

⌘ CANADIAN ⌘ MINING JOURNAL

Vol. XL

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No. 49.

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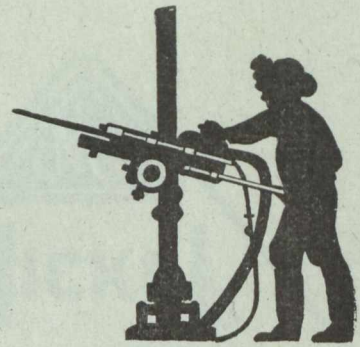
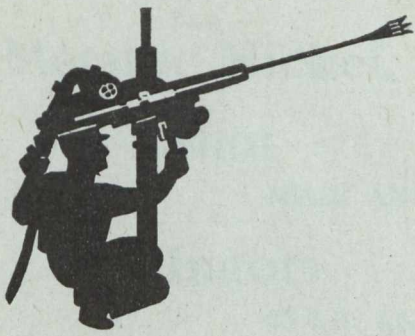
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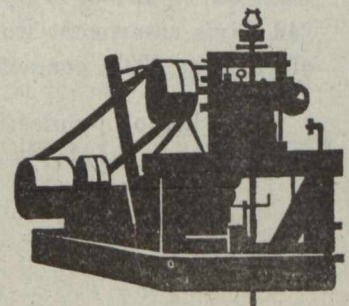
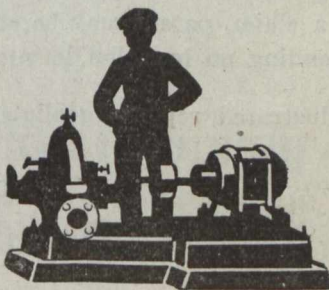
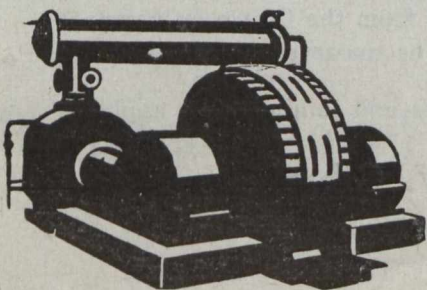


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PROVINCE OF ONTARIO



BUREAU OF MINES

G. H. FERGUSON, Minister.

Ontario's Mining Lands

Ontario, with its 407,262 square miles, contains many millions of acres in which the geological formations are favorable for the occurrence of minerals, 70 per cent of the area being underlain by rocks of pre-Cambrian age. The phenomenally rich silver mines of Cobalt occur in these rocks; so also do the far-famed nickel-copper deposits of Sudbury, the gold of Poreupine and Kirkland Lake, and the iron ore of Magpie and Moose Mountain Mines.

Practically all economic minerals (with the exception of coal and tin) are found in Ontario:—actinolite, apatite, arsenic, asbestos, cobalt, corundum, feldspar, fluorspar, graphite, gypsum, iron pyrites, mica, molybdenite, natural gas, palladium, petroleum, platinum, quartz, salt and tale. This Province has the largest deposits on the continent of tale, feldspar, mica and graphite.

Building materials, such as ornamental marble, limestone sandstone, granite, trap, sand and gravel, meet every demand. Lime, Portland cement, brick and tile are manufactured within the Province.

Ontario in 1918 produced 45 per cent. of the total mineral output of Canada. Returns made to the Ontario Bureau of Mines show the output of the mines and metallurgical works of the Province for the year 1918 to be worth \$80,308,972 of which the metallic production was \$66,178,059.

Dividends and bonuses paid to the end of 1918 amounted to \$13,359,210 for gold mining companies, and \$74,810,521 for silver mining companies, or a total of \$88,169,733.

The prospector can go almost anywhere in the mineral regions in his canoe; the climate is invigorating and healthy, and there is plenty of wood and good water. Hydro-electric power is available in many parts of the Province, and many undeveloped water-powers remain to be harnessed. A miner's license costs \$5.00 per annum, and entitles the holder to stake out in any or every mining division three claims of 40 acres each. After performing 240 day's assessment work on a claim, patent may be obtained from the Crown on payment of \$2.50 or \$3.00 per acre, depending on location in surveyed or unsurveyed territory.

For list of publications, illustrated reports, geological maps and mining laws, apply to

Thos. W. Gibson,

Deputy Minister of Mines,

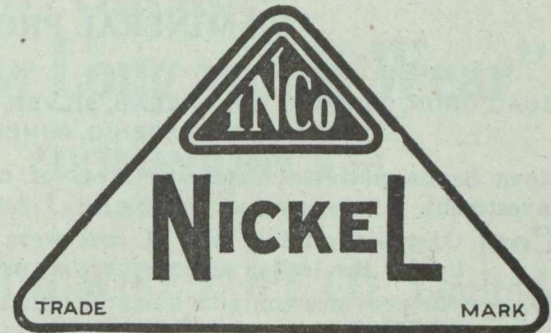
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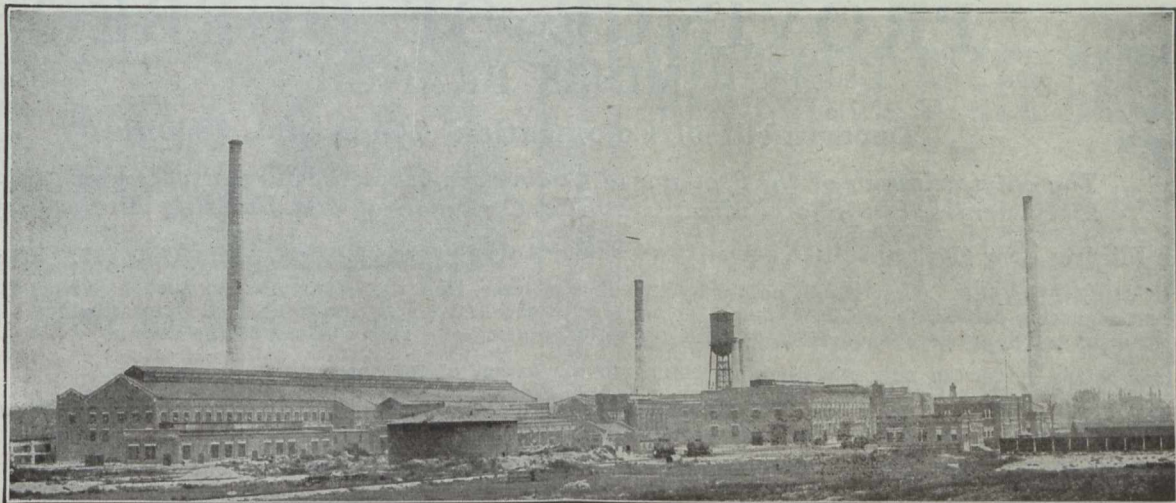
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Nova Scotia possesses extensive areas of mineral lands and offers a great field for those desirous of investment.

Coal Over six million tons of coal were produced in the province during 1916, making Nova Scotia by far the leader among the coal producing provinces of the Dominion.

Iron The province contains numerous districts in which occur various varieties of iron ore, practically at tide water and in touch with vast bodies of fluxes. Deposits of particularly high grade manganese ore occur at a number of different locations.

Gold Marked development has taken place in this industry the past several years. The gold fields of the province cover an area approximately 3,500 square miles. The gold is free milling and is from 870 to 970 fine.

Gypsum Enormous beds of gypsum of a very pure quality and frequently 100 feet thickness, are situated at the water's edge.

High grade cement making materials have been discovered in favorable situations for shipping.

Government core-drills can be had from the department for boring operations.

The available streams of Nova Scotia can supply at least 500,000 h.p. for industrial purposes.

Prospecting and Mining Rights are granted direct from the Crown on very favorable terms.

Copies of the Mining Law, Mines Reports, Maps and other Literature may be had free on application to

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Commissioner of Public Works and Mines



PROVINCE OF QUEBEC MINES BRANCH

Department of Colonization, Mines and Fisheries

The chief minerals of the Province of Quebec are Asbestos, Chromite, Copper, Iron, Gold, Molybdenite, Phosphate, Mica, Graphite, Ornamental and Building Stone, Clays, etc.

The Mining Law gives absolute security of Title and is very favourable to the Prospector.

MINERS' CERTIFICATES. First of all, obtain a miner's certificate, from the Department in Quebec or from the nearest agent. The price of this certificate is \$10.00, and it is valid until the first of January following. This certificate gives the right to prospect on public lands and on private lands, on which the mineral rights belong to the Crown.

The holder of the certificate may stake mining claims to the extent of 200 acres.

WORKING CONDITIONS. During the first six months following the staking of the claim, work on it must be performed to the extent of at least twenty-five days of eight hours.

SIX MONTHS AFTER STAKING. At the expiration of six months from the date of the staking, the prospector, to retain his rights, must take out a mining license.

MINING LICENSE. The mining license may cover 40 to 200 acres in unsurveyed territory. The price of this license is Fifty Cents an acre per year, and a fee of \$10.00 on issue. It is valid for one year and is renewable on the same terms, on producing an affidavit that during the year work has been performed to the extent of at least twenty-five days labour on each forty acres.

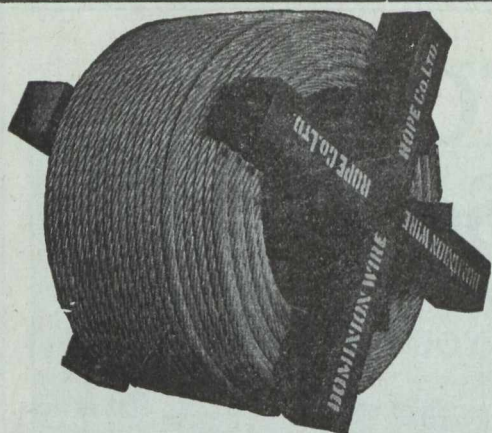
MINING CONCESSION. Notwithstanding the above, a mining concession may be acquired at any time at the rate of \$5 an acre for SUPERIOR METALS, and \$3 an acre for INFERIOR MINERALS

The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec, north of the height of land, where important mineralized belts are known to exist.

PROVINCIAL LABORATORY. Special arrangements have been made with POLYTECHNIC SCHOOL of LAVAL UNIVERSITY, 228 ST. DENIS STREET, MONTREAL, for the determination, assays and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. The well equipped laboratories of this institution and its trained chemists ensure results of undoubted integrity and reliability.

The Bureau of Mines at Quebec will give all the information desired in connection with the mines and mineral resources of the Province, on application addressed to

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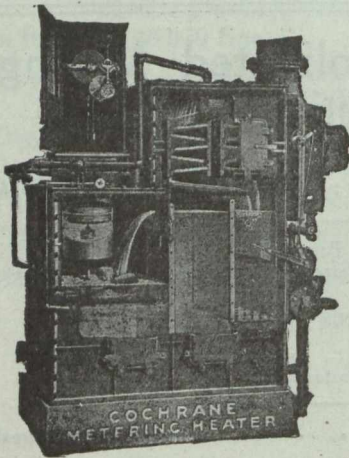
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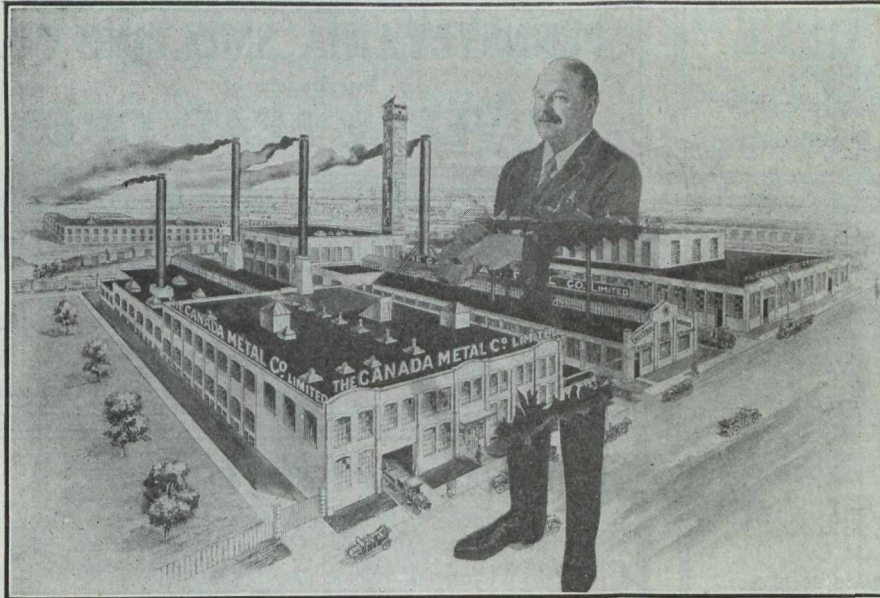
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Aggregate Value of \$637,353,581

The substantial progress of the Mining Industry of this Province is strikingly exhibited in the following figures, which show the value of production for successive five-year periods: For all years to 1895, inclusive, \$94,547,241; for five years, 1896-1900, \$57,605,967; for five years, 1901-1905, \$96,509,968; for five years, 1906-1910, \$125,534,474; for five years, 1911-1915, \$142,072,603; for the year 1916, \$42,290,462; for the year 1917, \$37,010,392; for the year 1918, \$41,782,474.

Production During last ten years, \$313,976,022

Lode-mining has only been in progress for about twenty years, and not 20 per cent. of the Province has been even prospected; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than those of any other Province in the Dominion, or any Colony in the British Empire.

Mineral locations are granted to discoverers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full information, together with Mining Reports and Maps, may be obtained gratis by addressing

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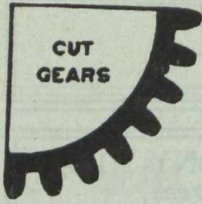
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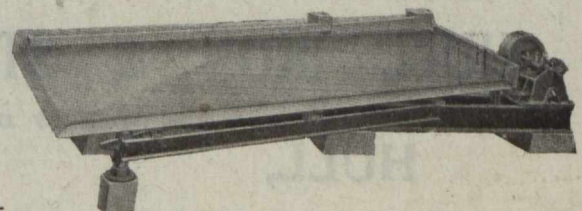
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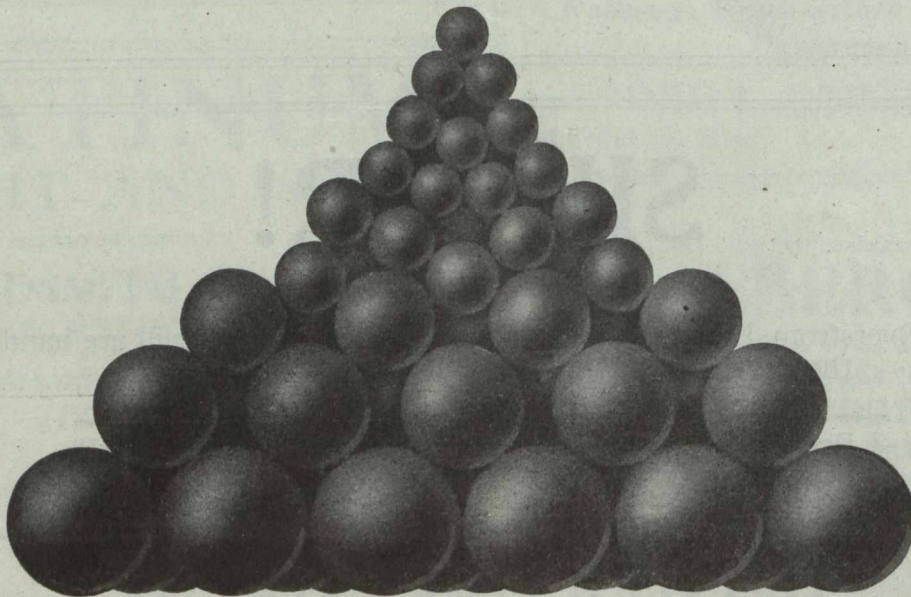


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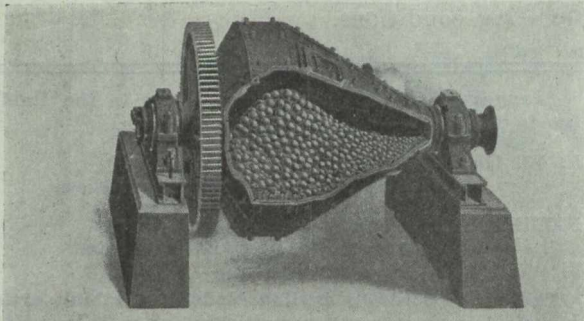
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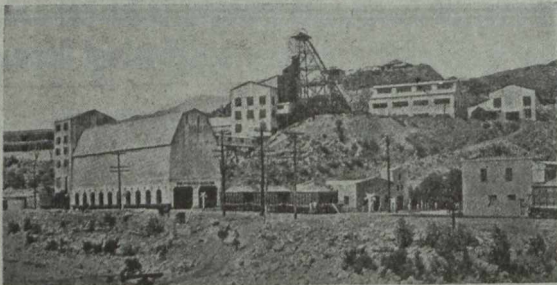
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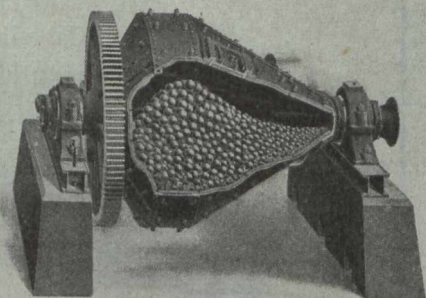
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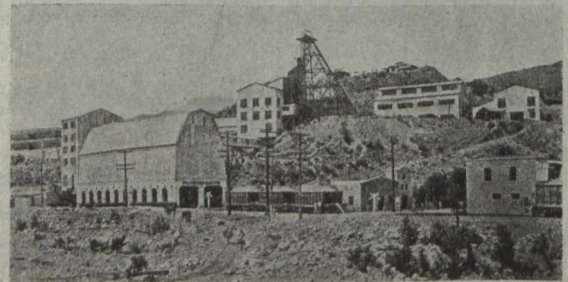


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EDITORIAL

AN UNJUSTIFIED ASSUMPTION.

One of the Toronto dailies has made a surprising discovery, to wit, that the article by Mr. Burns which recently appeared in the "Journal" advocating the electrification of the Canadian National Railway in the Maritime Provinces was inspired by the "coal barons" of Nova Scotia, and makes this statement: "The mine-owners have inspired a campaign for the electrification of the National Railways between Sydney, Halifax, and Montreal, with the Halifax-Moncton mileage for first choice." Torontonians perspicuity could scarcely go further. In detecting in Mr. Burns the spokesman of the "coal barons" of Nova Scotia, and in an editorial discussion of the merits of railway electrification a covert proposal to "nationalize Joggins," this Toronto paper achieves the feat of seeing something that is not there, and, moreover, betrays much ignorance of many things.

This same newspaper indulges in much laudation of Mr. Hanna, the President of the C. N. Railways, because of the manner in which he treated the coal operators of Nova Scotia, intimating that they were asking profiteering prices for their coal. As a proof of the proficiency of the C. N. R. Board in handling coal operators as they should be handled, it is said Mr. Hanna, sent down expert accountants to Nova Scotia to inspect the books of the coal companies, a procedure which this Toronto paper elegantly explains "got the goat" of the coal operators. It is not stated, however, that these same accountants found the statements of the coal operators to be accurate and in no way overstated.

It appears also to be believed in Toronto, if the newspaper referred to correctly expresses itself, that the high price of coal in Nova Scotia is an act of the coal companies, who are unduly profiting thereby. This assumption is as incorrect and as fantastical as the suggested aim of "nationalizing Joggins."

The causes of the high cost of coal in Nova Scotia are well known. They include a one hundred per cent increase in wages to the mineworkers, a forty per cent decrease in production, and increases in the costs of mine supplies such as pit-timber, brattice cloth, rails, metals, explosives, oils, horse-feed, wire-ropes, electrical supplies, and taxation which are a matter of common knowledge and widespread application.

The rivalry between Toronto and Montreal has many entertaining facets, but it is not good for Canada that the President of its national railways, or a thoughtful article such as that of our contributor, written, as we

know, without ulterior motive, and the well being of a national industry, should be dragged into a purposeless discussion which has its real origin in the railway strategy of rival cities.

It may also be pointed out that the gravamen of our argument was that the Maritime Provinces were undeveloped because of the inadequate transportation facilities on land; that "the coal mined in Nova Scotia has for generations gone to provide the driving power for the industries of New England, Quebec and Ontario, and has, in large part, been followed by the youth and energy of the Province." The remedy proposed was the generation of moderately-priced electrical energy at the coal-pit mouth, and the associated development of transportation lines and local manufacturing industries based on relatively cheap power costs.

These reasons are admitted to be good, but, states this Toronto paper, "we are a little suspicious of advice that comes from the 'barons' quarter." No one, we imagine, will be more amused at this sapient conjecture than the aforesaid "barons."

The irresponsible nature of the Toronto comment referred to is clearly shown by a later editorial in the same newspaper, which states: "The steam locomotive is a wasteful machine. In hauling a train of coal across the continent it consumes one-third of the cargo in making a round trip. We must as far as possible electrify our national railway system." Precisely so.

THE C.M.I. INSTITUTE MEETING AT VANCOUVER.

The Vancouver Meeting was well attended. The papers read were excellent, inasmuch as they told of new mineral discoveries, new and immensely improved coal mining plants and colliery housing, new processes in metallurgy, new movements amongst technical men, and potential industries in what is yet but a new country. Reasoned optimism characterized all the papers and enlivened the discussions.

Are not these things all outward signs of the inherent strength of the western branches of the Canadian Mining Institute, and the vigor of the industry the western members direct?

The "Journal" especially desires to congratulate the Vancouver newspapers on the accurate and understanding publicity given to the proceedings of the meeting, which is in favorable contrast to the scant space devoted to the proceedings of the Institute on the occasion of its annual meetings in the cities of the East.

The Canadian Mining Institute in Annual Meeting at Vancouver, B.C.

26th to 29th November 1919.

Three hundred members of the Canadian Mining Institute assembled at the Vancouver Hotel on the 26th November to take part in an unusual event, a meeting of Institute members in annual general gathering in British Columbia. The meeting was as unqualifiedly successful as it was unusual, and promised that future Western Annual General Meetings of the Institute will be equally as successful as they will become usual.

The members in attendance were naturally chiefly from British Columbia points—which does not necessarily imply that they did not travel far to attend the meeting—but there was a fair representation from the Alberta branches, and several from Quebec. More would have been present from Alberta, but for the more or less permanent condition of labour trouble in that province. The State of Washington was well represented, following a pleasant custom of western mining gatherings.

