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VOL. XXXVI

TORONTO

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817 feet of 7'-6" x 10'-0" Tunnel in 30 Days,
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Name of Tunnel	- - - - -	Rogers Pass (West End Pioneer Heading)
Location	- - - - -	Glacier, British Columbia
Contractors	- - - - -	Foley Bros., Welch & Stewart
Character of Ground	- - - - -	Slate with small quartzite bands
Drills	- - - - -	3 Leyner-Ingersoll Water Drills on 9'-6" Cross Bar.

CREW

Drill Runners	- - - - -	3	Trackman	- - - - -	1
Drill Helpers	- - - - -	2	Pumpman	- - - - -	1
Muckers	- - - - -	8	Walking Foreman	- - - - -	1

Haulage was done by mules.

PERFORMANCE

Average Advance per day	- - - - -	27.84 feet
Best Day's Work (Nov. 27)	- - - - -	37 feet
Best Week's Work (Nov. 23 to 29)	- - - - -	220 feet
Total No. of Blasts	- - - - -	140
Rock Removed	- - - - -	2270 cubic yards

COMMENTS

The Superintendent, Mr. A. C. Dennis characterized the ground as follows—
"Driven down grade through rock that could not be broken over six feet per round."

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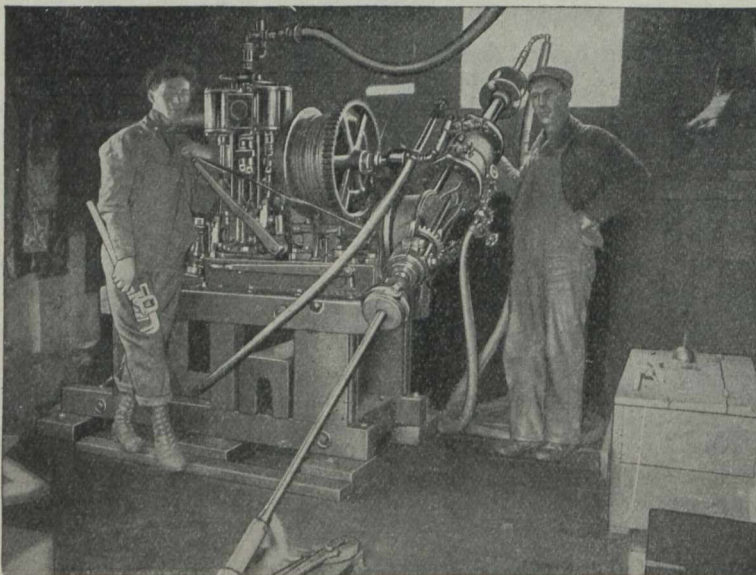
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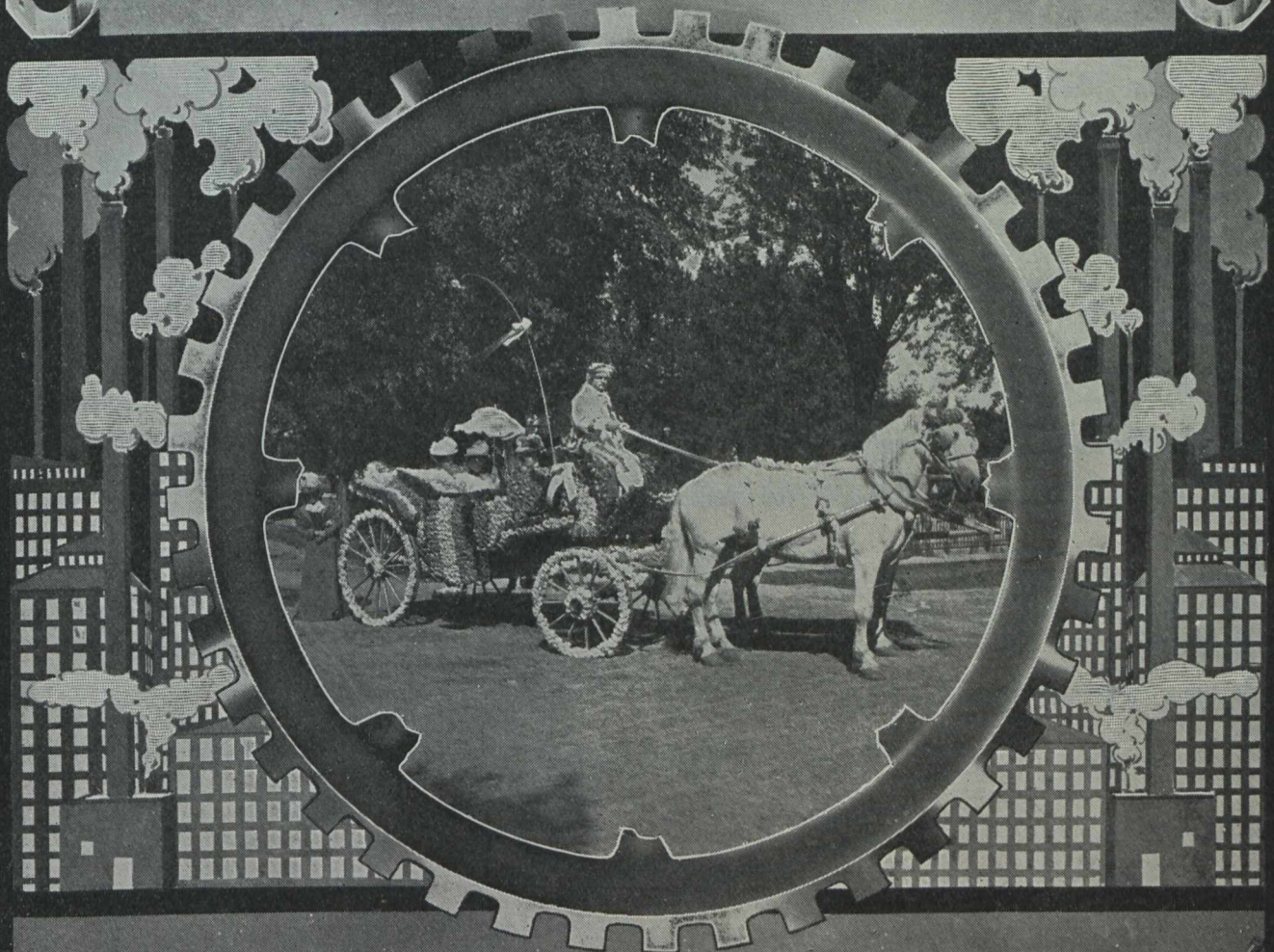
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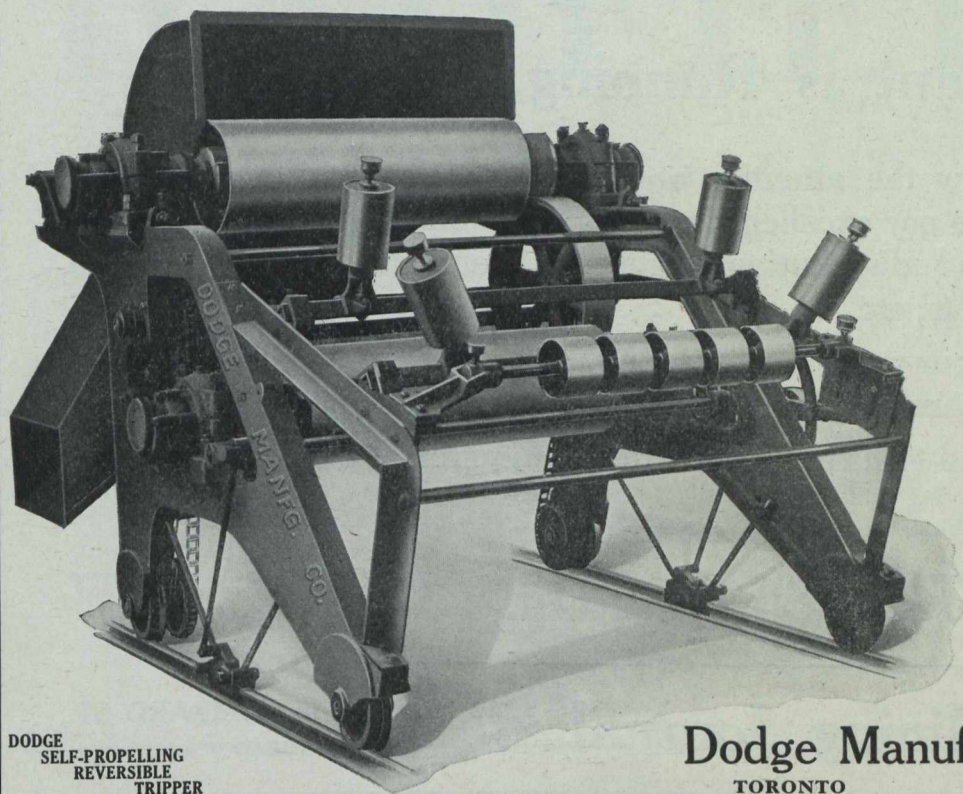
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Each application must be accompanied by a fee of \$5 which will be refunded if the rights applied for are not available, but not otherwise. A royalty shall be paid on the merchantable output of the mine at the rate of five cents per ton.

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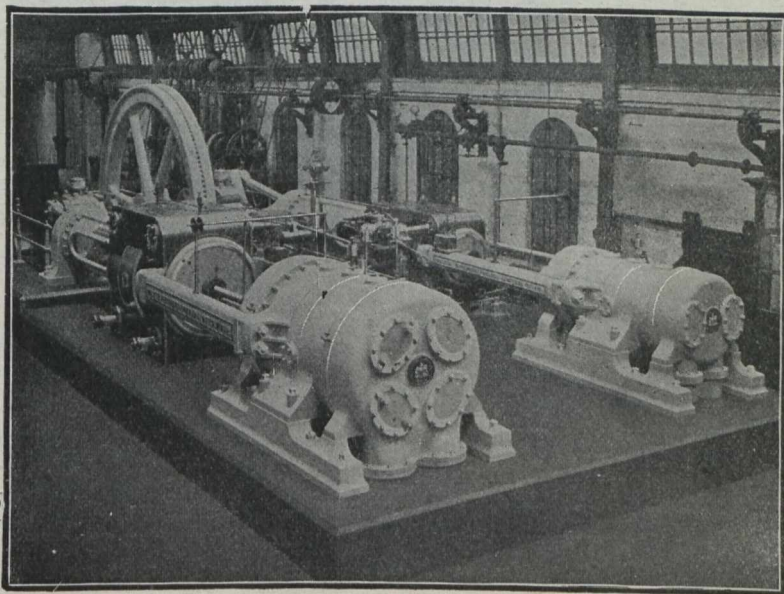
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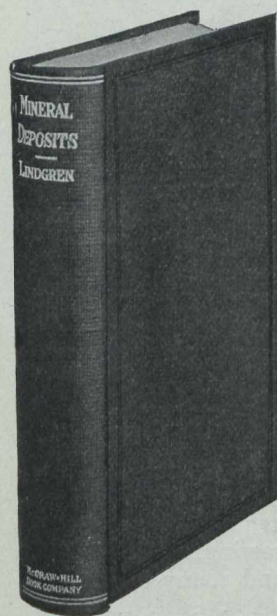


