism and brutality, will occupy an honored place in the list of Nature's beneficiaries.

MR. N. A. TIMMINS ON HOLLINGER MERGER.

In his report to shareholders President N. A. Timmins said: "Those of our shareholders who have followed the history of the Porcupine camp from its earliest days are aware that, in addition to the four Hollinger claims, containing 160 acres, the Syndicate now represented by Canadian Mining & Finance Co., Limited, about the same time purchased a number of adjacent properties and that, of these other properties, three claims, containing 120 acres, were transferred to Acme Gold Mines, Limited, that three other claims, containing 120 acres, were transferred to Millerton Gold Mines, Limited, and that Mining Claim No. 13147, containing 40 acres, was transferred to the Finance Company. Adding the Hollinger acreage to these other claims, we have an almost solid rectangular block of about 440 acres as the area to be taken into the consolidation.

"Under the original plans provision was thus made for carrying on operations on the various claims by separate companies, but it soon became apparent that joint operation at least, if not actual consolidation, would eventually prove the most satisfactory and economical method of dealing with the properties. The

final disposition to be made of the properties could not, however, be definitely and satisfactorily settled until a great amount of experimental work had been done and many complicated investigations made. The extent and character of the ore bodies, as well as the grade of the ore, had to be determined, and various mining and metallurgical problems remained to be solved. We, therefore, decided at a comparatively early stage of our operations, to keep in view the consolidation of the properties, and each step in the design and building of the plant and in the planning and carrying out of underground development work was taken with this possibility in view. We also determined to proceed with all due caution until the situation as a whole had been thoroughly worked out and until we were able to place before the shareholders of the Hollinger Company such a scheme as would readily commend itself to all interested parties. Our unique position as owners of all the other claims involved in the consolidation, and as largely interested shareholders in Hollinger Gold Mines, Limited, made it possible for us to give the subject the consideration its importance demanded, and to work out well considered and mature plans without regard to the pressure exerted from time to time to hasten our action.

"The extensive development work on the Acme claims and the increased mining and milling operations on the Hollinger properties have recently rendered it imperative to take action and to settle the question of consolidation. In fact we have reached such a stage in the operations of all the companies concerned and in the various mining and milling problems to be faced that any further delay might have a tendency to prevent consolidation. As shareholders of the company, you are fully aware of the thorough and painstaking methods of our General Manager in the conduct of the company's operations, and we can assure you that he has given to this Special Report and to the plans and details of consolidation the very best consideration possible.

"In our opinion the special plan to be submitted provides for consolidation of the various properties upon an equitable basis to all concerned, and it will, we feel sure, result in great advantage to all shareholders. As owners of the other properties involved, we feel that we are making substantial concessions in including a large block of unprospected territory at a nominal valuation, but we do so in full recognition of the fact that if there is to be any advantage in the transaction it must be given to the present shareholders of the Hollinger Company.

PETERSON LAKE.

Cobalt, May 20.—In a crosscut from the 50-foot level of the Reliance property, under option to the Peterson Lake Mining Co., a vein was cut this week. The vein is of calcite showing some specks of mineral but no silver. The crosscut was run to the southwest from the shaft and the vein was located about 85 feet from the shaft. The crosscut, it is expected, will be continued a few yards further, after a few rounds have been taken out in drifting on the vein.—Cobalt Nugget.

MINING ENGINEERS WANTED.

The War Office has asked for 50 mining engineers to enlist for special service. Applicants should be prepared to go overseas at short notice and train. They will be given commissions in the Canadian Engineers.

PERSONAL AND GENERAL

Commissioner Black, of Dawson, Yukon Territory, was operated on for appendicitis at the Royal Jubilee Hospital, Victoria, B.C., on May 4.

Mr. Raleigh P. Trimble, of Portland, Oregon, for several years actively interested in developing mining property on Roher Debole mountain, Omineca mining division of British Columbia, has returned to that part of the province to direct operations on the Cassiar Crown Copper Co.'s mineral claims, after having been on a business trip to Oatman mining camp, Arizona.

Mr. B. Mattingly, who was with the Tonopah-Belmont Co. in Nevada, is now at the Surf Inlet gold mine, on Princess Royal Island, British Columbia, where the Tonopah-Belmont Development Co. has been doing development work for nearly two years.

Mr. Harry W. Newton, who was on the Northport Smelting and Refining Co.'s staff some years ago, and since then did valuable metallurgical work in Republic camp, Washington, is now metallurgist and assayer for the Norman Mines Co., of Spokane, Washington, operating in the neighborhood of Northport, also in that State, and a few miles south of the International Boundary line and the south-eastern corner of Trail Creek mining division.

Dr. Willet G. Miller returned to Toronto on May 14th from a three-months' trip to England and France, and sails from San Francisco with T. F. Sutherland on May 23rd for Australia and New Caledonia.

Mr. W. E. Simpson is developing a molybdenite property near Amos, Quebec.

Mr. I. D. D. Daimpre, of Sudbury, is in Toronto.

Mr. R. E. Hore has returned to Toronto, after visiting Cobalt silver mines.

Siemens Co. of Canada, Ltd., 120 St. James Street, Montreal, have recently supplied a 470 H.P. electric hoist for the Mond Nickel Co., Ltd., Coniston, Ont. Also two 280 H.P. motors for driving air compressors at Acadia Coal Co., Ltd., Stellarton, N.S.

The Roberts and Schaefer Company, engineers and contractors, Chicago, have closed a contract for a horizontal screen and tippie equipment to be installed immediately for the Rose-Deer Coal Mining Company at Wayne, Alberta.

Mr. W. M. Brewer, of Victoria, will spend the greater part of the field season of this year investigating metal-mining conditions and obtaining information relative to metalliferous mining properties on Vancouver Island for the British Columbia Department of Mines.