The City of Vancouver had previous to the meeting sent out to all members of the Institute an invitation to come to Vancouver, and the formal opening of the business of the meeting was preceded by an address of welcome from Mr. R. H. Gale, the Mayor of Vancouver, who felicitously and correctly welcomed the Institute to a city which was "the industrial capital of one of the richest mining districts in the world."

The chair was taken by Mr. S. S. Fowler of Nelson, in the unavoidable absence of the President of the Institute, who had intended to be present, but was unable to sail from England until the 25th.

Much interest was added to the proceedings by the presence of members of the faculty of the Universities of Washington and British Columbia and by past and present members of the Canadian Geological Survey.

MORNING SESSION, WEDNESDAY, 26 NOV.

The first subject discussed at the morning session of Wednesday was how best to extend the fields of the Institute's usefulness in the West.

Mr. Fowler, the Chairman, deplored the fact that the mining industry of British Columbia was not represented in the manner in which it had been hoped for. He stated that he and two others formed the entire representation of British Columbia mining men from the interior. He appealed for greater interest to be displayed by mining men in their own organization and a more active part to be taken in the conduct of its affairs and the contributions to the proceedings at the branch and general meetings.

Professor Hodges, who is acting secretary of the meeting, said that Canada was entering upon a new era as regards the relationships between the government and the mining industry, between the employer and the employe and between the professional and business interests that direct mining matters. The day had passed he said, when the institute could confine its interests to the technical side of mining. If it is going to continue to be a worth-while organization, it must take a more active part in all public matters as far as they relate to mining. To do this the institute must be representative; it must include employers and employed,

the professional man, the miner and the prospector, and all connected in any way with the industry. The institute should enter politics, not as a political party, but as a party representing the mining industry.

It should give its endorsement or express its disapproval of every legislative proposal that affects mining. It must tell the government what the industry wants or does not want, and must be strong enough to speak on behalf of the whole industry. He pointed to conditions in the past when a few of the big mining companies presented their points of view at Ottawa with the result that no consistent representation of the industry as a whole was given. The viewpoint of the industry as a whole should be given by the institute, he contended, and he expressed the opinion that it would be very regrettable if the present meeting adjourned without taking some steps to make this possible.

Considerable discussion ensued, among those taking part being Dean R. W. Brock of the University of B.C., Messrs. Drummond, Lamb, and several others, but resolutions dealing with the matter were deferred for submission to the resolutions committee for consideration at a later session.

Free Importation of Machinery.

The resolution to be submitted to the meeting regarding the free importation of mining machinery was framed by a special committee appointed some time ago by the Institute to consider the matter. Mr. Louis Simpson of Ottawa prepared a paper on the subject, giving the reasons for the resolution which had been prepared, which calls for the importation into Canada of all machinery used in a basic industry, imported by the user, free from duty or war tax unless such machinery be placed on a list to be compiled by the Minister of Finance after hearing evidence on the matter and given free opportunity for representations from interested parties, this list not to include any machinery not made in Canada of the capacity stated, or equal quality to that hitherto imported and being offered for sale in this country at reasonable cost.

The resolution was presented by Mr. E. E. Campbell of Anyox, a member of the special committee, who stated that Mr. Simpson has informed him that the resolution would be endorsed by the tariff committee of the Manufacturers' Association of Canada. The resolution will come up for discussion at a later session of the meeting after passing through the hands of the resolution committee.

Returned Soldier Inspectors.

Mr. S. S. Fowler in introducing the subject of the employment of returned soldiers by the government in prospecting certain areas of the Dominion, said that the proposal was one of the greatest importance for the future of the mining industry in Canada and would be of peculiar value as regards certain areas such as the northeastern portion of this province. He pointed out that the race of prospectors was disappearing owing to the decreasing speculation in mining claims, which made the prospector's reward so precarious that he was not content to engage in an arduous occupation in the hope of little return beyond the grub stake, and

that there were fewer who would now speculate to the extent necessary to outfit prospectors.

He described the action that had already been taken. A plan whereby bodies of prospectors, all returned soldiers, would be sent out under the guidance of experienced geologists, the men to be paid by the government and to be given in addition a share of the proceeds from any finds which they may make in the areas to be approved by the department of mines, had been proposed to the government. On the grounds that it savored of class legislation the government had turned down the proposal, although it had been supported by a number of other influential bodies and had been endorsed by the Institute of Civil Engineers and the G. W. V. A., besides a number of boards of trade. It was intended now to re-introduce the proposal by way of approaching individual members of parliament in order to secure its appearance in concrete shape at the next session of parliament.

Professor Wallace introduced a resolution expressing the renewed endorsement of the plan by the Canadian Mining Institute and the opinion that immediate steps should be taken in order that the plan may be put in force early next year. The speaker pointed out that in view of the government's contention that this was class legislation the question of the land settlement scheme immediately arose. Mining was the next greatest industry in the Dominion to agriculture.

Mr. Fleet Robertson of Victoria said that he had been in communication with Gen. Leckie, who was very anxious to see the scheme again put forward, both on behalf of the returned men and on behalf of the mining development of the Dominion.

Mr. Sloan Will Help Scheme.

Mr. Nicol Thompson, chairman of the Mining Bureau of the Vancouver Board of Trade, said that that body had approached both the Provincial and Dominion governments on the matter. The Federal Government had informed them that they had already refused to take up the matter, but the Hon. Mr. Sloan had promised that the scheme should be taken up at the coming session of the provincial legislature with a view to adopting some portion of it for British Columbia.

Dean Brock was of opinion that the instruction suitable for prospectors should form part of the curriculum adopted by the department of Soldiers' Civil Re-Establishment for the education of returned men.

The remainder of the opening session of the convention was concerned with matters of membership and organization of the institute, a general desire being expressed for changes which will enlarge the basis of the institute and result in greater interest being taken in its meetings and deliberations.

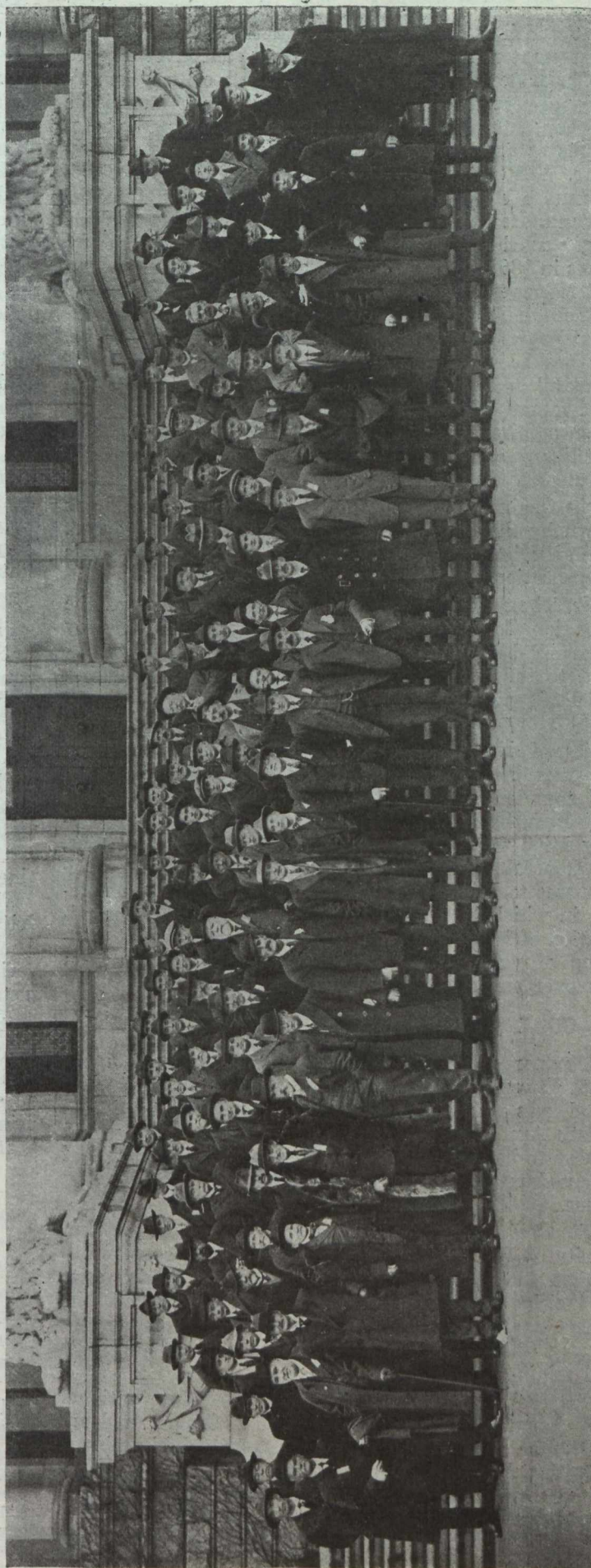
AFTERNOON SESSION, WEDNESDAY, 26th

Mr. O. E. S. Whiteside's paper on "The Future of Coal in Alberta" was not presented, much to the regret of the members, Mr. Whiteside having been prevented from attendance by labor matters.

It is to be hoped that Mr. Whiteside's paper will find its way into the Transactions as the future of coal in Alberta is to a large extent synonymous with the future of Canadian industries.

THE CASSIDY COLLIERY.

Mr. E. G. Wilson, superintendent of the Cassidy Colliery of the Granby Consolidated Mining & Smelting



Members of the Canadian Mining Institute, in attendance at the Vancouver Meeting, 26th-28th November, 1919, photographed on the steps of the Court House.

Company read a paper describing the newly completed plant which is situated inland on the Nanaimo River about eight miles from Nanaimo on Vancouver Island.

A brief description of this remarkable colliery has already appeared in the "Journal" and in a later issue it is hoped to include a detailed description, and photographs of a colliery layout unique in Canada.

Mr. Wilson, it may be here incidentally remarked, represents a third generation of coal miners in Canada. His grandfather sunk the shafts of the "New Winning" of the General Mining Association at Sydney Mines in 1867 and his father, Mr. W. R. Wilson, is General Manager of the Crow's Nest Pass Coal Co.

The notable feature of the Cassidy Colliery is the unusual provision for the comfort of the mine employees. Art has been used to beautify a site that is in itself beautiful and desirable, and after seeing Cassidy Mine, the average colliery official is divided in his mind between admiration at what has been achieved and regret that like provision has not been—and in some places unfortunately cannot be—made.

The Chairman believed that the care for its employees shown by the Granby Co. would, if generally adopted, markedly lower the cost of assessment for workmen's compensation.

Mr. Thomas Graham, General Superintendent of the Canadian Collieries (Dunsmuir) Ltd., said the Granby Company had set a pace for the East that would be hard to follow, a pace that only their large resources had made possible.

Mr. F. W. Gray said that to one coming from the collieries of Nova Scotia—where the mines were very far from being things of beauty—Mr. Wilson's paper had sounded like the Apocalyptic description of the City Beautiful. If, as Mr. Wilson had stated, the Cassidy Mine was the conception of Mr. F. M. Sylvester, the General Manager of the Cassidy plant, that gentleman was to be most heartily congratulated on the manner in which he had created such a practical exemplification of his theory that the mental and physical well-being of workmen is the secret of harmony between employer and employee.

COAL IN THE STATE OF WASHINGTON.

A paper on the "Future of Coal in Washington State" prepared by Mr. H. N. Freeman of Black Diamond, was read by Mr. H. H. Sanderson, of the Mines Safety Appliances Co. The title of this paper would appear to be a misnomer, it being chiefly descriptive of accepted methods used in mining and prospecting coal seams.

The Chairman asked Prof. Joseph Daniels of the University of Washington, to speak on the coal occurrences of that State, and at very short notice Mr. Daniels gave an incisive but quite comprehensive account of the known coal resources of Washington and of the unusually difficult and costly conditions attendant upon coal mining there.

The coal deposits extend from the International Boundary to the Cascade Mountains of Oregon, and are of Eocene age. The coal varies from sub-bituminous to anthracite. The term lignite as applied to Washington coals is probably erroneous. They contain a low percentage of moisture and do not disintegrate rapidly. They are not strictly to be classed with the lignites of the plains and the western provinces. The coal becomes more anthracitic as it approaches the Cascades. Its

coking properties are apparently the result of metamorphism, and the anthracitic characteristics are presumably the result of extreme metamorphism.

Prospecting is difficult. The seams are hidden under a mantle of glacial drift and thick forest cover. Steep dips and faults and igneous intrusions make difficult problems in mining and development.

Most properties have been so far opened from water-level drifts where the seams have been exposed by watercourses, and there are but two shaft mines in the State. So far no deep mining has been carried on.

Retreating longwall has been used successfully, but in the main longwall has not been successful, because of the disturbed character of the seams. For the same reason the introduction of coal-cutting machinery has not made progress. Hand mining and shooting out of the solid are usual practice. Costs are naturally high—the highest of any State in the Union—because of the combination of physical difficulties and initial high wages.

The coal seams are dirty and the coal must be cleaned outside the mine. Practically all coal mined must be wasted. The percentage of wasted coal is larger than anywhere else. The lump coal percentage is small, and fines predominate. Annual output of the State is about 3¼ million tons.

B. C. Coal a Favourite Fuel.

Prof. Daniels referred to the appearance of head lines in the Seattle papers when announcing the arrival of Vancouver Island coal cargoes, and said the success of B.C. coal in the Washington market was due to its fine physical appearance.

Use of Pulverized Coal.

The meeting was especially interested in Prof. Daniel's remarks on the use of pulverized coal in Washington because of its bearing upon the similar problem of the use of pulverized lignites in the prairie provinces of Canada.

The Pacific Coast Coal Company of Seattle is now delivering pulverized coal in truck-load lots to consumers, which solves the problem of the user of pulverized coal who does not wish (or cannot afford) to install a pulverizing plant.

Automatic Under-Feed Stoker for Domestic Heating.

Another interesting statement made by Prof. Daniels was that under-feed stokers, with electrically-operated automatic feed—controlled by thermostat device—were being successfully tried out on the Pacific Coast for heating houses and buildings.

OIL POSSIBILITIES IN THE WEST.

Mr. D. B. Dowling, the Director of the Geological Survey, was listed on the programme to speak regarding "Oil Possibilities in Western Canada," but his address was much more comprehensive in its scope than the title promised, being, in fact, a lucid explanation of the geological history and present condition of the oil-bearing rocks of North America, which he said occurred in two well-defined horizons, one in the older rocks and one in rocks of Tertiary age. Mr. Dowling illustrated his remarks by lantern slides, which included some fine reproductions of relief maps.

"Crystalline rocks and sediments older than the oil formations constitute a large part of the sub-surface of Canada," said Mr. Dowling. He pointed out that the promising areas may be defined as including the less distributed strata lying between the Cordilleras and the Appalachians in the United States while beds not affected by ancient folding are found in the Tertiary beds in California. In the fractured zone of

the Atlantic Coast small areas of intense deformation are found that give a small measure of promise as possible oil fields but also suggest that the possibility of porous beds may have been lost.

"In New Brunswick and Nova Scotia oil shales and cannel coals occur that give promise of great value as oil producers," said the speaker, as he illustrated the territory by means of lantern slides. The Western Peninsula of Ontario has long been the principal producing oil field of Canada, but while the production is slowly decreasing, a close study of the underlying strata has suggested an expansion of the field. The region west of the lakes contains the most potential oil fields and is divided into two areas, the Central basin and the Northern basin.

In the Peace River district heavy oil has been obtained by boring, and in possibly the same measures out-cropping in the Athabaska river, where sands up to 200 feet in thickness are saturated with heavy asphaltic oil. There is also a small area in the southern part of Saskatchewan in which the oil horizon may be reached at elevations approaching or above sea levels. This area is suggested from the discovery in a deep boring in the vicinity of this anticline of heavy oil or asphalt in sands at the same horizon as in the northern field.

Most Promising Oil Reserve is Peace River District.

The most promising oil reserve in Canada was in this part of the Dominion, he said. It might be many years before those northern reserves were utilized, but it was a good thing to know that they were there. When the world's fuel supply began to decrease, Canada would be glad to know that this supply existed, even if it was "in cold storage." As for the problem of transporting it, Mr. Dowling declared this would be solved when the necessity arose.

Speaking of the Calgary field, Mr. Dowling said this area had produced 13,000 barrels of oil last year, which was of a high grade and was valued \$100,000.

Oil Occurrences in Rocky Mountains Foothills.

In the distributed foothills confronting the Rocky Mountains narrow folds are frequently found, and these areas are small, but from one that has been prospected by boring, small flows of a very high grade oil have been obtained. Gas, which is derived from the same beds, is found to contain vapors of gasoline, and it is supposed that the accompanying oil is the condensation product.

There was no proof of the existence of strata on the coast here favoring the retention of oil, he said. He doubted if there was anything more than a few seepages. He told of a diamond drill hole having been made near here which went through a formation which would not hold oil. It would be a strange thing if oil was found here in commercial quantities, as there was no indication of there being an oil field here. Men who were trying to raise money for drilling had much to say about it but they kept away from the members of the geological department. That is where they made a mistake, because the members of this department were anxious to help everybody. "Tertiary beds are being examined in the Flathead Valley and at the mouth of the Fraser River. In the southern part of the Rocky Mountains bordering on Alberta seeps of oil, apparently from sediments of the Cambrian age, are being studied with a view to tracing the origin of the oil. Oil shales are found in the Queen Charlotte Islands, but their extent and value has not yet received much consideration. They are suggested as the origin of the oil found in basalts, which cut them."

DEAN BROCK ON THE PALESTINE EXPEDITION.

R. W. Brock, now Dean of the University of British Columbia, and attached to General Allenby's staff as a geologist with the rank of Major, described "Palestine and the Last Crusade" to a large audience in the ballroom of the Hotel Vancouver, in the evening of Wednesday.

Dean Brock was attached to the forces under General Allenby in the capacity of geological adviser. The Germans early in the war recognized the value of expert geological advice to their armies and in the west they employed forty geologists to the two that the English provided. Starting from a slide showing a cross section of Palestine from the coast across the trench of the Jordan Valley to the plateau of Moab, the speaker proceeded by means of a relief map of the country and a number of slides showing the character of the land in its different parts to give his audience an idea

o. the country over which Allenby had outwitted the German generals opposed to him, while the British forces had out-fought the Turkish and German soldiers and brought about the crushing defeat of the enemy in September, 1918, that forced Turkey to her knees.

The lecture consisted of little more than brief explanatory remarks accompanying a remarkable series of photographic slides. These showed the country from the south of Jericho to the extreme north at Damascus. They included the scenes of the big battle when Allenby's cavalry out-flanked the enemy while the infantry, owing partly to the effect of the successful concealment of the plans and preliminary preparations for the advance but chiefly to the endurance and quality of the men who pushed forward eagerly during the intensest days of the hot weather, made the frontal attack that did not flag until Allenby was able to enter Jerusalem in triumph, with the Turkish army completely in his possession, men, transport, artillery and baggage, while another army with its communications cut, menaced by the Arabs in rear and the British on the flank, was endeavoring to extricate what it could from the disaster.

The Valley of Death.

Among the pictures was one of the famous "valley of death" where the retreating Turkish artillery and transport caught in the steeply banked Nablus road was shelled by our airmen until the cutting, which formed the only line of retreat left open, became one hideous shambles of wrecked guns, waggons and lorries, dead and dying men and horses; the spot where the greatest amount of carnage in the whole history of the war is believed to have taken place.

Speaking of the German occupation of Jerusalem, Major Brock told of the use by the Germans of the monastery on Mount Carmel as a fort. There was a monument on the mount in memory of some of Napoleon's soldiers which the Germans destroyed.

A clock tower had been erected at Jerusalem to commemorate the visit of the ex-kaiser. This, he believed, was not there now.

Early in the war the Germans had geologists working in Palestine and archeologists were working at a number of points. One of these Germans, a professor, made complete topographical maps of the entire country. The British had to get along with an old reconnaissance survey made by the late Lord (then Lieut.) Kitchener in 1879.

Searchlight on Tower.

The Germans had a hospice on the Mount of Olives. There was a tower on this in which there was a searchlight. The Germans had hospices at every strategical point in the country, each one similarly equipped, and one of which could contain more tourists than visited Palestine in a year.

Some of the German sisters at the Mount of Olives hospice offered to keep house for the British officers. This was done for some weeks, but the general had found it easier to keep his plans secret by moving.

The Egyptian native troops disappointed the Turks by their attitude. While they not be persuaded to fight the Turks they would not join them, keeping a neutral attitude.

When the enemy evacuated Jerusalem they gave out that they would soon be back. But the populace put more faith in certain prophecies that had been made. One of them was that Jerusalem would not be captured until a prophet came. As the population pronounced the name of Gen. Allenby, it meant, in their tongue "The Prophet." Another prophecy was that the city would not fail until Nile water flowed into it. Nile water flowed in through a British pipe line. The other prophecy was that a wealthy man would be appointed governor. The British appointed General Money governor.

MORNING SESSION, THURSDAY, 27th NOV

On Thursday morning the Chair was taken by Major Angus Davis, of the Dolly Varden Mine.

POSSIBILITIES FOR PLATINUM IN WESTERN CANADA.

Professor W. L. Uglow of the University of British Columbia spoke to the above-mentioned title.

"Platinum still continues to be a very scarce article, and has advanced from the fixed war price to the present one of about \$130 per Troy ounce," said Professor Uglow. The largest producer of this precious metal was Russia, where in the Ural mountains the pre-war supply, had been about 300,-

600 ounces a year, but since the war this had greatly decreased. The United States is the second largest producer of this metal, and in 1917 the total output was 32,000 ounces, while Canada was running a close third, but this country had lost a lot of the credit on account of the fact that when the metal is discovered in the blistered copper from the Sudbury mines it is sent to the States, where it is refined.

"Native platinum has been found in various parts of Western Canada, chiefly in the Tulameen district of the Similkameen Mining Division, from which, during the year 1887-1891, an average annual output of 1500 ounces was recorded. It seems, therefore," said Professor Uglow, "on account of the present conditions of the platinum market, on account of our past production and because of the fairly wide distribution of platinum minerals in the west, that increased emphasis should be given to the possibilities of augmenting the Canadian output."