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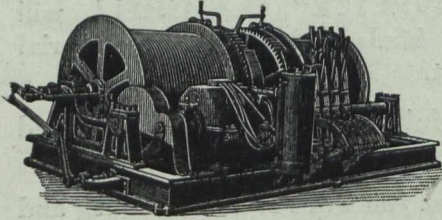
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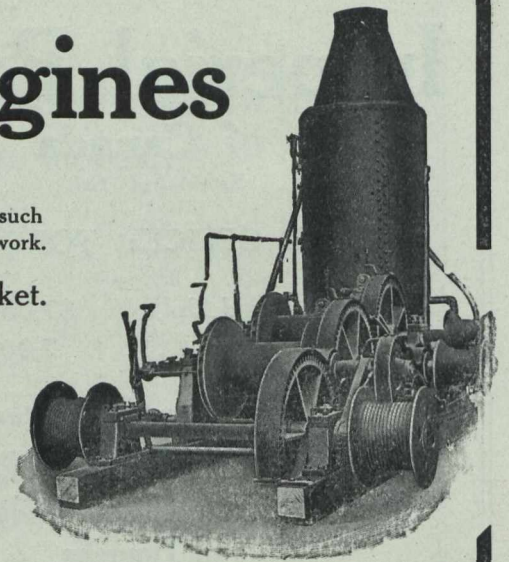
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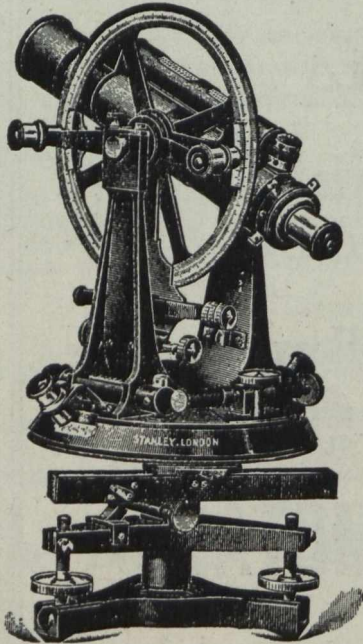
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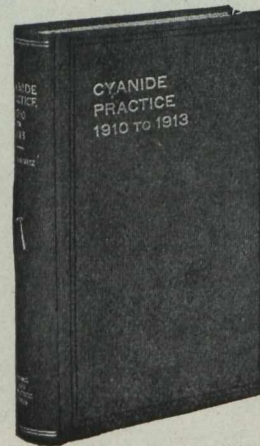
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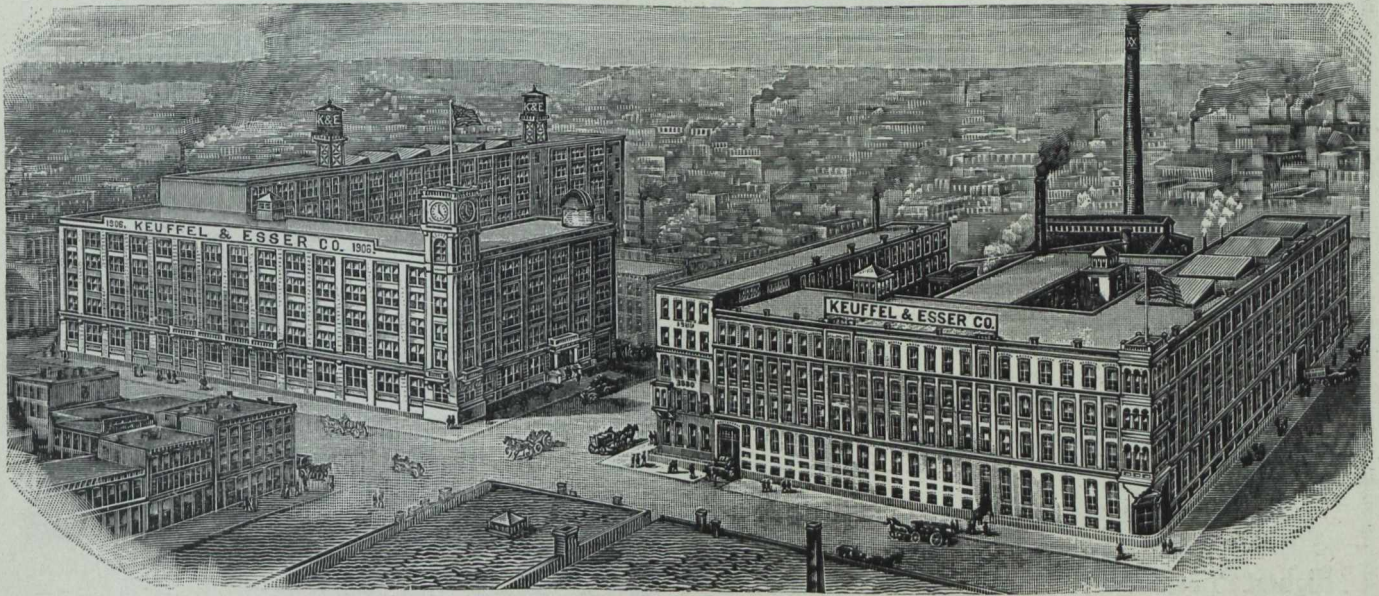
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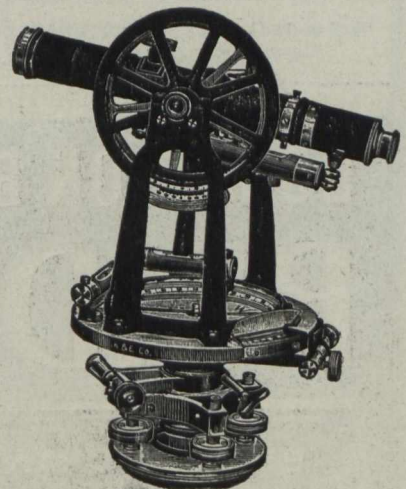
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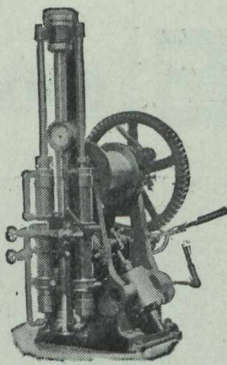
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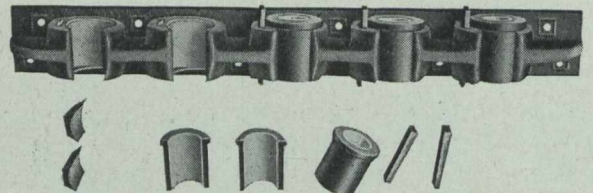
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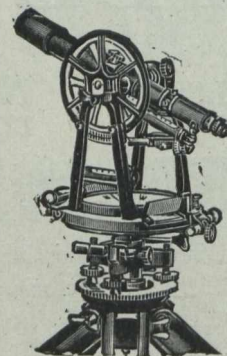
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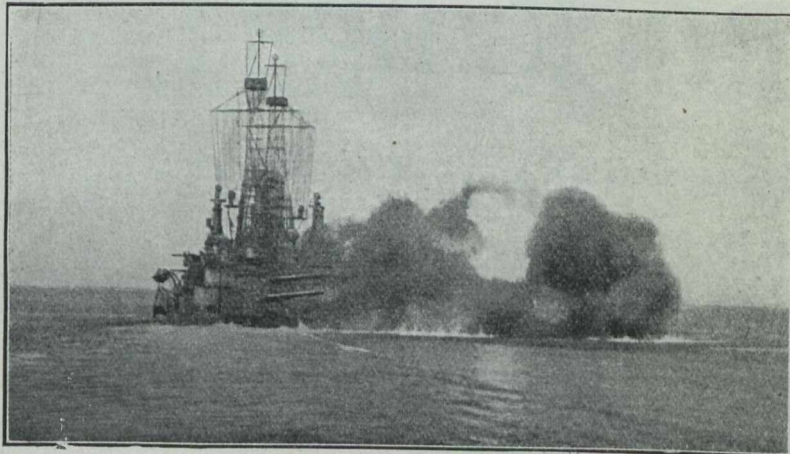
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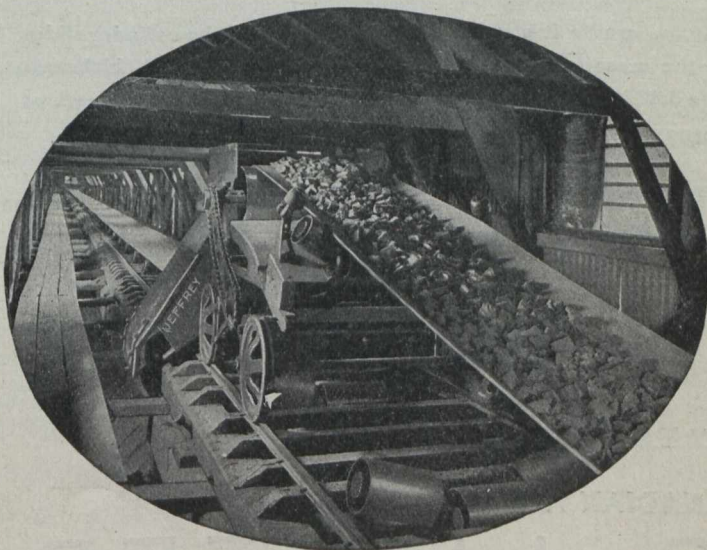
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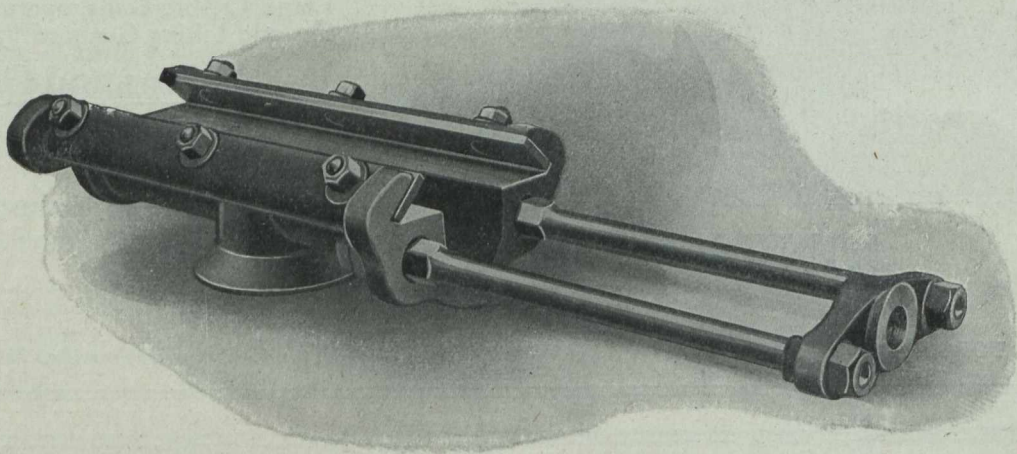
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THE CANADIAN MINING JOURNAL

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REGINALD E. HORE

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MR. GAMEY ON THE NICKEL QUESTION

In its issue of Friday, January 22, the Sudbury Mining News features an interview granted by Mr. R. R. Gamey, M.P.P., for Manitoulin, to the Toronto Telegram. The statement which appeals most to the News is the following:

"I would not allow one pound of nickel, either in the form of oxides or in the form of metal mattes, to be shipped out of this country, except to Great Britain. The British end of the Nickel Trust could supply the needs of the allies while the war lasts, and before the war ends, in fact inside of six months, Sudbury people could have a nickel refinery in operation in Ontario."

Mr. Gamey seems to be of the opinion that for some reason the Allies do not use much nickel in war time. We are under the impression that nickel is being used in considerable quantities by the Allies and friendly neutrals, while the German supply has been cut off.

Mr. Gamey says that in six months Sudbury people could have a nickel refinery in operation in Ontario. He evidently is anxious to pay a compliment to Sudbury people at the expense of Hamiltonians, for in the same interview he says:

"Nickel producing and refining is a very large business; it takes a good deal of money and a great deal of technical skill to accomplish anything. For example, a lot of Hamilton capitalists were allowed to buy properties and invest \$1,500,000; but the American company knew that the Hamilton people would never accomplish anything—they didn't have enough money or enough technical skill to accomplish anything."

Are the people of Sudbury to provide the necessary money and technical skill for Mr. Gamey's refinery? One might think so on reading the report of the interview.

What advantage would it be to the International Nickel Company to establish a refinery in Canada? We can imagine the directors saying that the company is in business to make money and that they would establish a refinery in Canada if they believed they would make more money by so doing. And apparently the directors do not think the change would be a profitable one.

But the directors have also to consider that the deposits are Canadian deposits and that Canadians expect every precaution to be taken to prevent nickel from reaching the enemy. And the directors must also consider that many Canadians believe that the refining should be done in Canada whether it costs the company more money or not. The business is profitable enough to stand some increase in cost of production. Mr. Gamey says in this connection:

"The deposits are so large, so rich, so much beyond world competition, the business so profitable, the metal so necessary to the world's requirements, that the companies are bound to refine here and give us at least the work in our own country. Imagine to-day when work is so scarce, men looking for employment, our nickel matte, the only nickel matte of any consequence in the world, going to a foreign country to help keep their workmen employed, we relying on foreign workmen to see that the nickel, without which Germany cannot continue the war many months, does not reach Germany. If it does not reach Germany then this same foreign workman is out of work; if it does reach Germany then he has work a-plenty making nickel."

This statement is less forceful than it might be if Mr. Gamey had omitted part of it. He seems to have the same desire that several of the newspapers have, of encouraging Canadians to believe that Germany alone uses nickel in large quantities. The fallacy of this statement has been pointed out in previous issues.

Regarding proposals to bonus a company establishing a refinery or to build a Government refinery here, Mr. Gamey says:

"No, I would not have our Government build a refinery here. I cannot imagine a worse sink-hole for money to be wasted in than a Government refinery.

"No, I would not give a dollar of bonus to any company to build a refinery."

SESEKINAKA

In this issue we publish an article by Mr. Charles Spearman on the rocks and ores of the Sesekinaka Lake district. Important discoveries were made last year, and when conditions are favorable there will doubtless be careful testing of some of the deposits. Mr. Spearman has made a careful study of the character of the rocks in this field, which has not yet been mapped in detail and concerning which there has been little published.

Sesekinaka is another field to the credit of the Ontario Government railway. If the deposits prove extensive the location on the railway will prove a boon. Their discovery having resulted from the building of the railway, it is but a fitting return that the working of the deposits should add to the railway's revenue.

The war has delayed the development of the Sesekinaka district. The coming summer should see renewed activity however.

CANADIAN MINING INSTITUTE

The proposal of Messrs. C. E. Smith and A. G. Burrows that the By-laws of the Canadian Mining Institute be amended so that the several Provinces will be represented according to membership, is one which deserves the serious attention of members. There are many things in favor of the present system; but much might be said in favor of the proposed amendment. We will be pleased to publish letters on this subject, and we invite our readers to state their views.

EDITORIAL NOTES

According to the Toronto World of January 26th, the American company controlling the Canadian Copper Co. began to double the output at Sudbury as soon as the war began. This will be news to Sudbury people. The World would make a better impression if it paid more attention to facts.

In the same issue the World says of Porcupine Vipond: "It is rumored that the net earnings will be at the rate of \$20,000 per month for the year just closed." Porcupine Vipond during the greater part of the year was not producing at all. Additions were made to the plant during the summer and good results were obtained in the last few months of the year. But the profit did not average \$20,000 per month, as our readers are well aware.

Reports indicate that an important ore body is being opened up at the Temiskaming silver mine. The company has had more ups and downs than most of the Cobalt companies, the ore bodies being mostly small, though rich.

The Porcupine Crown company has had many reasons to fear that the workings at depth would not be very profitable. Recent developments, however, have improved prospects greatly.

Considerable mystery surrounds the explosion in one of the small mines at Fernie on January 2nd. It is said that no one was in the mine when the explosion occurred. The results of the investigation now under way will be learned with interest.

Among the papers to be presented at the Toronto meeting of the Canadian Mining Institute in March is one by Mr. E. L. Bruce on the Beaver Lake Gold District, Saskatchewan. There have been interesting developments in this field during the past year. Some account of the district was given in an article by Mr. Bruce, published in our August 1st issue.

