MARCH 15, 1917 Single Copies 15 Cents

CANADIAN MINING JOURNAL

VOL. XXXVIII TORONTO No. 6

The Canadian Mining Journal, Purman Bldg., 263-265 Adelaide St. West, Toronto, Ont.

CANADA
DEPARTMENT OF MINES

HON. E. E. PATENAUDE, Minister. **R. G. McCONNELL, Deputy Minister.**

MINES BRANCH

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The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.

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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 1914 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.

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Memoir 64. Preliminary Report on the Clay and Shale Deposits of the Province of Quebec, by J. Keele.

Memoir 69. Coal Fields of British Columbia, by D. B. Dowling.

Memoir 74. A List of Canadian Mineral Occurrences, by Robert A. A. Johnston.

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 81. The Oil and Gas Fields of Ontario and Quebe, by W. Malcolm.

Memoir 82. Rainy River District of Ontario. Surficial Geology and Soils, by W. A. Johnston.

Memoir 84. An Exploration of the Tazin and Taltson Rivers, Northwest Territory, by Charles Camsell.

Memoir 85. Road Material Surveys in 1914, by L. Reinecke.

Memoir 87. Geology of a Portion of the Flathead Coal Area, British Columbia, by J. D. Mackenzie.

Memoir 88. Geology of Graham Island, British Columbia, by J. D. Mackenzie.

Memoir 89. Wood Mountain-Willowbunch Coal Area, Saskatchewan, by Bruce Rose.
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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.

Communications should be addressed to **The Director, Geological Survey, Ottawa.**

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VOL. XXXVIII. TORONTO, March 15th 1917. No. 6

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

Branch Office - - - - - - 600 Read Bldg., Montrea

Editor

REGINALD E. HORE

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

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

CIRCULATION

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

CONTENTS.

THE C. M. I. MEETING.

It was jocularly remarked by an American visitor at the annual meeting of the Canadian Mining Institute last week that the members are taking themselves very seriously. They are. As President Cole remarked, the reason is not far to seek.

Under ordinary conditions the present great activity in the Canadian mining industry might be expected to result in the meetings of mining men being even more hilarious than those meetings of a few years ago. The war is, however, now the subject of greatest interest to all mining men in Canada and there is no great desire to make merry.

Twenty-five per cent. of the Canadian members of the Canadian Mining Institute are now at the front. The thoughts of those who remain are with them, wishing them success and a safe return. When they come back we will have the most enjoyable meeting ever held.

The demand for minerals of all kinds is being met as far as possible in Canada and great success is being achieved in the production of a number of minerals concerning which we knew little a few years ago in Canada. The technical and descriptive papers presented at last week's meeting were therefore listened to and discussed with a special degree of interest.

Mr. H. C. Hoover has been elected an honorary member of the Canadian Mining Institute. He has won the admiration of Canadian mining men for his services as chairman of the Belgian Relief Commission. This distinction helps to convey to Mr. Hoover our appreciation of the work he and his fellow engineers are doing for humanity.

A considerable part of the Dominion Government ore-testing plant at Ottawa is at present being operated as a custom plant for the treatment of molybdenite ore. Excellent work is being done, but it is to be hoped that private enterprise will soon relieve the Mines Branch of this work so that further investigations can be carried on. The function of the Mines Branch is primarily to investigate and to show how ores can be treatel.

As pointed out by President Cole at the annual meeting of the Canadian Mining Institute, Canadian gold and silver mining companies are obtaining cyanide at the pre-war price. Our American friends are not so fortunate. They are largely dependent on the American branch of a German company which has shown no great desire to meet the demands. Canadian users, in common with others throughout the Empire, are being supplied by a Glasgow firm which is also doing important work for war purposes.

The importance of some of the work being done by the Mines Department at Ottawa was brought out in connection with discussions on the production of molybdenite in Canada. Mr. Geo. C. Mackenzie of the Mines Branch is to be congratulated on the success of his efforts.

Mr. S. V. Ells of the Mines Branch is doing good work in connection with the development of the bituminous sands of Alberta. He has carefully mapped and tested the deposits and has superintended the laying of a pavement in Edmonton. He has pointed out the possibilities and also called attention to some of the difficulties and to the failures in other places. As the railway will soon be completed to Fort Murray transportation to centres of population is now provided for.

A possible source of pebbles for mill purposes was indicated at the Montreal meeting by Mr. N. B. Davis of the Mines Department, Ottawa. According to Mr. Davis, there are large quantities of good pebbles in certain parts of Saskatchewan. Mr. Davis was studying the clay deposits and noted the pebble deposits incidentally. In view of the present scarcity and high price of suitable pebbles it is to be hoped that the Saskatchewan deposits will be further investigated.

MINING IRON CARBONATES IN ONTARIO.

A large deposit of siderite, iron carbonate, is being mined in the Michipicoten district, Ontario, by the Algoma Steel Corporation. The method of mining and treating the ore was described in a paper presented by Mr. A. Hasselbring at the annual meeting of the Canadian Mining Institute on March 8.

The ore is roasted in cement kilns and the product has a chemical composition and physical properties which make it very suitable for use in the blast furnace.

A report from Kamloops is that a net return of $1,400 has been received from a carload of gold-quartz ore shipped from the Wind Pass mineral claim situated in the neighborhood of Dunn Creek, North Thompson River. Included in the ore receipts at the Trail smelting works during the week ended December 7, 1916, was a lot of 33 tons from the Wind Pass. This property and the Fog Horn are stated to be about 80 miles north of Kamloops, on Whistler mountain, near the head of Joseph (Boulder) creek.

Eli Carpenter, who with John L. Seaton made the first discoveries of valuable mineral on the Slocan slope, they having located on September 2, 1891, the mineral claim that afterward became the famous Payne mine, died recently at Annis, B. C., from acute indigestion, at the age of 75 years. From Slocan he went to Alberta, and in 1898 was one of a party that

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Mr. F. E. Lathe, in charge of the Granby Consolidated Co's laboratory at its big copper smeltery at Grank Forks, Boundary district of British Columbia, has returned from a trip to Montreal, Quebec, whence he was called owing to the death of his brother.

MINING CONDITIONS IN ROSSLAND CAMP, B.C.

A Vancouver, B.C. newspaper recently published an account of an interview with Mr. Ernest Levy, manager of the mines at Rossland, B.C., of the Le Roi No. 2, Ltd. He is reported to have said:

"Rossland is doing well, I am glad to say, not from the flighty and uncertain point of view which characterizes the so-called success of many mining camps, but from the standpoint of stability, which, in spite of everything, is the only real test.

"Mining in Rossland, as far as the possibilities of the mines go is better than ever. Development has been fully satisfactory, and there is ore in sight, and other yet unknown which will, without doubt, secure the maintenance of extraction at the usual rate for years to come.

"The customary rate of shipping does not apply at the present time and has not done so for several months, but conditions recently have considerably improved and we hope soon to resume normal extraction.

"The factors which have interfered with our mining are a deficiency of labor and shortage of coke required for smelting. The labor situation is decidedly better than it was a few months ago, and the forces obtainable are adequate.

"Coke became scarce on account of the labor troubles in the Crow's Nest district coal mines. The disorganization of the fuel distribution naturally has proved of much longer duration than the actual period of disorganization of labor. We trust that the new agreement between coal mines employees and employers will be formulated without causing any renewed interference with coal production.

"Especially during the war it is of the utmost importance that industries should continuously progress. We should all take a leaf from the soldiers' book and let the welfare of the country take preference over personal benefits, and in doing this we will also give a measure of support to the soldiers without whom we should probably no longer be the owners of Canada.

"Wages in Rossland are higher than ever in spite of the fact that the value of the metallic contents of the ore does not justify the increase made. We increased wages to this extent for the purpose of continuing to prosecute our mining and to retain the services of the men who mostly have been with us for many years and who have their homes in Rossland.

"As you know, the value of gold has decreased greatly since the war started, consequently Rossland has been obliged, to a great extent, to eliminate the extraction of the more auriferous ores and, as far as practicable, press the production of the more copper-bearing ores.

"This, of course, necessitates somewhat of a variation in the general policy of the camp."

The mining committee of the Vancouver, B. C. Board of Trade has announced that it is most desirous of encouraging legitimate mining development in British Columbia and it is most desirous of preventing "wildcatting." It therefore warns all citizens, visitors, and strangers to use every precaution before buying any mining shares or claims without having first instituted a thorough investigation and inquiry from responsible persons.

CORRESPONDENCE

WASTE THROUGH DUPLICATION.

Editor Canadian Mining Journal, Toronto:

Sir,—In your issue of February 1st you state that the Commission of Conservation "spends much of its efforts in duplicating work done in other departments."

This statement is simply not true and, if you will make a specific statement, I will demonstrate that it has no foundation in fact. It is quite true, however, that we have undertaken work that has been neglected by other organizations and that, later, another organization has taken it up, thus duplicating our work.

You also state that we claimed "the discovery of phosphate deposits in the Rockies, when, as a matter of fact, what had been done was the re-discovery of deposits known to be of no economic value."

This statement is essentially untrue and the fact that Dr. Frank D. Adams attached his signature to the report is sufficient to demonstrate its inaccuracy.

(1) After the discovery by Dr. Adams and Mr. Dick had been published, we were informed that Mr. W. F. Ferrier had prospected in the Banff area but that his operations had been carried out secretly and nothing had been published as the information was the private property of his principals. Furthermore, Mr. Ferrier did not obtain permission to publish anything till March, 1916, although our discovery had been published in the preceding August. It is not necessary to tell anyone conversant with the English language and the ethics of science that, while interesting, this does not in any way detract from the credit due Dr. Adams and Mr. Dick. While we sympathise with Mr. Ferrier, he was only in the same position as hundreds of other mining engineers before him, and, when he accepted his employers' proposition, he knew the conditions attached thereto.

(2) As not one thousandth nor one ten thousandth part of the phosphate-bearing strata has been examined, your statement that the deposits are "known" to be of no economic value is unadulterated piffle.

So far as your references to the Commission of Conservation are concerned, your editorial is reminiscent of a certain historian of whom it was said that his history "had the merit of originality; in fact it was full of originality because he invented it as he wrote."

Yours, etc.,

JAMES WHITE.

Ottawa, February 13. Assistant to Chairman.

The tone of Mr. White's remarks is such that his misstatements are not to be wondered at. He has the difficult task of attempting to justify the existence of a Commission which has no sufficient reason for existence.

With regard to the discovery of phosphate boulders at Banff, Mr. White seems to think that only a question of priority in publication of discovery is involved. As a matter of fact the Commission persists in publishing glowing reports of the possibilities of imaginary resources, reports that are on a par with a wild-cat prospectus. It is further to be noted that the Commission was warned long before the voluminous reports were distributed. It is evident that the desire to publish a glowing report was so strong that nothing could prevent the dissemination of misleading information.—Ed.

QUEBEC IN 1916.

The banner year of the mineral production of the Province of Quebec was 1913. 1916 is only, however, ½ of one per cent. behind 1913. Moreover it is to be noted that if we compare the value of the "products of the mines" for these two years, leaving aside the structural materials, we find that the figures are $4,931,894 for 1913 and $7,982,430 for 1916, a considerable advance of 62 per cent. The diminution in the structural materials is of course due to the economic conditions which have prevailed since the beginning of the war.

MOLYBDENITE.

Very important shipments of molybdenite are being made from the Quyon mine of the Canadian-Wood Molybdenite Co. This mine was first opened in April 1916 and the first carload of molybdenite ore was shipped from it some three weeks later. There is now a well equipped mill for crushing and concentrating at Quyon, and another mill for concentration has been put up at Hull, the crushing of this ore being done by the cement works. The Quyon mine is probably the largest producer of molybdenite in America.

QUEBEC CHROMITE.

New record figures, both in tonnage and value 27,055 tons, $299,070, were reached in 1916 in the shipments of chromite from the Coleraine-Black Lake district. The prices which prevailed throughout the year were very satisfactory, and in the latter part of the year, the following scale was in force, for chromite f. o. b. Quebec Central Ry's stations: 50 per cent. ore, $45.00 a ton; 40 per cent. ore, $38.75; 30 per cent. ore, $22.50; 25 per cent. ore, $18.00. For special purposes, ore over 50 per cent. can be marketed at $1.00 a unit.

The two concentrating mills of the Mutual Chemical Company of Canada, one at Black Lake and the other on lot 7 range B of Coleraine, are now in operation.

ASBESTOS.

The asbestos mines of Quebec have been extremely active throughout the year. The shipments in 1916 amounted to 133,339 tons, valued at $5,182,905. The market could have absorbed much more asbestos than was offered, but the output was limited by the shortage of labor. As the demand was greater than the offer, the prices rose accordingly, more especially for the higher grades. As a result of this, although the tonnage shipped in 1916 shows an advance of only 18 per cent. as compared with 1915, the value increased 46 per cent. This is reflected in the average price per ton which was $38.87 in 1916; $31.33 in 1915; $26.96 in 1914; $28.04 in 1913.

The uses of asbestos have been greatly extended during the last two years and it is ever increasingly used in the manufacture of automobile tires, brake bands, tubings, coverings and tapes for electric wire insulating. These are practically new uses which must be added to the old uses.

The total amount of asbestos-bearing rock mined during the year amounted to 2,291,087 tons. The value of asbestos extracted from it, counting stocks on hand at the end of the year at the average rates of the year, was $4,878,931. This represents an average value of $2.13 of asbestos extracted from each ton of rock mined. In 1915 and 1914 these values were $1.46 and $1.44 respectively.

PRELIMINARY REPORT ON THE MINERAL PRODUCTION OF CANADA DURING THE CALENDAR YEAR 1916.

By J. S. McLeish, Mines Branch, Ottawa.

The total value of the metal and mineral production in 1916 as shown in the preliminary report presented herewith was $177,357,454, which compared with a production in 1915 valued at $137,109,171, shows an increase of $40,248,283, or 29.3 per cent. The previous maximum production was $145,634,812 in 1913.

In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals copper, gold, lead, nickel, silver, and zinc is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

The war has had a most pronounced effect not only in stimulating the production of those metals such as nickel, copper and zinc, iron and steel, molybdenum, etc., which are used so extensively for war purposes, but also in increasing the production of other products such as chromite and magnesite which can only now be obtained with difficulty if at all from sources previously available. The general industrial activity in metallurgical operations and in the manufacture generally of munitions of all kinds, including the freight movements required, have in turn increased the demand for fuel which has been met in Western Canada at least by large increases in coal production.

Increased production in quantity has in most instances been accompanied by large increases in prices, thus further enhancing the total value of the production.

Considerable progress has been made during the year in establishinng and increasing smelting and refining capacities of which the installation of electrolytic zinc and copper refineries at Trail and the beginning of construction of a nickel refinery at Port Colborne, Ont., are conspicuous examples. In addition, mention should be made of the production of metallic magnesium at Shawinigan Falls, of ferro-molybdenum at Orillia and Belleville, of metallic arsenic at Thorold, and of stellite, the cobalt alloy for high speed tool metal, at Deloro, and of the increased capacity for the production of steel particularly the installation of electric furnaces.

The mining output has been restricted and the efficiency of its operation considerably reduced by the withdrawal for war service of such a large proportion of the more highly experienced labor and engineering supervision. Higher costs have tended to offset the advantages to be derived from higher prices of output and in the case of gold mining have been a distinct burden.

The mining and metallurgical industries include a great variety of products so that in dealing with the industry as a whole the total value presents the only means of comparison, nevertheless quantities of production and prices are at all times the items of essential importance.

The accompanying statistical table shows the detailed production in 1916.

There has been an increased production of nearly all metals with the exception of lead and silver. The total value of the metallic production in 1916 was $107,040,035, as compared with $75,814,841 in 1915, an increase of $31,225,194 or 41.2 per cent.

The Mineral Production of Canada in 1916.

(Subject to Revision.)