In dealing with the different metals in which platinum was found, the speaker told of a large number, mostly in Russia, Spain and Tasmania and on this continent. He stated that over 99 per cent of the world's supply of the metal was derived from placer deposits, and that all present information pointed to the increase of deposits in this way in the future. He related several instances in British Columbia where platinum had been found associated with dunite, which occurs in gravel and in river beds. In some other cases the presence of platinum has been located in quartz veins around Burnt Basin, B. C. Another method of getting platinum has been discovered recently by treating blistered copper sulphite ores and yet, in spite of the fact that the largest portion of the world's production is derived from placers and of the fact that Western Canada is noted for the occurrences of platiniferous gravels, it is worthy to note that the Canadian production of the metal is at present very largely derived from ores of the lode type.

In conclusion Professor Uglow that in view of the great possibilities there were three lines of attack to develop them. First, attention should be directed to those localities whose geology is similar to that in producing districts; second, the ground should be accurately tested in accordance with approved methods, and third, progress must be made in the matter of facilitating the recovery of platinum from lode ores and auriferous gravels.

He gave at some length the reports of many prominent mining engineers of the province regarding the possibilities, along with a number of figures to show the percentage of platinum that existed in the various ores.

Mr. Charles Camsell mentioned that a considerable platinum content in Sudbury ores was recovered in treatment in the United States which was not fully credited to Canada, and that the figures quoted by Prof. Uglow should actually be greater.

Mr. E. A. Haggen, Editor of the B.C. Mining and Engineering Record spoke of some possibility of recovery of platinum from placer black sands, and on occurrences of palladium.

Mr. Wm. E. Greenawalt's paper on the "Hydro-metallurgy of Copper Sulphides" was read in the absence of the author.

Mr. E. P. Mathewson's paper on "Concentration of Copper Ores" was taken as read.

IMPROVEMENTS IN ORE CONCENTRATION AT THE TRAIL SMELTER.

Mr. A. W. Diamond, of the Canadian Consolidated Mining & Smelting Company, read a paper on "Recent Ore-Concentration Developments at Trail":

"The great advancement in the science of ore concentration by the oil flotation process in recent years naturally revives hopes in many cases for the successful treatment of ores by flotation which had formerly proved too refractory to the older gravity concentration methods and to the early undeveloped flotation process," said Mr. Diamond.

As examples of this process he told of the work of his company in developing low-grade gold ores of Rossland and the complex lead-zinc iron ore of Kimberley, B. C.

"During the first year efforts were directed chiefly towards the solution for gold ore and an experimental mill of 250 tons daily capacity was built and equipped with concentration

machines which it was known would effect some separation and which it was hoped would successfully solve the treatment," continued the speaker.

Sullivan Ore.

In referring to the Sullivan ore, he explained that it was a finely crystalline complex mixture of lead, iron and zinc sulphides, carrying only three to six per cent insolubles. From a preliminary series of laboratory tests it was discovered that a good separation of zinc could be made from the lead and iron by flotation of the ground ore after it had been roasted at such a temperature as to almost completely oxidize the lead and iron sulphides, but to oxidize only a small percentage of the zinc sulphide. He pointed out that this roasting operation was commercially practicable and had been tested and proved a very valuable asset.

In dealing with the Rossland ores he pointed out that the concentration of the low grade ores had been given a great deal of attention and that they had been converted lately from an oil process into a simple gravity-table mill.

The flotation of the Rossland ores was again investigated by Mr. John Bray at Trail in 1917 with the results indicating that both flotation and cyanidation were necessary similar to those previously obtained at Rossland.

When the Sullivan concentration problem was fairly well solved, concentration of Rossland ores was investigated by the speaker and it was found from laboratory tests that good recoveries were obtained by a combination of flotation and tabling. The ratio of concentration, however, was such as to make the advisability of this treatment questionable.

"It is doubtful," he concluded, "whether this work would have to be continued had it not been for the fact that the original Sullivan experimental flotation mill was available and could fairly easily be adapted to the concentration of these ores. The mill was accordingly arranged with tables and flotation machines so that both, or flotation only, could be used. Before the completion in the changes in the table installation in this plant, operation was commenced with flotation only and from the outset as a high recovery was obtained thus as was obtained with both tables and flotation in the laboratory tests, and at the same time a much higher ratio of concentration was secured than if tables had been used."

"On completion of the table installation tests were made for periods of a few days each, using both treatment, but with no additional recovery and with a much lower concentration ratio. Careful study of the flotation condition since that time has resulted in the securing of a still higher ratio of concentration by flotation alone, still maintaining as good or better recovery. Fortunately a mill installation for this treatment will be cheaper and more simple in operation. Plans are now being completed for a 1500-ton concentrator.

At a complimentary luncheon given by the Kiwanis Club to the members of the Institute, address were given by the Chinese Consul and Dr. McCallum of the Advisory Council.

AFTERNOON SESSION, THURS., 27th NOV.

Thursday afternoon's session, with Mr. Chas. Camsell in the chair, was notable for the very large attendance, the novelty and importance of the papers presented, and the keenness with which those present entered into the discussions. It would be hard to improve upon the "snappiness" of this meeting, and this was no fortuitous accident, but the result of much patient organization before the meetings.

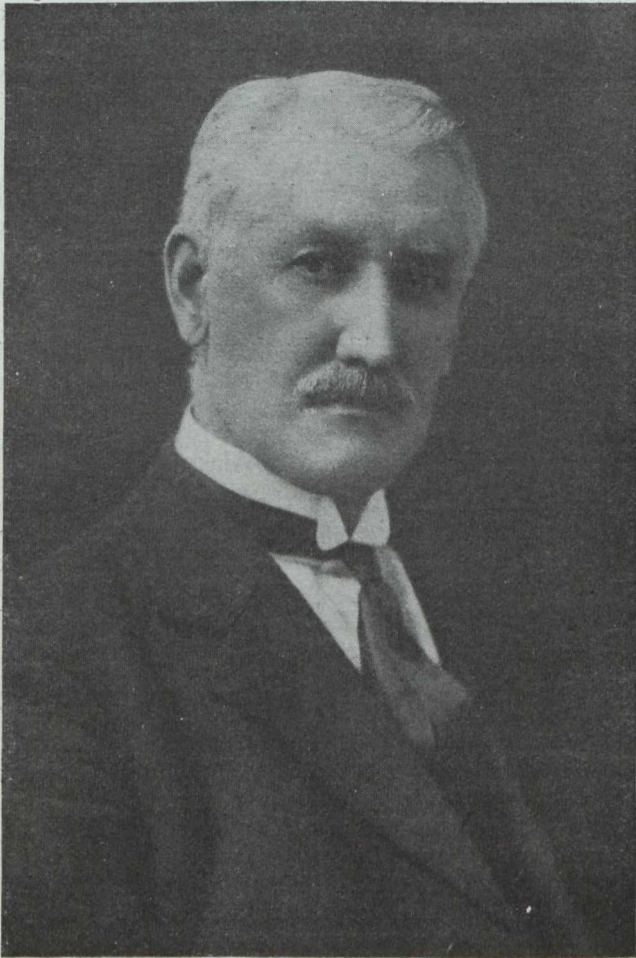
BY-PRODUCT COKE-OVENS AT ANYOX.

Mr. W. A. Williams' paper described the by-product coking plant of the Granby Company at Anyox, a description of which has already appeared in the "Journal." Mr. E. J. Conway read Mr. Williams' paper in his absence.

Mr. F. W. Gray said the Anyox plant was of unusual importance because it was the first large by-product installation on the Pacific slope. The bee-hive oven was rapidly falling into well-advised obsolescence, and of much significance was the fact that in 1919, for the first time, the tonnage of by-product oven coke pro-

duced in the United States had exceeded the tonnage of beehive coke. The tendency of coke-oven practice in the East was to reduce the coking time and to lessen the width of the oven-chamber. Typical modern practice was 17 hour coking time and oven-chambers 17 inches or 18 inches wide.

Mr. W. R. Wilson of the Crow's Nest Pass Company, said the Anyox plant had, of course, lessened the demand for coke from the Crow's Nest Mines. Mr. Wilson did not, however, dilate further on this point, turning his remarks much to the amusement of the meeting upon the beautiful colors of the Indian motive decorations of the "Totem Room" of the Hotel, and the general excellence of the climate and minerals of British Columbia.



MR. D. B. DOWLING.

THE DOLLY VARDEN MINE.

Major Angus Davis described the recent operation of the Dolly Varden Mine, which is located at Kitsault River, 17 miles above the point where it enters Alice Arm. Total shipments of ore from the mine, he said, amounted to about 6,500 tons of ore while the total silver production for this year to November 15 was 340,000 ounces. Shipments started last August and were the first to be made from this district.

The ore bodies were almost certainly of secondary origin. Owing to repeated faulting and cross-fissuring, mining operations had to be carried on with great care. The greatest depth obtained at present was under 300 feet. A lower tunnel was being driven this winter

which would give an additional 230 feet. At or near the surface native silver occurred, in some places in extremely rich streaks, and lower down native silver, ruby silver, argentite and stephanite occur. About 270 feet from the surface ruby silver was the principal silver-bearing mineral. Fine-grain pyrites, carrying good silver values, also occurred in ore from the present bottom level up to the surface. Only higher grade ore was being shipped this year, the poorer ore being left always available when milling operations are possible.

THE STEWART DISTRICT.

Mr. E. E. Campbell, Mine Superintendent for the Granby Company at Anyox, gave a description of the Stewart District in Northern British Columbia. Mr. Campbell said in part:

For the past year no part of British Columbia has demanded more interest from a prospective mineral producing



MR. THOMAS GRAHAM.

standpoint than that tributary to Stewart. About 10 years ago this place was the centre of a noted mining boom, and although at that time several properties of decided merit were found the district was more or less discredited by the foolish exploitation of a few properties of questionable value.

The interest now being taken in mine development in the Stewart district is based on many valuable discoveries of high-grade ore, and these cover such a wide area that the district as a whole cannot fail to be one of first importance.

Only that portion of the Stewart mineral area situated on the Salmon River will be discussed in this paper as it is in this part that many of the recent finds of rich ore have been made.

It has always been the opinion of geologists and engineers that the successful tenure of the mining industry in Northern British Columbia depend upon the development of primary ores of comparatively low metal tenure.

Due to heavy glaciation most of the oxidized portions of the outcropping ore bodies have been removed; the same

can be said of the surface-enriched zones, as few ore bodies on the north coast, on development, show definite evidence of surface enrichment.

Extensive Ore Bodies of Secondary Origin.

The recent discovery of extensive ore bodies carrying minerals that are unquestionably of secondary origin, establishes a reversal of the conditions thought to exist, as well as a change in the opinion of mining engineers regarding the types of ore to be encountered in the district.

Prospecting for minerals in northern latitudes has never been carried on as enthusiastically as in the districts further south, such as in California, Arizona and Mexico, due to the lack of rich surface ores. In these southern climates no glacial erosion occurred at the time the northern portion of the hemisphere was enveloped in ice which left that area free to the processes of oxidation and subsequent enrichment. This produced many rich surface ores which were eagerly sought for by the prospector, and when found could easily be turned to his credit.

The northern prospector generally had low-grade ore to deal with, the development of which usually entailed much capital, unless specially favored by location or other physical advantages.

The discovery of rich surface ores in the Stewart district has so stimulated prospecting that the final results to the prospector, mine operator, and the province should be manifold, and such discoveries should be an incentive to the further examination of other districts and the uncovering of new ore bodies.

Edge of the Batholith Offers Greatest Promise.

A large part of the Coast range of British Columbia and the adjacent portion of Southeastern Alaska, is made up of granitoid rocks. These vast bodies of granite enclose, or are adjacent to, many scattered areas of sedimentary and numerous types of igneous rocks, and it is these areas flanking the granite mass that afford the greatest promise of reward to systematic prospecting. The Stewart mineral showings occur in one of these areas adjacent to the granite.

For the first five miles up the Salmon River from where it empties into the Portland Canal the country rock consists of granite. In contact with this is highly altered schist of apparently sedimentary origin. Beyond this is a vast area underlain by greenstone and tuffs, and it is in these rocks that the recent ore discoveries have been made. The greenstone, which is essentially a quartz porphyry, has been sheared and silicified in places, and it is in such zones that the ore occurs.

The greenstone in places is overlain by a volcanic breccia, varying in texture from fine to coarse grained. This rock is generally grayish to green in color, and shows the same alterations as those found in the quartz porphyry. Where it is fine-grained and changed to the color of the greenstone it is almost impossible to classify accurately in the field.

The greenstones, or altered quartz porphyry containing the ore are part of a series of rocks, called by Mr. McConnell the Bear River formation. These greenstones vary widely in appearance, ranging from light green and almost normal quartz porphyry to a dark green and highly altered product.

Mineralization is confined largely to the greenstones, and is only present to a minor degree in the breccia. On the Province claim of the big Missouri group an enormous development of the primary ore replacing the greenstone is exposed. On the Yellowstone group the ore occurs altogether within the breccia.

The Province outcrop covers an area on the surface of approximately 1,500 feet by 1,000 feet. The Yellowstone does not show such an area of mineralization as the breccia is not shattered or silicified to the same extent as the greenstone, and mineralization is confined to shear zones and fissures with much higher values. It is possible that this breccia layer is shallow, and that more extensive mineralization, with probable high-grade ore, is present in the underlying greenstone.

The primary ore in the district consists of disseminated sulphides in a schist gangue; sphalerite, galena, chalcopyrite and pyrite, carrying gold and silver.

Provided a substantial tonnage of ore is developed, the district offers no obstruction to successful mine equipment and development. The mineral area is from 12 to 20 miles from tidewater, and no great difficulties to railway construction exist. For an elevation up to 2,000 feet the hills are densely wooded with a good quantity of spruce, hemlock and cedar. Many thousand horse-power, continuous throughout the year, could be developed in Cascade Creek, which flows across the mineral area.

The district should prove of great attraction to the engineer. The ore is complex, and will require skill in its treatment. The rich ore can be smelted direct, but the low-grade offers a broad field for the exercise of the greatest ingenuity that the engineering profession affords.

Are the "Bonanza" Ores of Secondary Origin?

Following the papers read by Major Davis and Mr. Campbell, both of whom expressed a belief that the high-grade or bonanza ores of Northern British Columbia were of secondary origin, came an animated discussion, the question being evidently one of much interest to the British Columbia members.

It was mentioned that the Premier Mine was developed to a depth of 200 ft. in what was considered to be a zone of secondary enrichment and showed no lessening in values.

Prof. Turnbull agreed with Mr. Campbell that the rich ores were secondary, and that below there would be found primary ores of sufficient though lesser richness to give permanence to the district.

Mr. C. Camsell said geologists had always advised prospecting on the edge of the Coast Range batholith, which, in the Portland Canal District, is unusually exposed by the fiord. Remnants of stratified rocks exist within the batholith, which is by no means the solid and uninterrupted mass of granite that some maps would indicate.

Dr. Hodges said, evidently there were areas of rich secondary ores that had escaped the general glacial erosion. He believed that bonanza areas which had so escaped glaciation would be found in Northern British Columbia, in the Yukon and in Alaska.

The Chairman mentioned that some time ago a special investigation of the question of secondary ores had been undertaken by a committee of which Dr. Broek and Dr. Dolmage had been members, and as Dr. Dolmage was present he was asked to take part in the discussion.

Mr. Dolmage disagreed with the previous opinions expressed, and believed that British Columbia ores were of primary origin. They may be later in deposition, but this did not prove that their high values resulted from the processes of oxidation and surface enrichment. The presence of ruby silver, mentioned by Major Davis, was the strongest evidence of the probability of secondary enrichment that had transpired in the discussion, but a number of minerals formerly regarded as secondary are not now so classed. Bornite is an example. This mineral had been found at 1,700 feet below sea-level, and in the belief of the speaker, was a primary mineral.

Dr. Dolmage asked Mr. Campbell if he would elucidate his theory of how the rich ore-bearing areas escaped glacial erosion.

Mr. Campbell believed that the rich ore-bearing areas under discussion had—after undergoing a secondary enrichment—had been covered by breccia deposits of later age of deposition, which had been removed by glacial erosion that ceased before the underlying strata had been attacked, or at least, so attacked as to effect their total removal.

Mr. R. C. Wallace, Commissioner for Northern Manitoba said that in the undoubtedly primary rocks of that district, which had, as was well known, suffered extreme glaciation, the mineral calcocite had been encoun-

tered, a mineral that until recently had been generally accepted as a secondary mineral. This was one proof that the presence of certain minerals did not necessarily indicate secondary origin.

Mr. Fleet Robertson, the Provincial Mineralogist, said calcocite had been found at Aspen Grove, B.C., under conditions indicating primary origin.

NEW METHODS IN HYDROMETALLURGY OF GOLD AND SILVER.

The most notable announcement made at the Vancouver meeting was unquestionably contained in Mr. H. N. Freeman's address, who described a method by which, in the final processes of the recovery of gold and silver by cyaniding, metallic sodium was substituted for metallic zinc, thereby enabling the regeneration of the cyanide solution and preventing the losses occurring through the use of zinc precipitation.

Mr. Freeman said:

"The research work, leading up to the development of this process, about 1890, was carried out with the use of potassium cyanide, but in mining operations sodium cyanide now is used to the total exclusion of potash, which is far too costly and possesses no advantage whatever over sodium cyanide. One is inclined to believe that the present custom of cyanide mill operators to express the strength of their solutions in terms of potassium cyanide, when they are actually using sodium cyanide, is the result of propaganda to create a demand for German potash. Even sodium cyanide has been a costly chemical and many attempts have been made since the inception of the process to cheapen and facilitate its production in response to the demand from the mining industry."

"The most important constituent in cyanide is nitrogen, which occurs in limitless quantities in the atmosphere, but which is very difficult to bring into the combined state. The next important constituent in cyanide is the element, sodium, a metal somewhat costly to prepare.

"At the outbreak of the war, the major portion of the world's cyanide was obtained from Germany and it was there prepared by using metallic sodium, and nitrogen in the expensive form of an hydrous ammonia. Numerous attempts have been made in Germany to produce cyanide direct from atmospheric nitrogen but without producing a commercially successful product. However, much success had been realized there in manufacturing a commercial fertilizer from atmospheric nitrogen. This product, known as calcium cyanamid, was at the outbreak of war, produced on a large manufacturing scale in Canada. In Germany, several attempts had not been successful.

"The blockade of Germany and the consequent heavy demand of the South African mines upon the British source of supply, gave me a greater incentive to research upon this line. I may say that the research work, leading up to the manufacturing development of cyanide from calcium cyanamid, was carried out in Vancouver, in collaboration with the American Cyanamid Company of New York," added Mr. Freeman.

Canadian Plant Leads.

The Canadian plant of the American Cyanamid Company at Niagara is the first to produce cyanide commercially from atmospheric nitrogen by this process.

The greater part of the production of the plant at Niagara Falls, Ontario, has been used for the extraction of ore in Mexico, Canada and the western United States and for the fumigation of the citrus trees in California, notwithstanding the high cost of all-rail shipments from Canada.

The use of Sodium Lead Alloys in the Recovery of Gold and Silver from Cyanide Solutions.

In the second part of his address the speaker referred to the process of recovery of gold and silver from cyanide solutions in mills. There were two distinct steps: First, the bringing of the precious metals into solution, whereby they were separated from the matrix, and second, the recovery of the metal from this solution. After reviewing the chemical process involved. Mr. Freeman, in conclusion, said that several methods had been developed for the production of the sodium-lead alloys requiring only ordinary salt as raw material. For this purpose it was fused with lead in a small electric furnace, evolving bleaching powder as a by-product.

"Alloys of sodium and lead are very remarkable," he said. "Sodium is a much softer metal than lead, yet the addition

of one or two per cent of sodium to lead results in an alloy hard enough for bearing metal. An alloy of lead and sodium containing ten per cent of sodium, is so brittle that it may readily be ground to a fine powder by hand with an ordinary mortar and pestle.

"In studying the chemistry of the gold cyanide solutions, it would seem that in order to recover the cyanide in the form which it would again be available for dissolving gold, the obvious thing would be to replace the gold with metallic sodium instead of metallic zinc. The objection to metallic sodium is that it decomposes water with explosive force and obviously it is impossible to use it as such for precipitating gold, but the employment of a sodium-lead alloy with only three per cent of sodium overcomes this difficulty.

Mr. Freeman explained that cyanide made in Canada contains a certain percentage of calcium chloride which acts as a colloidal congelant and gives a clear solution. It also contains a certain amount of caustic lime which adds a necessary alkalinity and is advantageous in treating ores containing small quantities of copper.

Mr. Fowler, in moving a vote of thanks to Mr. Freeman, said it was a long time since such a radical advance in metallurgical practice had been announced. Mr. Freeman's explanation of an intricate process had been very lucid. Mr. Hedley seconded the motion, which was carried with much applause.

In putting the motion, the Chairman said Mr. Freeman seemed to bring comfort to the distracted gold miner, and Mr. J. A. M. Dawson said Vancouver chemists thought a great deal of Mr. Freeman, taking great pride in the fact that he was a citizen of this city. Mr. Freeman had done work of great importance in discovering the new cyanide process, when the mines were cut off from the original source of supply. Local chemists were looking forward with a great deal of hope in connection with the work Mr. Freeman was carrying on.

THE SMOKER

One of the Vancouver newspapers said, not unkindly, and rather wittily, that the members of the Institute at the smoker on the Thursday evening, which, by the courtesy of the Terminal City Club, was held in its dining room, froliced "on the lower level," from which it would appear that the newspaperman was also an initiate.

The feature of the evening was the trial of Andy Larsen for a grave offence against a Canadian law which members of the Institute believe is honored more in its breach than by its observance. The verdict was that the defendant Mr. Larsen was not guilty, as "six bottles did not make a case," and in the opinion of the jury and the judge—a thirsty mortal—Mr. Larsen verged on becoming a public benefactor. The time-honored rendition of "Drill ye tarriers" was undertaken with disastrous effects. The fooling was excellent, but the fun was not quite so furious as on the night when a certain distinguished gentleman suggested two annual meetings before the general drought.

FRIDAY MORNING, NOVEMBER 28th

With Mr. E. E. Campbell in the chair, Mr. Paul Billingsley of Seattle spoke on—

GEOLOGICAL METHODS AS APPLIED AT BUTTE, MONT.

The speaker said that the Anaconda Company had developed its geological department into a very important branch of its organization, and this had resulted in a number of important factors. "The Butte ores are contained in rather narrow veins in granite. The common widths range from two to twenty feet," the speaker added.

In speaking of the early development, Mr. Billingsley said

that the first geological department was organized in 1900. Since then the work has advanced very rapidly, and has now reached a highly perfected state. The main object for the department has been to help the mine foreman and superintendents through a knowledge of the structure of the ground. As a result of 20 years' experiment it has come to regard the following points as essential: First, friendly cooperation and mutual respect between the mine foreman and geologists; second, prompt geological examination of all new workings in order that suggestions may be made without loss of time; third, accuracy in underground observation; fourth, immediate platting of notes and particularly of structural features upon general geologic maps and sections in order that new evidence may be studied in its proper relation to that already accumulated; fifth and last, a smooth working system whereby conclusions reached by a study of geologic data and translated properly into terms of mine operation.