Mr. E. V. Buckley, manager for the Queen Mine, Inc., at Sheep Creek, Nelson mining division of British Columbia, was in Spokane, Washington, recently to meet and confer with the president of the company, who came from Wisconsin. The Nelson Daily News states that an option of purchase of the Queen gold mine at the price of \$300,000 has been obtained by Mr. J. R. Rutherford, for some time general manager for the Motherlode Sheep Creek Mining Co., who is acting for the Tonopah-Belmont Company, which about six months ago took up its option to purchase for \$150,000 an 80-per cent. interest in the Surf Inlet Gold Mines, on Princess Royal Island, B.C.

Mr. Albert Dunn is superintendent for the Highland Valley Mining and Development Co., which is developing mineral claims in Highland Valley, in Ashcroft mining division of British Columbia.

Mr. A. C. Flumerfelt, of Victoria, B.C., has been re-elected president of the International Coal and Coke Co., operating a coal mine and coke ovens at Coleman,

south-west Alberta, with Mr. O. E. S. Whiteside as general manager.

Mr. Thomas Graham, chief inspector of mines for British Columbia, will shortly leave Victoria on a visit to Joplin, Missouri, where he will attend the annual meeting of the Mine Inspectors' Institute of America, of which he has been first vice-president for the year now closing.

Mr. A. B. W. Hodges, after having spent the winter at Honolulu, Hawaiian Islands, arranged to leave there for San Francisco on May 3. It was his intention to motor from the latter city to Los Angeles, Southern California, where he now has his home.

Mr. Frederic Keffer, of Spokane, Washington, spent the latter part of April at the Highland Valley Co.'s mine, Ashcroft, B.C., and early in May was in Victoria on his way home.

Lieut. O. E. LeRoy, of the Western Universities Battalion, was in Victoria, B.C., lately, attending one of the classes for the instruction of military officers in special subjects.

Mr. J. R. Lockard, of Cumberland, Vancouver Island, B.C., left that town early in May on a business visit to New York city. He is general superintendent for the Canadian Collieries (Dunsmuir) Limited, which operates several coal mines of its Comox colliery near Cumberland, and other mines, of its Extension colliery, near Ladysmith, also on the Island.

Mr. A. W. McCune, of Salt Lake City, Utah, is again in Ainsworth district of British Columbia, where he intends doing development work on one of his mining properties, situated within a few miles of the town of Ainsworth.

Mr. I. L. Merrill, of Los Angeles, California, president of the Hedley Gold Mining Co., was at Hedley, Similkameen, B.C., early in May, and while there agreed to grant an increase of 75c. a day to underground men and 50c. a day to surface men in the company's employ.

Mr. J. E. Oppenheimer, of Butte, Montana, who was at the head of the Montana Continental Development Co. that for three years operated under lease the Roher Debole copper mine, situated in the Hazelton region, Omineca mining division, British Columbia, has returned to that district to attend to other mining matters in which he is interested.

Mr. J. J. Warren, of Toronto, managing director for the Consolidated Mining and Smelting Co., a few weeks ago paid a visit to the company's smelting and refining works at Trail, B.C.

Thirty students and instructors from the College of Mines, University of Washington, Seattle, State of Washington, took part in the annual spring excursion in April. Studies were made of the new reverberatory and casting furnaces at the Tacoma smelting works, and the Dupont Powder Works, on Puget Sound, and of the mine and concentrating mills of the Britannia Mining and Smelting Co., on Howe Sound, Vancouver mining division of British Columbia. The Britannia Company is using Hancock jigs, Butchart tables and Minerals Separation flotation cells, to make a high recovery from low-grade chalcopyrite ore.

Mr. G. O. Buchanan, formerly of Kaslo, but now resident at Haney, on lower Fraser River, B.C., who for some years has been Dominion Supervisor of Lead Bounties, has been elected the first president of the recently-organized Associated Boards of Trade of British Columbia. For several years he did most effective work as president of the Associated Boards of Trade of South-eastern British Columbia.

SPECIAL CORRESPONDENCE

COBALT

Price of Silver.

The price of silver has been well maintained, although there has been a slight reaction during the last week. This was to be anticipated and there is every confidence that silver will not go below seventy cents. It has remained steady during the past week around seventy-five cents and it is quite possible there may be no further advance until information is received that silver stocks have again run low in the markets of the world.

Columbus.

Another prospect which has been shut down for some time is being reopened. The Columbus has had many starts. It was running when the Temiskaming first struck high grade in south-east Coleman, and it has been shut down and opened up again three or four times since. Quite extensive development has been carried out from two shafts, as low as the 400-ft. level, but nothing has ever been found to date, but a wide vein of galena, with low silver content. It is now being reopened under the management of Mr. William Donaldson. The company has no doubt been encouraged to take a further chance, by reason of the successful development of its neighbor the Adanae.

Advance.

Two winzes have been sunk on the Adanae from the 200-ft. level. One of these struck ore and ran out of it again and is now being continued to 350 ft. From another, a sub-level was run at 280 ft. and there is some high grade in sight now.

Gifford.

The Gifford is still laboring under water difficulties. The unexpected flow of water is holding up development and some arrangements will have to be made with adjoining properties, before active work can be prosecuted with much success.

Beaver and Temiskaming.

The progress of work in the shafts of the Beaver and Temiskaming is being closely watched by the whole camp. It is recognized that here, if anywhere in the camp, is there a hope of extending the life of the district as a silver producer. The shaft on the Beaver is further down than that at the Temiskaming. It is now between 1,500 and 1,600 ft. deep and only lacks 100 ft. of reaching the point where the diamond drill showed it could be expected that the lower contact would be reached. The Temiskaming shaft is down between 1,100 and 1,200 ft. It is not expected that any orebodies can be picked up in the lower contact without much cross-cutting and development, but that they do exist is hoped, as a consequence of successful operations on the same horizon by the Kerr Lake and O'Brien.

National Mines.

The National Mines with a lease on the old King Edward are also prosecuting deep level mining. There is also a prospect that this same company may install oil flotation cells to treat the old King Edward tailings, which were known to run high. Diamond drilling some years ago showed that the lower contact here might be reached at about 1,000 ft. The shaft is now down at 550 ft., so that it will be well into the fall before any definite results may be anticipated.