	Quantity.	Value.
Metallic Products.		
Antimony ore (exports), tons*	794	$ 48,158
Cobalt metallic and contained in oxide, etc., lbs.	841,859	926,045
Copper, value at 27.202c per lb., lbs.	119,770,814	32,580,057
Gold, oz.	926,963	19,162,025
Iron, pig from Canadian ore, tons	115,691	1,328,595
Iron, ore sold for export, tons	140,608	393,689
Lead, value at 8.513c per lb., lbs.	41,593,680	3,540,870
Molybdenite, contents at $1 per lb., lbs.	159,000	159,000
Nickel, value at 35c per lb., lbs.	82,958,564	29,035,497
Platinum, oz.	15	600
Silver, value at 65.661c per oz., oz.	25,669,172	16,854,635
Zinc, value at 12.804c per lb., lbs.	23,515,030	3,010,864
Total		$107,040,035
Non-Metallic Products.		
Actinolite, tons	250	2,750
Arsenic, white, tons	2,186	262,349
Asbestos, tons	136,016	5,133,332
Asbestic, tons	18,500	27,147
Chromite, crude ore**, tons	27,030	299,753
Coal,† tons	14,428,278	38,797,437
Corundum, tons	67	10,307
Feldspar, tons	19,166	71,357
Fluorspar, tons	1,284	10,238
Graphite, tons	3,971	285,362
Grindstone, tons	3,328	50,982
Gypsum, tons	341,618	730,831
Magnesite, tons	55,413	563,829
Manganese, tons	979	90,791
Mica, tons	914	122,541
Mineral pigments—		
Barytes, tons	1,368	19,393
Oxides, tons	8,811	58,711
Mineral water	.....	114,587
Natural gas, M. cu. ft.	25,238,568	3,924,632
Peat, tons	300	1,500
Petroleum, barrels	198,123	392,284
Phosphate, tons	203	2,514
Pyrites, tons	309,411	1,084,019
Quartz, tons	135,803	241,806
Salt, tons	124,033	668,627
Talc, tons	10,651	36,475
Tripolite, tons	620	12,139
Total		$53,015,693
Structural Materials and Clay Products.		
Cement, Portland, barrels	5,359,050	6,529,861
Clay products—		
Brick: common, pressed, paving	.....	2,358,245
Sewer pipe	.....	716,287
Tile, pottery, refractories	.....	1,104,901
Kaolin, tons	1,750	17,500
Lime, bushels	5,482,876	1,089,505
Sand and gravel (not complete)‡	.....	1,498,009
Sand-lime brick	13,825,307	113,136
Slate, squares	1,262	6,223
Stone—		
Granite	.....	1,277,019
Limestone	.....	2,326,519
Marble	.....	118,810
Sandstone	.....	145,711
Total structural materials and clay products		$17,301,726
All other non-metallic		53,015,693
Total value, metallic		107,040,035
Grand total, 1916		$177,357,454

* Tons of 2,000 lbs

** Ore and concentrates finally marketed estimated as 13,834 tons.

† Additional returns increase production to 14,461,678 tons, $38,857,557.

‡ Additional returns increase value to $1,734,183.

LILLOOET, BRITISH COLUMBIA.

In his "Preliminary Review" for 1916, the Provincial Mineralogist gives the following information relative to mining in Lillooet district of British Columbia:

The Cadwallader Creek camp is the most important part of the Lillooet mining division, and an important productive lode-gold mining camp. It is by the present route, via Mission mountain, about fifty-five miles from the Pacific Great Eastern Railway, and about seventy miles from the town of Lillooet. A good auto-road connects the camp with Mission station.

During 1916 there has been more activity on Cadwallader creek than during previous years, and the production has been larger. Three mills have been running practically continuously from early in June until November.

The Lorne, Pioneer, Coronation, and Wayside mines have each been actively operated, and the three first mentioned have produced satisfactory returns.

The Lorne group has been operated by A. P. Noel, of Lillooet, under a bond from the owners, the Lorne Amalgamated Mining Company. He has had about ten or twelve men at work, and has continued the main adit, which was started some years ago, until he has reached an ore-body at about 250 ft. below the upper workings, from which ore was mined and treated in an arrastra in 1900. In future this adit, which is a crosscut about 400 ft. long, will be the main haulage-way from the mine-workings to the 5-stamp mill, the portal of the adit being at a slightly higher elevation than the grizzly and ore-bin at the mill. The mill was operated from June until November, and was only closed down because of breaking of the camshaft, otherwise Mr. Noel intended to attempt to continue operations during the winter and establish a record. The cost of mining and milling is reliably reported to have been as low as $4.60 a ton, and the average gold content saved from the ore somewhere about $10 a ton.

The Coronation mine has been worked most of the year by B. Perry under a lease from the Coronation Mining Company, but near the end of the year the company made a deal with George H. Alyard, the managing director of the Standard Silver-Lead Mining Company, who has taken over the property and will operate it in future. The work done during the past season was principally confined to further development on the Countless mineral claim, one of the group contained in the property. The development-work is reported to show an increase in the width of the vein in the drift from about 8 in. to nearly 5 ft. of ore that assays high in gold. An assay from the narrow part of the vein is reported by Mr. Alyard as showing 4 oz. gold to the ton.

The 10-stamp mill at the Coronation mine was operated only a portion of last season, treating ore from the old stopes on the Little Joe mineral claim of the group, also ore sorted from the old dumps, all of which is reported to have yielded fair returns, especially considering that the old plates in the mill were in very poor condition, and consequently much gold was lost in the tailings.

The Pioneer Mining Company operated the Pioneer mine continuously during 1916. A sawmill, run by steam-power, capacity 1,000 ft. B.M.; Lane mill, capacity about 15 tons a day; rock-crusher; air-compressor, capacity six drills; hoist and pump, driven from the air-compressor, were installed and operated continuously from June last. The mill, compressor, and rock-crusher are run by water-power, developed by a dam and flume a quarter of a mile long. An upraise was made from the old adit level to the surface, and connected with a winze from the adit level sunk to a depth of 100 ft. with stations opened at 50-ft. and 100-ft. levels below the adit. Drifts were driven to the east and west for about 80 ft. on each level and stopes opened. About 1,500 tons of ore was mined and milled during the season. The yield is reported as very satisfactory, especially from the lower west drift, the face of which is said to show a width of 5 ft. of ore that was carried for several feet east from the face. The total amount of gold saved in the mill is reported as $32,500.

The Wayside mine has been further developed by D. C. Paxton, the owner, who has continued driving on the No. 4 adit until its total length is 350 ft., also on the No. 6 adit to a total length of 125 ft. These adits appear to be driven on parallel veins, and a good grade of gold-bearing quartz is exposed in both. At the face of the No. 4 adit the vein is 5 ft. wide and pans well.

The Golden Dream Mining Company has been prospecting the gravel-deposits on the south fork of Bridge river below the dam, and sluicing the material taken from a pit in which bed-rock was struck at 21 ft. C. P. Dam, the manager, installed an Empire drill early in the season, but owing to the boulders it was not a success. Later these operations were abandoned, and two scrapers, worked by water-power from an overshot wheel, were substituted and worked satisfactorily. About one-third of the gravel taken from the pit yielded between 35 and 40 cents to the cubic yard, saved in the sluice-boxes.

The usual assessment-work was done on those mineral claims in the camp that are not yet Crown-granted, of which there are not many, as most of the claims were staked in 1897, 1898 and 1899, and the owners acquired Crown grants some years ago.

The opening of the Pacific Great Eastern Railway has proved a great advantage to the camps in the Lillooet mining division, as previous to that event the district was so remote from rail transportation that the excessive freight rates retarded progress.

Molybdenite Ore.—During 1916 a shipment of molybdenite ore was made from mineral claims on Texas creek, a tributary of the Fraser river that empties into it on the west side about twenty miles south from Lillooet station, on the Canadian Northern Pacific Railway. The shipment contained 9 tons of molybdenite which carried 16 per cent. molybdenite. The operators of this property are greatly handicapped because of remoteness from transportation and rough trail from the claims to the Lillooet wagon-road.

Talc.—Two cars of talc was shipped during 1916 from the near shore of Anderson lake, near the mouth of McGillivray creek.

Early in February most of the flotation concentration plant at the Highland Valley Mining and Development Co.'s concentrating mill, in the Ashcroft mining division, was in operation. An account of the company's property was printed in the Journal of January 1, page 21.

FRENCH'S ZINC TREATMENT PROCESS.

On February 15 the "Daily Times," Victoria, British Columbia, published the following:

The plant of the French's Complex Ore Reduction Company at Nelson will be ready for operation in about one month, on the arrival of the sheet rolling mill from the manufacturers, says Thomas French, son of the late Andrew Gordon French, the originator of this system of ore treatment, who is now in Victoria.

Mr. French says that the plant has been constructed at a cost of $36,000, the B. C. Government having guaranteed up to $40,000 and being secured by a first charge which the directors hope to lift soon after operations are started. He explained that a considerable quantity of ore is in sight, and on such favorable terms as to warrant the sanguine expectations of the promoters. As one who has devoted years as a scientific enthusiast to the completion of the French ideas and patents for dealing with difficult zinc and similar ores, Mr. French not only believes in his patents but is confident they can be employed on a large scale commercially.

"We have got beyond the experimental stage," he said, "and this plant is a commercial demonstration of what can be done with ores from hundreds of small mines in the Kootenays which have hitherto resisted treatment. All the zinc we produce will be taken by the Munitions Board, and we have other avenues of disposal which promise profitable results to the producer."

From what Mr. French said it is clear that other mining concerns and promoters appreciate what the company possesses in its potential development, since he explained that numbers of people representing most influential interests were "biting" at the proposition to secure control; however, he added that the company intended to itself prove the value of the process in practice.

He impressed on the interviewer that the character of the constituents of the ores to be treated is all important, in the deposition of the purest zinc, and as the manganese, a constituent on whose presence the success of the process depends, may be of very limited percentage, severe tests of the efficiency of the process are thereby provided.

Mr. French briefly alluded to his experiments at Trail, on the Sullivan mine ore, and at Silverton of the Standard property's product, and stated that the percentage of zinc extracted depended on the character of the concentrates. At Silverton tests were made on ores ranging from mill feed containing 10 per cent. zinc up to zinc concentrates with 43 per cent. zinc. A test was made with a concentrate containing 32.2 per cent. zinc, 3.5 per cent. lead and 31.6 oz. silver to the ton. After the zinc was extracted its lead and zinc content increased to 8.7 per cent, and 76 oz. to the ton. The extraction of zinc amounted to 91.5 per cent. of that in the ore. Mr. French adds that his average is about 92 per cent.

In the course of the "Speech from the Throne," delivered by His Honor the Lieutenant-Governor on the occasion of the opening of the Legislative Assembly of British Columbia on March 1, the following reference was made to the mining industry of that Province: "The increase in the demand for metals caused by the War has given new impetus to mining operations, and legislation will be introduced providing assistance for systematic prospecting of the mineral-bearing districts of the Province. To meet the growing demand of the mining industry, you will be asked to consider the advisability of providing additional smelting facilities."

THE LAKE SHORE MINE, KIRKLAND LAKE.

The following summary of work done at the Lake Shore gold mine is contained in a recent report to the shareholders by manager J. W. Morrison:

At the beginning of 1916, the shaft had reached to a depth of about 300 feet, and our development, during the early part of the year, was confined to the 300 foot level.

The ore shoot on this level, encountered 68 feet west of the shaft, yielded a very low grade of ore for the first 40 feet. At that point the values increased, giving a good milling ore for about 70 feet in length. Further development along the vein promised nothing of value. In a cross-cut to the north, another vein was encountered, which later proved to be the north branch of the vein we developed. This gave an ore shoot 176 feet in length of good milling ore, making a total length of about 250 feet of milling ore on that level.

It was decided in June, 1916, that a larger plant should be installed to continue work. Consequently, underground work ceased the latter part of June, and the laying of foundations and the erection of buildings for the new plant were begun.

With proper delivery of machinery, mining operations would have been resumed early in September, but in consequence of slow delivery, the plant was not started until late in October. The installation consists of a 740 cubic ft. combination electric and steam driven compressor; a 10 in. by 12 in. hoisting engine; a 125 h.p. return tubular boiler; a 125 h. p. induction motor, with transformers of same capacity and general small equipment. A good head frame was erected and the shaft fitted up and cage installed. New buildings were erected and covered with fire-proof material. Though comparatively small, the plant is complete and is capable of doing economic work.

Upon resuming underground work in November, a raise was started from the 300 foot level and is now in progress. The face of the 100 foot level, west, is being driven, as also is the west face of the 300. No ore of consequence was passed through on the 100 foot level, but the face of the 300 is still in good ore.

800 feet of drifting, 160 feet of cross-cutting, and 35 feet of raising were done on the 300 foot level during the year. No further development was done on the 200 feet level; but about 100 feet of drifting was done on the 100 foot level. There is estimated to be about $300,000 worth of ore above the 300 foot level, in the present developed ore shoot.

The above report covers operations from January 1st to November 30th, 1916. Since that time, there has been developed, in addition, approximately $150,000 worth of ore. The ore will average between $16 and $18 per ton and has a stoping width of about 4 feet.

GOLD AND THE NEED OF CYANIDE.

In the course of a comprehensive paper on "Pacific-Northwest Minerals in Peace and War," which was read before the Northwest Mining Convention at Spokane, Washington, on February 21, Mr. Frank A. Ross, of Spokane, consulting engineer, formerly general manager for the Marcus Daly Estate of the Nickel Plate group of gold mines and 40-stamp mill and cyaniding plant in Camp Hedley, B.C., made the following observations relative to gold and cyanide:

"Gold, our present standard of values, is unique among metals because its price always remains the same—$20.67 per fine oz.—and because the profit derivable from gold ores is greater in times of adversity than in prosperity, which latter always increases costs. Owing to this fact, that is because of the increased cost of production under the high prices of labor and materials of the last two years, the domestic production of gold fell from $101,000,000 in 1915 to a little more than $92,000,000 in 1916, and the world's production will show proportionately a much heavier decrease as soon as the statistics shall be available.

"A striking instance of our unpreparedness and our dependence upon foreign countries is found in the shortage of cyanide, upon which our gold industry now relies for economical production, and to which the decrease in output is largely due.

"As most of you know, solutions of potassium—or sodium—cyanide necessary in any case is an important factor in the cost of production. Before the War, cyanide was worth from 18 cents to 22 cents a pound in the Northwest; now it is so scarce, at $1.15 a pound, that a number of mines have been closed and the remainder are working at a great disadvantage. The same is true of those silver properties that use cyanide. And yet we have right at our doors all the 'makings' of cyanide in quantities to supply the world. These consist of abundant lime, coke, and electric current, together with plenty of fresh air. Limestone is first burned to make quicklime which is then crushed and mixed with fine coke, fed to an electric furnace, fused at a temperature of about 2,600 deg. centigrade, poured into moulds, and then pulverized. This product is called carbide. Liquid air is then fractionally distilled at a temperature of about 190 deg. below zero and the nitrogen is driven off and collected, the carbide is then heated, and the nitrogen is passed over it, forming what is known as cyanamide-calcium-carbon-nitrogen compound from which sodium, or potassium, cyanide is then made. Cyanamide is also very valuable in the making of fertilizers, while cyanide is extensively used for a number of purposes, California alone consuming more than 1,800 tons annually as an insecticide. So that, some day, you will see this chemical industry firmly established here."

From the Merritt Herald it is learned that the first carload of machinery for the Donohoe Mines Corporation's concentrator has arrived in Nicola Valley. The site on which the mill is to be erected has been prepared and building materials are on the ground in readiness for construction work. Stoping is in progress on the 200-ft. level of the company's Joshua mine and ore of good grade is being hoisted. It is stated that there is sufficient ore on the dump to keep the concentrating plant supplied uninterruptedly for several months.