"At present the members of the department cover about 6,000 feet of working each month," added the speaker. "Underground notes are taken on loose-leaf sheets on a scale suitable to the amount of detail desired. Generally, either 30 or 50 feet to the inch. Colored pencils are used."

Mr. Billingsley showed in coloured chalks upon the blackboard how the notes of the geologists were made intelligible, even after long lapse of time, and he emphasised, what was evidently very true, that the working out of these conventional markings had been carefully done, and was in fact most fundamental.

Dr. Hodge said geologists were very proud of the pioneer work at Butte, which had been a great vindication of their contentions. In answer to Dr. Hodge, Mr. Billingsley said that perhaps 85 per cent of the geological deductions prove to be correct in actual test by development work, and that they nearly always were able to find veins temporarily lost by faulting.

Mr. R. W. Brock said that geologists were themselves to blame for the small regard in which they had been held. They had made geology a high-brow subject, and had considered the application of their science to be derogatory. The Latin motto, which might be rendered "by thought and dint of hammer," contained excellent advice. Geology consisted largely in the careful accumulation of observations.

Mr. Brock regretted that so little attention had been found possible to paleontology and stratigraphy in Canada, particularly in reference to the coalfields. He said that the application of these two branches of geological science had added more to the economic value of the minerals of the United States than any other work undertaken by the U.S. Geological Survey.

Mr. F. W. Gray believed that geological writings were often unnecessarily technical and written so as not to be understandable by the ordinary person. Mr. Brock was a joint author of one of the few works in Canada on Economic Geology that could be read without a headache. The lack of application of paleontology and stratigraphy was noticeable in Nova Scotia, where, probably owing to the inadequate appropriations at the disposal of the Geological Survey, very little more was known regarding the paleontology, the correct horizon, or the correlation of the seams in the Sydney coalfield than was known in Richard Brown's time, about 1870. The application of geology to coal-mining in Canada had been greatly neglected. Mr. Billingsley's paper exemplified the saying that success lay in an infinite capacity for taking pains.

TAXATION OF GOLD MINES

Mr. Holler introduced this much debated subject by stating that the production of gold now was only 60 per cent of what it had been before the war, but that the use of gold now was ten million dollars more, as the jewellers were using great quantities of it. The ques-

tion was mainly this, "How can men operate a gold mine at a narrow profit or even a loss when they are selling the gold to the arts profession at \$20 an ounce, the same price as it has been for years?" asked Mr. Holler.

The only way to get relief, he said, was to get lower taxation and then many more mines could operate. In view of the fact that the arts were using so much gold why could they not be made to pay a tax on this gold and the money put into a fund to be used as a bonus for gold mines. Most of the gold was now shipped to the assay offices or the mint, where it was given to the manufacturers, and thus the collecting of the tax would be very simple. He then introduced the following resolution:

"That a committee be appointed to take up the matter with the provincial and Dominion authorities, and that the council of the Canadian Mining Institute appoint a live secretary and that all the finances be provided by the gold companies. Also that the committee consider the matter of a gold excise tax for all the gold used by the arts whereby they would have to pay \$22, \$23 or \$24, or whatever amount was decided upon for each ounce of gold."

The necessity for some relief of gold mining from the present onerous conditions was generally voiced by the discussion which followed.

Mr. E. A. Hagen said that gold had depreciated 25 per cent per annum and that this question was purely an economic one and should be dealt with by statesmen. "The federal reserve board of the United States have taken steps to rectify this and have withdrawn a large amount of the money used in gambling on the stock exchange. During the war all the countries have been kite-flying and now they are trying to remedy the inflation of currency," he said. In speaking of the Victory Loan, he said that it had been done with patriotic intentions, but that the government had taken every dollar the people were willing to give and he thought this was not right. Lately the government had legislated that the banks could do all the kite-flying they wanted to and had issued a great deal more currency than they were supposed to.

Mr. James White, of the Commission of Conservation, pointed out that the suggestion made in the resolution submitted was economically unsound, and that to place a higher value upon gold—not matter what purpose it was used for—than the standard of gold value would have the result of taking all gold out of circulation and that precisely the same situation would be created that now faced the great powers through the advance of the price of silver to a point greater than the value of silver currency.

At the suggestion of the Chairman, the resolution was laid over for the consideration of the Resolutions Committee, who would frame a suitable formula for the consideration of the afternoon meetings.

Mr. H. N. Thompson of Vancouver read a paper on "Making the Hearth of a Matte Smelter Reverberatory Furnace," which drew an interesting talk from Mr. W. H. Jepp, an eminent Australian engineer, on methods in vogue in his country.

This concluded the morning session.

COMPLIMENTARY LUNCH FROM VANCOUVER BOARD OF TRADE

Mr. Chris Spencer took the chair at the luncheon tendered to Institute members by the Board of Trade.

Dean Milner Roberts of the College of Mines of the University of Washington, dealt at length with the conditions favouring the commencement of iron smelting in British Columbia. He was of the opinion that the Province contained sufficient iron ore, combined with fluxes, fireclays, and coal to make such a venture a success. Dean Roberts also pointed out how great was the preponderance of the produce of the mine in British Columbia revenues. He also said that the manufacture of iron and steel in the West would greatly assist the permanence of the shipbuilding industry there.

CONCLUDING SESSION, FRI. AFTERNOON.

Mr. R. C. Wallace, the Commissioner of Northern Manitoba, occupied the chair.

IRON AND STEEL INDUSTRY IN WESTERN CANADA

Mr. F. W. Gray, Secretary of the Iron & Steel Section of the Institute, and editor of the Canadian Mining Journal and Iron & Steel of Canada, explained that he had been asked to join in a discussion on the possibility of an iron and steel industry on the Coast and had not undertaken to speak to the title on the programme, which was hardly correct, inasmuch as there was as yet no iron and steel industry in the Canadian West, as the term is generally understood.

The speaker stated that all he could do was to review the evolution of the iron and steel plant in the East, and ask B. C. members to apply their own analogies.

The genesis of a successful iron and steel industry in Cape Breton Island came about through the presence of large deposits of coal, suitable for the manufacture of metallurgical coke, close to an excellent harbour, favourably situated with regard to world's markets, near large deposits of limestone and dolomite, and within easy transportation distance of the unique iron-ore deposit of Wabana, Newfoundland. It may here be remarked that even the people of the East have not quite grasped the valuable and illimitable character of the Wabana deposit.

Coal had been mined in Cape Breton for seventy years, but the industry was backward. Winters of idleness, and Summers of rush and hurry to obtain the largest possible outputs, made for unsatisfactory labour conditions, general instability and lack of progress. The resources of Cape Breton lay dormant until a man of vision in the person of Mr. B. F. Pearson collected facts and figures and presented them so convincingly as to interest Mr. H. M. Whitney, with whose advent into Cape Breton there commenced those consolidations of scattered coal properties and the influx of capital which made possible the coal and steel industry of Cape Breton as it exists to-day. Many undesirable happenings mark the Sydney "boom," but, whatever may have been the shortcomings of those days, the result has proved there is a legitimate place for the "entrepreneur," for the promoter of industrial enterprises who has vision and faith—but—before the promoter must come the careful compiler of commercial facts, who must demonstrate from the results of painful research and the slow accumulation of uninteresting but essential facts and figures that a sound basis exists upon which to found the projected industry. That the reward of the man who digs the foundation is often less than the reward of those who come after him seems to be one of life's ironies that must be accepted.

Steel Industry an Outgrowth of Coal.

The lesson taught by events in Cape Breton, and elsewhere, is that a steel industry is an outgrowth of the presence of coal.

The founders of the Cape Breton coal and steel industries appreciated the vital importance of transportation, and they provided large fleets of modern freighters.

Events have also showed that neither the steel companies nor the coal companies of Cape Breton are entirely self-supporting. One is the complement of the other. The underlying stability of the coal companies has enabled the steel companies to take advantage of periods of prosperity in the steel industry, the monetary results of which, in their turn, have greatly helped the coal companies.

"From the Ore to the Finished Ship."

The lesson that appears to be deducible from these gradual developments is that the most successful and permanent combination of industry is that of a associated industry of iron and steel manufacture, with steel-ship building, both based on large reserves of coal, iron ore and fluxes, having a suitable maritime location.

If actual events in the East seem to be foreshadowing the completion of such an evolution it should not be any matter for surprise, as such combinations have proved successful elsewhere.

In the application of this conclusion to British Columbian conditions, it is worthy of note that the technical conditions existing in Cape Breton were always most favourable, and such as might be expected to bring about cheap costs of operation. Nevertheless, the problems of the iron and steel industry have always been those of competitive markets and relative wages.

British Columbia has imperfectly known iron ore deposits, but sufficient is ascertained concerning these deposits to show that they are large and valuable. The maritime and strategic location exists on either the mainland coast or on Vancouver Island, but most important of all considerations is the existence of coking coal on Vancouver Island.

The analogy between the relative position of the iron ore deposit of Wabana and Cape Breton Island, and the position of Vancouver Island to the known iron-ore deposits of British Columbia is very exact, even to the existence of large deposits of undersea coal on the extreme east and west coasts of Canada.

Fuel costs are basic in the iron and steel industries. The problem of iron smelting and steel manufacture is chiefly that of providing great heat supply at a low cost.

The possession of large deposits of coking coal of metallurgical grade is British Columbia's chief industrial asset.

Canada's Fuel Reserve Concentrated in the West.

It is questionable whether the people of the West realize the tremendous concentration of the fuel resources of Canada in the two western provinces of Alberta and British Columbia. The map which is attached to the Final Report of the Fuel Controller shows that Alberta alone contains more coal than all the rest of Canada put together, and also more coal than any single State in the American Union. The West also contains the greatest potential oil-reserve of North America.

Empire and national growth follow the possession (and the utilization) of coal, and where coal and iron exists by the side of the sea, wherever true British stock is to be found they must fulfil the maritime destiny of our associated British peoples. It is the way of the race. The future of coal, iron and shipbuilding on the British Columbia coast is not a purely local question. It is far wider in its implications and impartial in its scope.

The considerations affecting a future iron and steel industry are primarily two, viz.,

- a. Technical questions.
- b. Economic and social questions.

Economic problems come first in importance. If a real necessity exists for the manufacture of iron and steel in British Columbia, the technical problems present no insuperable obstacle.

Dr. Stansfield's Report on the manufacture of pig-iron from B. C. magnetites by use of the electric furnace is full, complete and authoritative, but it must be borne in mind that Dr. Stansfield reported as a professor of metallurgy, on certain set questions, and not as a promoter, and that since his report was made the knowledge of B. C. iron ore resources has been enlarged. Dr. Stansfield's report is the document which will most interest capitalists with serious intentions.

The iron industry of British Columbia—which the future is quite likely to see—should not require aid from new and untried processes. It can, as Dr. Stansfield pointed out, be operated with complete technical success by using the ordinary and accepted methods of metallurgy which have been profitable employed elsewhere.

There is no necessity, and it would be a grave mistake, to be misled by unconfirmed reports of secret processes by which magnetite ore can be converted into steel by the electric furnace.

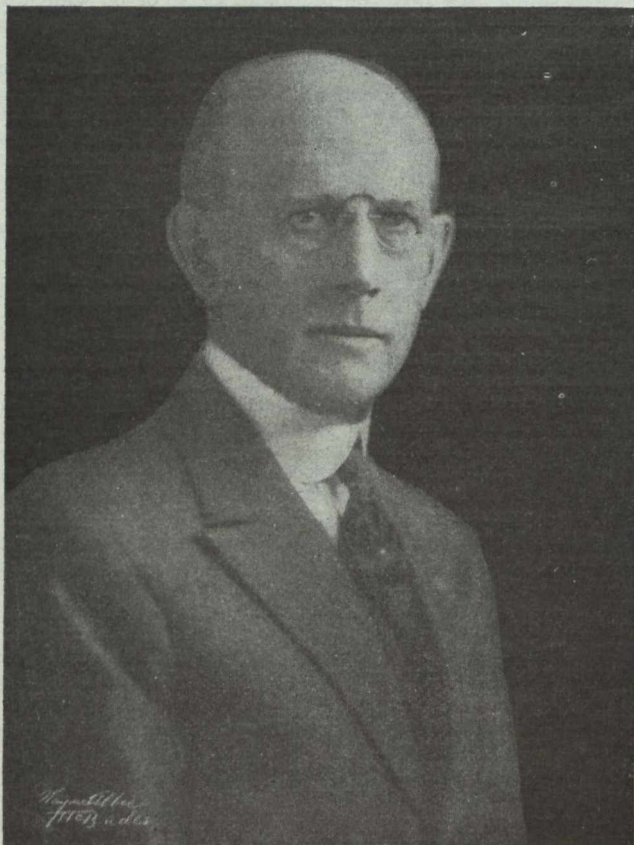
The economic problems resolve themselves into the question of a market. This should be made the subject of a careful statistical survey of local consumption of iron and steel, and the consumption in that territory over which a British Columbia plant could compete, which should include Alberta, the Yukon, Alaska, and the North-western States.

As to an export market, there would appear to be a good opening on the coast of South America, and while China will some day become the world's greatest producer of coal and iron, yet for the life of this generation, and maybe for fifty years, she should provide a market for pig-iron and steel products.

All these things will require to be compiled with exactness, and made ready for presentation to investors in a form suitable for study.

The social problems include the availability of suitable labour. An iron and steel industry requires a large number of unskilled labourers, and a smaller number of expert workmen, and there will be associated with the provision of these necessary workmen, large questions of transportation and housing.

There is another feature. Capital to-day is very timid, and it has reason to be. Before investors will find large sums of money for an iron or steel plant in British Columbia, substantial guarantees of safe investment must be given, and the social evolution of the province must include the fostering and protection of invested capital.



MR. F. M. SYLVESTER.

Things to be Avoided.

From the experience in the East the things which should be avoided in commencing an iron or steel industry include the following:

- a. An unnecessarily large initial capital expenditure.
- b. The establishment of a plant of a character too greatly in advance of local markets.
- c. A plant of an unbalanced character, requiring orders representing a large tonnage of one product in order to keep running.
- d. Too great reliance on subsidies. Subsidies while necessary perhaps in the initial stages of a new industry, should not be regarded as part of the permanent income of any enterprise.

These may seem elementary statements, but in the East they have been taught by painfully acquired experience.

In the discussion which followed, it was suggested that magnetite ores could not be smelted in a blast furnace, as a sufficiently high temperature could not be

reached. The speaker said he knew of no difficulty in smelting magnetite ores in the blast furnace except increased cost and a greater expenditure of fuel when compared with more kindly ores. Prof. Daniels confirmed this statement.

Mr. Nicol Thompson intimated that British capitalists have satisfied themselves that the time is ripe for the establishment of a steel industry on the Pacific Coast, and thought it would be in British Columbia.

Mr. A. C. Gardie drew attention to the Copper River district in the North as it contained both ore and coal. If they could get a branch from the G.T.P. to bring out the material, a smelting plant might easily be established near Prince Rupert.

Mr. A. E. Haggen said if they wanted an industry established they should allow those interested to choose the most economical place to carry it on, no matter where it was in the province. Wilmot in his report had selected Union Bay, on Vancouver Island, as the most suitable place for all conditions, but failing that, he considered the vicinity of Vancouver as the next best location.

THE UNIONIZATION OF TECHNICAL MEN

Dr. William Turnbull described the formation and the objects of a number of societies in Britain and in the United States which had for their object the raising of the status of technical men, and the education of the general public to the claims of the technical men for consideration. He held that, under present conditions technical experts were not rewarded by any means in proportion to the usefulness of their labors. Still, their first object was service, and they did not want to adopt the trade union method of forcing concessions if they could be obtained in other ways. Between service to others and self-interest, he believed they could find some medium if they could all come together. Speaking of criticism of the B.C. Technical Association, he said: "If it does not suit you, come in and make it suit you."

Dr. Turnbull's remarks were heartily endorsed by Mr. Matheson, the local chairman of the Engineering Institute of Canada.

RESOLUTIONS

The following resolutions, submitted by the Resolutions Committee, were carried, after each one had been thoroughly discussed.

With regard to the resolution of appreciation of the services of Mr. H. Mortimer Lamb, for fifteen years Secretary of the Institute, it should be mentioned that Mr. Lamb made a most fitting reply. It was evident that he felt most acutely the necessity to sever his active carrying out of the secretarial duties, which is enforced by ill-health. Mr. Lamb's best testimonial is the status of the Institute today, which is in large measure a monument to his assiduous work and careful guidance.

In passing this resolution, the Institute did itself no less honour than it gave to Mr. Lamb.

Resolution Regarding Returned Soldiers as Prospectors

"That the Canadian Mining Institute again urge that some suitable plan be provided by the government for aid in prospecting by returned soldiers and that the council take such steps as may be necessary to place the plan before the government in order that it may become operative during the summer of 1920."

Formation of Canadian Association of Engineers Favored

"That the formation of a Canadian Association of Engineers for purposes of social service, mutual protection and legislation is desirable and in the last interests of the public and the profession."

Taxation of Gold Mines and Platinum

"That the council of the Canadian Mining Institute appoint a committee of five to act in conjunction with a committee appointed by the B. C. Chamber of Mines and other committees which may be appointed by other interested bodies for the purpose of collecting and arranging of data on the taxation of gold mines, and the presentation of this data along with recommendations regarding gold mine taxation to the British Columbia legislative assembly at the next session."

Unification of Mining Laws

"A further motion favored the unification of the mining laws of the various provinces of the Dominion, particularly insofar as they relate to the tenure of mining properties. This was carried unanimously."

Appreciation of Government's Policy in Forming Western Branches of the Geological Survey

"That the meeting place on record its appreciation of the policy of the Minister of Mines at Ottawa in organizing branches of the geological survey in British Columbia under Mr. Chas. Camsell, and in Alberta under Mr. Stewart, and expresses the conviction that this policy has been most beneficial to the development of the mineral resources of this province. That copies of this resolution be sent to the minister and officers in charge of the branches referred to."

Committee on Mining Machinery Tariffs to Confer with Minister of Finance

"A motion was carried favoring the importation of mining machinery free of duty, unless it could be shown that such machinery was made in Canada of a capacity and quality equal to that hitherto imported. A list of such machinery should be made in the presence of parties interested, so that they might have an opportunity of taking up the matter with any commission the Minister of Finance might appoint to deal with it."

Resolution of Appreciation of the Secretary

"That this meeting expresses its appreciation of the policy of the Council of the Canadian Mining Institute in arranging an annual meeting of members in Western Canada and takes advantage of this occasion to place on record its appreciation of the service which the secretary, Mr. Mortimer Lamb, during his fifteen years of service, has rendered not only to the institute but to the mining industry of Canada as a whole."

Various resolutions of thanks to those who had organized the meeting, and to those public bodies and the Vancouver Hotel, which had afforded hospitality to the visiting members, were passed. Special mention should be made of Dr. Hodges, who was Managing Secretary of the Meeting, to whose energetic organizing is largely due the unqualified success of the meeting.

Especial appreciation was recorded of the manner in which the Vancouver newspapers had reported the proceedings of the meeting. No more accurate and generous account of the proceedings of a technical society

have ever been given by metropolitan papers in Canada, and the thanks of the meeting to the newspapermen was in every way deserved.

With the passing of the foregoing resolutions the meeting finished its proceedings.

THE BANQUET

Notable as the guests of the Canadian Mining Institute at its annual dinners have been in the past, the Institute never was more signally honored than by the presence at the Vancouver dinner of General Sir Arthur Currie, who was accurately introduced to the members by Mr. Fowler, the Chairman as "Canada's greatest soldier."

General Currie said he felt at home at a dinner of the Institute, and that he was reminded of a dinner held



MR. R. C. WALLACE.

by Institute members in France, presided over by Col. John Penhale, and which was ended, as the custom called for, by the singing of "Drill ye tarriers" led by "Foghorn" Macdonald.

The General paid a remarkable tribute to Major Angus Davis, and spoke at length regarding the work of the tunnelling companies in France. He honored the assembled guests by relating some of the less well-known phases of the war.

During his remarks General Currie said that he had been quoted as being in favor of compulsory training, but he said that he was rather in favor of universal training. "The lesson taught by the war was the folly of unpreparedness, and if the policy had been right in the first place I don't believe the war would have taken place. The men who have come back would not have the

same cause for their dissatisfaction, for they went away at the call of the country when she was in danger, and they returned to find men who did not go and who had paid off their mortgages by means of the prosperity they acquired and are now going about in automobiles and with the soldiers' girls. They have good reason to be dissatisfied," said the speaker amid applause. "If the proper steps had been taken at the start of the war we would not have the present unrest and the lack of preparation is directly attributable to this dissatisfaction. I am one who believe in the League of Nations as a help to the peace of the world. I would like to see the lessons of the war carried out and a system by which people would get the worth of their money and enable them to play a part in the British Empire adopted. If Canada is to remain a part of the Empire she must play her part, and if she is not prepared to do this she had better drop out," added Sir Arthur.

Other speeches were made by the Minister of Mines, the Hon. William Sloan, by Senator Bostock, Mr. H. B. Stevens, M.P., and Major Brock.

this had not been taken advantage of, it would mean that on a 300-ton plant approximately \$675 a day, or about \$213,975 a year.