South Lorrain.

The next month or six weeks should witness the resumption of ore shipments from the South Lorrain camp. The Bellellen has assembled a car of 25 tons of ore, including some high grade and some medium grade ore. The Comfort Leasing and Mining Company has also taken out some high grade from the Wettlaufer. Prospects for both companies producing further ore are very bright. There have been no shipments from the South Lorrain camp since the Wettlaufer Mining Company sent its last car out in 1914. The Bellellen only made one shipment previously and that was of 13 tons of high grade ore in 1911.

Oil Flotation.

The oil flotation plant at the McKinley-Darragh is all ready and now awaits the arrival of the press. It will be the first oil flotation plant in the camp which has operated in regular practice. The Buffalo work was largely experimental, and so is the Nipissing's. There are half a dozen other companies in the camp waiting until the McKinley-Darragh has obtained some definite results from their operation. Among those companies who may be reasonably expected to install oil flotation are the Trethewey, Hudson Bay, Coniagas, The National Mines and others, but the results obtained by the McKinley-Darragh will very largely influence further installations.

La Rose.

The La Rose Mining Company has closed down its new shaft next to the Chambers-Ferland. They found no encouragement to proceed with their work at this point. A pocket of very rich ore has been found on the Lawson and it is now being developed and stoped out.

Mining Corporation.

The Mining Corporation is developing some remarkable ore on the Cobalt Lake Fault. The vein here is sometimes 18 in. wide of very high grade silver indeed.

Gillies Limit.

Another section of the Gillies Limit is to be thrown open to prospectors on June 1st. This section of the Limit comprises over 7,000 acres and includes much Huronia rock which has come to be regarded as most favorable for the deposition of silver. The claims will be staked out in 40 acre claims. The block to be thrown open on the midnight of May the 31st, is bounded on the north by the Township of Coleman, on the east by the Montreal River and the T. & N. O. Railway and on the south by Johnny Lake and Johnston's Siding, on the T. & N. O. Railway. Owing to the large number of prospectors who have gone to the war and the decreasing interest in the possibilities of the Gillies Limit, there will be no such rush to stake as occurred two or three years ago, when the last section of the Limit was thrown open, but the high price of silver will undoubtedly cause some staking in the Limit and any discovery would lead to a very feverish interest in this hitherto forbidden section of the country.

PORCUPINE, KIRKLAND LAKE AND BOSTON CREEK

McIntyre.

The event of the past two weeks has undoubtedly been the remarkable discoveries on the lower levels of the McIntyre. It has now been made known that 62

ft. of ore averaging better than \$14 was cross-cut on the 700-ft. level. This orebody has been drifted on for not less than 100 ft. At the 1,000-ft. level the long crosscut which is to connect the McIntyre Extension shaft with the No. 5 had cut a vein 25 ft. wide of better than \$15 ore by the middle of the month. It is a remarkable fact that values did not grow to any appreciable extent until the cross-cut was in McIntyre ground. The value of these discoveries is fully appreciated in the camp as the big event since the opening up of the lower level orebodies of the Dome. It has put the McIntyre on a permanent basis as to ore reserves.

The McIntyre mill is now running almost to capacity. After various delays owing to the great difficulty of obtaining delivery of machinery and supplies, the Jupiter shaft is now connected with the McIntyre mill, by means of surface tramway and aerial tramway. Seventy-five tons a day is passing from the shaft to the mill. Quite a good tonnage of ore has already been broken in Jupiter stopes and development is well ahead of mill requirements.

Dome Lake.

Good results are being obtained at the Dome Lake. At the 300-ft. level the No. 1 vein has developed a shoot of high grade ore in a raise about 400 ft. west of the shaft and 14 ft. up. The No. 1 vein at the level is of the usual grade of \$5 or \$6, but on raising about 14 ft. it showed 5 ft. of ore which will run almost \$50 to the ton. Mill heads are being maintained about \$7.50.

West Dome.

The West Dome is experiencing good fortune with its development. This is particularly so in regard to diamond drilling. Below the 500-ft. level an orebody was entered which appears to be at least 5 ft. wide of ore that will run \$45 to the ton. The vein in the shaft is not more than 2½ to 3 ft. wide, but it shows considerable free gold and a good average grade. This company will soon have to order a new plant if they desire to extend their operations, as the better prospects of the property now warrant.

Croesus.

The Croesus Gold Mining Company in Munro Township is down to the 400-ft. level. The mine is producing about \$1,000 a day from raises in ore and development. Ore is broken down on the property and converted into bullion.

Within three miles of the Croesus a very promising discovery has been made on some claims controlled by Mr. C. A. Foster. Very spectacular specimens have been brought out.

Tough-Oakes.

At Kirkland Lake Mr. C. A. O'Connell will take charge of the Tough-Oakes mine at the beginning of June. The mine is looking very well indeed and production is being more than maintained at its last year's average.

La Belle Kirkland.

At the La Belle Kirkland mine at 350 ft. the vein is being drifted on both ways. The high grade streak of ore in the foot-wall is continuous in both drifts and the prospects of the mine are exceedingly good. Further cross-cuts will be undertaken to pick up other streaks of high grade ore shown in the shaft and on the 200-ft. level.

Boston Creek.

At Boston Creek the R. A. P. Syndicate holdings have recently been sampled by Mr. G. C. Bateman and

there will probably be some change in ownership of these properties very soon. The Nissen stamp mill on the Miller Independence is running and some very rich ore is being put through it. The first gold bar from Boston Creek should soon be shipped. Some finds of free gold on other claims in the district are also reported.

NEWFOUNDLAND

Iron.—Both mines at Wabana of the Dominion Iron and Steel Co. and the Nova Scotia Co. are now working full blast, and about two thousand men are now working there. The first cargo of ore to be shipped since navigation opened this spring was taken away this week from the mines of the Dominion Co. to the smelters at Sydney, Nova Scotia. There are now thousands of tons stocked piled on the bank ready for shipment, and it is anticipated that the coming summer will be the busiest in the history of the mines.