THE ELECTROLYTIC PROCESS OF ZINC RECOVERY.

The production of zinc by the electrolytic process is now well established in Canada and the United States. Those in charge of the plants state that the success is such that operations will be carried on profitably in normal times as well as in the present period of high prices.

In a paper presented at the annual meeting of the Canadian Mining Institute last week Mr. E. P. Mathewson said of the process in use at Anaconda:

"During the course of the experiment and during the trials in the test plant at Anaconda the process originally proposed by Messrs. Laist and Frick was much simplified. The process finally adopted consists essentially of the following steps: First careful roasting of the concentrate at temperatures not exceeding about 730 degrees centigrade; then dissolving the zinc together with a little iron by means of spent electrolyte in Pachuca tanks. A small amount of manganese dioxide is then added to effect the oxidation of the iron, which is then precipitated by means of powdered limestone, bringing down any arsenic or antimony that may be dissolved. These are separated in Oliver filters, and the residue sent to the blast furnaces, while the filtrate, which contains nothing but zinc with a little cadmium and copper, is then treated with zinc dust and again filtered, the filtrate being the pure solution which is sent to the tank room. The anodes are pure lead and the cathodes pure aluminum. The deposition goes on for 48 hours only, when the zinc is stripped from the cathode sheets, then melted into slabs."

ONTARIO'S NON-METALLIC PRODUCTS.

The summary report of the Deputy Minister of Mines of Ontario shows for 1916 an increase in production of non-metallic minerals: Arsenic, fluorspar, graphite, iron pyrites, mica, petroleum, quartz, salt, sand and gravel, talc, are the chief minerals of this class produced in Ontario.

There has been a decline in the output of clay products, but the value per thousand of brick has risen. Common brick in 1916 averaged $8.53 per thousand at the works, as compared with $7.96 in 1915. The explanation can be traced to scarcity of labor, higher wages and increased fuel costs. Porous hollow tile, used chiefly for flooring and wall construction in structural steel buildings, is increasing in importance, and Ontario clay workers are now making a high-class product. Cement tile manufacturing is increasing in importance. Last year 1,431 M. tile were produced, valued at $39,131. There was an increased production of natural gas, but the value has declined. An increase in industrial, and a decrease in domestic, consumption explains this situation, which is by no means ideal from the standpoint of conservation. Shipments of iron pyrites from two new sources were made in 1916, namely, by the Rand Syndicate, whose property is three miles west of Timagami, and by the Madoc Mining Company from the Goudreau mine on the Algoma Central railway. The last mentioned made larger shipments than any other pyrite mine in the Province.

ANNUAL MEETING CANADIAN MINING INSTITUTE.

The sixteenth annual meeting of the Canadian Mining Institute was held in the Ritz Carlton Hotel, Montreal, March 7th, 8th and 9th. Technical sessions were held on Wednesday and Thursday, the program being as follows:

Wednesday, March 7th.

Morning Session: 10 a.m. to 1 p.m.

Presidential address, by Mr. Arthur A. Cole.

"Organization for Industrial Preparedness," by Mr. E. P. Mathewson.

"The Work of the Honorary Advisory Council for Scientific and Industrial Research," by Dr. Frank D. Adams.

"A Plea for Definite Training for Social Responsibility by Means of Our Educational Institutions," by Mr. C. V. Corless.

"Possibilities for Manufacture of Cyanide in Canada," embodying a report prepared by a special committee of the local Section of the Society of Chemical Industry, by Mr. Gordon Spencer.

"Electro-Chemical and Metallurgical Possibilities in Canada," by Mr. H. E. Howe.

Afternoon Session: 2.30 p.m. to 6 p.m.

"The Development of Canadian Magnesite," by Mr. H. J. Roast.

"Canadian Magnesite and Its Uses," by Mr. H. J. Ross.

"Potash, Its Production and Uses," by Mr. C. W. Drury.

"The Concentration and Marketing of Canadian Molybdenite," by Mr. H. H. Claudet.

"Utilization of Canadian Molybdenite," by Mr. J. W. Evans.

"Notes on the Orillia Molybdenum Company's Concentrator and Refinery," by Mr. G. P. Grant.

"Pulverized Fuel for Locomotives," by Mr. J. S. Coffin.

"Canada in Relation to the Coal Trade of the Empire," by Mr. Allan Greenwell.

Evening Session: 7.30 to 10 p.m.

"Further Notes on Yukon Mining Problems," by Dr. Henry M. Payne.

"Preparedness Among Animals," by Dr. Alfred C. Lane.

"Alaskan Physiographic Features," illustrated by motion pictures, by Mr. H. W. DuBois.

Thursday, March 8th.

Morning Session: 10 a.m. to 1 p.m.

"Electrolytic Deposition of Zinc From Aqueous Solutions," by Mr. E. P. Mathewson.

"Electro Zinc in Eastern Canada," by Mr. E .E. Watts.

"The Kingdom Lead Mine," by Mr. John E. Hardman.

"The Future of the Iron and Steel Industry in Canada," a symposium by Dr. Alfred Stansfield, Mr. D. H. McDougall, Mr. Corbett F. Whitton, Mr. G. C. Mackenzie, and Mr. R. R. Hedley.

"Mining Methods at the Magpie Mine," by Mr. A. Hasselbring.

"The Occurrence and Testing of Moulding Sands," by Mr. L. H. Cole.

"Refractory Clays of Saskatchewan," by Mr. N. B. Davis.

"Notes on Milling Practice at the McIntyre Mine," by Mr. A. Dorfman.

"Counter-Current Decantation," by Mr. L. B. Eames.

"Milling Practice at the Buffalo Mines, Ltd.," by Mr. Robt. E. Dye.

"Flotation by the Callow Process in the Cobalt District," by Mr. John M. Callow and Mr. E. B. Thornhill.

"Flotation Experiments with Canadian Wood Oils," by Mr. C. S. Parsons.

"Partridge Furnace: Its Uses and Adaptability," by Mr. Allen R. Partridge.

"The Chromite Deposits of Quebec," by Dr. Robt. Harvie.

Friday, March 9th.

Visit to Munition Works.

By the courtesy of the officials of the Dominion Bridge Company and affiliated companies, namely, the Montreal Ammunition Co., and the Dominion Products Co., and also of the Canadian Vickers Ltd., members were afforded the opportunity of visiting the munition plants of these concerns.

A few of the papers had been printed and copies were distributed among those present. The rights of publication are reserved.

President Cole in his address pointed out the "crying need of effort and co-operation between the various agencies and organizations of the Dominion in the important work of striving to place the Dominion in a more satisfactory condition than that which she has occupied up to the present of being a hewer of wood and a drawer of water for the United States."

"We have enormous masses of information buried in different governmental departments, both Federal and Provincial, in our universities and private offices, but up to the present we have no one with power and initiative enough to make it valuable for practical purposes," he continued. "In many cases we have in governmental departments excellently qualified men who should be recognized as leaders in their respective fields. If those in charge cannot do the work required, let us get the men who can."

"As engineers we have a duty to perform for Canada," said E. P. Mathewson in his paper on "Organization for Industrial Preparedness." "That duty is," he continued "to advise the Government as to the necessity of compiling the proper statistics regarding all industries in this country. If we had done our duty a little earlier we would have been better prepared for the great struggle that is now nearing its termination. Now, however, we can redeem ourselves to a certain extent by advising the Government how to prepare for peace. Statistics should be compiled showing in detail all the important facts and figures concerning the various industries of Canada as at present existing; and at the same time these should be supplemented by additional statements setting forth the possibilities for extensions in old lines and for the beginning of enterprises along new lines.

"It has come to my knowledge from a very authentic source that the statistics prepared in Canada today are based on insufficient data and that one department after another in the Government takes the same data, re-hashes it and serves it up with a little different trimmings as matter originating in the particular department furnishing the report. I have been told that over 30 per cent. of the statistics published by various departments in Ottawa are absolutely copied verbatim one from the other and that the balance of the figures are merely a rearrangement of the same figures. This is not only a great waste of

time and money, but it is hindering the development of Canada.

"I suggest, therefore, that this institute recommend the Government to appoint a special Statistical Board from the employees of the Bureau of Mines, the Geological Survey, the Department of Labor, the Internal Revenue Department, and the Census Bureau to gather and compile the necessary data concerning all the industries of Canada, to publish yearly reports thereon, and to add to these reports each year statistics indicating possible openings for the establishment of new industries. If such a board were appointed it might require assistance for the first year or so from the members of the engineering societies of Canada. This, I believe, would be freely granted, as was done in the United States during 1916, when the entire industry of the great country was canvassed, without any cost to the American Government, and statistics prepared which were of such great value that the Government took steps to ensure that the information should thereafter be kept constantly up to date. In order to know what we can do, we must first know on what tools and on what men we can count for such work as there may be to do."

Education along social lines was the subject of a paper read by C. V. Corless. He said in part:

"We have developed social conditions in which, to a large extent, privilege and responsibility have become dis-associated, in which rights rather than duties are mainly insisted upon, in which conduct is, to a far too great extent, restrained by law and police rather than by ethical principles. We have evolved an educational system in which an attempt is made to develop the minds of the young by feeding them almost exclusively on husks and symbols of knowledge—language and number—whereas the basis of real mental growth and vigor is almost entirely overlooked.

"We are only now beginning to realize that it is one of the highest duties of the State to train the citizen to become efficient producers of the world's needs, whether of goods or of services.

"We have been trained under an educational system practically ignoring social science. Is it any wonder that we have reached our present period of life with views not clearly defined on social and economic questions? We now realize that here is a vast field of the very first importance, regarding which even most of our legislators have most inadequate knowledge.

"The most efficient citizen is he who fully realizes his interrelations to other members of society, who knows that his personal welfare is inseparable from that of his fellows. The quickest way to increase social consciousness is definitely to introduce a thorough social training into our educational system."

A feature of the banquet was the presentation by a delegation of the Mining and Metallurgical Society of America to Edward Payson Mathewson, born in Montreal and a graduate of McGill University, with the annual gold medal in recognition of his outstanding research work and "distinguished services" in metallurgy. Mr. Ingalls briefly sketched the career of Edward Payson Mathewson. After graduation, Mr. Mathewson was assayer and later superintendent of the Pueblo Smelting and Refining Company, 1886-1897. Here he showed a spirit of investigation and research which resulted in improvements in lead smelting. From 1897 till 1902, he was a member of the Guggenheim technical staff, at first superintendent and later general manager at Perth Amboy, N. J., where he greatly improved lead smelting practice. Later he was sent to Mexico, and to Chile.

From 1902 to 1916 Mr. Mathewson was connected with the Anaconda Copper Company, first as superintendent of blast furnaces and later as manager of the entire plant. Here he made many improvements in copper smelting.

In 1911 he received the gold medal of the Institute of Mining and Metallurgy of Great Britain. He is now manager of the British America Nickel Company with head office in Toronto.

In responding, Mr. Mathewson deprecated his own work and said that any success he had attained had been through his ability to choose good assistants and his good fortune in always being connected with corporations sufficiently prosperous to encourage extensive research work. He had gained much too from conversation with workmen about the plants and he encouraged all his hearers to seek out the workmen and talk with them.

The importance of a revival in the sense of responsibility in public affairs and Government was suggested by J. W. Flavelle, Chairman of the British Munitions Board. In the development of the material, he said the tendency has been to specialize and to leave to others the attention to the Government. Even the King's Counsel has given up his broad interests to become Counsel for a corporation. Other professional and business men specialized in their work.

This neglect of a broader education, he considered to be due to the passing of the winter lecture courses in the country stores where men were wont to meet, swap stories and to talk politics. Now, men meet in smokers at the club, talk patronage and how to win elections. The plain fact was men were staying out of politics because they were unwilling to pay the price.

"What right have we to stand aside from affairs of government whilst these men are laying down their lives for us," said he. And he quoted from a speech by Lloyd George in which the British Premier said that the community has the right to the best that each member can give, not as a privilege, but as a right.

H. Mortimer-Lamb, secretary, read a telegram of acceptance from Herbert Hoover, who had been asked to become an honorary member of the Institute.

Lieut.-Col. Caldwell and Edgar Rickard spoke in appreciation of the great work accomplished by Canadian mining engineers at the front. Their efficiency is proved in the honors they have won.

H. Payne, of the American Mining Congress, and P. N. Moore, of the American Institute of Mining Engineers, brought greetings.

Following are the officers elected by the Canadian Mining Institute: President, Arthur A. Cole; vice-presidents, Charles Fergie, Thos. W. Gibson, D. B. Dowling, M. E. Purcell; councillors: Nova Scotia, F. W. Sexton; Quebec, L. D. Adams, T. Denis and Dr. A. Stansfield; Ontario, E P. Mathewson, R. E. Hore, N. R. Fisher, J. V. Stovel, Clifford E. Smith, M. Summerhayes, W. E. Segsworth, W. J. Dick, G. C. Mackenzie, and M. B. Baker; Alberta: W. A. Davidson, W. F. McNeill, and N. A. Pitcher; British Columbia: G. P. Jones, E. E. Campbell and Thomas Graham.

UTILIZATION OF PEAT FOR THE PRODUCTION OF SULPHATE OF AMMONIA AND OF POWER.*

By Louis Simpson.**

An industry, to be a commercial success, must have its manufacturing plant properly planned, equipped, and operated. Unless the lay-out and equipment are done economically and efficiently, even the most careful management will not be able to secure the financial returns anticipated.

Up to date, the manufacture of peat fuel from the peat bogs of Canada has resulted in one long series of failures. Fortunately, all these failures carry with them, plainly indicated, the causes that were responsible for disaster. That the manufacture of peat fuel can be profitably carried on, when the conditions are favorable, and when the operating plant is properly laid out and equipped, is evident from the rapid extension of the peat industry in certain European countries.

One mistake made in the past was the endeavor to build up an industry which had for its aim the manufacture and supply of peat fuel for domestic purposes only. Peat being a very bulky fuel, the railways have demanded for its transportation rates that add materially to the laid down cost. The unloading and cartage expenses are also very heavy. Further, peat, when intended for domestic fuel, can be excavated and cured in Canada only during four months each year. Therefore, unless the manufacture be coupled to some other industry, operating during the whole year, the overhead charges for management, power, development, and skilled labor for repairs, etc., are altogether out of proportion to the value of the product. Any worth while attempt to reduce these charges invites disaster.

But the difficulties above mentioned are eliminated if a peat-bog is directly utilized in connection with a power plant, in which gas engines are driven by gas from peat produced in gas producers, or in which turbine engines are driven by steam generated from peat burned under steam boilers: both being directly connected to electric generators for the development of electric energy; or, where the gas produced from the peat is conveyed by pipe lines for utilization as power for manufacturing processes in the neighborhood, or utilized for domestic purposes—such as heating and cooking—in the homes of the people.

Moreover, in addition to the profits derived from the direct use of the gas produced from the peat, still further gains can be made from commercial by-products to be obtained from the so-called waste gases. These by-products include sulphate of ammonia, tar of valuable quality, and an ash not to be despised. The ash can be utilized directly as a fertilizer, or as a filler for other fertilizers.

The amount capable of being realized from the sale of these by-products—providing the peat bogs are of the right quality—will not only pay all expenses (including depreciation and amortization) involved in the manufacture of the peat fuel, but will also pay the expenses incurred in the development of the initial power, and in the operations of the by-product saving process. Hence, after deducting these incidental expenses from the returns obtained from the sale of the by-products, there will remain to the credit of profit—apart from the market value of the electric energy distributed, and the gas sold for power, manufacturing processes, and domestic uses—a very substantial cash balance.

Inasmuch as up-to-date useable knowledge of the manufacture of peat fuel, in a form desired by a busy man, is not available, the following description and data are given.

Excavation of Peat.