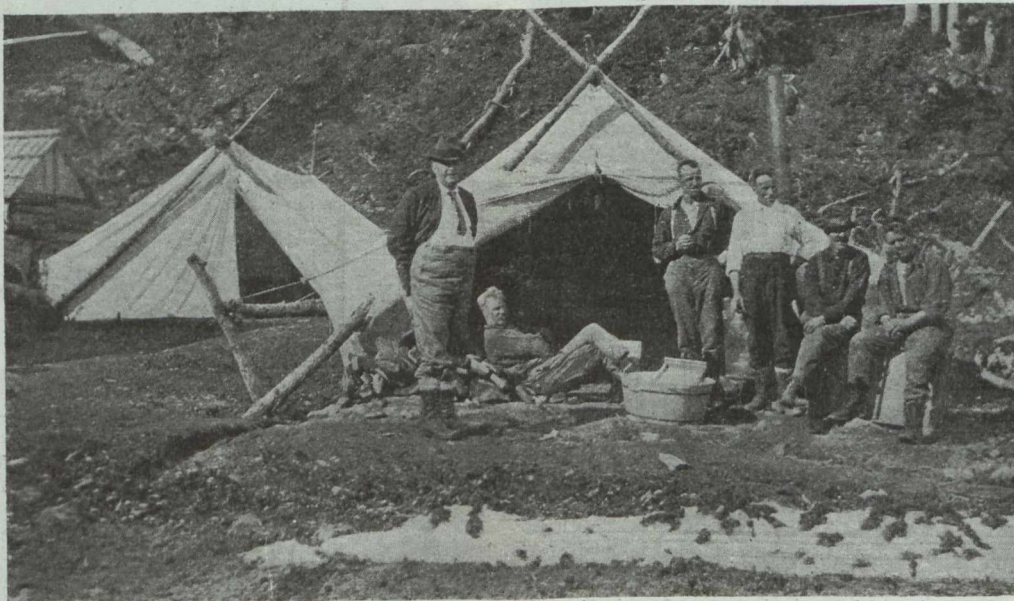
On the report of Dr. A. Stansfield, of McGill University it was found that the manufacture of high-class pig iron from the magnetites of the province by the electro-thermic method was in every way possible. Following the publication of this report, there had been many enquiries and the speaker said that New York investors were now considering the launching of an iron and steel industry. If water power could be secured at a reduced rate from that quoted in Mr. Stansfield's report, he had no doubt but that something would be done and done soon.

Mr. Sloan declared that personally he believed that there was room for a 250 to 300-ton plant in British Columbia now, the local market, apart from British Columbia's unrivalled position on the Coast, giving an uninterrupted and direct water connection.

In his closing remarks the minister dealt with the employment of aliens in the mines, saying that the large mining companies of the province had shown a disposition to view the position from the proper angle. He said in part:

Returned Men First.

"They recognize that, for the most part, the natural wealth of the province must be developed for the benefit of the coun-



Hon. WM. SLOAN, Minister of Mines for British Columbia.
Getting into touch with his constituency.

SPEECH OF THE MINISTER OF MINES

The Chairman introduced Mr. Sloan as "a real Minister of Mines," a dictum in which the guests appear to quite concur. Mr. Sloan spoke at length and with much grasp of the mining problems of the Province, which he has inspected at first hand during his term of office.

The Iron Ore Resources.

Speaking of the iron and steel industry in this province, Mr. Sloan informed his audience that the iron ores of the province were not confined entirely to the magnetites of the Coast, as this had been disproved by the discovery of a large deposit of hematite and limonite in the Whitewater basin, Bridge River, of the Lillooet district. The ore in this section consisted at a rough estimate according to the Provincial Government engineer, Mr. Brewer, of 50,000,000 tons of high-class quality. As soon as weather permitted the Dominion Government would send in Mr. Scholfield of the Dominion Government geological survey to determine the available ore in the new field.

Action Taken by B. C. Government to Encourage an Iron and Steel Industry.

The first step taken by the Provincial Government, the speaker said to develop the iron and steel industry was on his recommendation, the offering of a bonus of \$3 per pound on all pig-iron manufactured in the province from local ore. While

try and this can not be realized if British subjects, our Canadian boys who fought so nobly in Europe and have returned, are to be discriminated against in favor of Oriental or other alien labor. I feel, very strongly on this question. I feel that the time has come when we must take a definite stand, when we must formulate a policy that will forbid this kind of thing and from which we shall not deviate. We would be failing our returned men, on a question the right and wrong of which is clearly marked, if we permitted the employment of aliens in places that can and must be filled by men of our own race?"

Demand for Silver.

Pointing out that the more valuable the mineral or metal, the smaller in proportion became the freight as the case of gold and, in a lesser degree, silver, Mr. Sloan drew attention to the unprecedented demand for silver and the great opportunity that this situation presented to British Columbia. This province contained large, rich, undeveloped silver deposits which, with the metal at its present price, say \$1.20 an ounce, would pay good returns on capital invested.

"Among the many strange changes brought about by the war has been the wonderful increase in the value of silver," he said, "until to-day it has almost reached the sixteen-to-one parity with gold, and prominent economists assure us that the parity of \$1.30 an ounce is about assured for about at least five years to come, based on the inexorable law of supply and demand. Thus, what was refused by the law of nations have been effected by the war of nations, and what the silver producer hoped for in 1875 has been handed him in

1919, and this applies particularly to the present silver miners of British Columbia. I would advise them to produce to the limit."

The general opinion that British Columbia silver was almost exclusively produced from the galena (silver lead) ores was characterized by the speaker as incorrect, as the statistics of his department for 1918, showed that about 26 per cent of British Columbia silver was derived from copper areas carrying silver, so that his appeal was directed not only to the operator in galena, but as well to the copper operator.

"Just one more glance at figures before passing from this subject," said Mr. Sloan. "Records show that British Columbia's silver production in 1918 was 3,498,172 ounces. Now this proves that we have a long way to go if we get the share which this province should have of that 463,000,000 ounces for which the world will be looking for every year for some time, and which, at the present rate of output is unobtainable. Now mark you the silver producers of the world are going after that market. The deficit must be made up from new fields which have been little developed, and where can there be found a country with greater potentialities in this respect than British Columbia."

Provincial Output.

He pointed out that Canada's silver production in 1918 was 21,284,607 ounces, so that despite the riches of the province, it contributed a comparatively small proportion to the total. So that he could not be accused of being unappreciative of what was being done in development work in the province. Mr. Sloan pointed out the work that was under way in East and West Kootenay, in the Boundary country, in the Salmon River section of the Portland Canal district, as well as at Alice Arm. The development at the Premier mine he predicted would mean much for British Columbia. The Canadian Consolidated Mining and Smelting Company had announced its intention to establish a large concentration mill, probably at Rossland, and at Copper Mountain the Canada Copper Company was completing an exceedingly large development programme.

Silent Toast to the Late Capt. LeRoy

Major Brock, addressing his remarks to General Currie, paid an eloquent tribute to the late Capt. LeRoy, a devoted member of the C. M. Institute, who was, said Major Brock, "the finest company leader I have ever known." At Major Brock's request, the assembled company rose and drank a silent toast to Capt. LeRoy's memory, and the memory of those members of the Institute who also will not return from the Great War.

The dinner ended by some excellent fooling. Major Brock introduced himself as the President of the Pacific Coast Maritime Gold Recovery Company, Limited, explaining that he and his associates had discovered that the sodium atom contained 1,002 molecules, and by knocking off three molecules, they obtained gold—which the speaker gravely informed the meeting, had 999 molecules. By utilising the illimitable sodium content of the oceans the shareholders might hope for large financial returns. And so forth. The guests were duly impressed, and some of them are not yet quite sure whether there was not really something in the scheme. It would not be surprising to find that the reported discovery of the transmutation of metals by Dr. Rutherford is a rumor reflected from this little "stunt" of the grave and reverend seignors of the C. M. I.

Major Brock did his best to emulate "Foghorn" in leading the singing of the C. M. I. anthem, and his rendition of the word "perspoire" was worthy of County Cork. In view of the presence of ladies, Major Brock, with his well-known versatility, fittingly modified the reference to—well—shall we say, the protuberances of Hades!

So ended a gathering that was, as its promoters intended it should, successful and worth while in every way.—F. W. G.

REGISTRATIONS AT THE VANCOUVER MEETING OF THE CANADIAN MINING INSTITUTE.

Anderson, R. G., Mining Student, Fairview, B. C.
 Armstrong, E. E., Mining, Parkerville, B. C.
 Ayland, C. R., Mining Student, Victoria, B. C.
 Arderson, R. G., Mining Student, Fairview, B. C.
 Armstrong, W. H., Coal, Calgary, Alta.
 Archibald, E., Giant Powder, Traveller.
 Austin, P. H., Can. Expl., 913 Birks Building.
 Bain, A. S., Mgr. E. G. Prior & Co., Winch Building.
 Bonar, Robert, Mining, Wellington, Vancouver Island.
 Beel, H. G., Mining Student, Powell River, B. C.
 Beatty, T. J., Miner, 14 Broadway, East.
 Bell, W. S., Mining, Keefers, B. C.
 Banfield, W. P., Mining Student, 644 Bute Street.
 Bower, G. Mining, 25-11th Avenue, West.
 Breeze, Frank J., Miner, Stewart, B. C.
 Broughton, F. W., Mining and Assaying Student, Golden, B.C.
 Beiltz, E. D., Mining Student.
 Rajus, R. J., Student and Assayer.
 Bristol, C. F., Mechanical Engr., Sharon, Ont.
 Bacon, W. S., Mining Engr., 402-207 Hastings, W.
 Banks, E. G., Waihi Gold Mines, New Zealand.
 Bonnycastle, W. R., Hydro Electric Engr., Vancouver, B. C.
 Bullard, R., Mining Engr., 1570-11th West, Vancouver, B. C.
 Bruce, R. R., Mining, Windermere.
 Banks, C. A., Mining Engr., 5 Nelson Court, City, 3-Albans Rd. London, England.
 Carter, B. C., Mining Student, Lulu Island.
 Cartwright, C. E., Civil Engineer, 445 Granville.
 Clarke, T. A., Mining, 124 Broadway, West.
 Creelman, A. G., Contractor and Mine Owner, 1675 Laurier.
 Clowes, T. M., Mining Attorney, Mackenzie River Basin.
 Cameron, Alex., Mining, Barkerville, B. C., and Dawson, Y.T.
 Corwin, T. J., Mining, Merritt, B. C.
 Carleton, P. Browning, Gen. Supt. Britannia Beach.
 Campbell, Stuart C., Mining Broker, 1215 Standard Bank Bldg.
 Campbell-Johnson, R. C., Mining Engineer, Vancouver, B. C.
 Cagney, A. S., Engineer, Montreal (represents A. S. Peacock).
 Carry, Henry E. C., Civil Engineer, 1306 Cardero Street.
 Cartwell, F. E., Gen. Supply Co. of Canada, 736 Granville St.
 Cowan, Wm. Lbrman, Hotel Abbotsford.
 Creet, A. D., Civil Engineer, 409 Credit Foncier Building.
 Cue, T. G., Mining, Cue, Australia.
 Cunliffe, J., Coal Engineer, Burnaby, B. C.
 Comrie, Z. H., Assayer, University.
 Conway, E. J., Anyox, B. C., Mining Engineer.
 Campbell, E. C., Mining Engineer, Anyox, B. C.
 Campbell, C. R., Mining Engineer, Phoenix.
 Camsell, C., Geol. Survey Canada, Vancouver B. C.
 Duff-Stuart, Col. J., Mining, Seymour Street.
 Dolmage, V., Geol. Surv. Canada, Vancouver, B. C.
 Dickson, Jas., Insp. of Mines, Victoria, B. C.
 Daniels, Joseph, University of Washington, Seattle.
 Davidson, R., Mining Student, University.
 Davidson, J. R., Publicity Comm., 402 Pender West.
 Dixon, G. B., Mining Student, Vernon, B. C.
 Dowling, D. B., Geol. Survey, Ottawa.
 Dutcher, H. K., Engineer, 470 Granville Street.
 Dixon, G. B., Student, Victoria, B. C.
 Dawson, J. A. (D.), Mining Chemist, 326 Howe Street.
 Disney, J. H., Surveyor, Edmonds, B. C.
 Drummond, L. E., Mining Engineer, Edmonton, Alta.
 Ellbeck, Mining (Sheriff), Dawson, Y. T.
 Elridge, G. S., Assayer, 567, Hornby Street.
 Emmons, R. C., Student, B. C. University, Vancouver.
 Fowler, T. T., Mining Engineer, Riondel, B. C.
 Fitzherbert, C. H., Mining Engineer, care of Edwards Ames, Vancouver, B. C.
 Falcker, J., Mining, 1433 Barclay, Princess Royal Island.
 Foley, M. L., Mining, Hotel Vancouver.
 Fiddes, Robert, Mining, 159 Hastings, East.
 Floyd, Edward, Engineer, Hillcrest, Nanaimo.
 Freeland, P. B., Mining Engineer, Grand Forks.
 Faulds, Alex., Mining Engineer, 626 Hastings.
 Gold, Thomas, Mercury Miner, Cadboro Bay, B. C.
 Garde, A. C., Mining Engineer, Prince Rupert, B. C.
 Gill, J. E., Mining Student, Rivers Inlet, B. C.
 Graham, Chas., Mining Engineer, Cumberland, B. C.
 Graham, Joseph, Man. Dr. Fleeming Coal Co., Merritt, B. C.
 Graburn, N., Electrical Salesman, 1537 Robson.
 Hamilton, Col. Douglas, Consulting Engineer, 2254-2nd, West.
 Grimmitt, M. L., Mining Man, Mayor, Merritt, B. C.
 G. A. Gillis, M. E., University.
 Gardon, R., Mining, 737 Granville Street.
 Gilchrist, G. G., Mining Student, Britannia Beach.

- Gardiner, C. S., Mining Student.
 Gray, F. W., Editor, C. M. Journal (Sec. Iron and Steel Sec'n.)
 Galloway, J. D., Government Engineer, Victoria, B. C.
 Grubbe, R., Can. Expl., 718 Granville Street.
 Graham, Mining Inspector, Cumberland.
 Heidman, H. W., Mining, Anyox, B. C.
 Hooper, John, Mining, Barkerville, B. C.
 Hill, Wm. H. Chemist, 326 Haro Street, Vancouver, B. C.
 Hawkins, C. M., Mining, Min. Claims Dev. Co., 510 Hastings, W.
 Harris, H. A., Nugget Mine, Salmo, B. C.
 Hunt, W. V., Engineer, 510 Hastings, West.
 Hobart, Roy, Giant Powder, 704, 602 Hastings, West.
 Herring, J. P., Arthur M., Mining, 609 Queens Ave., New Westminster.
 Harsant, R. C. C., Mining, Granby, 718 Granville Street.
 Harpell, J. J., Publisher, Can. Mining Journal, Montreal.
 Hogger, E. A., Editor Mining Review, 426 Homer St. Vancouver.
 Holler, F. W., Mining, Surf Inlet.
 Honeyman, P. D. L., Mining Student, Sechelt, B. C.
 Hedley, R. R., M. E., Nicola, B. C.
 Heyer, B. E., Journalist, Vancouver
 Icke, H. A., Civil Engineer, Alcazar Hotel.
 Johnston, H. A., Canadian Expl., 913 Birks Building.
 Jarrett, Fred G., Mining, 27th and Yew St., N. Vancouver,
 (Mgr. A. E. M. I.)
 James, H. I., Mining Student, New Westminster.
 Jackson, J. A., Mining Student, Abbotsford, B. C.
 Kilburn, G., Mining Engineer, Victoria.
 Keen, J. P., M.E., Roseberry, B. C.
 Kingham, J. R., Mining Student, Victoria, B. C.
 Kirkland, R., Mining, 1525 6th Ave., West.
 Lea, E. H. Broker, 516-510 Hastings, West.
 Kerr, John, Mining Broker, 584 Richards.
 Kingham, J. R., Mining Student, Victoria.
 Lort, R. A., Arch't., 405 Credit Foncier Building.
 Lindston, A., Canadian Rockdrill, 517 Vancouver Blk., Vancouver.
 Lewis, Tom. B., Mine Owner, 3-5 Blemheim Court, Vancouver.
 Matheson, (Prof.) E. G., University, Vancouver Institute,
 Chairman.
 Moore, E. D., Mining Broker, Hotel Dufferin.
 McConville, John, Mining, Gold Point, B. C.
 MacKinnon, Archibald, Mine Owner, Dawson, 725 Broughton
 Street.
 MacKinnon, Donald, Mine Owner, Dawson, 725, Broughton St.
 McQueen, Donald W., Mining Student, Rossland, B. C.
 McKee, G. L., Inst. High Speed Steel Co., Rockaway, N. J.
 Matthews, John, Coal Engineer, Shaughnessy Mansions.
 McLaven, J. G., Mining, 1010, 207 Hastings, West.
 MacLean, J. T., M.E., 27 William St. New York, N. Y.
 LaMarque, E., Surveyor, 779 Bute Street.
 Larson, A. G., M.E., Spokane, Wash.
 Langley, A. G., M.E., Revelstoke.
 Lang, T. J., Student Assayer, Vancouver, Gen. Hospital.
 Lambert, N. D., Mining Student, Princeton.
 Law, Chas. E., Mining, Athabasca River.
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 Wallace, R. C., Govt., Le Pas, Man.
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Roof Control in Coal Mines

By JAMES ASHWORTH.

(Continued from page 904, issue 3 Dec. 1919.)

Mr. Rice has apparently concluded that "bump phenomena" are not related to gas outbursts, but result from the rigidity of the overlying rocks and the great weight of cover, and because the whole of the coal has not been taken out all the way from the outcrop, so as to allow the rocks to break down in successive slices". He has also "assumed" that the latest bumps were the result of "improper mining in 1907-1908 of the lower mine, viz., No. 2. In regard to Mr. Rice's report, the author of these notes would comment as follows. At the time of the "bumps" in No. 2, these were attributed to too small pillars having been left to support the roof and therefore it is probably correct to infer, that this is the IMPROPER mining referred to by Mr. Rice. Now if, as has been stated, the roof in No. 2 mine had in 1908 forced the small PILLARS into the pavement, and filled with fallen rock the spaces from which the coal had been extracted, the assumption of improper mining does not appear to have been proved (see Mr. Shanks paper on Bumps, C. Mining Institute Bulletin.) The great object of safe coal mining is, after extracting the coal, to make the roof fall and to bring it into close contact with the floor. The area in question was worked out earlier than 1908, and therefore it is not apparent or proved that the overlying strata up to No. 1 East of say 90 feet or less had not settled and compacted the roof in nine years, and if it had not, the fact would have been demonstrated in No. 1 East mine as soon as that area was reached. It has moreover been observed, that wherever No. 2 mine has been worked on the longwall system there have been no serious bumps, whereas under M. Rice's argument as to "improper" mining the results ought to have been worse than with so called pillars.

Mr. Rice's suggested "cure" for the bump malady is to drive six parallel roadways into the mine, three for the intake air and three for the return airways, and when these have been driven and only one fifteenth of the coal extracted, (only one fourth was extracted before), then the real getting of coal is to commence perhaps five miles perhaps ten miles inbye. There is no statement as to where this extraction is to commence nor is there any description as to how this extraction is to be safely accomplished.

The erection of very large ventilating fans, watering the roadways, double burned flue dust explosion barriers, electric safety lamps, etc. are in the category of prevention against firedamp explosions, which have never yet occurred from any recorded bump.

The question of profitable working is not directly taken into account, and therefore in view of the restrictions, it is possible that the working of the coal may incur a loss possibly in excess of its sale value, especially when a further cost is added for 100 feet bore holes in the face of every heading, seismographs etc., etc. The reason why such long bore holes should be suggested is not apparent, as high gas pressure is not given as one of the factors in the production of bumps, neither have bore holes been found to be an effective protection to mines which have produced

notable outbursts of gas, excepting in one case known to the writer, where the outbursts were from the floor and the floor was drilled to an underlying coal.

The special difficulties to be overcome in the Crows Nest Pass coalfield are in the summary stated to be,— "Unusual natural difficulties; coal is under heavy load; coal beds very gaseous; "bumps" not related to gas outbursts; overlying rocks are very rigid and there is a great weight of cover; too much coal extracted in advance mining; or not taken out completely from the outcrop; which would break the overlying rock in slices and prevent "bumps".

"Bumps" are believed to be caused by subsidence of roof in certain areas under rigid rocks, leaving a great unsupported span of rock stratum. Fig 6.

When one of these has given way it means the hammer like blow of thousands of tons of rock striking on the immediate roof or flexible stratum overlying the mine, which in its turn imparts the blow downwards, breaking timber, causing extensive falls in the mine and sending rock tremors through the strata."

Sketch showing M.G.S. Rice's Bump Theory

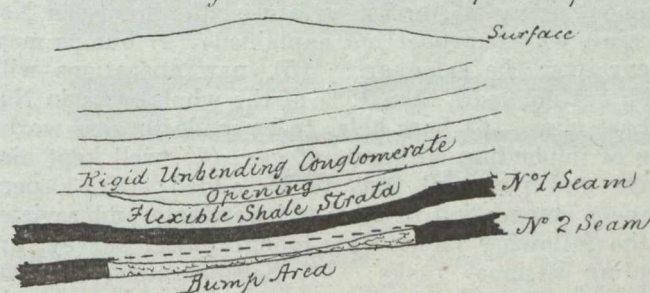


Fig. 6.

Mr. G. S. Rice's "Summary" was accompanied by "An Outline of Policy Adopted to Date by the Department of Mines",—in which it was announced that seismographs would be established to give warning of possible earth tremors. In reference to experimental methods of mining the coal the following method was to be adopted in No. 1 mine East, "A large pillar of solid ground will be left to support the bump area. Main entries will be driven through the temporary prohibited area, and driven on until a selected boundary is reached, when retreat will begin.....Under this plan less than 15% of the coal would be extracted in the advance."

To increase the safety of the mine as now at work and also in the future, the "rash" and "top coal" on the haulage and air ways is to be stripped down to "remove the danger of men being smothered by falls of this material simultaneously with bumps".

"In the gathering of samples of gas—the analyses have proved that the Crows Nest Pass Coal Field is the most gaseous field in the world."

The Gas Yield,——"The gas flow in the mines is not so much from the breaking of the coal at the face, but is largely governed by the area of the face exposed, so that it may be expected that the larger these mines

are made and numerous pillars standing, even though the tonnage actually produced daily may be small, yet large quantities of gas may be generated".

Gas Testing Machines,—the Department selected the Burrell Gas Detector which will detect from one tenth of one per cent up to three per cent.

It has since been discovered and accepted by the Department that a one quarter inch cap shown by the Wolf safety lamp represents 2½ per cent of Methane and indicates the point of danger at which the miners must be withdrawn. The necessity for this important decision of the Department of Mines for British Columbia has often been referred to by the present writer in his reports, because in past time the firebosses have had no rule to guide them, and have either reported "a little gas" or "small cap of gas" and infrequently "explosive gas," but there was no statutory "danger point".

Other points are also referred to but they do not affect the question of "Roof Control" to the same extent as do emissions of explosive gases, and need not therefore be discussed here.

Outstanding conclusions in Mr. Rice's report.