The dissolution of the Copper Producers' Association removes an anomaly. The Association published monthly statements of stocks on hand; but could not prevail upon the consumers to issue similar statements of their stocks or requirements. Such a one-sided exposure of vital statistics must have been made at considerable sacrifice. The consumers were given the service for several years and failed to make any return.

The price of copper has for several weeks been steadily improving. The drastic cut in production made by American copper mining companies last August has had the desired effect. If production had been maintained at normal, the price would have fallen so low that profits for most of the companies would have been impossible.

Now that a fair price is being obtained it is expected that any increase in demand will be met by increase in production. It is said that American companies are now making only about two-thirds of their normal output. Increase in production will be welcome news for the copper mining districts.

Mr. Bryan's letter dealing with contraband makes clear the United States Government's position with reference to copper. In future American companies will have little ground for complaint if cargoes consigned directly or indirectly to Germany are seized.

CORRESPONDENCE

CENTRIFUGAL AIR COMPRESSORS

To the Editor of the Canadian Mining Journal:

Sir,—In the issue of Dec. 1st, 1914, which has just come to my notice, Mr. A. Willcocks made some interesting comments on extracts from my bulletin on "Centrifugal Compressors," which you published on Oct. 15th. I am sorry the entire bulletin was not published, as it would have probably answered some of the questions raised by Mr. Willcocks.

I agree to the larger part of what he says. I, however, call attention to the fact that the compressed air remaining in the clearance spaces of the cylinder does not return to the piston, in expanding, the same power that it required for its initial compression, and that the difference between the power required for compression and that recovered by its expansion is lost. I also call attention to the fact that when high volumetric efficiencies are obtained by the method of creating high inlet velocities of air, the power required to create this high air velocity is considerable. In other words, a more efficient reciprocating compressor can be built with moderate volumetric efficiencies than with volumetric efficiencies of 95 per cent. and above.

As Mr. Willcocks states, the final and definite basis of comparison should be the amount of steam necessary to compress 100 cu. ft. of fresh air under definite conditions—that is, steam pressure, superheat or moisture, vacuum and total quantity of free air handled, and pressure against which it is delivered. The trouble, however, with this method of comparison is that although such figures can be given accurately for a centrifugal compressor (because all these quantities can be carefully measured by standard methods), some of these quantities cannot be measured in a reciprocating compressor. It is not possible to measure the amount of free air delivered by a reciprocating compressor, nor is it possible to accurately determine the pressure of the compressed air. The reciprocating compressor causes a fluctuation of pressure in the discharge pipe. The mean pressure does not represent the correct averaged pressure of the discharged air. It is also not possible to measure the amount of compressed air discharged, on account of the pulsating nature of the discharge. The air discharged from a centrifugal compressor can be measured by discharging the same through a calibrated orifice and, as the flow and pressure are kept absolutely steady, accurate readings can be taken.

Engineers have tried to do this with reciprocating compressors; but no accurate results can be obtained.

The best possible solution would be to have a reciprocating compressor discharge into a large calibrated gas tank, but the size of the tank necessary prohibits such an experiment. The next best way of comparing the amount of air delivered by a centrifugal compressor to that of a reciprocating compressor of the same rating would be to note its effects when doing the same work, as, for instance, blowing a cupola or blast furnace. This has been carefully noted for several years at many installations, and the general conclusions reached indicate that there is considerable difference between the displacement rating of a reciprocating compressor and the actual air delivered by it. With a centrifugal compressor it takes a much smaller volume of actual free air to perform the same work as is performed by a reciprocating compressor of a certain rating. When the reciprocating compressor is new, and all the valves are tight, volumetric efficiencies of about 85 to 90 per cent. are most common. When the reciprocating compressor has been in service for a short time only, this volumetric efficiency is decreased, due chiefly to wear of parts. Most guarantees for steam consumption on steam engine driven reciprocating compressors are based on the indicated number of pounds of steam used in the engine, to the number of cubic foot displacement air delivered. This is sometimes accompanied by a statement of volumetric efficiency. The guarantees on a steam driven centrifugal compressor are based on the number of pounds of actual steam used for every 100 cu. ft. of free air delivered. In order to compare the two, the customer must assume a volumetric efficiency, and must also assume the ratio between actual steam supplied to an engine to that which is shown on its indicator diagram.

For a confirmation of the above, I would like to refer to a paper by Mr. F. G. Cutler, of the Tennessee Coal and Iron Co., read recently before the Iron and Steel Institute at their last meeting in Birmingham, Ala. In a most careful analysis, he states when referring to their reciprocating compressors, "The ratio of the actual delivery to air displacement was about 80.2 per cent."

Yours, etc.,

L. C. LOEWENSTEIN.

Toronto, Jan. 14, 1915.

GOLD DISCOVERY AT JERSEY MILLS.

To the Editor of the Canadian Mining Journal:

Sir,—Enclosed please find a photo of a nugget of gold, value \$50.00, found on Dec. 5, 1914, on the shore of the Du Loup river here at Jersey Mills, by a little boy going to set a trap for mink. I hope you will mention the discovery in your valuable paper. Gold lies on clay in the bed of the river. I am willing to give free of charge two miles of the river, providing a dredge is built.

Yours, etc.,

LOUIS GENDREAU.

Jersey Mills, Beauce Co., Que., Jan. 18, 1915.

ANNUAL MEETING, CANADIAN MINING INSTITUTE.

The 17th annual meeting of the Institute will be held in Toronto on Wednesday, Thursday and Friday, March 3rd, 4th and 5th. An interesting programme is assured. In addition to the reading and discussion of papers on technical subjects, topical questions of general interest to the mining communities will be debated. These latter include a consideration of the

influence of the war on the Canadian mining industry, with a view to ascertaining in what direction, if any, undeveloped resources heretofore not utilized may be turned to profitable account. It is expected that Dr. Eugene Haanel, Director of the Mines Branch of the Dominion Department of Mines, will make an address on this subject. There will also be a general discussion on "How can Prospecting be Stimulated." This discussion will be opened by Prof. H. E. T. Haultain. Dr. Frank D. Adams, who represents the mining industry on the Board of the Commission of Conservation, has intimated that he will invite discussion on "The Conservation of Our Mineral Resources." Other papers promised or tentatively promised include: "Safety Engineering at the Canadian Copper Company's Mines and Works," by Mr. E. T. Corkill; "The Oxygen Torch," by Mr. David H. Browne; "The Hall Desulphurizing Process," by Mr. H. F. Wierum; "The Smelting of Titaniferous Iron Ores in the Blast Furnace," by Mr. Bradley Stoughton; "Recent Metallurgical Developments," by Dr. Alfred Stansfield; "Operations at the Weedon Mine," by Mr. L. D. Adams; "The Ore Deposit at Copper Mountain, Similkameen, B.C.," by Mr. F. Keffer; "The Beaver Lake Gold District, Saskatchewan," by Mr. E. L. Bruce; "Electric Hoisting," by Dr. J. B. Porter; "Gold Dredging in the Yukon," by Mr. O. B. Perry; "The Economic Possibilities of the Yukon," by Dr. D. D. Cairnes; and "Western Oil Fields," by Mr. D. B. Dowling. Three or four papers, the titles of which have not yet been received by the secretary, on subjects relating to mining and metallurgical problems and conditions in the Porcupine and Cobalt districts have also been promised.

BRITISH OIL SUPPLIES.

The Petroleum Review, London, in its Jan. 9 issue gives interesting information concerning the trade in oil.

"The important part which American petroleum products play upon the English oil market has long been recognized, but there are comparatively few who appreciate the fact that this importance has been very materially increased during the past few months—that is, since the commencement of the European war. In normal times, the United Kingdom draws its petroleum supplies from four main sources—America, the Far East, Russia and Roumania—and taking the year 1913 as a basis for comparison—we take that year by reason of its being a normal one—we find that America's percentage was 67, the Far East 14 per cent., and Russia and Roumania each 8 per cent., the remaining 3 per cent. coming from various countries of no significance. Thus in normal periods this country is dependent upon America for nearly three-quarters of her petroleum supplies.

"Consequent upon the outbreak of war last August, however, a new position was created, for it soon became apparent that if this country were to be immune from a petroleum famine, America would be the only oil producing country which could come to the rescue. The activity of the enemy's fleet upon the seas of the eastern hemisphere soon rendered it impossible to draw supplies either from the Far East, Russia or Roumania, and in this way 30 per cent. of our petroleum supply sources became cut off.

"It was fortunate for this country that we were able to look to America in such a crisis, and it is more fortunate still to know that America was in a position to come to the rescue of this country's petroleum trade at such a critical period. During the last three

months of 1914 the United Kingdom drew practically all her supplies from America, and these, it is satisfactory to record, were exported, transported and imported, just as though normal times and conditions prevailed. Up to the end of last September we had received from the United States 229,000,000 gallons of petroleum products, and from Mexico 22,700,000 gallons, but at the end of the year these figures had been increased to 317,700,000 gallons, and 31,000,000 gallons respectively, while from the Far East we only received 5,000,000 gallons, this being made up of three consignments, two of which came from Rangoon.

"Of the 103,000,000 gallons of petroleum products imported into the United Kingdom during the last three months of 1914, America therefore furnished almost 96,400,000 gallons, or over 85 per cent. of the total quantities received. It is easy to see the very critical position in which this country would have today been placed in regard to supplies of petroleum products had it not been for the fact that we were able to draw upon America to such a remarkable extent—an extent, in fact, far greater than in normal times."

CHILE COPPER CO.

According to the Boston News Bureau, the Chile Copper Co. will be in position to start production in March, according to present indications. Work has not been confined entirely to surface construction. Considerable new development has also been accomplished and this has resulted in increasing ore reserves to 300,000,000 tons.

Unit by unit the plant of the Chile Co. has been assembled and a part of it should inaugurate operations within 90 days.

"Six cents landed in Europe," has been predicted as the cost per pound of copper for this new Guggenheim property.

An authorized issue of \$15,000,000 bonds, practically all of which have been sold, has carried along the development work and paid for the gigantic construction programme which was undertaken about two years ago. Further financing will have to be done, but the amount or the method will not be determined until the return to New York of the company's consulting engineer, Pope Yeatman, now at the property.

The initial plant of the Chile Co. will have a capacity nominally of 10,000 tons daily.

The following excerpt from some "Reminiscences" published recently by the Sloean Record, of New Denver, B.C., may be read with interest by many who know something of the development of the mining industry of the Sloean district of British Columbia, in which district during the last few years deep-level exploratory work has resulted, generally, in establishing confidence that the production of silver-lead-zinc ore from its mines will be in increasing volume for some time to come. The Sloean Record said: "The first ore was shipped from the Freddie Lee claim, near Sandon. In the month of July, 1892, John Batt came in with a pack train of 67 animals owned by George Hughes, and they were loaded with Freddie Lee ore, which was packed to Nakusp. Jim Wardner had a lease on the mine and Bill Springer was superintendent." It may be added that Nakusp is the terminus of the Canadian Pacific Railway from Sandon, 41 miles in length; it is on the upper Arrow Lake, Columbia River, so the distance by pack trail from the mine to Nakusp may be placed at about 45 miles.

ROCKS AND ORE DEPOSITS AT SESEKINAKA, ONTARIO

By Charles Spearman.

The Sesekinaka Camp, which attracted many prospectors during the past spring and summer, is located in the township of Maisonville, Province of Ontario. As Swastika station is the gateway to the Kirkland Lake gold fields, so is Sesekinaka station the entrance to the new Sesekinaka field. Both stations are located on the Temiskaming and Northern Ontario Railway, the former at mileage 164 and the latter at mileage 176, reckoned from North Bay.

The area referred to in this article, is in general, the south-west quarter of the township of Maisonville, and in particular lots 9 and 10 in the north half of concession 2. This area is treated in particular, for petrologically it represents to a fair degree the whole area and in addition contains some of the important discoveries.

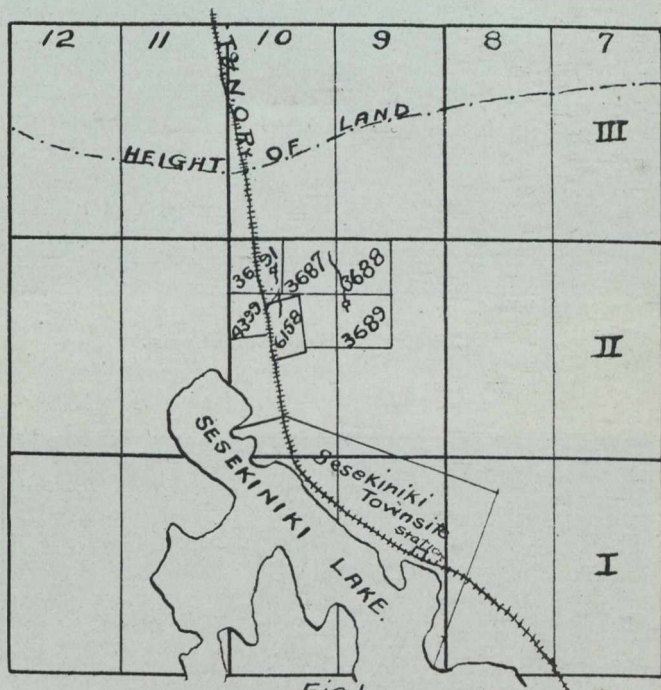


Fig. 1.
PLAN OF S.W. 1/4 OF MAISONVILLE TP. ONT.
—Scale 1"=1 mile.—

The topography of the area, taken as a unit, is quite gentle and displays many of the familiar and characteristic physical features of the typical glacial peneplain. About one and one half miles north of Sesekinaka station the area is traversed by a very broad flat ridge, striking irregularly across the country, in a general easterly and westerly direction. This is known as the "Height of Land." The rise to the summit is very gradual and almost imperceptible and attains an elevation of about one thousand feet above sea level at a point where it is crossed by the railway. This would be a fair average altitude for the whole ridge. Sesekinaka camp, at present, lies for the most part, across the summit and on the southern watershed of the "Height of Land."