A modern excavator, when erected and ready for operation, occupies a space (exclusive of the space occupied by the excavating buckets), 35 ft. long x 24 ft. wide, approximately. It stands upon flanged wheels, which rest upon a track of three rails: the distance between the centres of the two outside rails being 12 ft. The rails are of 60-lb. section, used in lengths of 13 3-4 ft., and are placed parallel to the long sides, when extended, of the cut being made. As the bog is excavated, the front length of rails are removed, and transferred behind the excavator, which is, from time to time, drawn back to permit the continuance of the excavation process. The excavator buckets work up the face of the bog from the desired depth, and after taking a cut, the buckets are moved sideways to the next position, to take another cut, and so on to the end of the face. When the end is reached, this side movement of the buckets is reversed. The angle or dip of the face is governed by the depth it is desired to excavate.

The distance the excavator is moved back from the face, without stoppage for relocation, is 13 3-4 ft. The time thus lost in making each of these necessary changes should not exceed 8 minutes. When excavating at the depth of 10 ft., the excavator should excavate a section 13 3-4 ft. x 28 ft. x 10 ft., in less than 52 minutes, which, with the 8 minutes lost in relocation, makes one hour, as the total time required to excavate one section of the dimensions indicated. Such a section contains 3,850 cubic ft. Bog peat weighs 66 pounds per cubic ft., hence the weight of a section will be 254,100 pounds, or 127 short tons, equivalent to 29 tons of 65 per cent. peat.

The buckets deliver the peat into a storage hopper of 5 tons capacity. From this hopper the peat is taken to the feeder connected to the macerator. This feeder should be so designed that unseen metallic substances, such as iron, would be magnetically extracted; while oversized roots should be removed mechanically, or by hand; in fact the macerator should be so made as to be "fool proof."

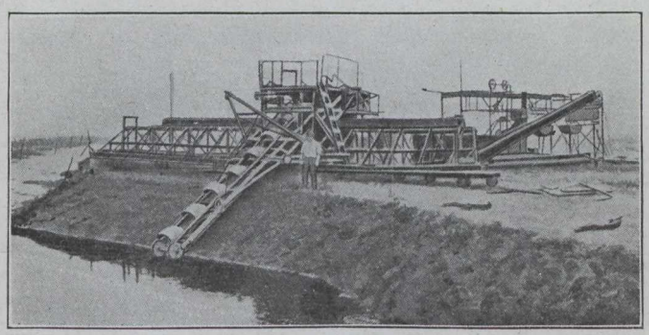
The emulsified peat is then discharged into a storage hopper capable of holding 5 tons, or more, of bog peat. This hopper should be so constructed that not more than a predetermined quantity of peat can be delivered from it, to a distribution car, at any one time.

In Canada, it has not hitherto been customary to operate the excavator up to its capacity, or to anywhere near capacity. Great losses resulted from such methods. An industrial production engineer would condemn operations that only secured 40 per cent. of the possible. A careful scrutiny of the cost sheets of a peat plant, by any man experienced in the handling of men and machinery in a modern industrial plant, will show that the causes of this astounding loss of efficiency should, in most cases, never have occurred; and where they did occur, should have been remedied.

The excavator should be so designed that the location of the weight burden, whether caused by the machinery or by the peat contained in the two hoppers, and the stresses due to the work done by the

**Member American Electrochemical Society, Industrial Engineer.

excavator's buckets, should be so adjusted and distributed that the smooth working of the excavator is not interfered with. Further, the excavator should be so constructed that it is impossible for the elevator to leave its tracks, when it is being moved thereon.



THE ANREP EXCAVATOR

The excavator under review was equipped with one 45 E. H. P., A. C. motor. It would have been better had the excavator and the machinery operated directly from the excavator been so designed that the whole would require a 40 or 50 E. H. P. motor. This motor should be specially constructed for the work, since a "general service" motor is not suitable. The motor should be installed by a competent electrician.

The motor on the excavator drives the macerating machinery, dump cars, and spreading machines, while the conveying and spreading machinery are in some outfits driven otherwise.

The spreading ground, on which the macerated peat is distributed by the spreader for the purpose of being dried by exposure to the atmosphere, is located on one side of the excavator. The length of the spreading ground is dependent upon the depth of the peat being excavated. The area of the ground required for a bog 10 ft. deep would be less than 1050 superficial feet, to which must be added a strip between the spreading ground and the excavator, and a like strip at the opposite end of the spreading ground. The size of these strips is dependent upon the room required to relocate the spreader, etc.; but with one spreader should not total more than 100 sq. ft. In the event of more than one spreader being used, further allowance would have to be made.

The track upon which are run the dump cars required for delivering the emulsified peat to the spreader, or spreaders, is constructed of light, moveable, tram rails, laid down in the shape of a parallelogram; but with the corners rounded. The side next to the spreading ground, then being used by the spreader, is supplied with duplicate rails, and is so arranged that the side, last in use, can be moved back quickly and placed in a new position, so as to permit the spreader to lay peat upon a new strip of the spreading ground. The removal and relocation of this duplicate track is done while the cars are using the side in place; and should be secured in the required new position before the excavator and spreaders stop for relocating; so that during the surplus time made available by the necessary stoppage, there will only be the rounded corners to move and readjust, and the cables operating the dump cars connected up.

As already mentioned, the time required to relocate the spreader should not exceed 8 minutes; the time therefore that should be allowed to relocate the car tracks, and spreader, or spreaders, should not be longer than 8 minutes. At present, when the excavator reaches the end of the cut and has to be relocated so that another cut can be made across the bog, much more time than 8 minutes is lost. For this reason arrangements, whenever possible, should be made whereby the excavator can be operated on one continuous cut during the entire season; so that the relocation can be done after the termination of the season's harvesting. If, however, this is not possible, then relocation should only occur twice, once in the middle of the season, and again after the harvesting season has terminated. Wherever this economy in the system of operating is possible, some modification of the existing moveable industrial track is called for. There should be no difficulty in arranging such modification and improvements. In the "Anrep" system the spreader is operated by cable from the excavator; whereas in the "Moore" system the spreader is operated by means of an electric trolley. A far more economic plan would have been to operate the spreader by means of a small gasoline motor. It is claimed that the "Moore" spreader operating at 7 ft. per minute, will lay down 34 individual strips 4 in. x 4 in., making an aggregate strip 11 ft. wide, at the rate of 26 1-2 cubic ft. per minute. And since bog peat weighs 66 pounds per cubic ft., it follows that this spreader should lay down 1749 pounds per minute. Allowing 8 minutes lost time per hour, for relocation, the production per hour should be 90,948 pounds, or 45 1-2 short tons of bog peat; which is equivalent to 10 1-2 short tons of 65 per cent. peat per hour.

Seeing that the excavator is able to excavate 29 tons of 65 per cent. peat per hour, it is evident that one excavator should be able to supply three spreaders. Such an arrangement is quite practicable, by placing the spreaders on the ground, in tandem. If one is placed at one end of the spreading ground, the second would commence to operate at one-third down the ground; while the third would commence operations at an equal distance ahead of the second. By this scheme, one continuous track would be amply sufficient for the dump cars; but extra dump cars would be required. In this way the relocation of the spreaders would be more expeditiously accomplished. The saving in wages and in capital cost with the accompanying interest and depreciation charges which this economic change would ensure, justifies the engineer or peat expert in giving this suggested innovation the most careful consideration.

Preparation of the Ground.

Every season, before the ground becomes hardened by the frost, the surface of the bog area required for the next season's operations—whether for excavation or for spreading purposes—should be carefully prepared. By preparation is meant, the removal from the surface of the bog of all overgrowth, and of any visible roots of inconvenient dimensions. Further, that portion of the bog required for the next year's operations should be surface drained; while that part intended for spreading purposes should be roughly rolled. The finishing rolling should be done in the spring; immediately before the ground is to be used for spreading. Too much attention cannot be paid to intelligently planned surface drainage. Included in this preparatory work, is the location of all soft spots. These soft spots should receive special attention with a view to improving them, but in any case their location should be indicated by poles with flags. For operations on a large scale, a machine, (gasoline driven), specially constructed for this preparation work, should be purchased. As far as possible, no horses nor cattle should be allowed on the

bog, as their tramping breaks up the surface, and interferes with surface drainage. For the same reason vehicles used should be provided with wheels having very wide tires. In some instances "creeper" attachments could be advantageously used.

Suitable Size of Peat Bricks.

Another economy would be a change in the size of the peat brick. The brick, as laid by the spreader, should be made of a size, the weight of which—at the time they are turned—is found to be the maximum weight a boy can turn, without lessening the number turned per hour. The dimensions of the brick made hitherto, (dictated entirely by the requirements of the domestic fuel trade), is 8 in. by 4 in. by 4 in. Such a brick made of 75 per cent. peat, averages in weight, 2 pounds. A brick of like dimensions, but of partially dried peat, say 35 per cent. peat and 65 per cent. moisture, will weigh 4 1-4 pounds. Experimental investigation will determine what size of brick, made of 35 per cent. peat, but weighing 8, 9, or 10 pounds, will prove to be the most economical in wages for turning and cubing. Having determined the most economical weight, there will be no difficulty in fixing the most suitable dimensions. Probably it will be found preferable not to increase the thickness, but to increase the length chiefly, and perhaps the breadth slightly. The bricks, as left by the spreader, lie on the field 10 days. They are then turned and lie, so turned, 10 days before being cubed. Once cubed, they can remain cubed for 7 days, and until it is convenient to remove them.

Transportation of the Peat.

The economic transportation of the dried peat to the bunkers over the gas producers at the power house, is the most difficult problem of all the many problems that surround the economic manufacture of peat fuel. It must be remembered that each peat fuel manufacturing plant, has necessarily its own particular system of transporting the air-dried peat to its destination. This is another reason why the excavator should be worked so as to give a production somewhere near its maximum capacity. To produce 80,000 tons of air-dried peat, under the old system of operating, there would be required 4 excavators, with 4 spreading grounds. Hence, it would not be a question of moving about 600 tons of peat per day—the production of 4 excavators operating on the old system; but the conveyance, each day, of a total of 600 tons of peat from four widely separated spreading grounds, with the peat located at the loading end being constantly shifted, thus making it practically impossible to use any of the numerous economic permanent loading devices.

The modern economies in the loading, carrying, and delivering of large quantities of material, in bulk, have partly consisted of economies in the time required to load and to unload; but chiefly in economies arising out of increasing the capacity of the conveying unit. In the case of a peat plant of the magnitude indicated, the first and last of these economies are denied, because the location of the peat to be loaded is being constantly changed and because the road that has to be used is on the surface of the bog, which eventually has also to be excavated, and cannot be improved and made into a road that can withstand the traction of great weights. In order to meet these extraordinary conditions, it may be advisable to lay down a moveable industrial tramway, and since the rails of such a tramway have to be continually moved and relocated they will, of necessity, have to be of light section. There must be correspondingly light cars, of small capacity.

Every peat bog has its own transportation problems, some peculiar to one bog alone, which call for special solution. The cost involved in overcoming such special difficulties, will vary in each particular case. There are not likely to be any difficulties, however, that cannot be overcome at a reasonable cost by the wise use of one or other of the many arrangements available. The difficulty lies more in the selection of the system that will prove to be the most economical under the existing conditions. On certain bogs, it will probably be found most economical to use specially constructed motor tractors, with trailers. These would transport the air-dried peat to permanent storage stations located just outside the limits of the bog. The peat fuel could be conveyed from these stations to the bunkers, over the gas producers, by means of an Ambursen aerial tramway. These stations being permanent, the peat could be handed to the trays of the aerial tramway by means of mechanical loaders. Such a system would have the distinct advantage of permitting the peat fuel required for winter use to be stored in several piles, each at a distance from the power house; instead of in one pile in close proximity thereto.

The Ambursen aerial tramway is economical as to labor, power, and repairs, and is low in first cost. Under favorable conditions, the peat fuel could be delivered into the gas producer bunkers at a price lower than could be done were any system of ground traction used. Moreover, these aerial tramways possess the distinctive advantage that they can be operated during the most severe winter weather, without the extra expense caused by the necessity of having to clear away the snow that may have fallen, or that had been blown upon the tracks.

In some cases, the motor waggons and the trailers could be used—when not otherwise employed—for delivering the peat fuel sold for domestic consumption to nearby customers. A method of operating a bog, suggested in the first place by Mr. A. J. Forward (Editor of the Canadian Peat Journal, and Secretary of the Canadian Peat Society) possesses important merits. In this scheme, the excavator takes a cut through the long centre of the bog, and when the opposite end is reached, the excavator moves into a removable turntable, which transfers it to a track of three rails placed on land or bog that will not be excavated. This track is placed at right-angles to the cut excavated. The excavator is then drawn to a second removeable turntable, which is placed at the end of the track of three rails on which the excavator is to operate next. When excavating the next cut, by this method, the excavaor is transferred to the track upon which it is to operate, with a minimum loss of time. Indeed, the loss of time may be made so small that it would be possible, during the week following, to make up for the time so lost, thus keeping the production at the desired total. Either one, two, or four excavators can, with proper management, be operated upon one bog when this system is adopted.

It may seem strange that these improved methods of working peat bogs should not have been thought out and put into operation before now; but when it is considered that up to the present time, no peat bog

in Canada has been worked upon a large scale, nor under management that was either experienced or competent; and, with one lone exception, had not the backing of the necessary capital, the negative results obtained, are not to be wondered at.

Production of an Excavator.

Great difficulty has been experienced in collecting the data necessary to arrive at a precise estimate of the possible average production of an excavator. It has been claimed that the "Anrep" improved excavator can excavate as much as 4 cubic yards per minute, when operating continuously. Now, a cubic yard of bog peat weighs 1,782 pounds, hence, 4 cubic yards would weigh 3.55 tons. Based upon this estimate, it follows—allowing 8 minutes for the moving of the excavator back upon its track—that the excavator, if kept at work consistently, should excavate 184 tons per hour. But for the presence in the bog of roots, and even of tree trunks, which are found in all bogs, it would be reasonable to conclude that the output of such an excavator would exceed 170 tons per hour. The two storage hoppers now supplied are important factors since they act as regulators. It has been claimed that a section of bog 13 3-4 ft. by 28 ft. by 9 ft., which contains 114 tons could be excavated in half an hour of continuous work, which is equal to 228 tons per hour. As a basis for these calculations, 127 tons per hour—allowing for the 8 minutes loss, as before mentioned—is taken as being quite possible, when the bog does not contain too many roots, etc.

Assuming the reasonableness of the foregoing facts and figures, it is evident that, where advantageous environment exists; where production is increased—due to economic improvements in manufacture—and where there is a nearby market for peat fuel, or gas produced therefrom, that very handsome financial returns may be expected. This is of special importance in the middle provinces of Canada, where the supply of coal is becoming so precarious, and increasingly costly.

Utilization of Peat.

In another article will be given the estimated capital cost, working cost, revenue, and profit and loss, of a by-product, recovery, peat-fuel plant and of an electric power plant, designed to develop 10,000 E. H. P., using gas-fired steam boilers, and steam turbine direct connected with an A. C. generator.

The gas producers would burn 65 per cent. peat; that is, peat containing 35 per cent. moisture. The peat used would be of a quality that, when dry, contains 2 per cent. nitrogen.

The nitrogen content of peat is a matter of the utmost economic importance. A bog may be a very paying industrial proposition when the peat contains 2 per cent. nitrogen; while a similar bog containing only 1 per cent. of nitrogen, may not be worthy of attention.

There are many advantages in having the peat plant of much larger capacity than the requirements of the gas producers. In nearly every case it is possible to dispose of the surplus supply of peat fuel in nearby markets at profitable rates; especially when a combination of two businesses is favorable, namely, supply of peat for gas producers, and supply of peat for domestic fuel. This ensures the delivery to the domestic trade, of just the quality of peat demanded by that trade, a quality which, up to the present time, has seldom been obtainable. Domestic peat fuel can only be satisfactorily made during the height of summer, and even then a proportion of what is made is not first-class. By the combination mentioned, the imperfect peats could be sorted out and be sent for consumption to the gas producers. The gas producers can use peat with a moisture content as high as 40 per cent.