After reading the quotations, which are a little condensed as above, we find certain outstanding points, (1), that "Bumps" are not related to outbursts of explosive gases; (2), that "Bumps" are believed to be caused by the subsidence of roof under rigid rocks; which later break down in great masses; (3) that improper mining in No. 2 mine caused the bumps in No. 1 mine, why improper not explained; (4) bumps may recur over the same area; (5), new operations will take out not more than 15% of the whole seam in No. 1 East mine; (6) bore holes to be made to give warning of impending outbursts of gas; (7), well kept airways and powerful fans to be added; (8), a permanent commission to further investigate and review,—the following points (a), topographical survey, including surface cracks; (b), Seismographs, to give warning of earth movements; (c), carry on experimental work on methods of mining coal especially No. 1 bed; (d), to gather samples of gas, ascertain amount of and now held; (e), to continue to take samples of mine air for chemical test; (f), to drill long bore holes the practical effect of which would be to determine the rate at which it would be wise to allow the entries to advance, (g), the question of methane flow and pressure which is going to be of an increasingly serious nature in all the mines; (h), appointment of a Commissioner to determine how the collieries are to be laid out; (i), tunnels may be required six, eight, or ten miles in length. (G. S. Rice up to this point.

Recommendations in the Rice Report adopted by Dept. of Mines.

The Department of Mines agrees to (a), (b), (c), and states how this is to be carried out; but "when the seams are adapted to longwall mining, it is contemplated using this method of mining". (d), have proved that, the gas flow "is largely governed by the area of face exposed".....the larger these mines are made and numerous pillars standing, even though the tonnage may be small, yet large quantities of gas may be generated"; (j), have adopted a gas testing machine to detect small per centages of methane; (k), Edison Electric safety lamps, larger fans, intakes and returns for each mine; (i), double burned ashes and

watering to be applied to neutralize explosive conditions of the dust;—also rock dust barriers;—(m), has fixed a standard gas cap as the withdrawal point for miners; (n), that an interval of four hours should elapse between shifts; (this is now in force).

The "nether roof" not mentioned in departmental reports.

In summing up the foregoing notes on roof control, and the present position of the most important detail of the safe working of coal mines in the Fernie district of British Columbia, it is necessary to call attention to the fact that in no case has the "nether" roof been referred to, and it has apparently been assumed that the "roof" to be considered extends from the coal seam to the surface. If it were so, then the timbering in the mine must be assumed to be strong enough to resist the pressure of the whole thickness of the strata up to the surface, and not up to the "nether" roof only. In this connection it would appear that it is not definitely known to what height the roof movements extended when the workings were carried out on the longwall method of extraction. It is however necessary to ascertain the height at which this nether roof is operative especially in the No. 1 mine east at Coal Creek, when deciding on the size of the pillars to be left in the first working. As the matter now stands we are told that 85 per cent. of the whole coal seam is left in pillars to provide against "bumps". This again would lead us to conclude that the height of the nether roof is calculated to reach up to the ground surface.

In the case of No. 2 mine, and the so called "improper working of this mine (see Mr. Rice's report) has a pronounced effect on the No. 1 East mine above, it seems fair to assume that No. 1 East mine formed the nether roof for No. 2 mine, and therefore as the long wall method of working the latter mine has never produced any serious bumps, nor in any way injured the No. 1 East mine above, it would seem to be proved that it is a better and safer method of extracting the coal than any pillar and stall method of extraction depending on the size of the pillars.

Both mines have at times suffered from serious bumps, but only when worked on the pillar and stall system, consequently as shown by past experience No. 1 mine East would be less subject to bumps if it were worked on a modified long wall system by which 85 per cent of the coal might be extracted in the first working, and 15 per cent lost in small abandoned pillars which would easily crush and let down the roof.

Influence of Faults in causing "Bumps".

There is moreover another factor which has received no attention whatever, and which has probably more influence on bumps than any other factor in the problem, and that is faults. Thus, in No. 1 East mine there is a fault with a south west to east north east direction and crossing the creek is also found in old No. 1 mine. On the south side of the creek this faulting brings up the No. 2 mine to the level of No. 1 East; and in Nos. 2 and 3 mines, which are really the same seam, there is a fault about a mile inbye which runs in a north-westerly direction and joins the first fault referred to. Part of this fault line appears on the plan exhibit No. 4, marked "crumpled area", see Minister of Mines Report for 1917.

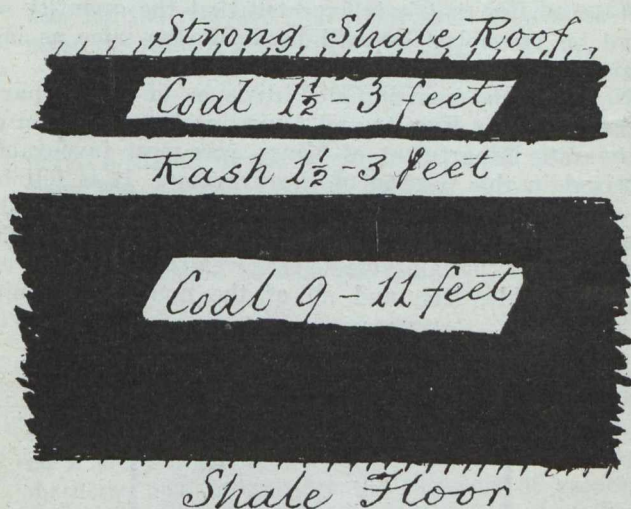
The influence of this faulting was more clearly demonstrated on the north side of the creek in old No. 1 mine, which corresponds with No. 1 East, here the

east north east fault was on the eastern side of the workings, a crumpled zone was on the north side, the outcrop of the same seam on the west side and an open side to the Creek on the south side of its workings. It is not surprising therefore to find that a break in the mountain took place from east to west and extended right up to the surface, and put an end to the bumps on that side of the Creek.

Possible effect of Rigid bed of Conglomerate above No. 1 Seam.

There is also another factor which requires to be taken into consideration, viz, a thick bed of Conglomerate above No. 1 mine. Doubtless this has an important influence on the breakage of the strata above the coal if bumps are to be prevented, which in plain

Section of N.º 1 East Seam of Coal

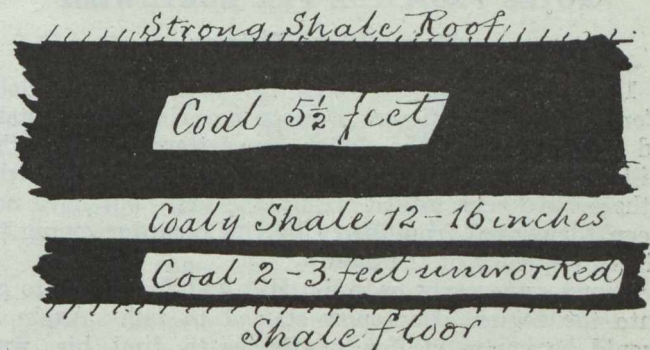


at many collieries where thick seams are being worked and with great success, as it may be applied to any method of working, and leave no goaves to fill, and remain filled with gas. In the Crows Nest Pass coalfield there would however be a part of the year when the intense frost might render its application difficult.

At the Dalzell Colliery in Scotland hydraulic stowage has been in regular use since 1911. Its adoption has rendered the safe working of the mines possible and practicable and nullified the risk due to the possible breakage of the roof strata which would bring down an influx of water.

In working a mine like the No. 1 East at Coal Creek, which in the official reports is classed as the most dangerous or gassy mine in the world, the importance of goaf stowage cannot be too earnestly considered, because even with the "approved" method of working set out in some detail in the British Columbia Minister of Mines Report, the area of surface of ex-

Section of N.º 2-3 Seam of Coal



English means that big pillars are a danger, because they prevent the roof breaking down in regular sequence as the coal is worked. When the roof breaks down in regular sequence the pressure on the coal seam is reduced and it is in its safest condition.

Emission of Firedamp.

As this article is on roof control the writer does not propose to consider the question of the production of firedamp in detail but as it has been proved that this is in proportion to the area of the exposed surface of the coal, it follows that the small pillar or no pillars at all will reduce the surface exposed per ton of coal extracted, and consequently reduce the volume of firedamp per ton, which has been stated to be equal to one ton of firedamp per 20 tons of coal gotten.

As regards the influence of occluded gas the evidence so far collected appears to prove that its pressure in the solid coal is not sufficient to add in any way to the mechanical effect of roof bumps, but it may have an influence where the bump is demonstrated by the lifting of the floor, as detailed in some of the occurrences at Coal Creek in No. 2 mine.

Hydraulic method of stowing the Goaf.

Roof control when considered as a means of avoiding the danger from bumps, would not be in any sense complete without a reference to the hydraulic method of stowing the goaf. This is in practical every day use

posed coal increases every day. This adds daily to the risks by requiring increased volume of air to sweep away the gas or reduce it down to say one per cent of methane in the main returns, and the goaf areas become reservoirs of either methane or firedamp. The approved plan shows no panel sections in the mine, and therefore a disaster in one district cannot be isolated from the rest of the mine.

Appointment of Commission Advocated.

Both the Premier and the Minister of Mines of the British Columbia Government have promised to appoint a Commission or Commissions to enquire into various questions affecting the safety of these mines in particular, but for some reason not publicly known this much to be desired enquiry has not yet commenced, —neither were there any additions bearing on this subject made to the 1911 Mines Regulation Act when the Act was revised in 1919.

For some length of time the miners have insisted on working only one coal-getting shift in each 24 hours, instead of two coal-getting, and one repairing shift, but it does not appear that this has lessened in any way the liability of the mine to "bumps", and so far as the emission of gas is concerned the reports, so far made public, do not how any material difference in the volume found in the main return air courses, and therefore it seems very desirable to have the opinion of a competent Commission at as early a date as possible.

(Concluded.)

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NOTES FROM THE FAR NORTHWEST

Yukon-Mayo District

120 applications have been forwarded to the Gold Commissioner's office at Dawson covering claims staked in Keno Hill. The claims are scattered all over the hill for a distance of four to eight miles. It is likely others have been staked within the area, but have not been forwarded from Mayo by the recorder owing to the infrequency of the mail.

Snows came early on Keno Hill and few cared to go into the region after snow started to fall. Again it would be impossible for a stranger to find his way about and to avoid staking over tops of other claims.

Within the last week or two many grants have been issued to men who staked claims on Keno and Extension during the summer and fall.

Large Hydraulic Plant Proposed for Tibet Creek, Alaska

Mr. George Adams, who has just gone South to Seattle, has been operating on Tibet Creek with two No. 6 Giants. The location is 107 miles Northeast of Telegraph Creek.

Hydraulic operations on this property are operated under most favorable natural conditions, with 400 feet head pressure and an unlimited supply of water. 600 feet of dumping ground is afforded by Tibet Creek Valley.

With 13 one-half mile leases, Mr. Adams is preparing four distinct hydraulic plants on the property, each using two No. 6 Giants. This will make the largest hydraulic plant on the Continent.

\$100,000 Cash for Pioneer Mine, B. C.

The Mining Corporation of Canada has purchased the Pioneer Mine at Cadwallader Creek, Lillooet, near the Pacific Great Eastern Railway. This announcement was made by Mr. W. R. P. Parker, Vice-President of the Corporation.

Development will begin on an enlarged basis. The Pioneer was sold by Adolphus Williams, K.C., and the two Ferguson Bros., who have owned and operated the mine for two years past. Considerable gold was taken out by them.

The Mining Corporation of Canada are becoming active in British Columbia. They at present have a proposition at Barkerville where they are developing some properties on the Mother Lode.

With engineers in many parts of the world Vice-President Parker's only regret is that they did not turn their attention to British Columbia much earlier.

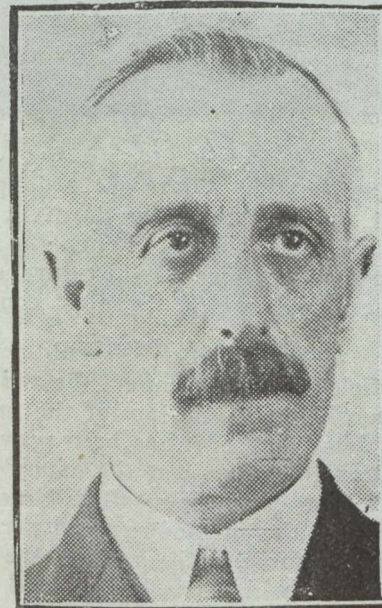
PORT ARTHUR NOTES

By J. J. O'CONNOR.

Port Arthur is not likely to suffer any inconvenience through the coal strike. The fuel situation at the lake front here is about normal. It is estimated that there is sufficient fuel on hand to meet all requirements, for railway, commercial and domestic purposes.

Importations of anthracite to Nov. 1st were 349,789 tons, as against 251,210 tons for the corresponding period in 1918. In storage here on Nov. 1st, 139,800 tons, on the same date last year there was 86,100 tons in store. The western movement has been greater than last season, so that it is expected that the quantity on hand on December 1st will be about the same as last year.

News of the contemplated division of the Department of Lands, Forests and Mines, and the creation of a separate Department of Mines, was most favourably received in this portion of the province. It is felt by all those who know him, that the Hon. Harry Mills, the new head of the Department, will do justice to the position, and that Ontario's great wealth in gold, silver, copper, nickel, iron and all of the non-metallic min-



HON. H. MILLS.

erals, are worthy of a separate Department, to which the Minister's whole attention may be devoted, something that hitherto was impossible, that, given the attention the Hon. Mr. Mills is certain to apply to it, the portfolio of Mines will soon rank as one of the first in the Cabinet, and that Ontario's premier industry will come into its own.

There is probably not sufficient anthracite on hand to supply all demands, but if shortage occurs, it may be easily made up by an increased use of bituminous coal.

The imports of the latter, to Nov. 1st were 396,427 tons, as against 288,419 tons to the same date in 1918. This refers to commercial coal only, and does not include railway fuel.

L. L. Stevens, M.E., and L. V. Stevens, M.E., of New York, spent about a fortnight in the examination and study of geological formations in this district. They covered a considerable portion of the older mining areas, and have become so interested in their investigations that it is their intention to return at an early date, and pursue this work.

The Lake of the Woods gold area is about to experience a revival of gold mining. The Mikado Mine, at Shoal Lake, has been sold to Chicago interests, headed by Robert Wachman, and will be put under operation at an early date. Some of the most spectacular gold ever seen in the northern country, was taken out of the early workings of this mine some years ago. The new owners are confident, that, with the improved methods now in use, for the recovery of values, they will be enabled to make the mine a good producer.

The Grace Gold Mine, and the Norwalk gold property, situated in the Michipicoten gold area, six miles from the Algoma Central Railway, have been sold to W. A. Burmeister, of Chicago, for \$80,000 cash. Both these properties are now under active operations, with a full equipment of men and plant.

The Foley Mine.—Another of the old-time gold properties of the Lake of the Woods gold region is about to be revived, and the activities of the late '90s repeated on a more modern and extensive scale. The improved methods, now in use, for the recovery of values, make it possible to operate mines at a profit today, that some years ago, could only be operated at a loss. The saving of values effected by the methods of today, more than offset the increased cost of labour, and all materials that enter into the problem of mining.

The "Foley Mine" situated on Shoal Lake, six miles south of the Canadian National Railway, (has been purchased by the Swedish-Canadian Gold Mining Co., Ltd., represented by J. A. Johson. The "Foley" comprises 191 acres, on which some thirty veins have been located. The company have also taken over several other mineral lands in North Western Ontario, and now own 955 acres in all.

The Swedish-Canadian Gold Mining Co. is capitalised at \$3,000,000 and has \$1,500,000 in the treasury.

There is a 20 stamp Fraser & Chalmers mill on the property, in good condition, together with camps and other necessary buildings to accommodate a staff of one hundred miners. The work of constructing an aerial tramway 1,600 feet in length, to convey the ore from the shaft to the mill, will be commenced Jan. 15th, 1920.

Two shafts have been sunk, 200 and 420 feet respectively. The 200 foot shaft will be used as a central shaft. Active mining operations will begin Jan. 15th. A drift will be run from the 200 foot shaft to connect with the 420 foot shaft, 1,200 feet to the north, this

drift will be on the vein, which has an average width of 8 feet.

A cyaniding plant will be installed that will effect a saving of 95 per cent of values, as against 55 per cent under the old operations.

This property has been examined and reported on by such well known mining engineers and geologists as the following: Walter G. Cole, Horace V. Winchell, mining geologist, Fredick Gleason Corning, E.M., J. H. Chewett, M.E., R. A. Kerr, M.E., J. A. Wood, and E. P. Rathbone, E.M., all of whom make favourable reports on the property, giving values, averaging from \$9.45 per ton, to \$24.00 per ton, on the various veins.

From 75 to 100 miners will be employed, under the superintendence of Mr. J. A. Johnson.

A good waggon road, with nominal grades, runs from the railway to the mine, on the south, it has water communication with Fort Frances, 42 miles to the westward. In the vicinity, there is ample water power for all mining purposes, of easy access and development.

TORONTO NOTES

Dr. M. Y. Williams on Oil Prospects in Northern Ontario

That oil exists in Canada's northland and that the indications are very promising is the conviction of Dr. M. Y. Williams of the Canadian Geological Survey, who has spent some time investigating the possibilities, and who is now preparing a report which will be published by the Ontario Department of Mines. The only public reference so far made to the oil discoveries is in a souvenir booklet prepared in connection with the visit of the Prince of Wales to the Cobalt district in which Dr. Williams gives some indication of the line his report will take. In an article dealing with the resources of the north the booklet says: "At some time in the not very distant future it is probable that the Temiskaming and Northern Ontario Railway will be extended to James Bay. In that event further mineral fields will become readily accessible. Fifty miles north of the Transcontinental Railway on the Mattagami River an extensive deposit of excellent fire and china clay has been located. Farther north there are prospective oil-bearing formations." Dr. Williams summarises his conclusions as follows:—

"Two formations known to occur south of Moose Factory may contain oil. These are the "Corniferous" limestone and the "Salina Shales." The rock structure is favorable. The Salina Shale is fairly deeply buried over considerable areas and probably retains any oil which it may originally have held. The "Corniferous" limestone is mainly stripped of its shale cover excepting over small areas where the shale occurs, principally in synclines, in structure not favorable for oil. Drilling in suitable areas alone can give final results. Black Huron shales occur near the foot of the Long Rapids on the Abitibi River. Thin beds of green clay shale occur in the black shale and some highly calcareous beds also occur. The latter are in part petroliferous. Samples of the oil shale have been submitted for examination but the results have not yet been reported."

Toronto People Interested in Radium Claims in Butt Township

The Mining Corporation of Canada have taken an option from Rinaldo McConnel on 74 acres of land in the Township of Butt, on the west side of Algonquin Park. The ultimate price is \$10,000, of which \$1,000 has been paid down. This property adjoins the large holdings of the Elliot Syndicate of Chicago, on which pitchblende and ore of radium have been discovered. The Bureau of Mines has reported that this ore is much richer in radium than any hitherto found in the United States. A number of Toronto people have also secured property in Butt. One of the largest holders is R. B. Rankin, of the Standard Bank Building. He and his associates have altogether 300 acres adjoining that on which the recent find has been made.

Canadian-American Resources, Limited—An Incorporation with Authorized Capital of Fifty Million Dollars

M. G. Hunt, barrister, Toronto, has announced the formation and incorporation in Ontario of a large concern known as the Canadian-American Resources, Limited, with an authorized capital of \$50,000,000. Both Canadian and American capitalists are interested, and it was stated that developments and production in min-

ing and oil was anticipated on both sides of the line. Already some properties in the United States are in view awaiting action by the new organization, but nothing definite has been secured in Canada as yet. It is expected that attention on this side the line, will centre chiefly in Northern Ontario. Engineers will be available to promptly investigate properties, and it is anticipated that operations will be carried on on a large scale. "It is the intention of the officers of the company," said Mr. Hunt, "to acquire only properties of value and have them operated by the company itself. The company will be equipped to carry on its own refining processes." The officers of the company are: President, Alexander Alexander, New York, President of the National Gum and Mica Company, and connected with several other large corporations; Vice-President, L. E. Denyes of Toronto, director of a number of corporations; Secretary, Dr. R. Gordon Bogart of Kingston, Ont., prominent in several Canadian industrial concerns; Treasurer, George B. Leighton, New York, President Lone Star Shipbuilding Company; directors, Col. Jacob Ruppert, New York financier and sportsman; George B. Gifford, for thirty years connected with the Standard Oil Company of New Jersey and manager of refining corporations; S. W. Jenckes, Sherbrooke, Que., a manufacturer with interests there and at St. Catharines.

Our Northern Ontario Letter

The quotation for silver has reached a point where the silver content of the silver coinage of Canada and the United States exceeds the face value of the piece. Between the silver coinage of these two countries and the melting pot is but one obstacle—the law. In the exercise of this, the writer believes, special legislation is necessary. It was at least found to be necessary in such countries as France, and finally in the British Isles.

Early in November your correspondent, in reviewing the opinion of metal authorities at the points of distribution, as well as the views of the silver producers, pointed out the advisability of anticipating a continued upward swing in quotations. As to this, however, the authorities at Ottawa appear to be letting matters drift. At the time of writing, the same is true of the United States.

The fact is that today the silver currency of these two countries is threatened with wholesale mutilation, and the governments appear to have failed to even warn the unscrupulous against such practice. As a result, a condition exists which might well cause a more or less rapid diminution of silver currency.

Silver is scarce, the price is high. Silver coins are flowing freely, they contain greater silver content than their face value. What may a great many silversmiths throughout this continent be expected to do?

Should quotations continue to advance, we may witness in Canada and the United States a great dearth and small change, and, perhaps, then witness the spectacle of the government bringing down legislation to suppress an evil that has already caused great inconvenience and much actual loss.

As a result of the high price of silver, and expectation of long-continued demand the scope of opera-

tions in the silver-bearing districts of Northern Ontario have taken on proportions greater than since production in Cobalt was at its maximum and the outlying districts were enjoying their short-lived boom.

So far this year some thirty mines in Cobalt have contributed to the output. Two Gowganda mines shipped ore, and one from South Lorrain. The indications appear to be that this total of 33 shippers so far this year will be added to somewhat in 1920. Not only is this indicated by the present activity and success in the Gowganda field, but may also prove to be true in Cobalt where some new small operations are commencing and where others are under contemplation.

According to recent advices, the Nipissing mine now has a surplus of some \$4,300,000, which is the highest in the company's history. Despite a decade and a half as a leading producer and having paid dividends approximating close to \$20,000,000, the Nipissing continues to produce at the rate of close to \$5,000,000 a year, and holds unchallenged the position of being the largest silver producing mine in the British Empire.

The negotiations between the Northern Customs Concentrator and the Chambers-Ferland, as mentioned recently in these columns, resulted successfully, the former company purchasing 25 acres of the Chambers-Ferland (lying to the east side of the railway.) The price is stated to have been in the vicinity of \$200,000.