On the southern watershed a large picturesque lake, dotted by many islands, begins at a point to the west of the railway about one half mile south of the axis of the "Height of Land." The railway skirts its eastern

shore for over three miles south. This lake and mainland are much used as a summer resort. It is known as Sesekinaka lake and the station and new townsite are located on the east shore.

The area is fairly well wooded by dense green patches of medium sized spruce and jack pine, the remnants of the most recent forest. All the larger timber, which occupied the higher ground, was fire swept and small poplar and birch have since grown up.

Rock outcrops are quite numerous and the area is characterized by relatively shallow pleistocene deposits, principally gravel and clay.

The history of the camp is somewhat varied and interesting. In 1905-06 several syndicates located claims just south of Wolfe Lake and prospected for silver. Sufficient work was performed on these locations to procure a patent; but no valuable mineral was discovered. In 1906-07-08-09 parties prospected the district for gold and silver. In 1906-07 Wendweidt arranged with the Government to colonize the area about Sesekinaka Lake. About this time Cleary found gold on the Trapper claims, about one mile south of Swan Lake, in the south-west quarter of the township.

Prospecting was progressing very favorably until the spring of 1906 when Blackburn and Jones, two prospectors, created a "rush" to Cariboo Lake which is located about ten miles west of Sesekinaka in Terry township. They recorded claims in Haileybury on the alleged discovery of telluride ores. Hundreds of prospectors rushed into the new field, which proved to be a chimera. Blackburn and Jones were arrested and tried for making a false affidavit. This rush discouraged the prospector and only desultory work was performed in the Sesekinaka camp for the next three years. In 1912 Malouf located some ground not far from Sesekinaka station and did some prospecting on it. In 1913 nearly all the ground in the camp was staked by Jno. Y. Cole et al. for nickel.

On March 18th, 1914, Joe Harris and Paddy O'Hara, two prospectors, arrived at Swastika with some rich specimens of gold and telluride ore from Sesekinaka and the same day many prospectors left different parts of Northern Ontario to stake in the new gold camp. Scores of claims were located and a few good discoveries were made. This attracted the attention of the outsiders. A few claims were optioned and arrangements made to develop others. In fact, Sesekinaka was in a fair way to become the newest Ontario gold camp, when progress was again seriously retarded by the European crisis.

Discoveries.—A description of three of the most important discoveries of Sesekinaka camp, viz., the Malouf, Labine-Smith and the Sullivan will show the nature of the occurrence of the deposits. These discoveries lie wholly within the igneous rocks and thus differ in part from the Kirkland Lake deposits.* The rocks are classed as Keewatin and are more or less medium to basic in character, except for occasional dikes of red and grey acid porphyry which are correlated as post-Temiskaming.†

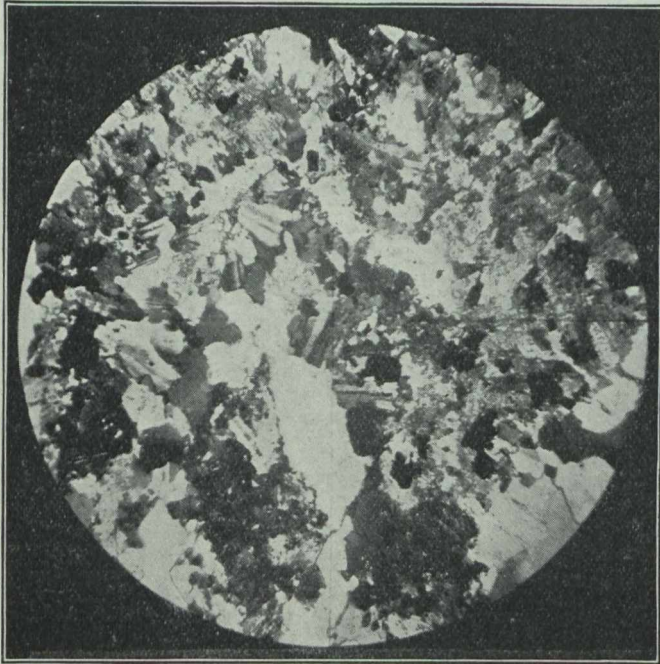
The Malouf claim No. 3691, Lot 10, Con. 2, is probably the largest showing to date. A rusty quartz vein about eight inches wide, striking nearly north and south, and standing about vertical, constituted the first

*"Ore Deposits of Kirkland Lake District" by Chas. Spearman, Can. Mining Journal, Oct. 1, 1913; also R. E. Hore, Kirkland Lake Gold Dep. Ibis., July 15, 1913.

†Report of Ontario Bureau of Mines, Vol. 23, Part 2, by A. G. Burrows and P. E. Hopkins.

discovery on this claim. In places both walls, and particularly the eastern, are highly schistose for a distance of from one to fifteen feet from the vein, and contain sufficient oxide of iron to give this whole a reddish gossan-like appearance. This loose oxidized

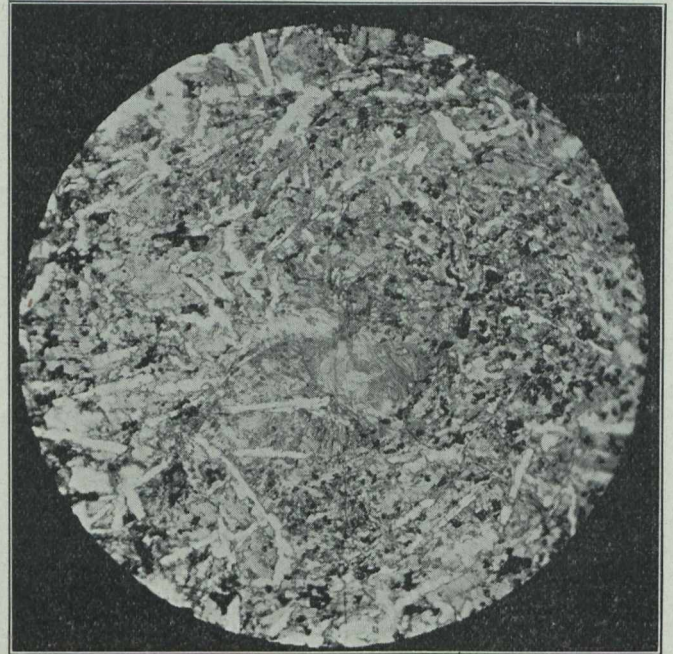
dized rock. The material removed was treated in an arrastra. Visible gold and tellurium alloys‡ occur quite frequently throughout the quartz and free gold pannings may be obtained almost anywhere from the pit in the oxidized zone. The vein is pegmatitic in



Photomicrograph No. 1.

x50

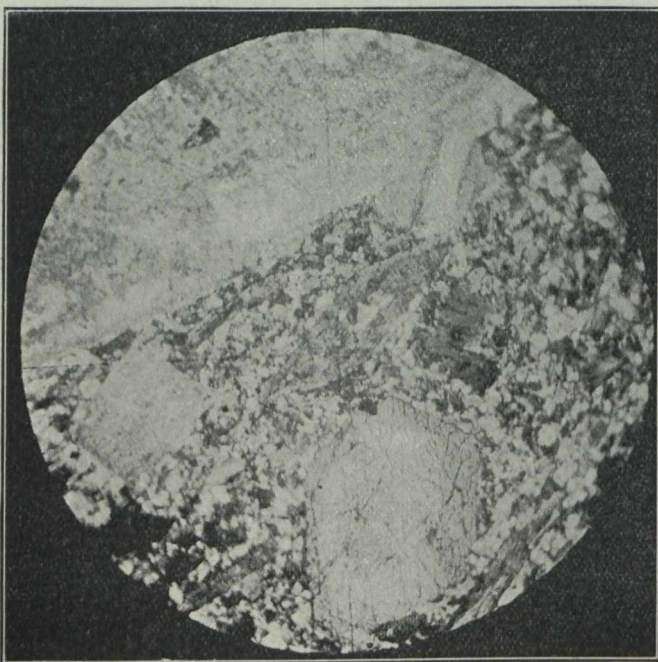
Showing the micropegmatitic structure of the veins, Malouf claim.



Photomicrograph No. 2.

x53

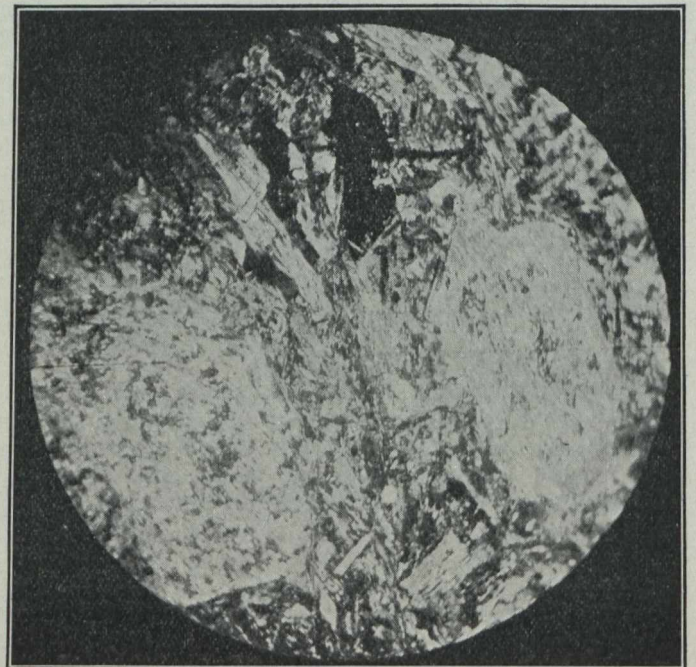
Country rock of Malouf vein.



Photomicrograph No. 3.

x53

Porphyritic dike Rock which cuts the rock shown in No. 2, Malouf claim.



Photomicrograph No. 4.

x50

A dike rock which cuts the rock shown in No. 2, Malouf claim.

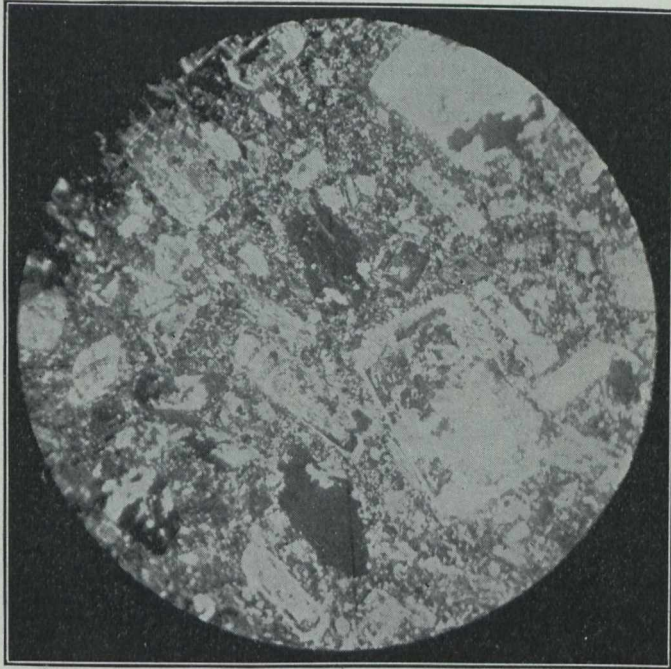
schistose zone contains numerous knife-blade quartz stringers intercalated between the vertical laminae of the schist. A small open cut across the strike of the vein, about twenty feet in length and five feet wide, was made at "the discovery" through the loose oxi-

‡Principally gold and silver with tellurium.

character, being relatively coarsely crystalline, the crystals very often approaching the centre in the "comb-tooth" structure. Again the vein quartz often presents an alveolate or honeycomb structure due to the interstices between the quartz crystals. The sub-

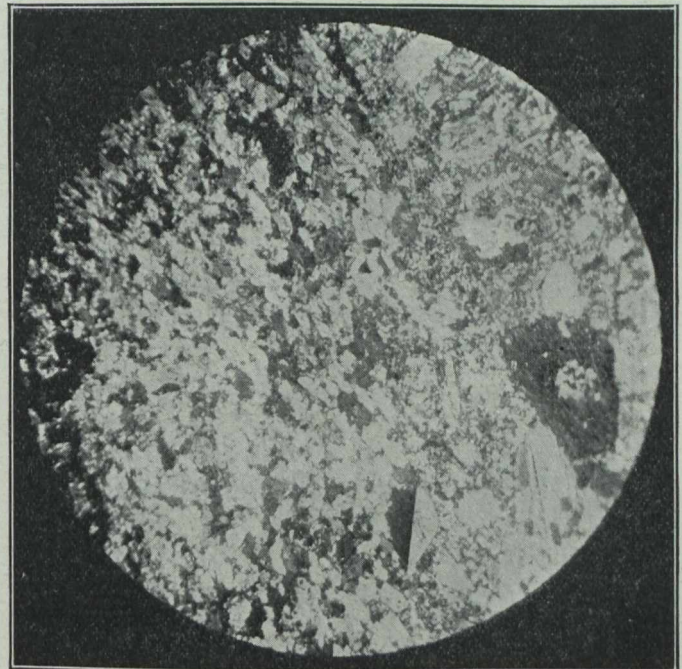
sequent introduction of gold, tellurium alloys, pyrite, chalcopyrite, occasionally galena and sphalerite, into these voids is quite marked. Often the metallization is but a faint coating on the faces of the crystals, again completely filling the spaces between them, thus causing flat faces to be impressed upon the metallic

grains are pyrite. Calcite occurs quite often in this section, enveloping the pyrite and evidently of later introduction. The fresh country rock is a greyish dense felsitic rock with a subconchoidal fracture. Where exposed on the outcrops it presents a brownish to greenish color, due to weathering which extends in-



Photomicrograph No. 5.