It would not be difficult to so arrange that the peat, while stored in the bunkers over the gas producers should be more or less subjected to the drying influence of heat which would otherwise be wasted. It is quite possible to so arrange that peat containing 50 per cent. moisture could be utilized economically, if it is found necessary to use peat containing so large a percentage of moisture.

(To be Continued).

TYEE CO.'S SMELTERY, VANCOUVER ISLAND.

On February 3 it was announced in Victoria, B.C., that Mr. F. A. Serberling, president of the Goodyear Tire and Rubber Co., is at the head of the Eastern American capitalists who have taken over from the Tyee Copper Co., of London, England, its copper smelting works at Ladysmith, Vancouver Island, B.C. The following information has been published:

"Since the announcement was made two months ago of the fact that United States capital was behind the project of enlarging the smeltery and placing it in operation, mystery has surrounded the personnel of the parties behind the transaction. Colonel Stevenson, the veteran Alaskan copper magnate, one of the best known mining men of the North, who arrived in Victoria on February 2, has stated that associated with him in the transaction was Mr. Serberling, who represents other prominent capitalists of the Eastern States.

Colonel Stevenson leaves on February 3 for Ladysmith, where he will look over the smelting works, the plant of which is now being enlarged and placed in position to commence operations. About $100,000 is being expended in additions and plant, and when ready for operation the capacity will be about 1,000 tons of ore a day, as compared with the former capacity of 600 tons a day.

"Colonel Stevenson states that ores from Alaska copper properties he and his associates are developing will be smelted at the Ladysmith works, and doubtless custom ores will also be treated there."

HOLLINGER IN 1917.

General Manager P. A. Robbins says: "We expect to treat in the neighborhood of one million tons per year. The strain of keeping up our production and keeping down costs, while at the same time carrying on a campaign of heavy construction work, has been severe, and it speaks well for the spirit of our organization that good progress can be reported in all work. The central shaft plant is nearly completed, mill and cyanide plant buildings are completed and foundations for machinery are almost completed. If no unusual delays occur in the deliveries of apparatus by manufacturers it is probable that we shall have a plant ready to treat nearly 3,000 tons of ore daily by the latter part of May."

MINING OF ANTIMONY ORES IN CANADA

By A. W. G. Wilson

(Continued from February 15th issue.)

Lake George, New Brunswick.

This discovery of antimony ore was made about the year 1863 in the parish of Prince William, York county, at a point about three miles west of the St. John river and a mile and a half from Lake George. The distance to Fredericton is about 27 miles by road, and to Harvey Station, on the Canadian Pacific railway is about eleven miles. The recently completed St. John Valley railway now runs within about three miles of the property.

According to Bailey "the rocks exposed in the vicinity consist of alternating beds of slate and quartzite, being part of a wide belt of such rocks traversing the central counties, and supposed to be of either Cambrian or Cambro-Silurian age." . . . "The beds are very highly disturbed, and show abundant evidence of metamorphism, connected, no doubt, with the close association of the strata with masses of intrusive granite, which may be seen in situ within a mile of the principal deposits of ore. These latter occur in connection with veins of milky quartz, some of which appear to be coincident with the bedding, though more commonly intersecting this at various angles. The total area over which lodes bearing antimony were found was about 350 acres, the quartz veins varying from a few inches to six feet, in which those of stibnite appeared partly in a network of fine veinlets, and partly in more considerable masses, sometimes attaining a thickness of twelve or fifteen inches. In some parts of the workings very fine specimens of native antimony were found."

The two principal veins are nearly parallel and strike approximately N. 75 deg. W., and dip to the north at an angle of about 45-50 degrees. The ore on these veins is said to have consisted of stibnite with quartz and country rock but without calcite. A third vein, striking nearly at right angles to these and dipping towards the east at an angle of 43 deg. was also discovered in the earlier days. This vein was characterized by the presence of calcite in the gangue, as well as quartz and country rock. A fourth vein appears to have been discovered some years after the first discoveries were made. These veins subsequently received names, in accordance with their location or discoverer. These names in order were Hibbard, Prout, Moody and Brunswick. In addition to the mineral stibnite, which occurs in all of them, native antimony was found in some of the deeper workings, and occasionally coatings of the oxysulphide kermesite or the oxide senarmontite were encountered in the upper workings.

Mr. Charles Robb records that in 1869 three adjoining locations had been worked from time to time during the previous six or seven years. At that time there were three shafts of 90 ft., 200 ft., and 208 ft. in depth respectively. The second shaft, which so far as I can identify it appears to be No. 1 of the Hibbard vein, gave access to about 400 lineal feet of drifting. The third shaft, which I identify as the Lawrence shaft, located on the transverse vein, was the deepest of the three and was in operation at that time.

The first organized company to begin mining appears to have been the Lake George Mining and Smelting Company, which owned the Hibbard property. Their operations began in 1876, but ceased the following year, apparently owing to the failure of one of the principal owners of the company, who was also acting as the selling agent.

About three years later, in 1880, the Hibbard Antimony Company was formed to take over the rights of the former company. This company appears to have controlled nearly 500 acres of ground, 200 acres of which were held in fee simple, and 300 acres under a 999 year lease. The four principal ore veins of the locality were included within this territory. Mining and smelting operations were carried on with partial success for about four years. Near the principal shaft, known as number 2, on the Hibbard vein was erected a concentrating mill employing crushers, rolls, four jigs and one Rittinger table. The smeltery included five reverberatory roasting furnaces with condensing chambers for recovering the antimony oxides, and one reverberatory furnace for making regulus. The Hibbard Company ceased operations in 1884.

The Brunswick Antimony Company appears to have been operating the Brunswick vein at about the time the Hibbard Company was working on the Hibbard and Prout veins. I have been unable to ascertain when this company began operations. They owned a smelter at Medford, Massachusetts, where they produced metallic antimony for the purpose of making babbit metals.

In 1885 the affairs of the Hibbard Company were taken over by the Brunswick Company. The control of this corporation appears to have lain in the hands of a Mr. James and a Captain Adams, both citizens of the United States. The latter is probably the Captain Adams who was associated with the early developments in the Copper Mining Districts of Quebec, who operated the old Hartford mine, now the Eustis, between the years 1866 and 1871, and who built the first copper smelter in Quebec in 1869. For the next two years ores from both the Hibbard and Brunswick veins were shipped to the plant at Medford, but operations ceased in 1886.

During the next year or so the Hibbard vein was worked under lease for a short time, and small shipments of ore were made.

The next incorporated company to operate in the district was the Canadian Antimony Company, Limited, organized in 1907 under the laws of New Brunswick, with a capital stock of $250,000. This company took over the mines and property formerly owned by the Hibbard Antimony Company, Limited. This company is still the owner of the property, which comprises about 446 acres of freehold, a portion of which is owned by the company, and the balance held under a perpetual lease. At the present time they also control the mining rights over an area of about two square miles.

This company appears to have operated the mines during the years 1907-8-9. The principal mining work was performed on the Prout vein through No. 1 shaft and at No. 6 shaft which lies west of the main workings on the Hibbard vein, and which may be sunk on an extension of this vein, or on a parallel vein.

This company erected a complete oxide plant and a reverberatory furnace for producing metallic antimony.

Trouble seems to have arisen in the metallurgical operations and work ceased in 1909.

About midsummer of the present year the holding company granted a three years' lease, on a royalty basis, to the newly organized New Brunswick Metals Company, Limited. This company immediately took over the property and made preparations to begin active mining and the production of metallic antimony. They found it necessary to make important alterations in the oxide plant and in the reduction furnace and active production will probaly not begin until early in the new year. They hope, eventually, to reach a production of three tons of metallic antimony per day. It is proposed to initiate an extensive prospecting campaign during the winter of 1916 with a view to systematic development of the property, which is one of great promise.

The extent of the mining work on the property, at the time the present lease holders took possession, may be judged from the following description of the workings as they existed in 1907. Very little additional development work was done during 1908 and 1909.

The principal veins on the property are the Hibbard and the Prout veins.

The Hibbard vein has been worked most extensively and is stated to have been traced for over one mile in length. Near the east end of the property it and the Prout vein are close together, but as one proceeds westward these veins diverge. Seven shafts have been sunk on this vein.

No. 1 Shaft—Is said to have a depth of 90 feet.

No. 2 Shaft—875 feet west of No. 1, size 6 ft. by 15 ft. and 220 ft. deep. At a depth of 80 ft. a level is driven east 160 ft. About 20 ft. from the shaft a cross-cut has been driven 30 ft.; farther on a winze 30 ft. deep has been sunk, and at 80 ft. from the shaft is an upraise of 20 ft. The vein had a thickness of three feet at this point. The western extension of this drift connects shafts numbers 2, 3 and 4, and is 320 ft. in length. A cross-cut from this level connects with the Prout vein at No. 1 shaft. At a depth of 130 ft. a level is driven east 20 ft. and west 30 ft.

No. 3 Shaft—Depth apparently 80 feet.

No. 4 Shaft—Depth apparently 80 feet, and distance from No. 2 is 320 ft.

No. 5 Shaft—Depth 20 ft., and distance from No. 4 is 280 ft.

No. 6 Shaft—Depth 150 ft., and distance from No. 5 is 1,200 ft. In this shaft levels were driven 160 ft. east and 80 ft. west at a point only 30 ft. from the surface. At 80 ft. from the surface levels were driven 260 ft. and 200 ft. west. At 160 ft. east of the shaft a rise was put in connecting this level with the level above. This shaft has produced a good deal of ore, which is said to have contained a little sulphide of arsenic in addition to sulphide of antimony. This vein also produced some native antimony.

No. 7 or Adams Shaft.—Depth 325 ft., and distance from No. 1 shaft 1,500 ft., size 6 ft. by 15 ft. Three levels are said to have been driven from this shaft, but records of their depth and length are not available.

It is to be noted that it has not been established that Shafts numbers 6 and 7 are located on an extension of the Hibbard vein. They might well be on similar parallel veins.

The Prout vein lies immediately south of the Hibbard vein. It has not been traced for so great a distance, but it appears to contain the best ore, so far as it has been explored.

No. 1 Shaft has a depth of 260 ft. on an incline of 25 deg. to the north, measures 6 ft. by 15 ft. It is at present (1915) the only one in operation. No. 1 level at a depth of 80 ft. is driven east 120 ft. and west 160 ft. Much of the ore has been stoped out but a small amount still occurs on this level. No. 2 level, at a depth of 115 ft. extended east 50 ft. and west 209 ft. in 1907. At a distance of 100 ft. west of the shaft an upraise was driven connecting with No. 1 level west. No. 3 level at a depth of 200 ft. extended east 100 ft. An upraise was driven from this level to the level above at a point 50 ft. east of the shaft. Work was in progress on both these levels in 1915.

This shaft exposed a well defined vein carrying stibnite ore varying in width from 6 in. to 3 in., the average thickness being probably about 21 ft. of quartz and stibnite. The metallic content would be about 20 per cent. antimony.

No. 2 Shaft has a depth of 50 ft. and is distant from No. 1 shaft 350 ft. No drifting or stoping has been done. The work is said to have exposed a persistent vein of ore varying in thickness from 6 in. to 3 ft., averaging about 20 in. in thickness.

No. 3 Shaft is located 850 ft. west of No. 2. A record of the depth is not available. The vein on the surface has a width of about 20 in.

The principal shaft in use is No. 1 on the Prout vein. This is covered with a building housing the boilers, hoist, and crushing equipment. At present ore blocked out in previous years is being stoped, crushed, hand-sorted and sent to the metallurgical plant.

The metallurgical plant is housed in an adjacent building. The original plant and the metallurgical process were described in 1909 by C. Y. Wang. It has been found necessary to modify the original plant. At the request of the operators a detailed description of the plant and the method of its operation is withheld. It may be stated, however, that the system used is a modified Herrenschmidt plant in which oxides of antimony are produced by roasting the ores in a vertical type of blast furnace with coke. The oxides are collected in special cooling and condensing chambers and are subjected to a special leaching treatment to remove the arsenical oxides. The leached oxides are then dried, the surplus heat from the flues being utilized for this purpose, mixed with reducing agents, and treated in the reduction furnace.

Other veins. In addition to the two principal veins, the Hibbard and the Prout, the earlier reports mention two other veins—the Brunswick and the Moody.

The Brunswick vein was operated by the original Brunswick Antimony company in the early eighties. Its strike is said to be parallel to that of the Hibbard vein. It lies about 250 ft. north of it and dips to the north. I have been unable to find any record of the amount of work done. It lies within the boundaries of the property leased by the New Brunswick Metals Company.

The Moody vein is apparently a cross vein, striking nearly at right angles to the main vein and dipping towards the east. There are said to be two shafts on this vein. So far as I have been able to identify it, this vein is the one upon which work was in progress in 1869 at the time of Mr. Charles Robb's visit to the locality. He mentions a shaft 208 ft. in depth, which

is probably the Lawrence shaft. The other shaft has a depth of about 65 feet.

The mining rights over three square miles of territory, adjacent to the property of the Canadian Antimony Company, Limited, and including the property in which the old Lawrence shaft is located, are controlled by Mr. A. R. Slipp, K.C., of Fredericton, N.B., and associates.

South Ham, Quebec.

Antimony ores were mined on lot 56, range I, township of South Ham, Quebec, many years ago. The present writer visited the locality in the summer of 1909. His report on this visit was published in the Summary Report of the Mines Branch for 1909. To make this account of Antimony mines in Canada complete the report is reproduced here:

"The old workings were not accessible, because the adit was blocked by clay and water, and the shafts were partly filled with snow and ice. As far as could be ascertained from a surface examination, the ore consists of metallic antimony, together with stibnite, and smaller amounts of other antimony-bearing minerals. The associated rock is chloritic schist, striking nearly northeast, in which numerous lenses of quartz, usually almost black in color, are found. In width these vary from narrow veins to lenses about 2 feet across. In the vicinity of the mine the quartz veins examined were all characterized by swells and rolls—narrowing to one-quarter of an inch, or even disappearing, or widening to 2 or 3 inches.

"In the vicinity of the old mine-workings the rocks are pretty well shattered by joints, and there appears to have been a slight jostling of the joint blocks; the cavaties thus formed have been filled with quartz. Such veins are very irregular in both dip and strike; presumably, some of the spaces which they now occupy were open spaces when the vein matter was introduced, because some of the quartz veins show comb structures. Originally, also, there appear to have been bands of sulphides (iron and possibly copper) between the quartz bands. In a vein 1 inch wide, six bands of quartz and five bands of red oxide of iron were noted; the latter about 25 per cent. of the whole. Occasional vugs lined with quartz crystals, and containing crystals of antimony minerals, stibnite (Sb_2S_3), kermesite ($2Sb_2S_3$, Sb_2O_3), cerantile (Sb_2O_4), valentinite (Sb_2 O3), and senarmontite (Sb^2O_3) still exists. Stibnite was noted both in plate-like crystals, and in minute acicular crystals. Kermesite in small tufts of acicular crystals, and more rarely, a yellow tinted oxide, probably cerantite, occur. In a few instances metallic particles were found in the quartz of the veins. In the rock adjacent to the veins more abundant metallics were noted, and on breaking the rock a large proportion of the metallics are seen to be distributed as thin plates along fracture planes—in some places producing a bright metallic lustre over a considerable area. Metallics in thicker particles also occur scattered through the rock. The ore in the rock seems to be most abundant near the veins. In many places, through the zone supposed to be mineral bearing, no visible particles of ore could be found. In some places impregnated rock was found adjacent to a fracture in which no quartz occurs.