Lime Quarry.—The lime quarry of the Dominion Iron and Steel Co. at Port-Au-Port is again working, operations having been started on May 1st. The quarry supplies a large portion of the flux material for the smelting of the company's ore at Sydney.

Last year operations were entirely suspended. Several hundred men are now working there. There is plenty of employment at the quarry and the wages are good. The manager, Mr. House, has during the past and present weeks been active in seeking men to engage at the work. Work is to be carried on uninterruptedly during the season, as enormous stocks of lime are needed for the Sydney smelters, and the Evening Herald states that "everything points to a big boom on the west coast."

Copper.—The Tilt Cove mine which was working all the winter, during which time excellent work was done, has made its first shipment of ore this spring. The cargo was shipped from the mines during the first week of May. The cargo was consigned to New York. Besides the actual mining of the ore there are large piles which were mined before the mine closed down some five years ago, owing to the low price that copper was fetching. All these piles will be shipped away this year.

There are at present at work at the mine between one hundred and fifty and two hundred men. If the price for copper is maintained it is not unlikely that work will be done on a scale in the near future equalling that of the good old days, when Tilt Cove ranked as one of the most productive and finest copper mines in the world.

It is more than probable that the Bob's Head copper property will be worked this summer. This property is located in Notre Dame Bay, within a few miles of Tilt Cove. About seven years ago actual work was done on the property. Two shafts were sunk, one of which was eighty feet and the other was something over fifty. Several trial pits were made and everything indicated that here was a second Tilt Cove. A quantity of ore was mined. Just at the time that the shipping of the ore was about to begin, a decline in price of that commodity discouraged the promoters, and work was discontinued. The stock piles, which are large, will be shipped at an early date.

Engineers from Boston are now on their way to examine the property, and I have been reliably informed that if conditions are favorable, which I know them to be, vigorous operation will be at once commenced. The property is now locally owned, but those who will finance it are Americans.

Coal.—A law suit over the possession of coal areas, which occupied the attention of the Supreme Court for

a period of two years was recently concluded. The case was between a lessee of the areas and the Newfoundland Government. The claims are situated at Robinson's Brook, on the west coast of the country.

The Government claimed that the titles to the areas were not legal, which titles were given in the usual way at the Office of Mines, and over the legality of the titles a fierce suit was carried on. The areas in question are said to be rich in coal, and since the suit has been decided an American Syndicate, it is reported, has made arrangements to have the property opened and worked this summer. The areas in question have been examined and no doubt exists but that this is a valuable deposit. The Government for the sake of the rentals acted penny wise and pound foolish in the matter, and to retrieve the mistake instituted a legal suit for the recovery of the claims.

Lead—The lead mine at Rose Blanche was worked all during the winter. Considerable ore was mined and placed on the surface. Operations there are since the spring opened assuming a much larger scale, and some more men are being taken on. In a few days it is hoped that a cargo of ore will be shipped away.

What is undoubtedly the best lead property in the colony will be reworked again this summer after being closed down for a number of years owing to the difficulty of financing. This property is located at Port-au-Port on the west coast. The ore averages eighty-five per cent. lead, and the quantity is assured. Conditions for shipping are admirable. American capital will finance the working. Already this spring engineers visited the property and reported most favorably after a thorough investigation of the entire area.

Wabana Iron Claims—Quite recently a number of submarine claims which adjoin the holdings of the Dominion Iron and Steel Co. and the Nova Scotia Co. at Wabana were sold for a sum aggregating \$60,000. The claims were sold to private parties who are numbered amongst the shareholders of the companies. In one instance the claims sold numbered nine. Other sales were for claims numbering more or less than these. The claims are said to be very valuable, and contain within their areas ore to the extent and value that will render their acquisition by and by, by the companies, a most profitable proposition.

The Copper Smelter—The copper smelter at St. John's which opened about two months ago and did excellent work for about six weeks is now closed down for a short time to be refitted with new linings which burnt out. Mr. W. A. Mackay, who promoted the enterprise, left last week for America, where new and better fittings will be obtained, and as soon as these are refitted work will be recommenced on a good scale, as there are a number of cargoes of ore now waiting to be taken to the smelter.

NOVA SCOTIA

Nova Scotia Mining Society.

The annual meeting of the Nova Scotia Mining Society was held in Sydney on the 5th of May at the rooms of the Society. The meeting was a purely formal one, for the election of officers and the reception of the report of the Council. The following officers were elected for 1916:—President, D. H. McDougall; vice-president, Col. Thos. Cantley; second vice-president, Alfred J. Tonge; secretary-treasurer, E. C. Hanrahan, Sydney; associate secretary-treasurer, E. A. Saunders, Halifax. Members of Council—T. J. Brown, F. W. Gray, J. R. McIsaac, Malcolm Blue, C. M. Odell,

Hon. R. Drummond, Malcolm Beaton, John Johnston, John Casey, Alex. McEachern, R. E. Chambers; Jas. T. Cumming, C. J. Coll, W. H. Graham, F. E. Lucas, Isaac Greenwell. In lieu of the usual expenses attending the annual dinner, which was dispensed with, one hundred dollars was sent to the headquarters of the Nova Scotia Red Cross Society at Halifax.

Dominion Coal Officials.

Several changes are announced in the staff of the Dominion Coal Company, following on the appointment of Mr. D. H. McDougall as general manager of the Dominion Steel Corporation, thereby giving him jurisdiction over the works of the Dominion Iron and Steel Company, in addition to his duties as general manager of the Dominion Coal Company. Mr. Alfred J. Tonge, who has been the mining engineer of the company since 1912, has been appointed general superintendent of mines, in addition to the duties of mining engineer. Mr. J. D. Maxwell has been promoted from the superintendence of No. 2 district to the position of assistant general superintendent of mines. Mr. Alex. S. McNeill, formerly manager of No. 2 Colliery, is appointed superintendent of No. 2 district in place of Mr. Maxwell.