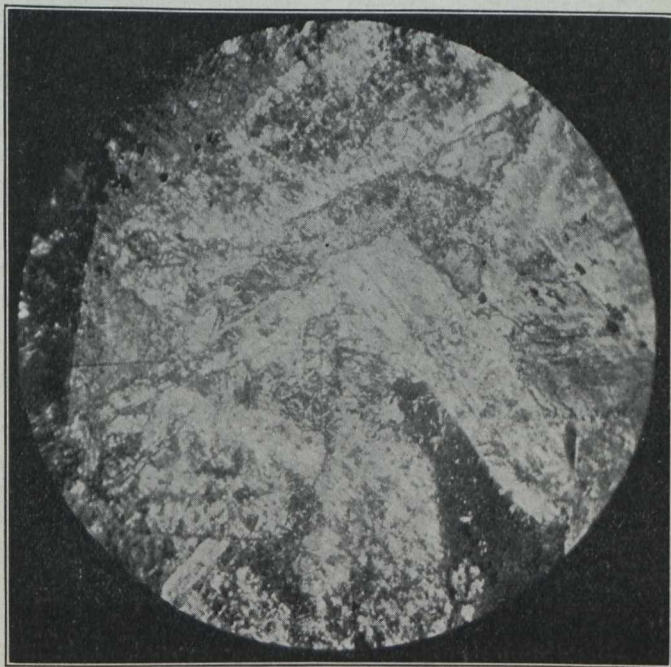
x50



Photomicrograph No. 6.

x50

Dike rock which cuts country rock of Labine-Smith claim.



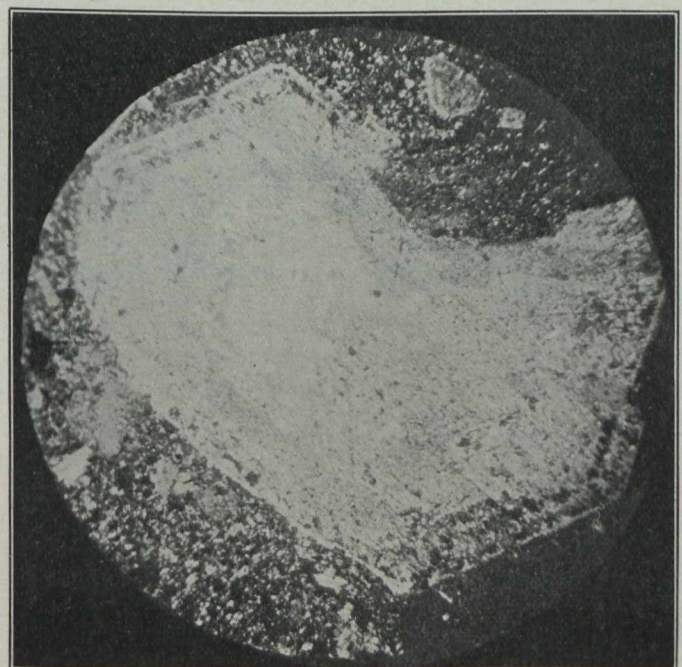
Photomicrograph No. 7.

x50

Coarse phase of country rock of Labine-Smith vein.

filling where in contact with the prismatic or rhombohedral faces of the quartz crystals. This is particularly characteristic of the ore at the Sullivan discovery.

Photomicrograph No. 1 shows the micropegmatic structure existing in the veins. Many of the dark



Photomicrograph No. 8.

x50

Porphyritic dike rock which cuts country rock of Labine-Smith vein.

ward for an inch or so. In thin sections the rock is microcrystalline, with automorphic soda-lime plagioclase crystals enclosed in a greenish slightly pleochroic ground mass of xenomorphic pyroxene, much altered to uralite, serpentine and chlorite. The feldspars are comparatively well preserved, and no isotropic base is

present. This rock represents a transition from the andesite to the basalt series.

Photomicrograph No. 2 shows clearly this ophitic structure and the development of uralite.

About twenty feet to the east of the vein, a dike at least twenty-five feet wide, running approximately parallel to it, cuts the above described country rock. This dike is more acidic in character than the rock it intrudes, and no doubt its dynamic and metamorphic influence are responsible for the schistose zone lying between it and the region of the vein. Phenocrysts of green hornblende and soda-lime feldspar are quite abundant in a phaneric groundmass of soda-lime plagioclases. This rock in thin section is shown in photomicrograph No. 3 and closely corresponds to a diorite porphyry.

On the west side of the deposit is another dike about two feet wide striking about north-east and south-west. On account of the overburden the age relationship between this dike and the vein at the intersection could not be established. This dike shows much alteration, especially in the hornblende and feldspar phenocrysts, while the second generation minerals of the groundmass, consisting of needles of green hornblende and plagioclase feldspar crystals, show relatively fresh faces, as seen in photomicrograph No. 4. A few quartz grains and abundant secondary products, serpentine, kaolin, pinrite, chlorite, etc., are present and altogether this rock corresponds very closely mineralogically to the large syenite dike on the opposite side of the vein. The texture is mediophyric. A rock of similar composition but with a finely granitoid texture and ophitic structure occurs in an outcrop about three hundred feet west of the small open cut.

Labine-Smith Claims.—Probably next in importance comes the Labine-Smith Nos. 3687-88-89 in lots 9 and 10, Con. 2. Here another pegmatitic quartz vein about four inches wide, quite similar in general appearance of the Malouf, except that it does not present a rusty appearance, is stripped for over five hundred feet. The strike of the vein is north and south and the dip is about 45 degrees west. A prospecting pit has been sunk on the southern part of the vein, where gold and telluride ores were first discovered. The country rock at this point is a dense greyish almost phyllite-like rock with a greenish lustre, and resembles very closely the wall rock at the Malouf discovery. Microscopically it has a similar texture to the country rock at the Malouf, viz.: microcrystalline; but the decomposition has been carried to a much more advanced stage; the feldspars, showing their outline only, are replaced by kaolin, saussurite, chlorite, etc., while the ferro-magnesian constituents are now represented by a magnetite residue.

Striking about north-east by south-west and standing nearly vertical, a small dike about two inches wide cuts the country rock on west side of the prospecting pit, and apparently "feathers out" within about two feet of the vein but may cut it at a lower level. It is a reddish rock with a mediophyric texture as examined in the hand specimen, the pinkish feldspar phenocrysts giving a reddish or pinkish color to the rock, thus resembling very closely the Kirkland Lake reddish porphyries.* A few white feldspar and green hornblende phenocrysts are present; but at the contact the feldspar phenocrysts are all white, showing a marked contrast to those of the dike. A few well crystallized small orbicular schlieren-like masses about 2-4 m.m. in diameter and of a somewhat darker color

than the enclosing rock are also present, and pyrite is fairly well distributed in fine crystals. Under the microscope, the orthoclase phenocrysts in the dike are seen to be greatly in excess of the plagioclases, and both varieties show alteration (see photomicrographs No. 5 and 8). The orbicular masses are of a basic character composed of many small green hornblendes surrounded by alteration products, viz.: calcite, sericite, serpentine, etc., (see left half of photomicrograph No. 6), and probably represent small inclusions of the country. This rock corresponds closely to a syenite porphyry.

In the region of the dike, in the prospecting pit visible free gold and telluride alloys occur fairly frequently in coarse masses in the interstices of the quartz vein. The wall rocks near the vein contain much fine grained pyrite; but are low in gold. As the distance increases either north or south from the dike along the vein, the gold content decreases, so also do the other metallic contents, and at a point about twenty feet north from the dike on the vein the assays are very low.

Two hundred feet north of the pit the vein maintains the same pegmatitic structure; but the country rock changes to a coarsely granitoid texture of feldspar and pyroxene, which under the microscope shows the ophitic structure as seen in photomicrograph No. 7. The pyroxene is entirely altered to serpentine, chlorite, and uralite. The feldspars are much altered but appear to belong to the acid series. This rock is quite similar in mineralogy to the country rock of the Malouf above described, and the diabasic texture is present in both. It is cut in many places by narrow dikes from one half inch to a foot in width. These dikes strike in no particular general direction, and, in the hand specimen, present a dense felsitic texture, and greyish green color. Microscopically the texture is minophyric; but altered to such an extent that it is difficult to determine the original minerals. The thin section presents a mass of chlorite, serpentine, etc., interrupted here and there by aggregates of magnetite arranged so as to suggest the remnants of a ferro-magnesian mineral, probably pyroxene. The feldspar crystals have been entirely replaced by the usual alteration products. This rock probably corresponds mineralogically very closely to the country rock in the prospecting pit, the great difference being the far advanced degree of alteration of the former. The metallization of the vein at this point is very sparse.

There appears to be at least three different periods of intrusion shown on the Labine-Smith claims. The coarse grained granitoid rock, being the oldest, is cut by the numerous dense much altered dikes, which are quite similar to the country rock of the prospecting pit and may be of the same age, and this in turn is cut by the small dike of the syenite porphyry. These rocks have all been described above.

The Sullivan discovery No. 4399, located in lot 10, Con. 2, was probably the most attractive in camp. The occurrence in a sense is somewhat different from those just described. Lenticular pegmatitic veins of white quartz from one-eighth of an inch to six inches wide, and not exceeding five feet in vertical or longitudinal dimensions, are enclosed in a dark colored dike of phanerohyaline nature. The native gold and tellurium alloys occur in coarse aggregates, frequently completely filling all the interstices in the open pegmatitic structure of the vein. About five hundred pounds of rich ore of this nature was sacked from one lens.

*Discussion of "Ore Deposits and Geology" of Kirkland Lake, by J. E. Tyrrell, J. M. Bell and A. G. Burrows, Can. Mining Journal, April 1, 1914, also "Microscopic Characters of the Ore Deposits and Rocks of the Kirkland Lake District, Ont." by Chas. Spearman, Can. Mining Journal, May 15, 1914.

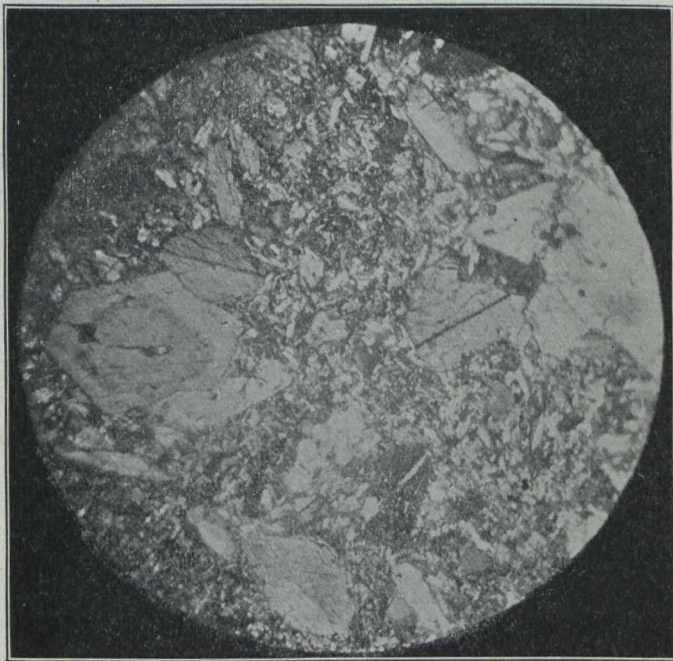
The enclosing dike is about ten inches in width, strikes north-east by south-west and stands about vertical. It cuts and displaces the fourteen-inch quartz vein, striking north and south on the Robbins, No. 6158; but does not appear to have enriched this vein at any point.

The country rock exposed on the west side of the vein is a dense, somewhat greyish rock with a conchoidal fracture. It has a marked translucency and slightly green color on the sharp edges. Under the microscope the section shows a cryptocrystalline texture and the constituent minerals are highly altered. Magnetite, arranged in more or less parallel bands indicating schistosity, is probably a remnant of the ferromagnesian minerals, while kaolin, epidote, etc., now represent the feldspars. This rock is quite similar to the wall rock at the Malouf and the Labine-Smith above described, except that it is more of a glassy nature.

results, in addition to the metallization of the vein proper. On the Sullivan the ore is contained in a hyaline dike.

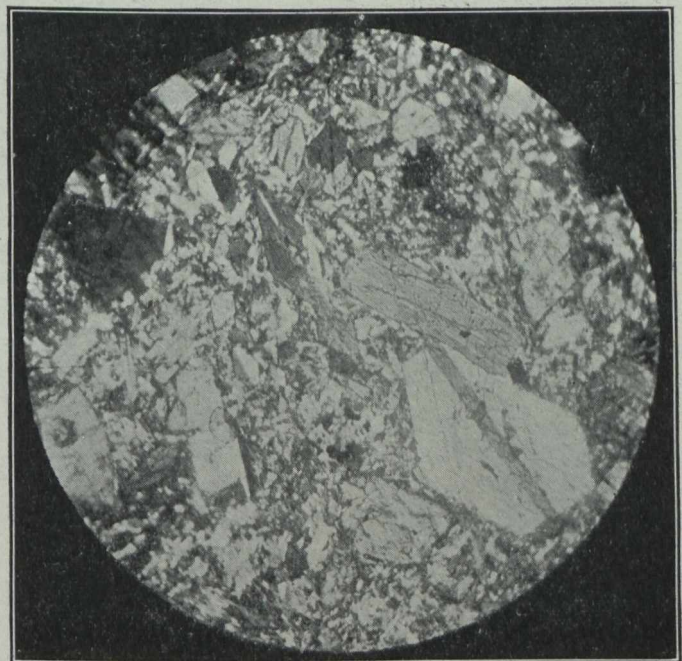
In all three cases described above the gold is found associated with pegmatitic quartz veins, but not of contemporaneous origin, for the metallics are found coating the surface of the crystals and occupying the interstices between them. The absence of pneumatolitic minerals associated with the ore would indicate that it was probably introduced into the present location by solutions, of low rather than high temperature, and probably as an end phase of the acid intrusive, thus bearing a striking resemblance to the Kirkland Lake occurrence.