"The strike of the structural planes of the schists lies between N. 40 deg. E. and 50 deg. E. magnetic, or, towards the ridge which lies north of the mine, and the front of which runs nearly east and west. The presence of a waste cover makes it impossible to study the area for any distance along the strike. The prospecting work has all been along the face of the hill, or nearly at right angles to the strike. Between the most easterly shaft and the most westerly one, the distance is nearly 300 yards. Prospecting pits are to be found for some distance west of the main shaft, and much costeaning has been done.

North of the shafts the hill referred to above forms a dome-like ridge about a quarter of a mile in length. It is composed of basic plutonic rock, now serpentine on the side next the schists, but consisting of a diabase on the north side. About 850 feet southeast of the east of this ridge is another similar but smaller dome. Nearly half a mile south of the shafts—on the opposite side of a valley—lies a large area of serpentine rocks, which gradually pass into diabase farther south. The two small dome-like ridges in the immediate vicinity of the mine carry included fragments of schists in the upper surface, and they were probably forced into the schists as lacolithic masses from below. This circumstance makes it extremely probable that the band of schists has no great depth.

"The mineralized area or zone lies close to the contact between the schists and the intruded serpentines. It is thus probable that other mineralized areas may occur in the same district along the line of contact. While the shape of the intruded masses makes it possible that the orebearing band may be of no great depth, there are no data at present obtainable from which it would be possible to determine what that depth is. On the other hand, it is also possible that the mineralized zone may follow the supposed curved surface of contact between the schists and serpentine and that a very considerable area beneath the schists may carry antimony minerals.

"In 1881 there were two shafts on the property, 60 feet and 100 feet in depth, respectively, and 250 feet of drifting. Assays of the ores as they occurred in these shafts and drifts are said to have shown from 5 to 7 per cent. of antimony. A small experimental plant was in operation in that year. The ore was crushed by stamps and then washed upon a broad travelling belt, the lighter particles being washed off, while the heavier were deposited at the end of the belt. This plan does not appear to have been very efficient and the losses in the tailings were high.

A number of small trial shipments were made from the property in 1881. The returns from these shipments show an antimony content of about 7 per cent. Experimental work on a Krom machine produced concentrates assaying from 30 per cent. to 49 per cent. antimony, in different experiments. In one case, what are called "extra concentrates" were obtained—assaying 53.9 per cent. antimony. Concentrates on a Hastings machine assayed 37.13 per cent. The ore was found to contain about 4 ounces of silver to the ton of 2,000 pounds. No gold has been reported.

"In 1886 the property was purchased by Dr. James Reed. Under his control an adit was driven into the side of a hill to cut the deeper shaft near the bottom. This adit is about 304 feet in length. A small amount of drifting was done in later years, but no information is now available as to the results obtained.

"The thin plate-like character of the particles of metallic antimony, as seen on the fracture planes of the rock near the surface, undoubtedly will make concentration difficult. While the concentration ex-

periments made on the ore from the drifts and shafts seem to have yielded a product that is commercially valuable, no data whatever are available as to the costs. Nothing can be learned about the quantity of rock handled in obtaining this ore, and the weight of the ore mined is not known. Further information is needed with respect to the underground conditions; the surface showings are not of commercial importance."

Bridge River District, British Columbia.

No information with respect to antimony occurrences in this locality is immediately available. I understand that a small amount of stibnite was shipped during the past summer.

Wheaton River District, Yukon.

This locality is situated about 30 miles from Robinson station on the White Pass and Yukon railway. The district was studied by Dr. D. D. Cairnes, of the Geological Survey, in the summer of 1909, and the results of his work were published in 1912. During the past field season (1915) Dr. Cairnes revisited the locality and a report of his more detailed study of this district will presumably appear in the Summary Report of the Geological Survey for 1915.

A good wagon road connects Robinson with the district in which these ores occur. Robinson is only 78 miles from Skagway by rail. It is therefore to be expected that if the ores of this district prove to be as valuable as is anticipated, they may be an important source of antimony in the future. At present there is no regular output, and only small trial shipments have been made.

In this locality a remarkable series of antimonial silver veins have been discovered, outcropping on both sides of the Wheaton river on Chieftain Hill and Carbon Hill.

According to Dr. Cairnes,—

"These antimony-silver ores occur distributed throughout a westerly-trending belt about 5 miles long by 1-5 miles wide, which includes all the southern portion of Carbon hill, and extends to the west across Wheaton river, and embraces the central portion of the eastern face of Chieftain hill. The greater number of the veins, however, have been discovered on the western face of Carbon hill, on an area about one mile in diameter. These ores occur in the Jurassic Coast Range granitic rocks, and in the Chieftain Hill andesites and volcanic breccias. The veins have, with one exception, a general westerly trend and are either perpendicular in attitude or dip to the north-east.

"Two of the veins are traceable for over 2,000 feet on the surface, but other outcrops are generally covered with superficial materials, so that 200 feet is the farthest that any of them have been followed, but a number probably extend much greater distances.

"The veins vary in thickness from 2 or 3 inches to 6 feet, but 1 to 3 feet is generally about the average of the more valuable. The fissures, in all the cases so far discovered, appear to be simple in form and without any foot or hanging-wall stringers or branching fissures.

"The ores consist chiefly of quartz, calcite, barite, stibnite, sphalerite, jamesonite, galena, and grey copper. Stibnite constitutes the greater part of the vein-fillings in parts of some of the veins and in such cases is generally associated with minor amounts of sphalerite and jamesonite. Wherever any gangue is present, it is generally chiefly quartz, barite and calcite occuring only in subordinate amounts. The veins that are richest in silver consist of a quartz gangue impregnated with more or less galena and grey copper, and very few antimony minerals. In fact, the ores high in silver are generally low in antimony, and vice versa. But there are places where both antimony and silver occur together in considerable amounts.

"Assays running over 500 ounces of silver to the ton have been obtained, but they are very exceptional. Samples of the better class of ores containing galena and grey copper often carry from 100 to 200 ounces. The better grades of the stibnite ores contain 50 per cent. to 65 per cent. of antimony. The ores rarely contain more than a few cents per ton in gold. It is not known what the ores will average over any considerable portion of their outcrops, nor what they will assay more than 10 feet below the surface.

"The zone of vein-oxidation is prevailingly shallow, and unaltered sulphides generally occur within a few inches or 4 or 5 feet of the surface. Only a slight amount of leaching appears to have taken place in these ores."

Further and more detailed descriptions of the various veins in this locality will be found in Dr. Cairnes' report.

WHITEHORSE DISTRICT, YUKON.

Newspapers published in Vancouver and Victoria, British Columbia, printed last month an account of an interview with Mr. J. P. Whitney concerning mining conditions, with especial reference to Whitehorse copper camp, which is situated in the southern part of Yukon Territory. Mr. Whitney said, in part:

There are in Whitehorse copper camp five properties that are making an excellent showing, and with copper at prices from 27 1-2 to 30 cents a pound they are paying enterprises. The Grafter mine is shipping from 600 to 1,000 tons of ore a month; the old Pueblo mine, now known as the Yukon, has an output of about 600 tons monthly; the Copper King has an average of 300 tons, the War Eagle 450 tons, and the Anaconda 100 tons a month. All these mines were being worked at full capacity last summer, and arrangements were made for starting another one, known as the Empress of India. In addition, there are others that will be developed in due course.

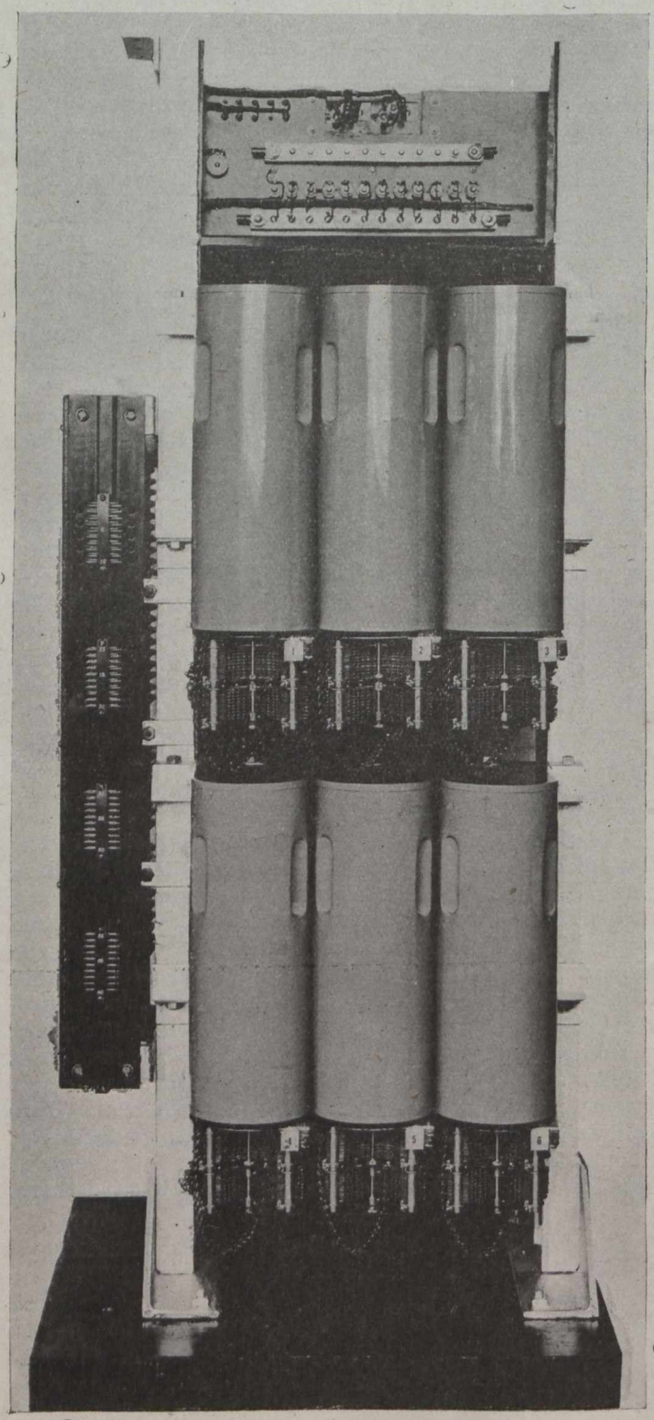
Referring generally to the mining industry in the Canadian West, the trouble is to procure capital in Canada. There is only a comparatively small amount of Canadian capital invested in the mines in British Columbia or Yukon Territory; most has come from the United States. In Canada, people seem to be afraid of any mining proposition, and the result is that promoters have to go south to obtain money necessary to do development work. The ore from the mines he is interested in is being shipped to the smelting works at Tacoma, Washington, instead of to the Granby Consolidated Co.'s smeltery at Anyox, B.C., as formerly, due to an insufficiency of power at the latter works, to allow of all custom ore offering being treated there.

The twenty-fourth general meeting of members of the Western Branch of the Canadian Mining Institute will be held in Vancouver, British Columbia, on March 15. The Copper Mining Industry of the Coast District and Mine-Safety matters will be two of the subjects to have the attention of the meeting.

AUTOMATIC TELEPHONY.

For the past fifteen years the demand for better telephone service has been insistent. No matter what progress was made in any year, the needs of users and of possible buyers has been far beyond the capabilities of any equipment that has been offered on the Canadian market.

This year The Automatic Telephone is being introduced in Eastern Canada and is already proving its merit. In the West, the cities of Calgary, Edmonton, Lethbridge, Medicine Hat, Prince Albert, Regina and Saskatoon have for years been fully equipped with Automatic Telephones, and every one who has used them there is enthusiastic over the service. They say it is incomparably better than anything in the East, in either public or private plants.



No matter what local conditions are, they can be met by The Automatic Telephone, and the service is faster and surer than with any other type. The Automatic Telephone does not make mistakes, call wrong numbers, give false busy signals or disconnect during conversation. The Automatic Telephone is a straight two wire, full metallic circuit, this doing away with all possibility of disturbance on the lines caused by induction from power or lighting circuits.

The small dial is really a private operator for each telephone in the plant—an operator not paid but made to give perfect service. The switchboard is wonderfully simple and complete, and is fully automatic in the true sense of the word. Over 1,000,000 of these telephones are in service to-day in practically every country in the world; good evidence of the quality of service and satisfaction they are giving. The cut shown on this page illustrates the switching equipment of a 25-line board. A system can be started with twenty-five lines or less and can be added to just like a sectional bookcase.

Signal Systems, Limited, are Canadian Sales Agents of The Automatic Electric Co.

CANADA'S NEW MOLYBDENITE MINE.

During 1916 there was developed in Quebec near the village of Quyon, Pontiac county, an excellent deposit of molybdenite. The property, known as the Wood mine, is now Canada's chief source of molybdenite. Concerning this property Mr. J. A. Dresser writes in the March bulletin of the Canadian Mining Institute:

"Hand sorting is done in the pit and on the surface but the total amount of waste rock is small, apparently little more than 10 per cent. After trial shipments had been made to the laboratory of the Wood Ore Testing Company at Denver, the ore was principally sent to the concentrating plant of the Mines Branch of the Department of Mines at Ottawa. In shipment the ore is hauled by teams from the mine to Quyon station on the Waltham branch of the Canadian Pacific Railway, a distance of 3 miles over an average country highway. The hauling is done by contract, generally by farmers from the neighborhood. The ore is shipped without crushing and may be in blocks up to any size that can be conveniently handled by two men.

"A concentrating mill capable of treating 60 tons of ore in 24 hours has recently been completed at the mine and second concentrator of 150 tons capacity is also being built in the city of Hull, 35 miles distant, by the owners of the mine. The essential equipment of each mill consists of crushers, rotary dryers and ball mills together with a Wood flotation plant designed and patented by Mr. Henry E. Wood of Denver, one of the owners. Commodious quarters for the men, well lighted and furnished are a noteworthy feature of equipment of the mine. Exclusive of the teamsters who work by contract about 130 men are at present employed in mining construction."

PORT ARTHUR COPPER COMPANY.

During the past year a number of shipments of copper ore have been made from Mine Centre, Ontario. The Tip Top mine is the chief producer. A neighboring property is being developed by Mr. F. M. Connell, of Toronto, and associates. A company, known as the Port Arthur Copper Co., has been formed to carry on the work begun on this property.

PERSONAL AND GENERAL

Mr. Samuel W. Cohen, general manager Crown Reserve Mining Co., Ltd., Porcupine-Crown Mines Limited, consulting engineer Dominion Reduction Co. Ltd., is now permanently located in the Dominion Express Building, Montreal.

Mussens Limited of Montreal have removed from 318 St. James St., and are now occupying their new offices on the second floor of the McGill Building, 211 McGill St., Montreal.

Lieut. J. C. Murray is at St. John's, Quebec.

Mr. Noble W. Pirrie, formerly of Vancouver, B.C., where for several years he had a wide business connection with mining men as an assayer, is now Director of Explosives for the Imperial Munitions Board at Ottawa.

Mr. Harold W. Aldrich, of the Anaconda Copper Mining Co's Washoe smelting works at Anaconda, Montana, about the middle of February visited the copper smelting works at Ladysmith, Vancouver Island, B.C., recently sold by the Tyee Copper Co., to United States capitalists.

On February 16 the "Daily News" of Nelson, B.C., published the news that Major Angus Ward Davis and Captain Allen Bruce Ritchie had been honored for bravery on the field in the European War. The Distinguished Service Order had been conferred on Major Davis, and the Military Cross had been awarded to Captain Ritchie. Both enlisted as privates and left British Columbia with the first contingent of Canadian Engineers, and were afterward given officers' commissions for distinguished work. Both were on the Consolidated Mining and Smelting Co's staff, Major Davis as a field mining engineer and Captain Ritchie as a mine superintendent. Another of the Consolidated Co's staff, Lieutenant Graham Cruickshank, who was in charge of the company's experimental concentration plant at Rossland, has also received the Military Cross for gallant service in the field and has been decorated by the King. Lieut.-Col. John E. Leckie, D.S.O., mining engineer, who went to the War from Vancouver, B.C., has been gazetted in London a Companion of St. Michael and St. George.