Miners' Wages.

Demands for wage increase have been made at several of the Nova Scotia collieries. The Nova Scotia Steel & Coal Company have given their workmen a substantial increase. The men at the Springhill Mines of the Dominion Coal Company have also been granted an increase, which brings their wages up to about the same level as they were previous to the reduction of ten per cent which was enforced after the United Mine Workers' strike in 1911. The workmen of the Acadia Coal Company have asked for an increase of 25 per cent., and the mines of this company have been idle for about a fortnight. The men have returned to work, and the matter is to be referred to a Conciliation Board.

Mine Supplies.

The price of some mine supplies is becoming a serious matter, particularly the price of explosives. These have increased from three to four cents a pound, while fulminate detonators have doubled in price. Increases in such materials as wire ropes, lumber, all iron and steel supplies, rubber, oils of all kinds, brattice cloth, and many other materials, have also to be faced. When these are added to increased cost of wages, plus most extraordinary transportation rates, it is quite evident that the price of coal must also increase, more particularly so when, owing to the demands of the army, coal outputs are decreased by from 25 to 40 per cent. of the production of the summer of 1915.

Mining Legislation and Politics.

An election is said to be approaching in Nova Scotia, and as is usual at such times the legislators of the Province, on both sides of politics, are occupied in the congenial task of tinkering with mining legislation and baiting the mining companies. For some reason, probably dating back to the breaking of the Duke of York's lease of the minerals of Nova Scotia almost two generations ago, the politicians of the Province have always taken a great interest in the mining laws, and their activity reaches a climax when elections are approaching. This is all very well for the politicians, but it is very bad for the business of legitimate mining companies. An example of this feature of Nova Scotia politics is a bill recently presented to the House

providing that where a lessee holds an idle or abandoned mine, he may be given notice to commence the operation of the mine, failing which the lease can be revoked, and the mine turned over to some one who will undertake to work it. This bill is aimed at one particular property in Inverness County, but the number of idle mines in Nova Scotia is very large, and they are none of them idle except for good and sufficient reasons. A similar attempt has been made to force one of the Pictou companies to operate an idle colliery, notwithstanding that this company has not sufficient men to properly operate the mines it has working. It is becoming more and more evident that coal mining in Nova Scotia is only financially possible by large corporations with adequate financial reserves, and it is one of the features of large coal companies the world over that mines are opened and closed as the market and financial conditions dictate. One of the most striking illustrations of this is the Westphalian Coal Syndicate, a controlling body that succeeded in turning the collieries of Westphalia from profitless ventures to producers of regular dividends, and at the same time rendered it possible to sell coal to customers at a uniform but quite moderate price. Under the rules of this syndicate a colliery that it was inadvisable to operate was closed down. The owners were given a remunerative percentage on the capital invested, and when it became advisable to reopen the colliery, then it was done. Large coal companies in the United States like the Pittsburg Coal Company open and close collieries as they see fit, and it is this very flexibility of operations that makes it possible to prosecute mining operations with profit. But in Nova Scotia, if a colliery is closed, there is an immediate potholer. Deputations go to see the political powers that be, and wires are pulled most assiduously. It matters not whether the mine in question be worked out, or flooded, or financially impossible of operation, so long as a political end is served the mine operator has to submit to be made the butt of local politics. The most casual and vicious legislation is drafted to serve an immediate and political end, and it has become necessary for the coal operator of the Province to closely follow every phase of legislation before the Provincial Parliament, unless he wishes to see placed on the statutes some foolish law that will endanger his leases. That there are such things as trust deeds for bond issues subscribed to by persons in the United States, in Great Britain and Europe, seems to trouble these pettifogging legislators very little. It must be confessed that few, if any, of these draft bills become law, as their absurdity is apparent very quickly, but it is the constant threat of ill-considered legislation that is deplorable. A fearful fuss has been made in Halifax because the Port Hood Colliery remains closed. The mine is flooded, and in all probability will remain flooded for ever, but it is thought that another opening could be made on the same lease, and the industry re-started. But the only operating coal company in Inverness is in the hands of a receiver, and that company has not sufficient men to work its mine to full capacity. Just one coal company in the Province is paying a common stock dividend, only one or two can afford a preferred stock dividend, and some cannot even pay bond interest. And then reputedly wise men spend long hours in discussing why mines are closed! Little the shareholders of a coal company living thousands of miles from Nova Scotia care whether a mine is open or closed. They are chiefly interested

in an interest return on the money they have invested in good faith, and politicians may talk until even they are tired, but when all is said it is the possibility of dividends that will decide whether mines shall remain open or closed. If the legislators of the Province think they can compel coal companies to operate collieries under disadvantageous conditions they will speedily find that investors will go to some place where politicians know enough to keep their hands off legitimate enterprise, except, of course, where the need is real, and in that event, no right-minded person will object.

BRITISH COLUMBIA

In connection with the persistent efforts of Robert T. Ward and his associates to oust John Hopp from possession of leases of placer ground at Bullion, Cariboo district, the following press despatch was sent out from Victoria, on May 4: "Because R. T. Ward's counsel agreed weeks ago that he had no more evidence to produce, and because Ward to-day said that any matter he could place before the committee would have no bearing upon the legal points as to whether the special Act of the Cariboo Gold Mining Co. was overridden or not by the General Mining Act the Mining Committee of the Provincial Legislature this morning, by Chairman Hunter's casting vote, refused to reopen the case.

"Two weeks ago the committee deliberated on the evidence and decided to report to the Legislature against taking any action in the case. The committee took the view that the points at issue are purely legal and can only be settled in Court.

"Ward said this morning that he could show there had been a conspiracy to do him out of the placer property involved in the hearing, but the committee members argued that the case had been closed and that it was in any event useless for it to waste further time on a matter which could only be decided by the Courts."