J. P. Bickell, president of the Temiskamig Mining Company, paid a recent visit to the company's Cobalt mine, where considerable high grade ore is being de-

veloped. The physical condition of the mine is now such as to encourage the belief that dividend disbursements may be resumed at an early date. The treasury contains close to \$1,000,000.

The Beaver Consolidated continues to encounter substantial quantities of high grade ore. In this connection President F. L. Culver has issued the following statement:—

BEAVER.—Since mailing the annual report to the shareholders, we have had strenuous times in the North Country. The spirit of unrest, which is dominant throughout the world, has not escaped the North, and in the Cobalt Camp work was suspended for a period of seven weeks on account of labor difficulties. However, these difficulties have been satisfactorily adjusted, and operations were resumed about September 9th. Recently we have made discoveries of rich, high grade ore, which are most important—on the 200-, the 600-, and on the 700-foot levels. On the 200-foot level, working from a little slip, we found a vein carrying very rich ore running parallel to a drift which was very productive in the early days. As yet we have not determined the extent of this vein; assays, however, give us values as high as 4,000 ounces to the ton. On the 600-foot level a shoot of high-grade ore was encountered, which seems to be an off-shoot of one of the old ore-bearing veins. Work will soon be started to intercept this at the 700-foot level. On the 700-foot level on the No. 3 vein system we have encountered high-grade ore which has been opened up for a distance of 120 feet. This ore will run between 2,000 and 2,500 ounces to the ton. On the No. 5 vein system on the 700-foot level we have recently discovered a new shoot of ore in virgin ground which we have opened up for a distance of one place, about 10 feet long and $3\frac{1}{2}$ inches wide, the ore is about 40 feet. The vein is carrying good high-grade, and is estimated to run 10,000 ounces to the ton. This ore body has yet to be developed both above and below the 700-foot level. Since resuming operations we have shipped 79 tons of silver ore.

KIRKLAND LAKE.—At the property of the Kirkland Lake Gold Mining Company, in which the Beaver is so largely interested, labor conditions forced the suspensions of operations for a period of about 18 weeks, from June 12th to October 15th. When work was suspended the stopes on the 400-foot level were filled with ore ready for the mill. On the 500-foot level we had been changing the grade since resuming have this work completed, and are putting in chutes and breaking stopes. No stoping has been done on the 600- and 700-foot levels, although both drifts are in excellent ore, which is being raised to the mill. As soon as the drifts are carried a little farther, stopes will be broken in both of these levels. In future all ore between the shafts will be trammed on the 5th level, which will greatly reduce our operating costs. The mill is now operating at full capacity, treating 150 tons a day. Scarcity of good miners is hampering our underground operations somewhat, and we are forced to supplement the tonnage from the underground by raising from the surface dump. However, we believe it will not be long before our underground operations will be on a much larger scale.

A new company has been incorporated, known as the Hargraves Consolidated, for the purpose of taking over the old Hargraves and the Reliance, both properties situated in the Kerr Lake section of the Cobalt camp. A plan of operation is stated to be under consideration. The new company has an authorized capital of \$2,500,000 made up of 2,500,000 shares of the par value of \$1.00 each and with 1,800,000 shares issued.

The McKinley-Darragh has declared a regular 3 per cent dividend, payable January 1st. The disbursement will amount to \$67,428 and will make to total paid to date amount to \$5,686,735.

Diamond drilling operations have commenced on the Adanae property, one machine being employed to

drive a horizontal hole. The machine is working from a cross-cut at the 310 ft. level, the hole being drilled for the purpose of exploring the territory adjacent to the Gans property of the Temiskaming Mining Company. Other underground operations on the Adanae have been suspended.

Underground mining operations will shortly be under way at the Peterson Lake property, part of the workings having already been de-watered. On the part of the directorate and management there is manifest a tendency to regard the old Seneca lease as likely to yield further revenue. They point to the fact that at the time the rich Seneca vein was mined, a substantial quantity of low grade ore may have been passed up owing to the fact that at that time the price of silver averaged about 55 cents an ounce as against upwards of \$1.30 at the time of writing.

At the Temiskaming mine a considerable quantity of ore has been developed during the current year, and further profit has been carried to surplus which at the beginning of this year amounted to some \$900,000. The management, however, declares that the new ore shoots opened up are more or less patchy and their full importance cannot yet be estimated. Among not a few of the shareholders the present physical condition of the mine and the strong financial position may enable the directors to resume dividend disbursements early in 1920.

The Beaver Consolidated continues to mine substantial quantities of high grade ore at and above the 700-ft. level.

The Trethewey-Cobalt Company is meeting with success in the development of the Castle property in the Gowganda district. At the time of writing, the new shaft has reached a depth of 100 feet and a substantial shipment of high grade ore is being assembled ready for shipment. The consignment is expected to be sent out during the last half of December. At the beginning some 205 bags had been taken out, and this number was being added to at the rate of around ten bags daily. It is also learned that in the main workings at a depth of 400 feet some high grade ore has been encountered in a strong vein. The shipment will be the first from the Castle property.

The Reeves-Dobie at Gowganda is now operating its mill and producing at the rate of not for under \$1,000 every twenty-four hours. As yet this company has confined its effort to surface, not going below a depth of 100 feet. As to whether or not there is sufficient tonnage in sight to continue the present rate of output for a long period has not been announced.

The general outlook in the Gowganda district is quite favorable. The three producers, namely: The Miller Lake O'Brien with an established record of over \$1,000,000 annually, the Reeves-Dobie producing \$1,000 daily at least for the time being, and the Castle property to join the producing list this month, lends to the Gowganda area considerable importance. In addition to the producers, there are a number of

new operations under way with fair prospects of developing into shipping mines. Such properties include the following: The Walsh property, which adjoins the O'Brien on the South, and which is controlled by Jack Walsh of Montreal; the Miller Lake Silver Bullion, formerly held by interests who are associated with the Hudson Bay Mines, but now under the option to Montreal interests; the Eastern property situated on the East arm of Gowganda Lake, and which is said to be controlled by interests who are identified with the Eastman Kodak Company; the Collins property at Leroy Lake, as well as the Silver Bullion property in that district. In addition to the shipping mines, as well as the Silver Bullion property in that district. In addition to the shipping mines, and the large number of other active properties, there are a number of important deals pending. Among these might be mentioned the Everett property which adjoins the Castle and which is being secured by interests with whom is associated Sir Henry Pellatt of Toronto.

Everything considered, there appears to be reasonable assurance that the Gowganda area may serve to replace to some extent at least the natural decline in silver production in other centers.

In the South Lorrain area there are also signs of reviving interest. This week, according to a report from Toronto, J. M. Wood and Robert Josey, original stakers of the Keeley mine, have sold their Beaver Lake property, and work is to commence at an early date.

Cobalt Shipments of Silver Ore—No Bullion Shipped

During the week ended Nov. 28th, four Cobalt companies shipped an aggregate of four cars containing approximately 323,321 pounds of ore, as shown in the following summary:—

	Cars	Pounds
Buffalo	1	110,000
McKinley-Darragh	1	84,274
O'Brien	1	61,850
Hudson Bay	1	63,197
Totals	4	323,321

During this period it is interesting to note that no bullion shipments were made. The absence of bullion shipments is remarkable for the reason that the mines are all producing at full blast and the average price of silver during the week was the highest in Cobalt's history. The incident appears to indicate an expectation on the part of the mining companies that quotations for silver will advance to still higher levels.

During the week ending 6th December, shipments of ore from Cobalt amounted to only one car from the McKinley-Darragh, the consignment amounting to 108,145 pounds. The reason for the low shipments may be attributed to winter having set in, which always has a tendency to handicap shipment of crude ore. Another is the fact that an increasing quantity is being treated locally. From this date until spring, ore shipments may not be expected to be large, although the bullion shipped during that time will be heavy.

Following the sale of 25 acres of its property, the Chambers-Ferland has commenced development work on its remaining ground on the west side of the railway, at shaft No. 4. It is proposed to crosscut through that strip of territory lying between the LaRose and the Nipissing. The formation is favorable, being made up of a thick layer of conglomerate.

A number of veteran employes of the Buffalo Company have been presented with a purse of \$1,000 each as a mark of appreciation for service rendered while in the employ of the company. The Mining Corporation of Canada has now taken complete possession of the mine, following the purchase of the controlling interest a week or so ago.

As yet no decision has been rendered in connection with the legal points at issue between the opposing interests in the Bailey-Cobalt.

During the month of November the Kerr Lake mine produced 115,000 ounces of silver as compared with 112,000 ounces during October. The mine is maintaining its position of being the third largest silver producer in Canada.

The Mining Corporation of Canada in an official statement declares that it has been found advisable to not pay the regular quarterly dividend, ordinarily due this month, but expresses the belief that disbursements will continue early in the new year. The reason for this course is due to the company having purchased a 70 per cent interest in the Buffalo Mine as well as a lease on the Foster property. The official statement issued also deals with the fact that the company lost two and a half months' production owing to the last summer's labor strike. The indications are that the company will produce slightly under one and a quarter million ounces of silver during 1919.

The offer made by the Northern Customs Concentrator Company for the La Rose mine was not accepted, it is learned officially. The La Rose Company is understood to have not endeavored to sell its original holding, the offer being entirely voluntary on the part of the Northern Customs Company.

THE GOLD MINING CAMPS

Rapid improvement is taking place in the gold mining camps of Northern Ontario. On every hand a greater degree of activity is made manifest. While not a few industrial plants in other parts of this continent are curtailing operation due to the shortage of coal caused by the great coal strike which continued throughout the whole of the month of November, the mines of this country have been able to operate at desired capacity. This favorable situation may be attributed to the rigorous climatic conditions of the North where it is necessary to provide, months ahead, the required fuel in order to avoid the unsatisfactory delivery during the winter months. Your correspondent has followed progress in the gold mining camps of the north from the commencement of development. Reviewing the entire field there exists a greater degree of confidence than ever before in the North's history.

The number of men available is slowly but steadily increasing.

The Hollinger has succeeded in accumulating a surplus of around \$3,750,000 in addition to distributing a one per cent dividend \$246,000 every eight weeks. The McIntyre, in addition to paying an interim dividend of 5 per cent every four months is constantly adding to its surplus. The Dome, after being closed down and

without any surplus last spring, has declared a dividend of 2½ per cent payable January 15th next. These factors are all tending to lend greater stability to the degree of confidence placed in the leading mines.

The McIntyre-Porcupine is carrying on work on a scale more extensive than ever before. By spring a depth of over one-third of a mile will have been reached. The importance of this cannot be lost sight of. Values have increased accordingly as greater depth has been reached. What holds good at the McIntyre may reasonably be found to apply in a more or less general way to all the leading mines, in that the geological conditions peculiar to each bear marked resemblance.

The Dome is treating close to 30,000 tons of ore monthly. The mill has a rated capacity of 45,000 tons a month. Costs are said to average between \$3.50 and \$4 a ton, while the ore treated in recent months has averaged around \$8 a ton. These figures, of course, must be dealt with cautiously. First of all, \$8 a ton is above the average in the entire mine. Also, \$3.50 or \$4 a ton for costs is abnormal for the reason that the mill is only operating at two-thirds capacity. The fact appears to be, however, that operating at full blast that costs may reasonably be reduced to about \$2.75 a ton. This would compare with about \$2.50 prior to the war. Although costs of material and labor are a great deal higher at present the system of handling the ore is better, with the result that a cost of \$2.75 seems a fair estimate. This being so, it would appear that in treating an average grade of ore of about \$5.25 a ton, a net profit of \$2.50 a ton is indicated. Treating 40,000 tons with a mill with a possible capacity of 45,000 tons a month, the net profit would approximate \$100,000 a month, or \$1,200,000 a year, which would be equal to 30 per cent on the companies issued capital of 400,000 shares of the par value of \$10 each.

In connection with the Dome Extension, nothing of an official nature seems to be available. It is learned, however, that it is proposed to commence treating a substantial tonnage of Dome Extension ore in the Dome mill, the work to start some time this month.

The first half of 1920 is expected to be marked by the resumption of production three more important properties, namely: the Porcupine Crown, Porcupine V. N. T., and the Schumacher.

At a number of the smaller properties aggressive work will be carried on, that is at such properties as the Clifton-Porcupine, Porcupine-Keora, Gold Reef, Gold Centre, etc.

In the Kirkland Lake district, everything appears to be shaping up satisfactorily, and 1920 will probably record the heaviest production so far from that camp. The Kirkland Lake Gold Mines has recently encountered some very rich ore at a depth of 700 feet and the physical condition of the property is steadily strengthening. At the Wright-Hargreaves it is learned that with the arrival of spring the big new mill will be rushed to completion. The Tough-Oakes, it is learned officially, it is proposed to resume work in March, and by early summer the mill should be brought into operation.

At Boston Creek, a number of properties continue to be worked in an aggressive way. They include: the Miller Independence, Boston-McCrea, Peerless, Kennedy-Boston, Catherine Gold Mines, etc. Among the new operations soon to commence are the Ivanhoe-Boston and the McElroy-Hughes.

From the township of Skead prospectors are bringing encouraging reports, and the result of exploration work offers reasonable assurance that that area will be quite active during the coming year.

In the Fort Matabechan district, activity is increasing. Diamond drilling is to be carried on at least three different properties. At the Otisse the management is confident of bringing the mine to a profit-yielding basis—"Just how big it will be," said an official, "we do not know, but we are confident of success."

Special Correspondence

BRITISH COLUMBIA

The Coal Trade in the West

W. G. Gaunce, of Victoria, B. C., has been appointed fuel controller for British Columbia. This step was taken following the passage by the Dominion Government of an order-in-council prohibiting the export of coal except under license.

To obtain some idea of the condition in respect of the coal supply for domestic use, Mr. Gaunce has made inquiries at the collieries and in the different centres of the Province and finds that there is no prospect of anything approaching a serious shortage. Some weeks ago there was trouble in Kamloops, B. C., because of delay in shipments from Vancouver, B. C., but this has been overcome and the situation now is satisfactory.

What British Columbia coal can be spared is being shipped to the State of Washington, where there is a ready market. When it is proved that the local requirements have been cared for Mr. Gaunce does not hesitate to recommend that the companies be permitted to export. While the contributions from this side unquestionably are doing much to alleviate the shortage in Washington as a result of the strike, the demand there cannot be adequately supplied from this side of the line. It is not surprising, therefore, to learn that some of the mines on the American side are being operated to an extent by volunteers. One recent report is to the effect that a crew of civilians, few of whom had been underground before, went into a mine and is producing upwards of 70 tons a day.

The initiation of the federal policy in regard to licenses caused some difficulty and inconvenience among operators of small tug-boats which had been accustomed to coaling at any time fuel was required. This since has been overcome by giving such craft permission to go to the bunkers to replenish their supplies without complying with the formality of securing a license.

Mr. Thomas Graham, general superintendent of the Canadian Collieries (D), Ltd., in discussing the present condition in British Columbia in regard to the coal supply, makes the plea frequently heard that the consumer would do much to assist the producer by purchasing his winter fuel in the summer, or at least by getting over the habit of waiting until the first cold snap before placing his order. Mr. Graham described the position of the collieries as follows:

"The mines of Vancouver Island have a steady bunkering business with the steamship companies through summer and winter. A large portion of their output, however, is for domestic consumption. In order that both classes of consumers shall have a

steady supply, it is necessary to equalize the summer and winter output. If the householders neglect to stock coal during the summer for winter consumption it generally happens that a severe period of cold weather in the winter will create an unusual demand for coal and the mines cannot keep up with both their domestic and bunker orders. Then they are faced with the disagreeable situation of refusing coal to those shipping companies that have made it possible during the summer months to keep the mines operating and give employment to large numbers of men. This, of course, endangers future business from such a source. In order to keep miners employed steadily throughout the year it is necessary to have a steady demand all the time and this is the reason that for years the operators have been trying to induce people to buy their coal supply months in advance."

Mr. Graham stated that 1,300 men now are employed at the Cumberland mines.

In discussing progress in first aid and safety first appliances and training in connection with the coal mines of British Columbia, credit is given the Canadian Western Fuel Co. of Nanaimo as being the first concern of its kind to take up in this Province the training of its employes in first-aid and mine rescue work. It was the first company to voluntarily install mine rescue apparatus and training stations. This was done when T. R. Stockett, of Vancouver, was general manager, and Thos. Graham, now general superintendent of the Canadian Collieries (D), Ltd., was general superintendent of the company. As well, it was the first company to use seismographs in its mines, daily readings being taken to give warning of the possibility of explosions attending seismic disturbances. The Canadian Western Fuel Co. now has organized a First Aid and Mine Rescue Association with a membership of about 200. A meeting is held each Sunday morning at which a lecture is given or paper read on some branch of mine safety work followed by addresses by medical men on first aid. Following the inauguration of the work by the Western Fuel Company, the Provincial Government passed legislation requiring that mines be equipped with safety apparatus and that employes should be trained in its use. All important mines in the Provinces, therefore, now are so provided.

In giving evidence before the Alberta Provincial Coal Commission, at its closing session held recently at Edmonton, George H. Montgomery, an operator,

expressed the opinion that only British born should be allowed membership in any of the labor unions of Canada. Foreigners tended to be agitators. An amendment, he also contended, should be made to the eight-hour day law permitting overtime work and longer hours, should it be desired by the miners. He gave incidents in connection with his own experience to prove that miners frequently were willing to work overtime. O. E. Whiteside, manager of the Coleman Collieries, thought that the government should be asked to adjust the transportation difficulties. With satisfactory railroad service there was no reason why Alberta should not dominate the fuel market of Manitoba. J. R. Richards, inspector of mines, referred to the losses of coal in Alberta through the partial development of the fields. Some 43,000,000 tons had been lost through interruption of work in the mines since 1906.

Since the announcement of the Dominion Government's action with reference to the export of coal, it has been authoritatively stated that the coal of the Province of Alberta is not affected and that the collieries of that Province will be delighted to fill all orders possible coming from the other side of the line. It is pointed out, in this connection, that the mines of Alberta have an annual capacity of 13,000,000 tons and only 8,000,000 tons are used. Shipments accordingly are being made to the South. An order of 1,000 tons of steam coal for the industrial plants of Great Falls from the collieries of Lethbridge is one instance of this of which public notice was given.

METAL QUOTATIONS.

Fair prices for ingot metals in Montreal as at December 8th, 1919:—

	Per lb.
Electro copper	24c
Casting copper	23½c
Lead	8¼c
Tin	59c
Zinc	10½c
Antimony	11c
Aluminum	33c

Steel Bars	\$3.10
Plate	3.35

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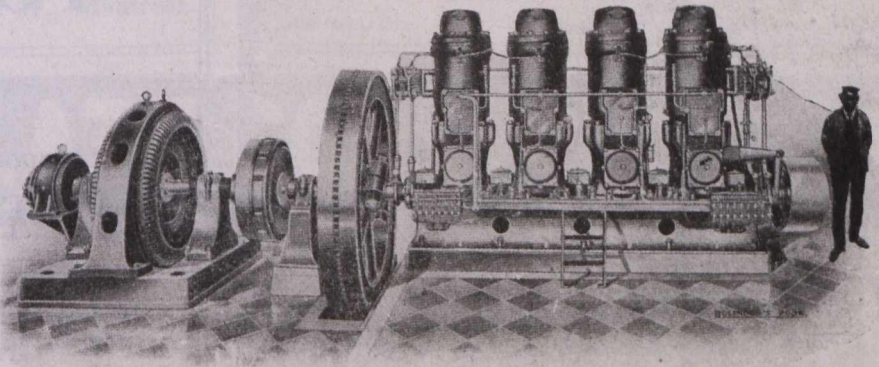
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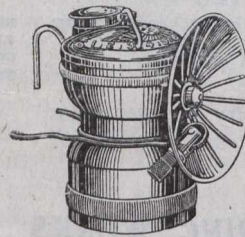


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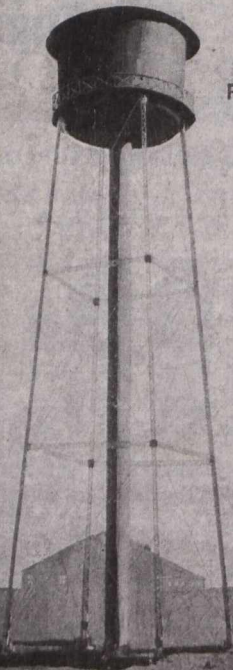
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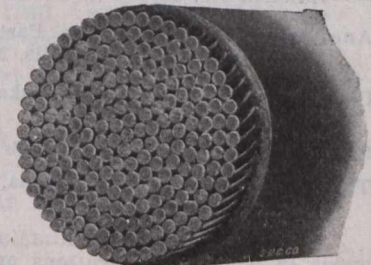
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Recent Publications

Iron Ore Occurrences in Canada, Vol. II. Compiled by E. Lindeman, M.E., and L. L. Bolton, M.A., B.Sc. Introductory by A. H. A. Robinson, B.A.Sc.

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

Building and Ornamental Stones of Canada (British Columbia). Vol. V., by W. A. Parks, Ph.D.

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 Mineral Production Reports, by J. McLeish, B.A.

The Coal-fields and Coal Industry of Eastern Canada, by F. W. Gray.

Occurrences and Testing of Foundry Moulding Sands. Bulletin No. 21, by L. H. Cole, B.Sc.

Analyses of Canadian Fuels. Parts I to V, by E. Stansfield, M.Sc., and J. H. H. Nicolls, M.Sc.

Clay Resources of Southern Saskatchewan, by N. B. Davis, M.A., B.Sc.

Summary Report of the Mines Branch, 1917.

The Mineral Springs of Canada. Part II., by R. T. Elworthy, B.Sc.

The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—

Fuel Testing Laboratory.—Testing value of Canadian fuels for steam raising and production of power gas; analyses, and other chemical and physical examinations of solid, liquid and gaseous fuels are also made.

Ore-Dressing Laboratory.—Testing of Canadian ores and minerals, to ascertain most economical methods of treatment.

Chemical Laboratory.—Analysing and assaying of all mineral substances and their manufactured products. Copies of schedules of fees, which are slightly in excess of those charged by private practitioners, may be had on application.

Ceramic Laboratory.—Equipment is such that complete physical tests on clays and shale of the Dominion can be made, to determine their value from an economic standpoint.

Structural Materials Laboratory.—Experimental work on sands, cements and limes is also undertaken.

Applications for reports and particulars relative to having investigations made in the several laboratories should be addressed to The Director, Mines Branch, Department of Mines, Ottawa.