Mr. M. S. Davys, of Kaslo, B.C., managing director of the Silverton Mines, Ltd., operating the Hewitt and Lorna Doone mines and concentrating mill near Silverton, Slocan lake ,and latterly at the head of the enterprise having for its object the establishment at Kaslo, Kootenay lake, of a silver-lead ore concentrating and magnetic separating industry, the latter for the making of marketable zinc concentrate, left Nelson, B.C., for Pasadena, California to recuperate after a severe illness with pneumonia.

Mr. E. V. Buckley, manager for the Queen Mines, Inc., has returned to Sheep creek, in Nelson division of British Columbia, to arrange for an early resumption of gold mining and milling at the Queen mine after a suspension of work of nearly six months' duration.

Mr. Alex. Smith, of Kaslo, B.C., who for years had charge of the development of the Surprise silver-lead-zinc mine, situated above Cody, in Slocan district of British Columbia, left that province on February 15 for a visit to Toronto, Ontario.

Mr. Thos. J. Lloyd, for several years prior to the closing of the Van-Roi mine, near Silverton, Slocan, B. C., in charge of underground operations in that mine, is again directing development work there, the mine having been taken over by Mr. Clarence Cunningham and associates, who will energetically operate both mine and concentrating mill.

Mr. E. G. Houghton, of the Jewel gold mine, near Greenwood, Boundary district of British Columbia, is now in military training camp at St. Johns, Quebec.

Mr. Albert I. Goodell, for several years manager of the smelting works at Boundary Falls, B.C., and afterward superintendent of the Northport Smelting and Refining Co's reduction works at Northport, Washington, is now in charge of a small smeltery in Montana.

Mr. Thomas W. French, of Nelson, B. C., manager for the French Complex Ore Reduction Co., when in Victoria about the middle of last month stated that the company's electrolytic zinc reduction plant, at Nelson, was then nearly ready for operation, only awaiting the arrival from the East of a little more machinery to allow of a commencement being made to treat zinc ores.

Mr. C. L. Copp, formerly superintendent of the Coronation and Pioneer gold mines, in the Bridge River region of Lillooet district, British Columbia, last month was in the Canadian training depot at Shorncliffe, Kent, England.

Mr. Oscar Lachmund, of Greenwood, B. C., general manager for the British Columbia Copper Co., was in Spokane, Washington, last month, attending the Northwest Mining Convention.

Mr. A. L. McCallum is superintendent of the sulphuric acid plant designed by him and erected under his supervision at the Consolidated Mining and Smelting Co's big smelting and refining works at Trail, B. C.

Capt. John L. Retallack, formerly of Kalso, B. C., who in 1915 left Victoria for England on active service as quartermaster-sergeant of the 48th Battalion, has severed his connection with that regiment and now holds an important post in the 239th Railway Construction Battalion, which left Canada for Europe several months ago. For many years he was actively associated with mining in Slocan and Ainsworth divisions of British Columbia.

Mr. Walter Newton, assayer, of Sandon, B. C., fell down a mine shaft last month and received injuries that have incapacitated him for duty for a while.

MINING SOCIETY OF NOVA SCOTIA.

The Annual Meeting of the Mining Society of Nova Scotia will be held in Sydney, April 19th, 1917. The forenoon will be taken up by a visit through the works of the Dominion Steel Corporation. At two o'clock the same afternoon the meeting will convene for general business and the reading of papers. Owing to the war, the usual banquet will not be held.

The following officers have been elected by acclamation: President, Col. D. H. McDougall; vice-presidents, Col. Thomas Cantley and Alfred J. Tonge; Secretary-Treasurer, E. C. Hanrahan; Associate Secretary-Treasurer, E. B. Saunders.

MAGNESITE.

Active development and exploitation of the magnesite occurrences of Argenteuil county, Quebec, is being carried on. The shipments in 1916 reached 53,976 tons, valued at $525,966, as compared with 16,285 tons valued at $137,353 in 1915.

One of the mines, the Scottish Canadian Magnesite Co., is now connected by a railway spur of 12 miles with the C. P. R.

SPECIAL CORRESPONDENCE

BRITISH COLUMBIA.

Recent editorial comment in the Kaslo "Kootenaian" on the question of possible further taxation of the mining industry in British Columbia follows:

"The Provincial Government is faced with the necessity of raising more money for carrying on the affairs of state. . . . . Alarm is felt in some quarters that there may be some additional burdens placed on the mining industry. If the Government is wise it will leave the mining industry alone as far as increased taxation is concerned, for the present at least. Any promise of increase in taxation is bound to do the mining industry of the province great injury in view of the fact that capital is so hard to attract even under the most favorable conditions. With high metal prices the chance to get the necessary capital invested in our various mining enterprises now appears very good, but if capital once gets the idea into its head that it is going to be mulcted of a big share of the profits of what is known to be a very speculative enterprise, it is not going to speculate at all, at least so far as British Columbia is concerned. At a time like the present, every pound of copper, zinc, silver, and lead that is produced is making it just that much easier for the allies to win the war, and every encouragement should be given to the capital from outside financial centres to come in and go after the metals. The 2-p.c. mineral tax is bad enough, but it is well to leave it as it is or else fix it so that it more evenly falls on the mines or mining companies which have proved up and which are yielding their owners big profits, far in excess of the ordinary. On the other hand things should be made just as easy as possible for the investor who is just breaking into the game. The mining goose may be quite prosperous, but it would be wise not to kill it while it is laying the golden eggs."

In this connection, the Nelson "Daily News" observes editorially: "As the 'Kootenaian' points out, an increase of taxation of the industry by the Province, as part of the plan of the Brewster Government to raise more revenue, would inevitably have the result of frightening capital away. And capital for many years to come will be the greatest need of the mining industry. Adequate development is impossible without it. At this time mining in British Columbia is of more than Provincial or Domnion importance. It is an industry of Imperial importance. In fact, mining production in this Province cannot fall off without hurting the cause of the Allies, who need every pound of zinc, copper, and lead that they can get. The Hon. the Minister of Mines should let it be widely known at the earliest possible moment that he industry is not to be set back by additional taxation."

Shortage of water for power purposes, where concentrating-mill and compressor plants have to depend on a good water supply in order that motive power for their machinery may be obtained, has interfered with mining and milling operations in parts of Kotenay district. In the Slocan, particularly, has this difficulty been experienced during the first two months of the year. On the other hand, the snowfall has been heavy, generally speaking, so that when the cold weather shall have given place to a mild or warm temperature, there will be abundant water for all purposes.

The note of alarm sounded by Kootenay newspapers, referred to in previous correspondence, has been taken cognizance of in Spokane, Washington, in which city there are large numbers of men interested in mining companies operating in the Kootenay district of British Columbia. The matter was twice mentioned at sessions of mining men attending the Northwest Mining Convention. One mining operator telegraphed the Minister of Mines, Victoria, as follows: "Recent Kalso and Nelson newspapers suggested Government purposes increasing taxation on mines or ores. Mining men attending Northwest Mining Convention, now in session here, consider this prejudicial to investment in British Columbia properties. Respectfully request your authority by wire to place before convention your denial of suggested change." The reply received from the Minister of Mines read thus: "In answer to your wire, no changes in taxation on mines or ores have yet been considered. Any reports to the contrary are premature and unwarranted."

Professor Arthur Lakes, a veteran geologist and contributor to mining publications, long active in Colorado but of late years resident at Nelson, B.C., in the course of a short address made at one of the sessions of the Mining Congress in Spokane, said: "British Columbia is but in the infancy of its mineral development, despite vast strides at many large properties. In Colorado, where timber growth is not heavy by comparison, they say there is no use in sending out prospectors, the situation of about every great ore-deposit having been discovered. But the condition in British Columbia is different. The country there is so covered with timber that ore deposits are not to be seen readily. There is lots of room in British Columbia to find more ore-deposits than are now known of."

EAST KOOTENAY.

Several cars of ore have been shipped to Trail from the Burton mine, which is the only property in the neighborhood of Elko, on the C. P. R.'s Crowsnest railway, in Fort Steele mining division, that has shipped ore in bulk. In his summary report for 1913 Mr. S. J. Schofield, of the Geological Survey of Canada, gave the following information relative to this property: "The Burton group of claims is situated on the western slope of the Rocky Mountain system about four miles northwest of Elko. The country rocks in the neighborhood consist of the upper members of the 'Galton series' of Pre-Cambrian age and the lower palaeozoic formation, all of which strike N. 40 deg. W. with a dip of 45 deg. to the East. The vein, which is two to four feet wide ,occurs in a fissure in the Roosville siliceous metargillites. There has been a vertical displacement along the fissure of four feet. The vein, which strikes N. 50 deg. E., and dips 85 deg. to the North, consists of pyrite and chalcopyrite in a gangue of quartz. The value sought after is in copper and gold. A tunnel about 400 ft. long has been driven along the strike of the vein to the contact of the Roosville and Burton formations. The possibility of this vein extending farther into the hill will depend upon the ability of the Burton shales to carry a well-defined fissure." No official description of later date is available.

A press despatch states that on the night of February 27 fire destroyed the entire concentrating plant and mill building at the St. Eugene mine, Moyie, owned and operated by the Consolidated Mining and Smelting Co. The old mill and equipment was stated to have been of a value probably of $300,000; the plant was being remodeled for experimental work, and a

short time ago it was reported that ore was to be sent there from the company's Sullivan lead-zinc mine, also situated in Fort Steele mining division. The original mill building was of wood throughout; it was 250 ft. by 125 ft., and its height from the lowest floor to above the part where an aerial tramway delivered ore from the St. Eugene mine was about 100 ft. Solid masonry walls supported the several terraces on which the machinery stood on concrete foundations. The earlier equipment included Cornish rolls and a Huntington mill for ore-crushing, 14 Hartz jigs, 10 Wilfley tables and 20 Frue vanners, but additions of improved concentrating appliances were made in later years. Milling was commenced in April, 1900, and the first year's operations showed a daily capacity of 400 to 500 tons. Up to June 30, 1912, the total output of the mine had been 1,015,280 tons of ore and the concentrated product shipped, nearly all to Trail, had totalled 190,121 tons. Since then the mill had been inoperative, and the small output of the ore in quite recent years had been shipped as crude ore.

Ainsworth.—More ore was shipped to Trail from Ainsworth mining division during the week ended February 21 than in any other week of this year. The out put was as follows: Bell, 71 tons of zinc ore; Bluebell, 63 tons of lead concentrate; Highland, 177 tons of silver-lead ore, and Utica, 49 tons of silver-lead ore; total, 360 tons. This quantity does not represent the total output of the division, for the Florence Mining Co. is now operating its new concentrating mill, the product of which has not yet been shipped to the smelting works.

Slocan.—It is reported that the amount of ore found in the Van-Roi mine, in Silverton camp, since operations were commenced in it by Mr. Clarence Cunningham and associates, is very satisfactory and encouraging. Some 30 men are employed.

Snowslides have blocked the Kaslo and Slocan railway between Zincton and Three Forks, thereby cutting off the supply of ore from the Lucky Jim mine for the concentrator at Rosebery. The railway line has been cleared between Kaslo and Zincton, so ore has been shipped to the concentrating plant at Kaslo.

Nelson.—The Rio Tinto recently made its first shipment of copper ore to Trail from Beasley Siding, near to the British Columbia Copper Co.'s Queen Victoria mine.

The Eureka copper mine, at the head of Eagle creek, continues to ship ore, the total of receipts at Trail from this mine for 1917, to February 21, having been 503 tons.

Developments in the lower level of the Hardscrabble mine of the Granite-Poorman group, are stated to be increasingly satisfactory, the size of the ore-shoot and the gold content of the ore both being well up to expectations.

During December and January 37 carloads of zinc ore were shipped from the Hudson Bay mine, in the Salmo region of Nelson Mining division. This production was made by W. G. Harris & Co., lessees.

Receipts at Trail of lead ore from the Emerald mine since January 1st have exceeded 1,000 tons. Work at the Molly molybdenite mine, on Lost Creek, was discontinued last month. Both these mines are situated southeast of Salmo.

Rossland.—Shipment of ore to Trail is gradually getting back toward former proportions, the available supply of coke for the copper blast-furnaces at the smelting works being now larger than for several previous months. Last October the average of daily receipts at Trail from Rossland mines was 625 tons; in November it was 594 tons; for December it was very low, only 203 tons a day, shipment from the Le Roi and Centre Star mines having been suspended during two weeks, and the output for the remainder of the month much curtailed; for January the average was 404 tons, and for three weeks ended February 21, 444 tons. More than half the February production was from the Le Roi mine, with a total of 5,721 tons for the three expired weeks, while that of the Centre Star group was 2,854 tons and of the Josie group 739 tons.

The Le Roi 2, Ltd., London, has made public the Josie mine report for December, received late in January from its managers at Rossland, as follows: Ore shipped, 703 tons. Receipts from the smeltery were $43,758 in payment for 1,448 tons of ore; sundry receipts were $191; total receipts, $43,949. Expenditures during the same period were estimated at $6,650 for ore production and $9,500 for development (including diamond-drilling); total, $16,150.

Trail.—Ore receipts at the Consolidated Mining and Smelting Co.'s smelting works during three weeks ended February 21, totalled 30,471 tons, in the following proportions: From East Kootenay, 9,460 tons; Ainsworth, 670 tons; Slocan, 936 tons; Nelson, 674 tons; Rossland, 9,314 tons; Arrow Lake, 18 tons; Lardeau, 26 tons; Revelstoke, 40 tons; Boundary, 2,585 tons; Nicola, 38 tons; Kamloops, 392 tons; Vancouver Island, 25 tons; Omineca, 99 tons; Alberta, 40 tons; Ontario, 439 tons; State of Idaho, 1,259 tons, and State of Washington, 4,456 tons. The daily average of receipts for this period was 1,451 tons as compared with 1,180 tons for the month of January, 948 tons for December, and 1,358 tons for November.

Other Divisions.—Small quantities of ore continue to be shipped occasionally from the Millie Mac, in Arrow Lake division; the Beatrice, in Lardeau in Revelstoke division and the Lanark at Illecillewaet. In both Lardeau and Trout Lake division prospecting and development is being continued, but the lack of transportation facilities is an obstacle in the way of shipment of ore.

SIMILKAMEEN.

When in Spokane last month, Mr. Oscar Lachmund, general manager for the British Columbia Copper Co., said, as reported in a local newspaper: "We have proved the occurrence of at least 5,000,000 tons of ore in our Copper Mountain property ten miles south of Princeton, Similkameen, and expect to greatly increase the quantity developed in the next two months. Exploration of the ground by diamond drill, engaged in several years ago, has been followed by a comprehensive system of tunneling, lateral operations, and raises, by which the quantity just mentioned has been developed. The tunnel has a maximum depth of 225 ft. in an advance of 2,000 ft. This makes possible the ready removal of the ore above the tunnel level by 'glory-hole' methods, and the remainder by various stoping methods. The ore lies in parallel bodies adjoining the dikes that traverse the country in northerly and southerly directions. We figure on an output of 3,000 tons daily, and an increase as conditions shall warrant. The average content of the ore is 1.75 per cent. copper, although bunches of ore in some sections contain 4 to 5 per cent. The recoverable value in gold and silver is

about 20 cents to the ton. A 50-ton concentrating plant is being installed, chiefly for experimental purposes in dressing the ore."

YALE.

In Nicola mining division there is more activity in developing mineral claims than for a long time past. The chief shipper so far has been the Aberdeen, with a total of about 1,400 tons of copper ore in 1916 and 167 tons additional received at the smeltery at Trail up to the first week in February of this year.

Satisfactory results are reported from the Highland Valley Mining and Development Co's operations at its mine and mill in Ashcroft mining division. A good percentage of recovery of copper concentrate from the tables is supplemented by further saving of the metals by flotation concentration of the tailing.