It may be added to the foregoing despatch that the Guggenheim interests, when they sold their "assets" to Ward and his associates for \$20,000, knew full well that their title to the placer ground in dispute had lapsed before this sale, as was shown by their instructing their caretaker to stake the ground in his own name for them and not to discuss the question of title with Ward when he should be given possession of plant, buildings, etc., of which the caretaker had long been in charge. Mr. Hopp and his associates have been for years the largest hydraulic placer-gold mine operators in Cariboo district, so the fact that the continued efforts to dispossess them of ground lawfully acquired by them after the Guggenheim Company had forfeited title to it, have failed, is favorably viewed by many who prefer successful operators to others.

Since the foregoing notes were written, Mr. Parker Williams, an ex-Socialist member of the Legislature, has attempted to induce that body to interfere in the interests of Mr. Ward and his associates, but only the Opposition members in the House supported this further endeavor to do injustice to Mr. Hopp, so now the only recourse Mr. Ward has seems to be to the Courts, one of which, however, early in the dispute, decided that it had no jurisdiction in the matter.

WEST KOOTENAY.

Slocan—Now that the snow is melting and it will soon be practicable to get a pack train up to the property, preparations are being made to undertake the

summer season's work at the **Mountain Con.** This mine is situated at a high altitude. Last year several cars of ore were packed from it down to the railway at Sandon; some of that ore was exceptionally rich, its silver content having been very high.

The report for the month of March of the **Standard Silver-Lead Mining Co.** was issued from the company's office in Spokane, Washington, early in May. The secretary-treasurer stated that the gross income for the month, amounting to \$187,338, was the highest since the company commenced making a considerable output. The net profits were \$136,743, and the company's credit balance at the end of March was \$248,163. Shipments of concentrates and crude lead ore during the month totaled 1,295 tons, and preliminary settlements brought the company \$172,347. On May 10, the company paid its customary monthly dividend of 2½ cents a share; the total of \$50,000 for the month brought the year's profit disbursements up to \$250,000 and the grand total of dividends to \$2,050,000, or \$2.02½ a share paid to shareholders since commencement of dividend-paying in 1912.

Nelson—A news despatch from Spokane, Washington, gives the information that a company has been organized in that city to acquire and develop the Fawn group of mineral claims, situated in Sheep Creek camp, in the southern part of Nelson mining division. This company has been named the Efanjay Gold Mining Co. It is doing development work on a vein of gold ore about 15 inches wide, which is stated to give assay returns from \$21 a ton upward. The 4-stamp mill of the Nugget mine, a neighboring property, has been leased and it is expected that before the end of May there will be available sufficient water to admit of the mill being operated.

The most important mining news received this year from the gold properties in Sheep Creek camp is that of the opening on the 700-ft. level of the **Queen mine** of a shoot of ore which is believed to be the downward extension of the big body of ore that was worked on the 600-ft. level of the mine. The Queen Mines, Inc., is a corporation chiefly of Wisconsin men who for several years have been steadily operating the mine and 20-stamp mill and are understood to have made a considerable profit. The company's manager is Mr. E. V. Buckley, also a Wisconsin man, who has been in charge of the property for several years and has been successful in his efforts to make the mine a profitable producer.

Rossland—The London office of the Le Roi No. 2, Ltd., has published the report of its **Josie mine** for March, received from the company's managers at Rossland, as follows: Shipped 1,512 tons of ore. Receipts from the smeltery were \$15,073, in payment for 1,148 tons of ore; \$113, umpires' award on concentrate; sundries, \$376; total, \$15,562. Estimated working costs for corresponding period were \$5,925 for ore production. There was also expended \$542 on capital account, and \$9,885 on development (including diamond-drilling). Total expenditure on all accounts was \$16,352.

A summary of the Josie mine reports of the Le Roi No. 2 for three months—January, February and March—of 1916, is as follows: Ore shipped to smeltery, 4,043 tons, and concentrate 50 tons. Total receipts for ore and concentrate, \$49,385; sundry receipts, \$1,574; total, \$50,959. Estimated working costs for corresponding period were \$15,445 on ore production, \$400 on milling, \$3,043 on Capital account, and \$29,281 on mine development (including diamond drilling); total, \$48,169. The concentrating mill was operated only for

a part of January. The comparatively large amount spent on mine development indicates that the company is carrying out the policy outlined in its last annual report, in which the following was included in the report of the managers: "We propose to continue during the ensuing year the exploration of the Deep, California, and Josie territory, and to restart work in the No. 1 mine which will lead to our return to exploration on the northern part of our ground."

COAST DISTRICT.

Alice Arm—When on a visit to Trail a few weeks ago, Mr. Wakely A. Williams, superintendent of the Granby Consolidated Co.'s smelteries, who has his headquarters at Anyox, Observatory Inlet, gave the Trail News some information about progress at Alice Arm country, north-east of Anyox, as under:

"The Alice Arm district, situated at the head of an arm of Observatory Inlet, is attracting attention, and there are now about 300 people in there. The most important property, so far as yet disclosed by development, is the **Dolly Varden**, owned by a syndicate composed of stockholders of the Goldfield Consolidated Co. It is a silver-lead property and its orebodies have been extensively prospected by diamond-drilling. The ore contains unusually high values in silver. The mine is to be equipped next summer with machinery for development.

"Another property that is also having attention is the Alice Arm group of copper claims. Like most of the known properties in that region, it lies about fourteen miles back from tidewater, the situation there being much the same as in the case of the town of Stewart in relation to a number of the mines in the Portland Canal division. There occurs on the Alice Arm group a wide vein containing some copper ore of extremely good grade; it is showing up well as the result of the development done on it last winter and of work still in progress.

"The new town at the head of Alice Arm already has a good hotel (which cost \$10,000) and three or four stores. There is likely to be a large incursion of prospectors and working miners into that district in the coming summer."