GEOLOGICAL SURVEY

Recent Publications

Summary Report. The annual Summary Report of the Geological Survey is now printed in parts. Applicants should therefore, state what particular geologist's report is required, or what subjects they are interested in.

Memoir 95. Onaping Map-Area, by W. H. Collins.

Memoir 105. Amisk-Athapapuskow Lake district, by E. L. Bruce.

Memoir 107. Road materials in the vicinity of Regina, Saskatchewan, by L. Reinecke.

Memoir 108. The Mackenzie River basin, by Charles Cammell and Wyatt Malcolm.

Memoir 109. The Harricanaw-Turgeon basin, northern Quebec, by T. L. Tanton.

Memoir 110. Preliminary report on the economic geology of Hazelton district, British Columbia, by J. J. O'Neill.

Memoir 112. Geology of the district belt of southwestern Alberta, by J. S. Stewart.

Map 42A. Duncan sheet, Vancouver Island. Geology.

Map 44A. Sooke sheet, Vancouver Island. Geology.

Map 115A. Sheep river, Alberta. Topography.

Map 164A. St. John, New Brunswick. Topography.

Map 179A. Onaping; Sudbury and Timiskaming districts, Ont. Geology.

Map 183A. Harricanaw-Turgeon basin; Abitibi. Timiskaming and Pontiac, Que. Geology.

Map 1585. Mackenzie River basin. Geology.

Map 1680. Portions of Grenville, Harrington, Chatham and Wentworth townships, Argenteuil county, Quebec. Geology.

Maps 1697 and 1698. Explored routes in a belt traversed by the Canadian Northern Ontario railway,—in two sheets: Sheet 1 Gogama to Missonga, Sudbury district; Sheet 2 Oatland to Penhurst, Algoma district, Ontario.

Map 1690. Whiteburn Gold District, N.S. Geology.

Map 1702. Klotassin, Yukon Territory. Geology.

Map 1708. Bridge river, Lillooet district, B.C. Topography.

Map 1710. Bothwell-Thamesville oil region, Kent county, Ontario.

Map 1712. Foothills of Southern Alberta, St. Mary river to Hightwood river. Geology.

Map 1714. The Niagara peninsula, Ontario. Geology.

Map 1715. The Ontario peninsula. Geology.

Applicants for publications not listed above should mention the precise area concerning which information is desired.

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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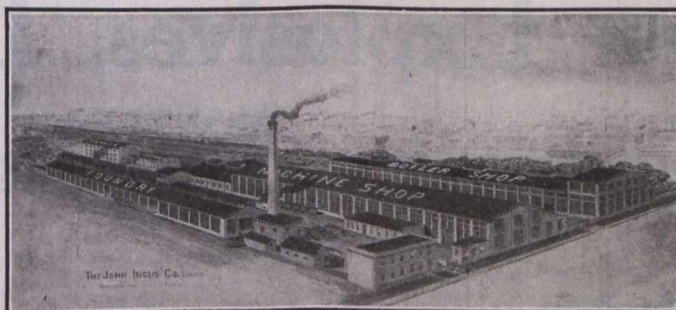
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Pennsylvania Smelting Co.
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Mine and Smelter Supply Co.

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Canadian Fairbanks-Morse Co., Ltd.
Hoyt Metal Co.

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Hull Iron & Steel Foundries, Ltd.

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Sullivan Machinery Co.
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Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.

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M. Beatty & Sons
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Engineers:

The Dorr Co.

Ferro-Alloys (all Classes):

Everitt & Co.

Feed Water Heaters:

MacGovern & Co.

Flood Lamps:

Northern Electric Co., Ltd.

Flourspar:

The Consolidated Mining & Smelting Co.
Everitt & Co.

Forges:

Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Forging:

M. Beatty & Sons
Canadian Foundries and Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.

Frogs:

Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore

Frequency Changers:

MacGovern & Co., Inc.

Furnaces—Assay:

Canadian Fairbanks-Morse Co., Ltd.
Lymans, Limited
Mine & Smelter Supply Co.

Fuse:

Canadian Explosives
Northern Canada Supply Co.

Gears (Cast):

Hull Iron & Steel Foundries, Ltd.
The Link-Belt Co.

Gears, Machine Cut:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Hamilton Gear & Machine Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Granulators:

Hardinge Conical Mill Co.

Grinding Wheels:

Canadian Fairbanks-Morse Co., Ltd.

Gold Refiners

Goldsmith Bros.

Canadian Miners' Buying Directory.—(Continued)

- Gold Trays:**
Canada Chicago Bridge & Iron Works
- Hose (Air Drill):**
Goodyear Tire & Rubber Co.
- Hose (Fire):**
Goodyear Tire & Rubber Co.
- Hose (Packings)**
Goodyear Tire & Rubber Co.
- Hose (Suction):**
Goodyear Tire & Rubber Co.
- Hose (Steam):**
Goodyear Tire & Rubber Co.
- Hose (Water):**
Goodyear Tire & Rubber Co.
- Hammer Rock Drills:**
Mussens, Limited
The Mine & Smelter Supply Co.
- Hangers and Cable:**
Standard Underground Cable Co. of Canada, Ltd.
- High Speed Steel:**
Canadian Fairbanks-Morse Co. Ltd.
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rockaway, N.J.
- High Speed Steel Twist Drills:**
Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
Northern Canada Supply Co.
- Hoists—Air, Electric and Steam:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Jones & Glassco
M. Beatty & Sons
Marsh Engineering Works
Northern Canada Supply Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
R. T. Gilman & Co.
Mussens, Limited
Link-Belt Co.
- Hoisting Engines:**
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
M. Beatty & Sons
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Mine & Smelter Supply Co.
- Hose:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co
- Hydraulic Machinery:**
Canadian Fairbanks-Morse Co., Ltd.
Hadfields, Limited
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Industrial Chemists:**
Hersey, M. & Co., Ltd.
- Ingot Copper:**
Canada Metal Co., Ltd.
Hoyt Metal Co.
- Insulating Compounds:**
Standard Underground Cable Co. of Canada, Ltd.
- Inspection and Testing:**
Dominion Engineering & Inspection Co.
- Inspectors:**
Hersey, M. & Co., Ltd.
- Jacks:**
Canadian Fairbanks-Morse Co., Ltd.
Can. Brakeshoe Co., Ltd.
Northern Canada Supply Co.
R. T. Gilman & Co.
Mussens, Limited
- Jack Screws:**
Canadian Foundries and Forgings, Ltd.
- Laboratory Machinery:**
Mine & Smelter Supply Co.
- Lamps—Acetylene:**
Dewar Manufacturing Co., Inc.
- Lamps—Carbide:**
Dewar Manufacturing Co., Inc.
- Lamps—Miners:**
Canada Carbide Company, Limited
Canadian Fairbanks-Morse Co., Ltd.
Dewar Manufacturing Co., Inc.
Northern Electric Co., Ltd.
Mussens, Limited
- Lamps:**
Dewar Manufacturing Co., Inc.
- Lead (Pig):**
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.
- Levels:**
C. L. Berger & Sons
- Locomotives (Steam, Compressed Air and Storage Steam):**
Canadian Fairbanks-Morse Co., Ltd.
H. K. Porter Company
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
- Link Belt**
Canadian Fairbanks-Morse Co. Ltd.
Northern Canada Supply Co.
Jones & Glassco
- Machinists:**
Burnett & Crampton
- Machinery—Repair Shop:**
Canadian Fairbanks-Morse Co., Ltd.
- Machine Shop Supplies:**
Canadian Fairbanks-Morse Co., Ltd.
- Magnesium Metal:**
Everitt & Co.
Hull Iron & Steel Foundries, Ltd.
- Manganese Steel:**
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Metal Marking Machinery:**
Canadian Fairbanks-Morse Co., Ltd.
- Metal Merchants:**
Henry Bath & Son
Geo. G. Blackwell, Sons & Co.
Coniagas Reduction Co.
Consolidated Mining & Smelting Co. of Canada
Canada Metal Co.
C. L. Constant Co.
Everitt & Co
- Metallurgical Engineers:**
The Dorr Co.
- Metallurgical Machinery:**
The Dorr Co.
- Metal Work, Heavy Plates:**
Canada Chicago Bridge & Iron Works
- Mica:**
Everitt & Co.
Diamond Drill Carbon Co.
- Mining Engineers:**
Hersey, M. Co., Ltd.
- Mining Drill Steel:**
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, N.J.
- Mining Requisites:**
Canadian Steel Foundries, Ltd.
Dominion Wire Rope Co., Ltd.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
- Mining Ropes:**
Dominion Wire Rope Co., Ltd.
- Mine Surveying Instruments:**
C. L. Berger & Sons
- Molybdenite:**
Everitt & Co.
- Monel Metal:**
International Nickel Co.
- Motors:**
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
MacGovern & Co.
The Wabi Iron Works

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Motor Generator Sets—A.C. and D.C.
MacGovern & Co.

Nails:
Canada Metal Co.

Nickel:
International Nickel Co.
Coniagas Reduction Co.
The Mond Nickel Co., Ltd.

Nickel Anodes:
The Mond Nickel Co., Ltd.

Nickel Salts:
The Mond Nickel Co., Ltd.

Nickel Sheets:
The Mond Nickel Co., Ltd.

Nickel Wire:
The Mond Nickel Co., Ltd.

Oil Analysts:
Constant, C. L. Co.

Ore Sacks:
Northern Canada Supply Co.

Ore Testing Works:
Ledoux & Co.
Can. Laboratories
Milton Hersey Co.
Campbell & Deyell
Hoyt Metal Co.

Ores and Metals—Buyers and Sellers of:
C. L. Constant Co.
Geo. G. Blackwell
Consolidated Mining and Smelting Co. of Canada
Oxford Copper Co.
Canada Metal Co.
Hoyt Metal Co.
Everitt & Co.
Pennsylvania Smelting Co.

Packing:
Canadian Fairbanks-Morse Co., Ltd.

Perforated Metals:
Northern Canada Supply Co.
Hendrick Mfg. Co.
Greening, B., Wire Co.

Pig Tin:
Canada Metal Co., Ltd.
Hoyt Metal Co.

Pig Lead:
Canada Metal Co., Ltd.
Hoyt Metal Co.
Pennsylvania Manufacturing Co.

Pipes:
Canadian Fairbanks-Morse Co., Ltd.
Canada Metal Co., Ltd.
Consolidated M. & S. Co.
Northern Canada Supply Co.
R. T. Gilman & Co.

Pipe Fittings:
Canadian Fairbanks-Morse Co., Ltd.

Pipe—Wood Stave:
Pacific Coast Pipe Co.
Mine & Smelter Supply Co.

Piston Rock Drills:
Mussens, Limited
Mine & Smelter Supply Co.

Plate Works:
John Inglis Co., Ltd.
Hendrick Mfg. Co.
The Wabi Iron Works
MacKinnon Steel Co., Ltd.

Platinum Refiners:
Goldsmith Bros.

Pneumatic Tools:
Canadian Ingersoll-Rand Co., Ltd.
Jones & Glassco
R. T. Gilman & Co.

Prospecting Mills and Machinery:
The Electric Steel & Metals Co.
E. J. Longyear Company
Standard Diamond Drill Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Pneumatic:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Sullivan Machinery Co.

Pumps—Steam:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
Northern Canada Supply Co.
Smart-Turner Machine Co.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Turbine:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Vacuum:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
The Wabi Iron Works

Pumps—Valves:
Canadian Fairbanks-Morse Co., Ltd.

Pulleys, Shafts and Hangings:
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
The Wabi Iron Works

Pulverizers—Laboratory:
Mine & Smelter Supply Co.
The Wabi Iron Works
Hardinge Conical Mill Co.

Pumps—Boiler Feed:
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
Mine & Smelter Supply Co.

Pumps—Centrifugal:
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
Smart-Turner Machine Co.
M. Beatty & Sons
Canadian Ingersoll-Rand Co., Ltd.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Diaphragm
The Dorr Company

Pumps—Electric
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
Smart-Turner Machine Co.

Pumps—Sand and Slime:
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Electric Steel & Metals Co.
The Wabi Iron Works
Smart-Turner Machine Co.

Quarrying Machinery:
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
Hadfields, Limited
Mussens, Limited
R. T. Gilman Co.

Rails:
Hadfields, Limited
John J. Gartshore
R. T. Gilman & Co.
Mussens, Limited

Railway Supplies:
Canadian Fairbanks-Morse Co., Ltd.

Refiners:
Goldsmith Bros.

Riddles:
Hendrick Mfg. Co.

Roofing:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Rope—Manilla:
Mussens, Limited

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

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Rope—Wire:

Allan, Whyte & Co.
Dominion Wire Rope Co., Ltd.
Greening, B. Wire Co.
Northern Canada Supply Co.
Mussens, Limited

Rolls—Crushing

Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
Hadfields, Limited
The Electric Steel & Metals Co.
Mussens, Limited
The Wabi Iron Works

Samplers:

Fraser & Chalmers of Canada, Ltd.
C. L. Constant Co.
Ledoux & Co.
Milton Hersey Co.
Thos. Heyes & Son
Mine & Smelter Supply Co.
Mussens, Limited

Scales—(all kinds):

Canadian Fairbanks-Morse Co., Ltd.

Screens:

Greening, B. Wire Co.
Hendrick Mfg. Co.
Mine & Smelter Supply Co.
Link-Belt Co.

Screens—Cross Patent Flanged Lip:

Hendrick Mfg. Co.

Screens—Perforated Metal:

Hendrick Mfg. Co.

Screens—Shaking:

Hendrick Mfg. Co.

Screens—Revolving:

Hendrick Mfg. Co.

Scheelite:

Everitt & Co.

Separators:

Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Mine & Smelter Supply Co.

Shaft Contractors:

Hendrick Mfg. Co.

Sheet Metal Work:

Hendrick Mfg. Co.

Sheets—Genuine Manganese Bronze:

Hendrick Mfg. Co.

Shoes and Dies:

Canadian Foundries and Forgings, Ltd.
H. A. Drury Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Shovels—Steam:

Canadian Foundries and Forgings, Ltd.
M. Beatty & Sons
R. T. Gilman & Co.

Silice:

Coniagas Reduction Co.

Saline Refiners:

Goldsmith Bros.

Smelters:

Goldsmith Bros.

Sledges:

Canada Foundries & Forgings, Ltd.

Smoke Stacks:

Hendrick Mfg. Co.
MacKinnon Steel Co., Ltd.
Marsh Engineering Works
The Wabi Iron Works

Special Machinery:

John Inglis Co., Ltd.

Spelter:

The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.

Sprockets:

Ltnk-Belt Co.

Spring Coil and Clips Electric:

Canadian Steel Foundries, Ltd.

Steel Barrels:

Smart-Turner Machine Co.
Fraser & Chalmers of Canada, Ltd.

Stamp Forgings:

Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.

Steel Castings:

Canadian Brakeshoe Co., Ltd.
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
The Wabi Iron Works

Steel Drills:

Canadian Fairbanks-Morse Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
The Electric Steel & Metals Co.
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited

Steel Drums:

Smart-Turner Machine Co.

Steel—Tool:

Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
N. S. Steel & Coal Co.
Hadfields, Limited
Swedish Steel & Importing Co., Ltd.

Structural Steel Work (Light):

Hendrick Mfg. Co.

Stone Breakers:

Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Sulphate of Copper:

The Mond Nickel Co., Ltd.
Coniagas Reduction Co.

Sulphate of Nickel:

The Mond Nickel Co., Ltd.

Surveying Instruments:

C. L. Berger

Switches and Switch Stand:

Canadian Steel Foundries, Ltd.
Mussens, Limited.

Switches and Turntables:

John J. Gartshore

Tables—Concentrating:

Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.

Tanks:

R. T. Gilman & Co.

Tanks—Acid:

Canadian Chicago Bridge & Iron Works

Tanks (Wooden):

Canadian Fairbanks-Morse Co., Ltd.
Gould, Shapley & Muir Co., Ltd.
Pacific Coast Pipe Co., Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tanks—Cyanide, Etc.:

Hendrick Mfg. Co.
Pacific Coast Pipe Co.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tanks—Steel:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Chicago Bridge & Iron Works
Marsh Engineering Works
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Hendrick Mfg. Co.
The Wabi Iron Works

Tanks—Oil Storage:

Canadian Chicago Bridge & Iron Works

Tanks (water) and Steel Towers:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Chicago Bridge & Iron Works
Gould, Shapley & Muir Co., Ltd.
MacKinnon Steel Co.
Mine & Smelter Supply Co.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

Tramway Points and Crossings:
Canadian Steel Foundries, Ltd.
Hadfields, Limited

Transits:
C. L. Berger & Sons

Transformers:
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
Northern Electric Co., Ltd.

Transmission Apparatus:
Jones & Glassco

Troughs (Conveyer):
Hendrick Manufacturing Co.

Trucks—Electric:
Canadian Fairbanks-Morse Co., Ltd.

Trucks—Hand:
Canadian Fairbanks-Morse Co., Ltd.

TTrucks:
Canadian Fairbanks-Morse Co., Ltd.

Tubs:
Hadfields, Limited

Tube Mills:
The Electric Steel & Metals Co.
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.

Tube Mill Balls:
Canada Foundries & Forgings, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Tube Mill Liners:
Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Turbines—Water Wheel:
MacGovern & Co.

Turbines—Steam:
Fraser & Chalmers of Canada, Ltd.
MacGovern & Co.

Twincones:
Canada Foundries & Forgings, Ltd.

Uranium:
Everitt & Co.

Welding—Rod and Flux:
Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.

Welding and Cutting—Oxy-Acetylene:
Prest-O-Lite Co. of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Imperial Brass Mfg. Co.

Wheels and Axles:
Canadian Steel Foundries, Ltd.
Hadfields, Limited
The Electric Steel & Metals Co.
The Wabi Iron Works

Winding Engines—Steam and Electric:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Wire:
Canada Wire & Cable Co., Ltd.
Greening, B. Wire Co.

Wire Rope:
R. T. Gilman & Co.
Dominion Wire Rope Co., Ltd.

Wire Cloth:
Northern Canada Supply Co.
Greening, B. Wire Co.

Wire (Bars and Insulated):
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Wolfram Ore:
Everitt & Co.

Woodworking Machinery:
Canadian Fairbanks-Morse Co., Ltd.

Zincium:
Everitt & Co.

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Consolidated Mining & Smelting Co.

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Canada Metal Co., Ltd.
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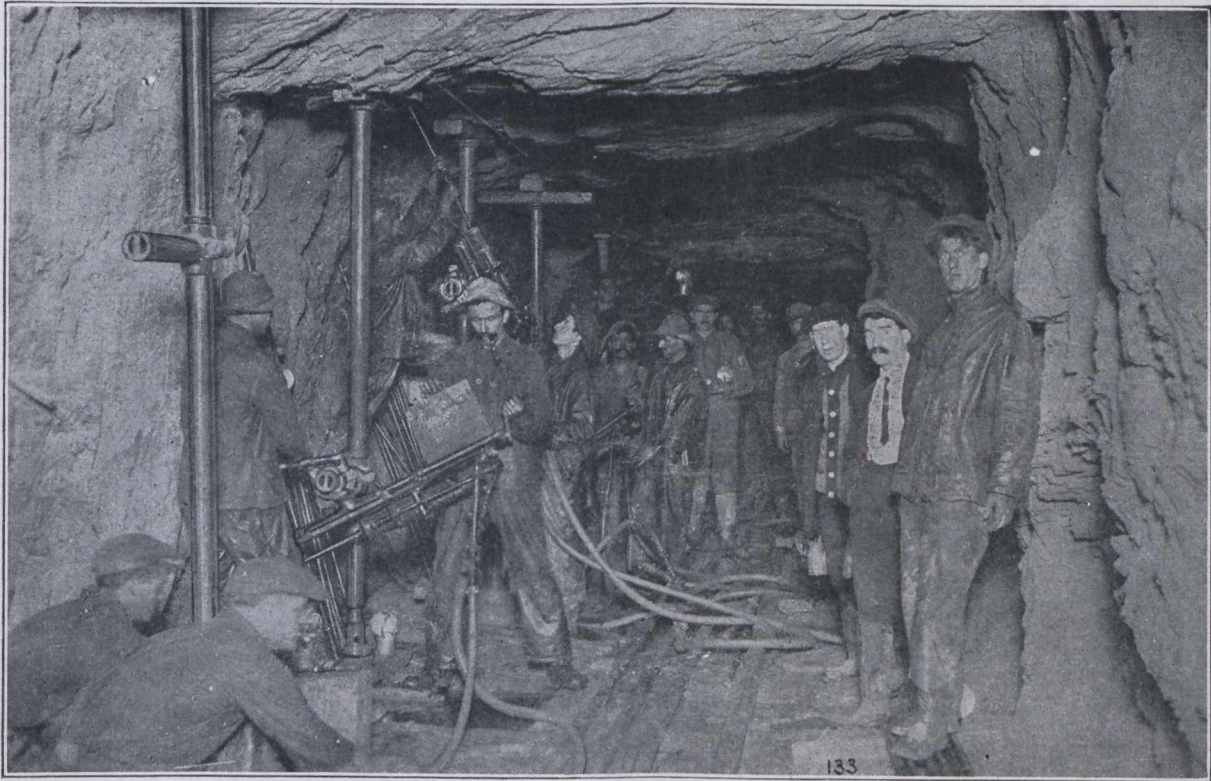
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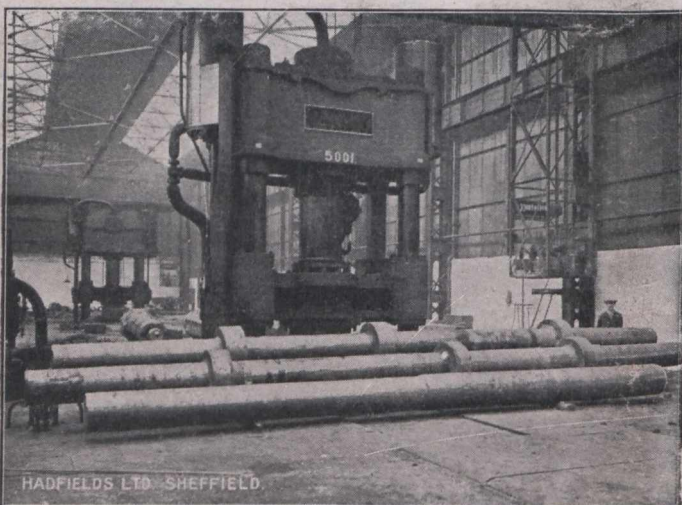
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