Receipts at Trail from the Iron Mask mine in Kamloops mining division, between December 31 and February 21 have totalled 1,084 tons. An official report states that the mine is six miles south from Kamloops, and that it was operated continuously in 1916 with 50 to 60 men employed, and that approximately 8,000 tons of ore was shipped. The ore contains a good average value in copper; much of it is concentrated before shipment to the smelting works.

COAST.

Preparations are being made for working on a larger scale the Ikeda mine, on the south east coast of Moresby island, one of the Queen Charlotte group. Last year's output of ore was reported to have been about 1,060 tons containing 7 per cent. copper, which ore was smelted at The Granby Consolidated Co's smeltery at Anyox, Observatory inlet. W. G. Norrie, superintendent of the Silver Standard mine, near Hazelton, Omineca mining division, is stated to have mapped out the work to be done this year at the Ikeda, and is to visit the mine periodically to direct new development as progress shall be made.

Shipment of ore from the Dockrill & Jefferson mining property in Howson basin in Telkwa district, Omineca division, to the smeltery at Anyox has been commenced. The ore has to be hauled 37 miles over a sleigh-road to the Grand Trunk Pacific railway by which it is conveyed to Prince Rupert and is shipped thence to Granby bay by steamer. In an official publication it is stated that there is on this property a vein of high-grade copper ore, mainly chalcocite and bornite and it was expected that more than 300 tons would be hauled to the railway during the winter.

BOUNDARY.

Mr. D. C. Corbin and associates, of Spokane, Washington, who own mineral claims in Copper Camp, have let a contract for driving 100 ft. of adit on the Copper Queen claim. Years ago a lot of high-grade ore was shipped from the King Solomon, one of the group, but it was from a secondary enrichment deposit of ore that was of much better grade than the sulphide ore occurring at greater depth.

Shipments of ore from the Union mine, in Franklin Camp, 40 to 50 miles up the north fork of Kettle River from Grand Forks, are being made at the rate of about 40 tons a week to the Granby Consolidated Co.'s smeltery at Grand Forks. A published report gave the total quantity shipped in 1916 from this mine to the Granby Smelting Works as having been 261 tons; for 1915 the output was 517 tons. In the "Annual Report of the Minister of Mines, 1915," it is stated that: "A good idea of the average value of ore from the Union mine is conveyed in a report by the mine superintendent, in which it was shown that the average gold and silver contents of more than 200 tons of ore shipped to Grand Forks was 0.85 oz. gold and 45 oz. silver a ton. The cost of hauling 25 miles to the railway was $13.50 a ton, freight by rail to smeltery was $1.50, and charge for smelting, $6.75; total freight and treatment costs, $21.75 a ton, which is a rather heavy handicap on mining in Franklin Camp."

The following notes concerning mining in region of Beaverdell and Carmi, on the west fork of Kettle River, were printed in the official "Preliminary Review," issued early in February: "On Wallace mountain, near Beaverdell, several properties were worked under lease and bond, and ore shipments were made via the Kettle Valley Railway to the Trail Smeltery. The Bell was leased to Robert Perry, who shipped two cars of ore which is said to have returned very high value. The Sally was also worked under lease and some ore shipped. The Rob Roy, one of the claims in the Sally group, was bonded during the year and work is now being done on it. The Carmi mine and stamp-mill at Carmi remained idle during the year, but another property near the Carmi was worked under lease and bond."

COBALT AND PORCUPINE.

Nipissing.

The month of January was a good month for the Nipissing Mining Company of Cobalt. The production was considerably less than normal, owing to the fact that the annual clean-up, certain repairs and changes necessitated the shutting down of the mills for a short period. Underground work, however, proceeded without any interruption, and proved very satisfactory. Development at shaft 73, on vein No. 490 consisted of sinking two winzes below the fifth level. The south winze reached a depth of 41 ft. where it encountered the Keewatin, stoping was then commenced. The ore continued to the Keewatin but was low in grade after about 21 feet. The north winze is being sunk on a vein averaging six inches in width of from 1,000 to 2,000 ounce ore. Crosscutting from the fifth level has been done with the object of determining the existence of parallel veins. So far none have been encountered. The company mined ore of an estimated value of $173,988, and made shipments of Nipissing and Customs ore of an estimated value of $301,692.

Anchorite.

The Anchorite property in Deloro Township, about one mile southwest of the Dome Mines is showing up well under development which is being conducted by the Coniagas Mining Company of Cobalt. At the 100-ft. level two parallel veins have been encountered about twenty feet apart. These veins are said to carry from $11 to $15 per ton in gold and the rock intervening is said to be highly mineralized. Assays are being made of this, and if it is found that ore of commercial value is made by mixing the vein matter and intervening rock, development similar to that in progress in the "Glory Hole" at the Dome will be undertaken. It is understood that a trial run of one hundred tons of the ore will be sent to either the Dome Lake or the McIntyre mill for treatment.

The Hudson Bay Mining Company.

The Hudson Bay Mining Company, of Cobalt, are at present raising on two veins from the 65-foot level. These veins are from two to three inches wide and contain very high grade ore, which is characteristic of the Hudson Bay. The two veins merge into one where the crosscut encountered them; but as raising proceeded, it was found that they were two separate veins. One is believed to be the vein discovered on the surface of the property last year, shortly after the company resumed work.

Beaver Consolidated.

Developments at the Beaver Consolidated since the discovery of the high grade vein at the 1,600-ft. level have included cutting a station with considerable speed. The high grade values were well maintained in the vein so far as opened which averages about six inches of 1,500 to 2,000 ounce ore with high grade milling ore across a width of from two to eleven feet. The ore so far developed adds considerably to the reserves of the mine. The Temiskaming property on which the shaft is being sunk to the 1,800 ft. level adjoins the Beaver. It will be necessary to sink to a deeper level than 1,600 ft. on the Temiskaming as the formation through which the Beaver went before they got the enrichment is somewhat deeper on the Temiskaming, owing to the rolling nature of the diabase in this section of the camp. When the 1,800 ft. level is reached on the Temiskaming, it is planned to do considerable exploration work.

Power for Kirkland Lake Mines.

With the completion of the Northern Ontario Light and Power company's electric transmission line to the Kirkland Lake camp and the turning on of the power two weeks ago a new era was opened up for the mines of this section of Northern Ontario. A number of properties in the camp are already availing themselves of the new supply of energy and have connected up their plants with the electric line. From this time on the progress of development will be much more rapid than in the past.

White Reserve.

The White Reserve mine in the Maple section of the Elk Lake district is now working with a force of eighteen men. The old plant has been overhauled and put in first-class shape. The shaft has been sunk to the 130-ft. depth; but the company ran out of funds before any drifting could be done to determine the value of the vein system located on the surface. The present management of the property will crosscut to these veins at the present depth, and on the results of this work will depend the future plans of the company.

National Mines.

Due to trouble with the sand pumping apparatus recently installed at the National Mines, Cobalt, for the purpose of pumping the tailings from the lake to the mill the seventy-five ton oil flotation plant is not working. In the meantime a number of changes are being made in the classifiers and it is expected the new plant will be in operation about the end of next week. A Morris pump with a capacity of ten tons of dry sand per hour is on order and will be installed at an early date. Underground developments at the 1,000 ft. level of the property are being pushed vigorously, and at the present time the crosscut is close to the Silver Cliff property.

Hollinger.

The four-weekly report of the Hollinger Gold mines ending February 28th, shows a falling off in production from that of the preceding period of $7,957. The gross profits for the period were $217,100, which was some $30,000 less than dividend requirements.

The mill treated 48,119 tons of an average value of $8.71 per ton. These figures compare with 49,616 tons of an average value of $8.49 per ton for the preceding period. The mill ran 85.5 per cent. of the possible running time. The operating costs for the four weeks were slightly higher than for the preceding term, being $3.88, which exceeded last month's costs by 11 cents per ton. $71,279 was spent on the plant.

Inability to obtain sufficient balls for the ball mills, shortage of labor, delay in delivery of parts and extensive alterations and additions in progress are given as reasons for the curtailment of production.

Mining Corporation.

The Mining Corporation of Canada sent out what is estimated to be the richest carload of ore that ever left the Cobalt camp. The car contained between twenty-two and twenty-three tons, carrying approximately seven thousand ounces per ton of silver and was valued at $175,000. The Temiskaming mining company sent out a car load of silver ore about a year ago which contained more silver, but as the price was considerably lower than that prevailing recently the value of the car was much less.

Boston Creek.

A large building program is being carried out at the Boston Creek mine, the premier property of the Boston Creek camp. Lumber and other building materials in large quantities are arriving and it is the intention of the company to erect a large shaft-house, camp buildings and offices. The quarters for the men will be erected in such a manner as to accommodate about two hundred men.

A winze is being put down from the 200-ft. level and is now down about ninety feet, and is understood to be in good ore.

Gowganda.

The Gowganda Power Company have a large gang of men at work on the erection of their power plant at Hanging Stone Falls. A dam is being built for the purpose of developing from 400 to 500 h.p. which will be used to build the 6,500 ft. tunnel from the east branch of the Montreal River to Hanging Stone Creek. This tunnel will divert enough water from the Montreal River to generate 1,500 h.p. for the use of mining companies operating in the Gowganda district. It is also understood that the power company have purchased the Bartlett properties in the immediate vicinity of their plant and will develop same. This property is considered one of the most promising in the Gowganda district.

Staking Claims in Thackeray.

About forty or fifty claims have been staked in the Township of Thackeray, which lies about twelve miles north-east of Bourkes Siding. Some free gold has already been discovered. The rock formation in this district is Keewatin. There are a large number of quartz veins in evidence, and it would not be surprising if some good discoveries were made. The township of Thackeray is about twelve miles north of Teck and Level, and about ten miles south of Lake Abitibi.

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Northern Canada Supply Co.
Hendrick Mfg. Co.

Pig Tin—
Canada Metal Co., Ltd

Pig Lead—
Canada Metal Co., Ltd.

Pipes—
Can. Fairbanks-Morse Co.
Canada Metal Co., Ltd.
Consolidated M. & S. Co.
Pacific Coast Pipe Co., Ltd.
Northern Canada Supply Co.
Smart-Turner Machine Co.

Pipe Fittings—
Can. Fairbanks-Morse Co.
Northern Canada Supply Co.

Piston Rock Drills—
Mussens, Limited.

Pneumatic Tools—
Can. Ingersoll-Rand Co., Ltd
Jones & Glassco.

Prospecting Mills and Machinery—
Standard Diamond Drill Co.
Fraser & Chalmers of Canada, Limited

Canadian Miners' Buying Directory.—(Continued from page 14.)

Pulleys, Shafting and Hangings—
Can. Fairbanks-Morse Co.
Fraser & Chalmers of Canada, Limited
Jeffrey Mfg. Co.
Northern Canada Supply Co.

Pumps—Boiler Feed—
Can. Fairbanks-Morse Co.
Darling Bros., Ltd.
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co. Ltd.
Fraser & Chalmers of Canada, Limited
Wettlaufer Bros.

Pumps—Centrifugal—
Can. Fairbanks-Morse Co.
Darling Bros., Ltd.
Escher Wyss & Co.
Mussens, Limited.
Smart-Turner Machine Co.
M. Beatty & Sons.
Can. Ingersoll-Rand Co., Ltd
Fraser & Chalmers of Canada, Limited

Pumps—Electric—
Can. Fairbanks-Morse Co.
Darling Bros., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited

Pumps—Pneumatic—
Can. Fairbanks-Morse Co.
Darling Bros., Ltd.
Smart-Turner Machine Co.
Can. Ingersoll-Rand Co., Ltd
Sullivan Machinery Co.

Pumps—Steam—
Can. Fairbanks-Morse Co.
Can. Ingersoll-Rand Co., Ltd
Darling Bros., Ltd.
Mussens, Limited.
Northern Canada Supply Co.
Smart-Turner Machine Co.

Pumps—Turbine—
Can. Fairbanks-Morse Co.
Darling Bros., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited

Pumps—Vacuum—
Can. Fairbanks-Morse Co.
Darling Bros., Ltd.
Smart-Turner Machine Co.

Quarrying Machinery—
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.

Rails—
W. Fraser.

Roasting Plants—
Fraser & Chalmers of Canada, Limited

Rolls—Crushing—
Fraser & Chalmers of Canada, Limited

Roofing—
Can. Fairbanks-Morse Co.
Northern Canada Supply Co.

Rope—Manilla and Jute—
Jones & Glassco.
Northern Canada Supply Co.
Allan, Whyte & Co.

Rope—Wire—
B. Greening Wire Co., Ltd.
Allan, Whyte & Co.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Limited

Samplers—
C. L. Constant Co.
Ledoux & Co.
Milton Hersey Co.
Thos. Heys & Son.

Scales—
Can. Fairbanks-Morse Co.

Screens—
B. Greening Wire Co., Ltd.
Jeffrey Mfg. Co.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Limited
Roberts & Schaefer Co.

Screens—Cross Patent Flanged Lip—
Hendrick Mfg Co.

Separators—
Can. Fairbanks-Morse Co.
Darling Bros., Ltd.
Smart-Turner Machine Co.

Sheet Lead—
Canada Metal Co., Ltd.

Sheets—Genuine Manganese Bronze—
Hendrick Mfg. Co.

Shovels—Steam—
M. Beatty & Sons.
W. Fraser.

Smelting Machinery—
Fraser & Chalmers of Canada, Limited

Stacks—Smoke Stacks—
Can. Fairbanks-Morse Co.
Hendrick Mfg. Co.

Stamp Mills—
Fraser & Chalmers of Canada, Limited

Steel Barrels—
Smart-Turner Machine Co.

Steel Drills—
Sullivan Machinery Co.
Northern Canada Supply Co.
Can. Ingersoll-Rand Co., Ltd

Steel Drums—
Smart-Turner Machine Co.

Steel—Tool—
N. S. Steel & Coal Co.
Armstrong, Whitworth of Can., Ltd.

Surveying Instruments—
W. F. Stanley.
C. L. Berger.

Tanks—Cyanide, Etc.—
Fraser & Chalmers of Canada, Limited
Hendrick Mfg. Co.
Pacific Coast Pipe Co., Ltd.

Tipples—
Roberts & Schaefer Co.

Transits—
C. L. Berger & Sons.

Tube Mills—
Fraser & Chalmers of Canada, Limited

Turbines—
Escher Wyss & Co.
Fraser & Chalmers of Canada, Limited

Valves—
Can. Fairbanks-Morse Co.

Winding Engines—
Canadian Ingersoll-Rand Co., Ltd.

Wire Cloth—
Northern Canada Supply Co.
B. Greening Wire Co., Ltd.

Wire (Bare and Insulated)—
Standard Underground Cable Co., of Canada, Ltd.

Zinc Spelter—
Canada Metal Co., Ltd.

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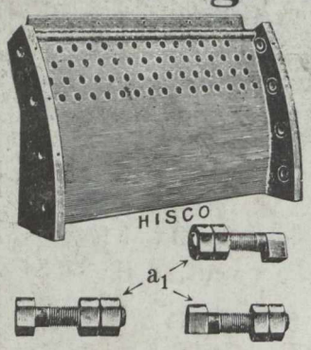

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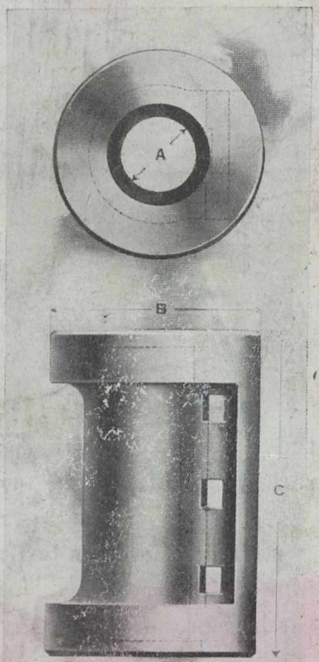

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