Several new discoveries have been made in the camp in the past few months although very little real exploration work has been done, except on a few claims south of Wolf Lake.



Photomicrograph No. 9

x50



Photomicrograph No. 10

x50

Rock 20 feet north of vein, Sullivan claim.

A dark grey rock of minophyric texture outcrops about twenty feet to the north of the deposit. In the thin section the rock appears to be composed of many hornblende phenocrysts in a ground mass of feldspars which are in a fair state of preservation. (See photomicrographs No. 9 and 10). The relationship between this rock and the wall rocks of the deposit could not be determined on account of the overburden.

Relation of Ore to Enclosing Rocks.—From the foregoing description of the various deposits of the camp, it is remarkable that the acid dikes, and especially the porphyritic type, are more or less associated with the deposits. In one instance at least, viz.: on the Labine-Smith, where the wall rock is cut by a syenite porphyry dike good ore results, while further away along the vein where the country rock is cut by more basic dikes low values prevail. On the Malouf a diorite-porphyry intrusive cuts the country rock quite close to the vein, and an impregnation of the schistose walls

ALASKA GOLD.

In light of the values revealed on the Alaska Gold property, the bargain the United States made with Russia in 1867, to purchase the territory of Alaska for \$7,200,000, looks like "some bargain." At current price for Alaska Gold, 28, the market puts a valuation on that property alone double the purchase price of the entire district. The 750,000 shares outstanding are selling for \$21,000,000. Subtracting the \$7,500,000 new American dollars invested in property development, there is left a valuation equal to \$13,500,000.

And yet, when it was proposed to purchase the 590,884 square miles of territory included in Alaska at 2 cents an acre 48 years ago, the price was considered high. Not one in a hundred believed the territory worth the purchase price, and Russia chuckled when she was voted the money by an unwilling American Congress.—Boston Herald.

DOMINION AND ONTARIO REGULATIONS FOR THE DISPOSAL OF MINING CLAIMS, COMPARED

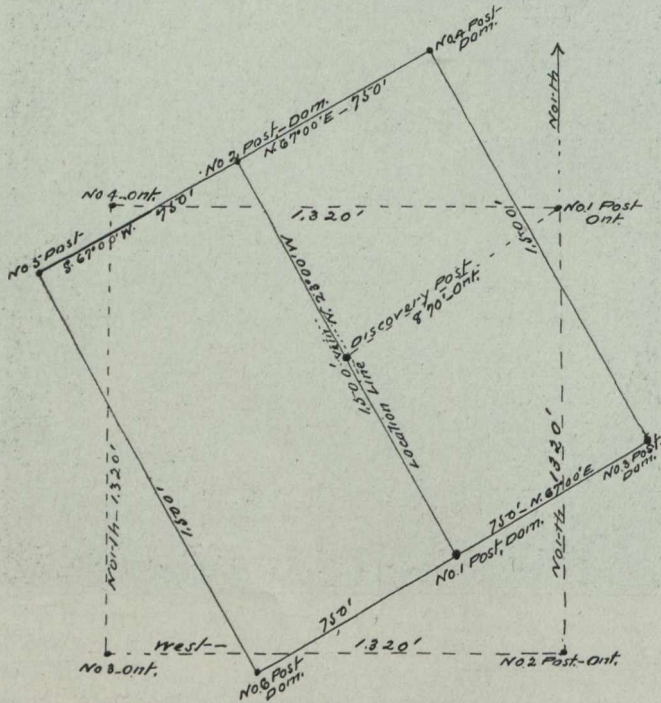
By J. A. McDonald.

The regulations governing the disposal of quartz mining claims in Ontario and in the western parts of the Dominion differ considerably. The Ontario regulations govern, of course, only within the provincial boundaries, but the Dominion regulations govern all unappropriated Dominion lands in Manitoba, Saskatchewan, Alberta and the Yukon. It follows, therefore, that one familiar with the Ontario regulations may not be familiar with those of the Dominion. By a series of illustrations the writer will endeavor to reconcile the Ontario and Dominion regulations.

The Ontario regulations are more favorable to the prospector and give the poor man a better opportunity for prospecting and developing a mining claim, chiefly by means of "working permits" (described in Jan. 1 issue), and "prospecting picket" claims, which in the Dominion regulations are not recognized.

Victoria, Vancouver, etc., etc., and at Dawson, in the Yukon district.

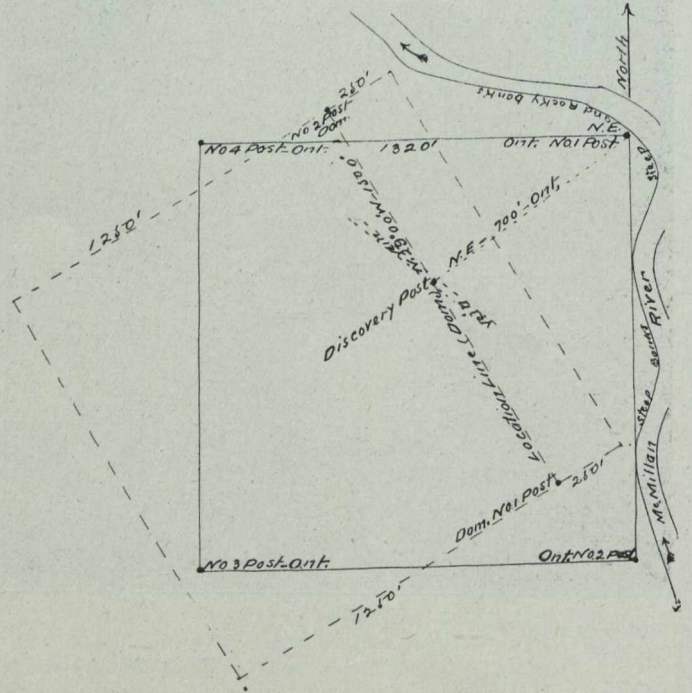
According to the regulations "free miner"—prospector—shall, during the continuance of his certificate, but no longer, have the right personally, but not through another, to enter, locate, prospect and mine upon any vacant Dominion lands for all minerals other than coal. Any person, therefore, possessing a valid existing miner's certificate and desiring to locate a mineral claim, and having discovered valuable mineral within the area proposed to be located as a claim by him, may enter upon the same and locate a plot of ground not exceeding 1,500 ft. in width and length. All angles must be right angles, except in cases where a boundary line of a previous surveyed claim is adopted as common to both claims, and the boundaries need not be, as they must be in Ontario, north and south, east and west lines.



Sketch plan of mineral claim, surveyed according to Dominion (full lines) and Ontario (dotted lines) regulations.

In the Dominion, the word mineral means all valuable deposits, gold, silver, copper, nickel, etc., etc., except coal. Limestone, marble, clay and building stone are not considered minerals, within the meaning of the regulations.

In the Dominion, as in Ontario, every person over eighteen years of age is entitled to all the rights and privileges of a free miner, upon taking out a free miner's certificate, which certificate is not transferable. There is an advantage in the Dominion regulations in that the certificate grants to the holder thereof the privilege of "fishing and shooting," also the privilege of "cutting timber for actual necessities, for building houses, boats and for general mining operations," for the exclusive use of the miner himself. Free miners' certificates are obtainable at the Department of the Interior, Ottawa, from the agents at Winnipeg, Calgary, Edmonton, Prince Albert, Kamloops, New Westminster,



Claims surveyed according to Dominion (dotted lines) and Ontario (full lines) regulations.

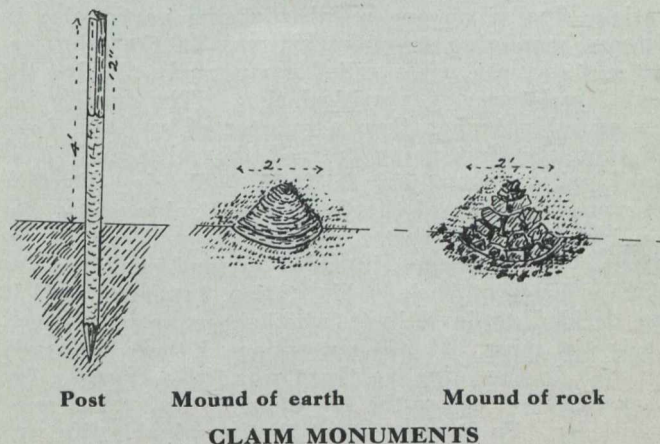
A Dominion mineral claim is marked by two "legal posts," placed as near as possible on the line of the lode or vein, and the posts numbered 1 and 2. The distance between posts 1 and 2 must not exceed 1,500 ft, and upon the posts must be written the name given to the mineral claim, the Christian name and surname of the locator, and the date of the location. Upon post No. 1 there must be written in addition to the foregoing, "Initial post," the compass bearing to post No. 2, and a statement of the number of feet lying to the right and to the left of the line from post 1 to 2, thus: Initial post, direction of post No. 2, N. 23° 00' W.; 750 ft. of this claim lie to the right, and 750 ft. to the left of the line from post No. 1 to post No. 2 (see figure 1).

All particulars required to be put on No. 1 and No. 2 posts must be furnished by the locator to the mining recorder in writing, at the time the claim is recorded, and shall form part of the record of such claim.

When a claim has been located, the holder is required to immediately mark the line between posts Nos. 1 and 2, so that it can be distinctly seen; in a timbered locality, by blazing trees and cutting underbrush, and in a locality where there is neither timber or underbrush, he must set "legal posts" or erect monuments of earth or rock not less than two feet high and two feet in diameter at the base, so that such line can be distinctly seen. "Legal posts" and mounds are shown in Fig. 3.

The locator must also place a "legal post" at the point where he discovered a valuable deposit of mineral, just as required by the Ontario regulations, on which shall be marked "Discovery Post." The line from post No. 1 to post No. 2, running approximately along the course of the lode or vein, is known as the "location line," and this line governs the direction of the sides of the claim, upon which the survey of the claim is extended.

By the Ontario regulations no "location line" is run, but a line must be opened from the print of the "discovery post" to the north-east corner of the claim, and its appropriate bearing and length marked on the post No. 1 as shown in Figs. 1 and 2.



An Ontario mining claim must have its boundaries north and south, east and west, and its sides not more than 20 chains, or 1,320 ft. in length. Post No. 1 must always be set at the north-east corner, and this post governs all the others, and contains the markings.

In figure No. 1 an Ontario claim and a Dominion claim are represented as staked out for the same mineral deposit. The discovery post in both cases is the same. Under the Ontario regulations, a line must be opened to the point which determines the north-east corner of the claim, and at this point post No. 1 is set. By the Dominion regulations the course of the vein is the determining factor in determining the direction of the boundaries of the claim. Along the direction of the course of the vein, as shown in Fig. 1, the "location line" is run. In this case it is N. 23° 00' W., and this line governs the side lines. The "discovery post" is driven at the point of discovery. In Fig. No. 1 the full lines show a Dominion claim, and the dotted lines show an Ontario claim, laid out on the same property.

Owing to obstacles, such as creeks, bodies of water, high rocky hills or mountains, etc., it is desirable to confine the boundaries of the claim to where no obstacles interfere. Such a claim is shown in Fig. No. 2. Here a creek with high rocky banks forms an obstacle and it is not thought desirable to cross it. In this case, the location line is run to one side of the centre for a Dominion claim, whereas for an Ontario claim the procedure is approximately the same as if no obstacles obtained. From the point of discovery, marked by "discovery post," a

line is cut open, N.E., 700 ft., to the point near the creek where post No. 1 marks the north-east corner of the claim. In this figure the Ontario claim is shown in full lines, and the Dominion in dotted lines.

Recording.—Under Dominion regulations a mineral claim must be recorded within fifteen days after the location thereof, if located within ten miles of the Recorder's office. One additional day is allowed for such record for every additional ten miles. The prospector must be able to furnish the recorder the direction and length of the lines from posts Nos. 1 and 2, as "N. 23° 00' W.—1,500 feet," Fig. 1, or "N. 29° 00' W.—1,500 feet," Fig. 2, the date of location and the date of record.

In Ontario it is only necessary to furnish the recorder with the direction and distance of the discovery post from post No. 1, as, "N.E. 700 feet," Fig. 2.

The Dominion recorder's fee is \$5.00. The fee for a free miner's certificate (for each year) is \$10.00.

ACCIDENT PREVENTION.

That accident prevention is largely a matter of education has been clearly demonstrated by carefully compiled statistics of some United States railways, recently published. On one railway, during a period of fifty-three months of operation since the formation of safety committees among the employees, a reduction of 371 is shown in the number of persons killed and of 11,258 in the number injured.

At the same time, despite this favorable showing, in three years there were registered 17,781 accidents, of which 99 out of every 100 could have been prevented.

While no statistics of the accidents occurring throughout Canada, are available, it requires only a casual glance at the newspapers to show that the number is large. In view of this fact, it is very evident that there is great need of an extension of the "safety first" educational movement in Canada. The subject is one which should not be left entirely to private interests to develop; it is in the general interest of Canada at large that the number of her disabled and injured citizens should be greatly reduced.

A fertile field for the propagation of the "safety first," or accident prevention, movement is the public school. The need of care should be taught the child, as lasting impressions can be made upon the young mind. The pulpit also has an influence which should be directed towards education along accident prevention lines. This work may rightly come under the head of social service, in which some churches are taking an active interest.

Canada owes it to her people, municipalities owe it to their citizens, schools and other organizations owe it to their scholars and members that attention be faithfully directed to the matter of safety and accident prevention, both public and personal, and that they be made to realize that it is better to be careful than a cripple.—D.

BETHLEHEM'S ORE SUPPLY.

New York, Jan. 21.—Official denial is given to the report that the Bethlehem Steel Corporation has contracted for large supply of ore from Great Northern Ore Trust.