It may be added that those who have access to the Report of the Minister of Mines for British Columbia for the year 1913 can find, on pp. 79-83, some preliminary information concerning the Kitsaulte copper camp, Alice Arm, together with two sketch maps. While this information is not now up to date, it will serve to give a general idea of the locality and its mineral possibilities. Probably the Annual Report for 1915, now being printed, will give notes of developments in that year.

Progress at Anyox—Mr. Williams also briefly outlined to the Trail News conditions at the **Granby Consolidated Co.'s smeltery** at Anyox. He said:—

"During the last month the smeltery at Anyox has been operating all four furnaces and treating ore at the rate of 80,000 tons monthly, which rate will be maintained from now on. Last winter, which was the most severe experienced for a generation in Northern British Columbia and Alaska, we were badly handicapped by insufficient water power, though we also had in operation a small auxiliary steam plant. This summer we shall install a large auxiliary steam-power plant, so that our operations will not again have to be curtailed for a similar reason to that just mentioned. That is the only important improve-

ment remaining to be provided to make the company's Anyox plant capable of operation at full capacity at all times and seasons. The town of Anyox now has a population of about 1,600. Some 540 men are being employed in connection with the working of the company's Hidden Creek mines, and we have about 400 in and about the smelting works."

MOLYBDENITE MINING IN QUEBEC.

Mr. W. E. Simpson and his associates have formed a company to take over the molybdenite claims at Kawagama, near Amos, in Northern Quebec, and Mr. Simpson is taking in a small plant at once. He has picked up three boilers and mining equipment, and a Huntington mill and he will install a complete oil flotation plant at the first possible moment. Now that transportation is open he will be able to get down the Hurricanaw River to within a short distance of the claims and the Quebec Government has promised to assist the company in cutting through some low ground over which a portage has now to be made. The orebody is very wide and the syndicate of railway contractors had spent over fifty thousand dollars in sinking some forty or fifty pits on it. Then Mr. Simpson and his associates acquired it from them. There is a ready market for the molybdenum concentrate and utmost haste will be made in getting out the product.

The St. Maurice Mines Co., Ltd., with a capital of \$400,000, has been incorporated under Quebec patent laws to prospect and exploit mines in the Counties of Montcalm, Pontiac, and in the Temiskaming and also in the Abitibi region. The promoters of the company are Messrs. Albert Edward Turner of London, England, dealer; W. E. Simpson of Grantown-on-Spey, Scotland, engineer; Daniel E. Moran, of New York, engineer; A. E. Doucet, C.E., and George Belleau, bank inspector, of Quebec. The head office of the company will be Quebec City.—Northern Miner.

THE HOLLINGER MILL.

Cobalt, May 20.—Now that the Hollinger deal has been formally ratified by the Hollinger shareholders, no time is being lost in knitting the whole system into one compact group.

Work on the mill is being rushed with all the expedition possible. The excavations for the extension of the mill are well in hand. The extension will be under the same roof as the old mill, but there will be a space of 14 feet between them down which a branch of the surface electric tram will run so that all supplies and material can be hauled at a minimum of trouble. The ore from the group of properties will be crushed in the rock house in the leg of the steel head-frame of the central shaft and it will then be transported to a thousand-ton rock bin which will stand approximately where Mr. Globe's house does now. From there it will be taken to the mill up a trestle in inclined skips.

The hundred stamps will be of the Rand type, the first of their kind in the camp. The stems are shorter and there is a greater weight behind each stroke. The orebodies of the Acme and the Hollinger are in many cases the same. Previously development on both properties has halted at the line, with much duplication of sampling and handling. Now they will be connected without delay and the whole system will become one.—Northern Miner.

PLANT OF CANADIAN MINING AND FINANCE COMPANY.

The administration building is fireproof reinforced concrete construction. It occupies a ground space of 74 feet by 59 feet, with extension 24 feet by 16 feet. There are a basement and three storeys. The first floor is devoted to management and accounting; the second floor is devoted to the technical staff and draughting rooms; the third floor provides living accommodations for a number of the staff. The building is located upon the property of Acme Gold Mines, Ltd., and will cost when completed approximately \$38,000.

The air compressing plant is located upon the property of Hollinger Gold Mines, Ltd., being situated at the edge of Gillies Lake, and occupies a ground space of 157 feet by 54 feet. The entire building is constructed of steel and reinforced concrete and is fireproof throughout. The installation consists of three compound air compressors, having a capacity of 4,500 cubic feet of free air per minute each, with space left for the installation of a fourth unit. The compressors are electrically driven and the entire electrical and mechanical equipments are the best obtainable. An emergency boiler plant of 1,800 horsepower capacity has been provided for generating power in case of failure in the hydro-electric supply. An equipment of pumps for supplying water to the mill of Hollinger Gold Mines, Ltd., and an emergency fire pump are also installed. The entire plant has been designed and constructed for permanent work and has cost, including distributing pipe lines, \$244,273.

In order to keep pace with the demand for increased tonnage, Canadian Mining and Finance Co., Ltd., has under construction a Central Hoisting Plant and Shaft. The shaft is six compartment and is concrete lined, all six compartments have been sunk to a depth of 500 feet with a station established at the 425-foot level. Two compartments have already been carried down to a depth of 800 feet, where a second station has been established, and the remaining four compartments will be stoped out during the present year. Surmounting the shaft is a steel head frame. This frame is 120 feet in height. There is being installed a crusher station, having a capacity of 5,000 tons per twenty-four hours. The electrically driven hoists and other electrical apparatus will be housed in a concrete building. Up to January 1st, 1916, the expenditure upon this shaft and plant had amounted to \$65,454, and it is estimated that a further expenditure of approximately \$200,000 will be necessary to complete the plant and provide means of transporting the crushed ore to the mill.

Altogether, up to January 1st, 1916, Canadian Mining and Finance Co., Ltd., had invested in plant and equipment \$483,695.97.

MANGANESE CHAINS.