The Bethlehem Company has its own supplies of ore. It shipped about 150,000 tons from its Chilean deposits in 1914 and about 300,000 tons will be imported this year.

Other supplies will come from the company's acquisitions in Cuba.—Journal of Commerce.

RESCUE ORGANIZATIONS

The life savers of the United States Bureau of Mines have, according to the statement of Dr. Joseph A. Holmes, the director, rescued more than one hundred entombed miners from certain death. More than this, he asserts in his annual report that volunteer rescuers in the employ of mining companies and trained in rescue work by the bureau have saved many other men. As a result of the example set by the bureau, rescue and first-aid organizations have been established at many mines and more than 1,200 sets of rescue apparatus have been purchased by mine owners. These stations are expected to save the lives of many men in the future.

The bureau in the furtherance of its work now maintains six mine rescue stations, eight mine rescue cars, and one rescue motor truck, located in the mining districts of the country. The cars visit the various mining camps and train the men in rescue work and also in first aid to the injured. This movement has reached the point that whenever there is a mine disaster it is now possible to obtain a sufficient number of trained volunteers to take care of the rescue in an orderly and systematic manner and without the great loss of life so frequently found among the rescuers in the past.

Director Holmes declares that there should be fifteen rescue cars, instead of eight, to take care of the needs of the million miners in the United States. "The work of the States in carrying out their part of this program in mine safety is being carried forward in a reasonably satisfactory manner," says Dr. Holmes. "The States are already spending in their inspection and police supervision work more than the Federal Government is spending in all of its investigations in behalf of mine safety. Thus, for example, a single State, Pennsylvania, maintains a well-organized and efficient inspection force at a cost of \$213,000 each year.

"Many of the mine owners have begun a system of operations in which safety is considered of first importance. More than 170 mining companies have individually, or through the association of two or more companies, established seventy-six mine-rescue stations at which there are 1,200 sets of rescue apparatus besides the auxiliary equipment for first aid and fire-fighting work. There are also twelve mine-rescue cars now operating by individual companies about their own properties.

"In the relatively short period during which the crews of the bureau's rescue cars and stations were able to conduct active training of miners, 46,694 miners have visited the cars and stations, 26,229 attended lectures and safety demonstrations, 2,826 were given mine-rescue training, and 5,780 first-aid instruction and rescue training."

USE OF RESCUE APPARATUS

Our British Columbia correspondent informs us that there seems to be good reason to think that omission to strictly observe the prescribed regulations or instructions relative to procedure when using oxygen-breathing apparatus underground indirectly if not directly, led to the lamentable loss of the life of the late District Mine Inspector Evans in one of the coal mines in Crowsnest district of British Columbia. It is stated that the rules provide in effect that no oxygen-breathing apparatus shall be removed from its proper place on the person wearing it while the wearer is in a gaseous atmosphere in a mine; that all members of a party wearing such apparatus shall while underground

keep within touch of one another; and that when any rescue or exploring party wearing such apparatus shall have entered a mine, a second or emergency party, fully equipped, shall be at hand prepared to enter the mine immediately there shall be found necessity for it to proceed to the relief of those already in the mine on rescue or exploratory work under conditions involving danger. The wording of the rules is not used above, but the substance of them has been stated. At Coal Creek one man improperly removed his mouth breathing apparatus so as to speak to other members, who had gone ahead and out of touch of each other, and he immediately succumbed to the effect of the poisonous gases; then the late mine inspector and the colliery manager in their efforts to assist their companion in his distress, he being a big and very heavy man, over-exerted themselves. Mr. Evans, who was wearing a Draeger helmet, either knocked it out of its proper position when he fell exhausted, or in his struggles to get air dragged it out of place, so that he breathed the poisoned atmosphere of the mine in which several hours before an explosion had taken place, putting the ventilating fan out of operation: finally, on one member of the party, also in distress, managing to make his way to the mine entrance there was not a relief party ready to give the needed assistance at a critical time. The trouble began probably in less than a quarter of an hour from the time the first party entered the mine and, it is stated, within about 150 ft. from fresh air. Further the man in charge of the Government mine-rescue station had been told that his services would not be required since it was not intended to send men into the mine, so he went back to his station, but afterward it was decided to investigate whether or not there was fire in the mine. It was not supposed there was even one man in the mine, so there was little urgency for an examination before the fan could be restored to running order. So it came about that a valuable life was lost when there was really no need to incur risk, and certainly no justification for neglect to follow carefully the prescribed regulations or instructions in such an emergency. Our correspondent makes these statements with the object of showing that there is no good reason to suppose that the oxygen-breathing apparatus was faulty, or unsafe had it been used properly; also, in the hope that this second fatality (the other was the loss of life of a member of a rescue party at Bellevue, Alberta, several years ago, also through improper removal of the oxygen-breathing apparatus) will impress upon those who go underground in a poisoned atmosphere that they must rigidly adhere to the prescribed rules, if possible, or fatal results may be expected to follow their not doing so.

HOLLINGER DIVIDEND INCREASED.

Directors of Hollinger Gold Mines, Ltd., at a meeting in Toronto, Jan. 15, placed the stock on an annual dividend basis of 52 per cent. Hollinger has been paying 3 per cent. each 28-day period, or 39 per cent. per annum. Beginning with the 30th dividend, payable Jan. 28, the rate will be 4 per cent. every four weeks. Payment of the dividend due Jan. 28 will bring total distribution on the stock up to \$2,730,000. The additional 1 per cent. every four weeks will require \$120,000, or \$1,560,000 annually.

Hollinger's statement for the four weeks ended Jan. 2 showed a surplus of \$1,236,304. It is expected that the new dividend rate will be easily maintained.

CANADA'S TRADE WITH UNITED STATES.

In his recent address at the dinner of the Chamber of Commerce of Buffalo, President Farrell, of the United States Steel Corporation, made some interesting and significant remarks in regard to the trade of the United States with Canada. On this subject, Mr. Farrell said:

"It is a peculiar commentary on the public's view of foreign trade that, while so much attention is given to over-sea trade development, Canada, under normal conditions, buys more from the United States than do all the republic of Latin-America.

"This important part of our international trade well repays examination. Exports to and imports from the Dominion are grounded upon mutual necessities. The transaction of the business valued in the fiscal year 1914 at \$505,000,000, is facilitated by railroads which know no borders, similarity of currency relieving settlements from the dependence upon European exchange characteristics of our over-sea trade, and a steady investment of American capital which develops Canadian industry and enlarges the demand for American materials.

"In this trade are apparent the benefits of the application of the commercial, industrial, transportation and financial activities familiar in our own domestic business life, but which, except in Canada, Mexico and Cuba, we have not largely applied to foreign markets.

"Our export trade to Canada is profitable, not merely by reason of its great volume, but also because it consists in great part of manufactures in which labor represents a high percentage of value. Canadian-American commerce is a particularly useful illustration because it demonstrates that our capital is not timid of foreign investment when conditions are understood. It is estimated that not less than \$650,000,000 of United States capital has been invested during the last ten years in Canadian industries. This does not include the enormous sums taken by American settlers to the Canadian North-West and there devoted to the development of the greatest of all industries, that of agriculture. These investments have been of reciprocal advantage to both countries.

"It speaks well for the product of American manufacturers that they find favor in the highly competitive Canadian market, where our advantage geographically contends with, first the Canadian protective tariff and, second, a preference, under that tariff, to articles of British manufacture.

"If our position in all great foreign markets were as advantageous as in Canada, the numerous public movements for foreign trade encouragement would be unnecessary. Enlightened self-interest would provide the necessary co-operation, one class of business men supporting the efforts of another class, and all gaining strength from the concentrated effort.

"The determining factor in general foreign trade is ability to produce and to sell at a competitive price. Highly important though they are, the agencies of transportation, finance and salesmanship, are auxiliary facilities for the conduct of trade, rather than the basic equipment for it.

"All that militates against the competing efficiency of our production must be weighed when our prospects for future world trade are seriously considered."

The American Brass Co., the world's largest copper consumer, made a net profit in 1914 of \$1,450,347. Profit in 1913 was \$1,917,605.

COPPER PRODUCERS' ASSOCIATION.

The Boston News Bureau publishes the following obituary:—

Had the consumers of copper shown an inclination to yield something in return for what they secured from the monthly statements of the Copper Producers' Association, that organization might to-day be in active existence. Efforts were made to induce the manufacturers using large quantities of copper to become members of the association and to report monthly the stocks of copper at their works. The idea was not favorably received by the manufacturers.

The producers have long felt that they were "giving away their hands" too freely and receiving nothing in return. Finally at their meeting last August the members of the association appointed James McLean, chairman of the executive committee, to see if the consumers would be interested to join the association. It is understood that his first and only consultation was with the American Brass Co., the largest individual consumer of copper in the world. This company, so the members were informed, did not consider the project feasible and would not submit figures. With this refusal it was regarded as useless to take the matter up with other manufacturers.

The Copper Producers' Association ceased by unanimous vote of its members, after six years of existence. Its predecessors, the Producers of Copper of the United States, lasted about eight years. Its end was forced through the refusal of one of its members, the Montana Ore Purchasing Co., to submit its monthly output.

The deathknell of the association was sounded last week when the members of the executive committee, headed by James McLean of Phelps, Dodge & Co., decided to recommend to the full membership that the organization discontinue. This action was taken by the members unanimously when they met Wednesday in New York for the last time.

From Boston there attended L. C. Graton, secretary of the association since its formation, and now a professor at Harvard, and R. L. Agassiz of Calumet & Hecla. The other attendants who voted to dissolve were John D. Ryan of the Amalgamated Copper Co. and United Metals Selling Co., Murry Guggenheim of the American Smelting & Refining Co., who was proxy for Joseph Clendennin now in California, W. Parsons Todd of the Quincy Mining Co., W. H. Nichols of the Nichols Copper Co., James McLean of Phelps, Dodge & Co., John R. Stanton of Mohawk and Wolverine companies, L. Vogelstein of L. Vogelstein & Co., and C. M. Loeb of the American Metal Co.

The association was started very largely through the efforts of Col. Thomas L. Livermore, then with Calumet & Hecla, who interested New York producers in the scheme late in 1908. The first statement was issued for January, 1909, and the last covered operations during June, 1914. In August a meeting was held, but the members decided to withhold statistics for the preceding month of July owing to the unsettled condition of the copper market brought about by the European war.

It has been decided to burn the individual statements to which Secretary Graton had access. Mr. Graton, who received \$6,000 salary, offered last August to relinquish one-half of this amount until the regular monthly sessions were resumed, but the members decided that he should receive full pay until Feb. 1.

THE METALLURGY OF IRON AND STEEL*

By Sir Robert Hadfield.

Early Metallurgy and Alloys of Iron and Steel.

The problem of alloys of carbon and of many different elements with the world's leading metal—iron—is an extraordinarily fascinating one. I use the qualitative "leading" advisedly, since without this metal the world would be plunged into uncivilized darkness, and when this metal does fail, for fail it must at some future time, it is difficult to see how the world can avoid returning to the Stone Age at a quicker pace than that at which it emerged from it. Iron is in truth the leading metal. It is constantly used and in everybody's hand and service in some shape or other and for an immense variety of purposes; yet we all recognize that it still embodies a vast amount of secrets, it still affords a wonderful field for research.

One can picture to one's self the joy of the first metallurgist, apparently Tubal Cain, when, in the early history of mankind, he discovered that a lump of red-looking, earthy material tossed by accident in his fire gave quite another material, a "metallic product which could be made to cut. This first member of the prehistoric Iron and Steel Institute was not long in recognizing the far-reaching consequences of his accidental discovery. He, no doubt, first made weapons—a crude type of javelin presumably—from this new product, but, appalled at the rate at which the men of his period had become able to destroy one another by reason of this discovery of his, he probably endeavored to counteract the action of the new offensive weapon he had been able to put in their hands by providing them with defensive ones, and he gave them "metallic" shields. By that time others had entered the field and started producing both classes of weapons, making each alternately the stronger, and so matters progressed; the idea caught on, and Tubal Cain, besides being the first metallurgist, was probably also the first man to initiate the "projectile versus armor" conflict, a conflict which has continued ever since, is being continued to this day, and one in which my city of Sheffield, I venture to think, has acquired a world-wide renown.

From Tubal Cain to Faraday is a far cry indeed. The latter, our revered master, whose name has so wisely been adopted by our Society, was one of Britain's noblest sons. In the earlier years of his activity he attacked the problem for the sake of the problem itself. His whole life was one of untiring energy, and a detailed record of his researches would fill volumes of an Institute's proceedings. He devoted a certain amount of attention to the study of metallurgy. As regards his metallurgical research work, fully described in the source to which I have previously referred, it was in 1822 he mentioned in one instance that he himself could not go to Sheffield, where he intended to have his alloys made in continuance of the experiments he and Stodart had started at the Royal Institute, but that he was carefully preparing in London the mixtures to be melted in Sheffield, placing them in separate parcels. The work was to be given to a trusty assistant, who was to go down and see the experiments put in hand and completed at Sander-son's works, this firm being still in existence to-day. In those early days there was only one way of sending the specimens from London to Sheffield—that is, by coach, a long journey, and one can picture the great scientist carefully sorting out his materials, various

alloys and iron, for mixing together in order to produce the different classes of material he had in view, and carefully packing them in different parcels.

Faraday foresaw that metallurgy was destined to become one of the leading branches of science, and that in a general way it is upon progressive metallurgy that most of the advances in modern effort and progress are dependent. I say this advisedly, for what would life be to-day without the aid of the metal iron and its alloys and combinations? This was pointed out very fully in my presidential address to the Iron and Steel Institute in 1905. So much was I then imbued with this spirit that in that address I gave the portraits of some twenty-one early scientists, largely Swedish, to whom the world owes such a great debt of gratitude with regard to the work they did in first separating many of the various elements now used in the alloys of iron and steel. Probably in no country was more good work done than by these early scientists in Sweden.