The Jeffrey Manufacturing Co. has ready for distribution a bulletin on manganese chains. They say: "This bulletin contains full details and prices of our Detachable, Peerless and Hercules type of Manganese Chains, Sprockets and Attachments, which insure a maximum of elevator and conveyer service in aggravating cases of wear, where the conditions require that the chains and sprockets not only handle gritty and abrasive materials, but come in actual contact with them."

COLUMBUS.

The Columbus Cobalt property in south Coleman is to be developed this year. The Columbus adjoins the Adanac.

MARKETS

NEW YORK MARKETS.

May 19, 1916—Connellsville Coke—
 Furnace, spot, \$2.25 to \$2.40.
 Contract (nominal), \$2.50 to \$3.00.
 Foundry, prompt, \$3.50 to \$3.75.
 Contract, \$3.50 to \$3.75.
 May 22, 1916—Straits, Tin, nominal, 48.75 cents.
 Copper—
 Prime Lake, nominal, 28.50 to 29.00 cents.
 Electrolytic, nominal, 29.00 to 29.50 cents.
 Casting, nominal, 26.75 to 27.25 cents.
 Lead, Trust price, 7.50 cents.
 Lead, outside, 7.25 to 7.35 cents.
 Spelter, prompt western shipment, 15.05 to 15.30 cents.
 Antimony—
 English brands, nominal, Chinese and Japanese, 29.00 to 30.00 cents.
 American, 29.00 to 30.00 cents.
 Aluminum—nominal.
 No. 1 Virgin, 98-99 per cent., 59.00 to 61.00 cents.
 Pure, 98-99 per cent., remelt, 57.00 to 59.00 cents.
 No. 12 alloy, remelt, 48.00 to 50.00 cents.
 Nickel, 45.00 to 50.00 cents.
 Cadmium, nominal, \$1.25 to \$1.50.
 Quicksilver, nominal, \$86.00.
 Platinum, nominal, \$80.00.
 Cobalt (metallic), \$1.25.
 Silver (official), 71.25 cents.
 Metal Produce—All prices are nominal as follows:
 Sheet copper, base, 37.50 cents.
 Copper wire, base, 32.50 to 33.50 cents.
 High sheet brass, base, 38.00 cents.
 Seamless brass tubing, 43.50 to 44.50 cents.
 Seamless copper tubing, 43.50 cents.
 Brazed brass tubing, 43.50 to 44.50 cents.
 Brass wire, 38.00 cents.
 Brass rods, 38.00 cents.
 Sheet zinc, f.o.b. smelter, 24.50 cents.

TORONTO MARKETS.

May 25—(Quotations from Canada Metal Co., Toronto)—
 Spelter, 22 cents per lb.
 Lead, 9 cents per lb.
 Tin, 54 cents per lb.
 Antimony, 35 cents per lb.
 Copper, casting, 31 cents per lb.
 Electrolytic, 31½ cents per lb.
 Ingot brass, yellow, 16 cents; red, 21 cents per lb.
 May 25—(Quotations from Elias Rogers Co., Toronto)—
 Coal, anthracite, \$8 per ton.
 Coal, bituminous, \$5.75 per ton.

STOCK QUOTATIONS.

(Courtesy of J. P. Bickell & Co., Toronto, Ont.)

May 23, 1916.

New York Curb.	
	Bid. Ask.
Atlantic Steel	60.00 62.00
Alta. Cons.	52.00 55.00
Butte	7.00 7.25
Can. Car	68.00 71.00
Curtiss Aeroplane	48.00 53.00
Chevrolet	234.00 235.00
Can. Copper	2.32 2.35
Chandler Motors	103.50 104.00
Chalmers	145.00 175.00
Cambric Steel	81.00 81.50
Con. Ariz.	1.58 1.62
Emma Copper	67.00 69.50

Howe Sound	5.75	6.00
Inter. Nickel (New)	45.87	46.00
Kennecott Copper	55.50	56.00
Maxim Munitions	7.00	7.25
Midvale Steel	61.25	61.50
Marconi	3.12	3.25
Magna	16.50	17.00
Mother Lode	32.50	33.50
Steel of Canada	61.00	53.50
Submarine Boat	38.00	38.50
Tonopah Extension	6.75	6.87

Porcupine Stocks.

	Bid.	Ask.
Apex	.08	.08¼
Dome Extension	.35½	.35¾
Dome Lake	.28½	.29
Dome Mines	.26	.27
Foley O'Brien	.40	.51
Hollinger	29.75	30.10
Jupiter	.36	.36½
McIntyre	1.96	1.98
McIntyre Extension	.37	....
Porcupine Crown	.77	.79
Porcupine Imperial	.04	.04½
Porcupine Vipond	.61	.62
Preston East Dome	.05¾	.06
West Dome Con.	.35¼	.35½

Cobalt Stocks.

	Bid.	Ask.
Adanac	.63	.65
Bailey	.09½	.09¾
Beaver	.41	.42
Buffalo	1.00	1.50
Chambers Ferland	.27	.27½
Coniagas	5.00	5.40
Crown Reserve	.48	.54
Foster	.09	.10
Gifford	.07	.08
Gould	....	.00⅝
Great Northern	.05	.06
Hargraves	.04½	....
Hudson Bay	.40	.45
Kerr Lake	5.00	5.14
La Rose	.65	.75
McKinley	.59	.62½
Nipissing	....	.08
Peterson Lake	.28	.28½
Right of Way	....	.06
Rochester	....	.05
Seneca Superior	.52	.54
Temiskaming	.68	.68½
Trethewey	.25	.28½
Wetlaufer	.07	.09

SILVER PRICES.

May—	New York.		London.
	Cents.	Pence.	
9	73¼	35 1/8	
10	76¼	36½	
11	76½	36⅝	
12	77¼	37	
13	77⅞	36 1/8	
15	75½	36⅝	
16	75¾	36¼	
17	75¾	36¼	
18	75¾	36¼	
19	75½	36⅞	
20	75¼	36	
22	71¼	34	

PROFESSIONAL DIRECTORY.

The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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