Of the position which had been early reached by Sweden, Professor le Play said in 1846:

"For two centuries the Swedish metallurgists have exploited with great cleverness the steel making quality of their minerals. This branch of the metallurgy of iron is due to their efforts.

"Understanding that the success of cementation steel works rests essentially on the confidence which the manufacturer may feel in the raw material, they have made every individual and collective sacrifice which the scrupulous maintenance of the qualities represented by the trade marks necessitated. Hence, for example, the establishment of these 'Jern-Vagen,' model institutions for all commercial people, which, by a rigorous control over the quality of the products, guarantees the entire industry of the country against the divergences which might be prompted by private interests. It is, therefore, to the intelligence and the commercial integrity of the Swedish ironmasters, no less than to the genius of Yorkshire manufacturers, that is due the expansion of this new art, which, placing henceforth the steel industry within the means of every nationality, has come to subserve one of the most pronounced tendencies of modern society, and which, by a large output of steels of greater perfection and above all harder than the natural steels, has endowed our civilization with means of action proportionate to the magnitude of the control which it exercises over matter and to the greatness of the results it seeks to attain. The facts revealed in this paragraph prove that Swedish metallurgists have been able to place themselves, so far as they are concerned, at the head of this noble mission, while everything appears to indicate that they will know how to maintain that position."

Value of Research.

Let us remember that it is to the valuable properties of the many alloys of iron now made, from carbon steel to the complex one known as high-speed tool steel, which contains no less than five different elements apart from the iron itself, is due the remarkable progress we have made, whether in the arts of peace or war. I will give one simple concrete instance—the modern motor vehicle, whether for private or trade use, with which such an enormous traffic is now carried on with so great convenience and comfort to the

*Extracts from a presidential address delivered to the Faraday Society, July, 1914.

public of all lands. Take away the alloy steel used in its construction, and it could no longer be produced. The combination of lightness and strength necessary in such modern products is only possible by the use of special alloy steels.

To study the qualities of alloys of iron with other elements involves much research work, which is a noble occupation for mankind. Whilst this work may not appear so attractive as the discovery, for example, of a new element, it is not less important. The value of research work was early recognized in this country, for in the very Interesting History of the Royal Society of London for the Improving of Natural Knowledge, published in 1702, and written by "Tho. Spratt, D.D., Lord Bishop of Rochester," it is said in the Preface or Dedication portion to the King Charles II.:

"Of all the Kings of Europe, Your Majesty was the first, who confirm'd this Noble Design of Experiments, by Your own Example, and by a Public Establishment of the Royal Society. An Enterprise equal to the most renown'd Actions of the best Princes. For, to increase the Powers of all Mankind, and to free them from the bondage of Errors, is greater Glory than to enlarge Empire, or to put Chains on the necks of Conquer'd Nations. A higher degree of Reputation is due to Discoverers than to the Teachers of Speculative Doctrines, nay even to Conquerors themselves. Nor has the True God himself omitted to show his value of Vulgar Arts. In the whole History of the first Monarchs of the World, from Adam to Noah, there is no mention of their Wars, or their Victories; All that is Recorded is this, They liv'd so many years, and taught their Posterity to keep Sheep, to till the Ground, to plant Vineyards, to dwell in Tents, to build Cities, to play on the Harp and Organs, and to work in Brass and Iron. And if they deserv'd a Sacred Remembrance, for one Natural or Mechanical Invention, Your Majesty will certainly obtain Immortal Fame, for having establish'd a perpetual Succession of Inventors."

Quaint as may seem these words to us of to-day, there is indeed still now as great truth in them as when they were uttered. The marvellous recent progress of the world has been largely due to the scientist, to the inventor, and not least in these branches of human thought are those who work in "natural or mechanical invention," or, to use again the Bishop's words, "in brass and iron," though nowadays the latter metal plays the more prominent part.

Since the date when these wise words were uttered the Royal Society has seen one long-continued career of success, and owing to the devotion of its Fellows to the cause of science and scientific progress, mostly without reward of any kind, there is no country where science and scientific work is more highly esteemed than in Great Britain. I know it is often customary to say that we lack appreciation of scientific merit, but I do not believe it. The fight for the cause of advance may be severe here, but in the end we English recognize to the full true merit. We need not be ashamed when from this little island have come—not to mention those still with us—such men in the Anglo-Saxon race as Bacon, Newton, Priestley, Dalton, Boyle, Cavendish, Faraday, Davy, Huxley, Tyndall, Spencer, Darwin, Kelvin, Percy, Roberts-Austen, and many others; on the more technical side, Dudley, Sturtevant, Pettus, Huntsman, Darby, Kirwin, Cort, Heath, Heaton, Mushet, Bessemer, Siemens, Bell, Whitwell, also many others in the Old World; in the New World, such men, as regards both classes of research, as Benjamin Franklin, Fulton, Agassiz, William Gibbs, Rowland,

Barus, Edison, Bell, Steinmetz, Sterry Hunt, Howe, Holley, Fritz and others.

The foregoing list is necessarily a very incomplete one and refers only to the workers in the Anglo-Saxon race. It, however, represents at any rate some of those who have done the greatest work in the domains of the sciences of chemistry, physics, electricity, engineering and metallurgy.

The Author's Research Work.

At the time I first started my own research work in 1882, little was known on the subject of alloys of iron. In fact, in the light of our present knowledge, one might safely say that the subject was practically an unknown one.

Pourel, the distinguished French metallurgist, said that he "considered the production of manganese steel the most important event in practical metallurgy during the last ten years, and which might take its place beside the result of the labors of Gilchrist, Bessemer, Siemens, Martin and Mushet."

Dumas, in his *Recherches sur les Aciers au Nickel* a Hautes Teneurs, said that my alloy studies were "the first publications which had been made upon alloys containing high percentages of elements other than iron."

Bradley Stoughton, in his excellent work *The Metallurgy of Iron and Steel*, was good enough to make similar comments.

Finally, Osmond, the great French scientific metallurgist, said that my discovery of manganese steel was of the same order and equalled in importance the discovery in past centuries of the effect of quenching upon carbon steel.

I have referred to these quotations in order to show the truth of my earlier remarks, that when first starting my labors in the eighties of the last century the general knowledge available on this subject was very small indeed.

In this connection I should like to add that the conception which formerly ruled in regard to the term "alloy" prevails to this day in the mind of the general public. An alloy to many implies nothing more than the addition of a baser metal to a finer one, the object of the mixing of the two together being to obtain a cheaper commercial article and one that will wear better. This, we all know, is not at all the case in regard to special steels and special steel alloys or combinations of the present day. The definition of the word "alloy" might better be made to read, "the combining by fusion of two or more metals together, or of a metal with one or more metalloids, for various specific purposes."

Development of Research During the Last Fifty Years

In regard to the alloys of iron with other elements than carbon, this field of research, the development of which I claim without fear of contradiction to be one of the most marvellous of the many extraordinary developments of the last fifty years, was indeed a narrow one even so near our times as the sixties and seventies of the last century.

An extract from Kerl's *Practical Treatise on Metallurgy* reads as follows:

"Ever since the Swedish chemist, Bergmann, in the second half of last century, called attention to the part which carbon plays in the formation of different kinds of iron, steel has been considered as a combination of iron with, in certain limits, a variable proportion of carbon, which proportion, and its more or less uniform distribution, influences the quality of the steel; this view is still very frequently entertained.

"Accepting this view, Gurlt considers steel as a combination of $Fe_8C + Fe$; Tunner, as a combination of $Fe_4C + Fe$; Lohage, as certain combinations of carbon ($Fe_{12}C$, $Fe_{20}C$, $Fe_{28}C$) consisting of tetrahedral molecules which admit of hardening in opposition to compounds forming octahedral molecules which cannot be hardened.

I have quoted this somewhat fully because the opinions expressed are not a little remarkable. It will be seen that the chemist of that day had formulated theories which at any rate to some extent were running in the direction in which modern research seems to be tending with regard to combinations of iron and carbon. It seems to me, too, that we have not followed up this particular direction of research as much as might have been the case.

Prize for Research Work.

This is a rich and profitable field for the younger chemist if he will devote his attention to this particular branch of chemical research. In fact, to show the importance I attach to this subject, I have suggested to the two leading Institutes in England and America, namely, the Iron and Steel Institute and the American Institute of Mining Engineers, that I am willing to offer a prize of £200 for the best paper or research on this subject—in other words, to continue the investigations with regard to the combinations of iron and carbon, and thus follow up the great work originated by Abel, Muller and Ledebur. This competition is not confined to any particular country, but is international and open to all.

The following suggestions are also added for the guidance of those who wish to take part in this competition. While it is not desired to define too closely the exact lines or scope of the research, as it is advisable to make these as broad as possible, the object in mind may be said to be generally as follows:

To elaborate and find out the best methods of determining the forms of carbon in steel or iron, including those in iron alloys. A portion of the work would probably be a continuation of the researches which have in the past been carried out by Jullien, Abel, Muller, Ledebur, T. Sterry Hunt, Akerman, Arnold, E. D. Campbell, Stead, Hogg, Parry and others.

In a generic way, metallurgists now speak of carbides, sub-carbides, double carbides, special carbides and other combinations. It is very desirable that those should be accurately defined and understood.

It is also desirable to know whether there are other or new forms; if so, can these be separated and their characteristics obtained?

It may be interesting to point out that the carbon compounds now definitely known are stated to number over 80,000. It is very probable, therefore, that there is room for much valuable and useful research to be carried out with the object of increasing our knowledge of the various combinations of carbon with iron, as probably some of these are still unknown.

In addition to research work upon particular forms of carbide which have not yet been determined, it is also desirable and necessary to determine the state in which the carbon exists. For example, there exists what is termed a "missing form" of carbon, about which little is known or understood. More light is required about this form, as for many years very little has been added to our knowledge on this subject. It would be desirable, for example, to know whether the carbon not accounted for as carbide is "missed" in consequence of its being in so fine a state of division,

or whether it is present in some special form or condition.

It may be mentioned as a general statement that when steel is in the austenitic condition it is softer than when transformed to the martensitic formation. In the former, the carbon is considered to be in complete solution; yet steel showing martensitic structure is said to contain its carbon in complete solution also. If it could be shown that the martensitic formation results from the commencement of the falling out of solution of the carbon, this would be of great assistance to all those who are desirous to have increased knowledge in this direction. It is therefore desirable to know exactly in what state the carbon exists in the austenitic and martensitic formations.

It is also necessary, if possible, to ascertain the molecular constitution of the carbides. Such a point has been raised by the able American scientist Prof. E. D. Campbell, and much important research work has been carried out by him with regard to certain particular combinations or forms of carbide. In other words, is the ordinary carbide Fe_3C , Fe_6C_2 , or is it some other combination? If so, what is its nature and molecular constitution?

The above seems to be an outline of the general direction which should guide those considering and taking part in this research. It is hoped that the results obtained will throw much light on the cause of the hardness of steel, also the nature and form of carbon combinations with iron and its alloys.

Effect of Carbon Upon Iron.

In the matter of alloys of iron with other elements, the fact should not be lost sight of that carbon still pre-eminently holds a position of supreme importance, for the presence of carbon even in special alloy steels is, with some few exceptions, absolutely necessary. Take as an illustration high-speed tool steel, which has led to such an enormous saving in machine shop practice, with consequent benefit both as regards quicker and greater output, combined with greater precision of execution. Whilst the carbon present need not be relatively high, yet there must be sufficient carbon present, otherwise the cutting properties of the steel in question would not be attained. The explanation is probably as follows: In high-speed tool steel of modern composition there is usually about 16 to 20 per cent. of tungsten, 2 to 4 per cent. of chromium, and about .70 per cent. of carbon. Before treatment of the steel, the carbon exists in the form of carbide carbon and hardening carbon as defined by Ledebur.

Hardening carbon .....	.18%
Carbide carbon .....	.56%
Total carbon .....	.74%

After treatment, and with the nose of the tool in the condition required for mechanical work, we find the carbon content to have been transformed into

Hardening carbon .....	.60%
Carbide carbon .....	.14%
Total carbon .....	.74%

Therefore, when we talk about the wonderful effect of the addition of elements other than carbon to iron, we must not fail to recognize that many, if not all, the new properties acquired by the steel are due entirely to the marvellous change that the treatment has wrought in the form of the carbon present, that is, its transformation from the soft or carbide carbon into

what is believed to be the hardening or hardenite form of carbon, that is, the alloy elements which enable the hardening carbon—or call it what you will—to retain its hard cutting properties in the steel. Whilst a similar change occurs by heat treating any low carbon steel, that is to say, carbon steel without other modifying elements present, or present in very small percentages only, the chromium and tungsten in high-speed alloy steel maintain, or assist in maintaining, the hardenite present in that form, so that the cutting edge, does not lose its hardness even when quite a considerable degree of heat caused by frictional contact is reached, which would entirely soften ordinary carbon steel.

Field for Research.

It will be seen that even to-day the field for research has been and still is an immense one; it is full of difficulties and perplexities. Contradictions often seem to present themselves. Nevertheless, the advance made in this branch of alloy steels since the date of my first researches in 1882 and onwards, also my paper on "Manganese Steel" in 1888, has been of a startling nature.

Whilst it is true there may not be at the present time room for such abnormal discoveries in ferrous metallurgy as in the past, yet workers all over the world are quietly and steadily adding to our stock of knowledge on points, some of which may not seem so important at the time, but all of which tend to enable us to better understand and therefore control the desired qualities of iron and its alloys.

VANADIUM IN STEEL.

Vanadium is a metal, which in late years, has been applied with remarkable results in the steel industry. The reason it was not used sooner in the manufacturing arts was because of its scarcity. Large and exceptionally rich deposits of vanadium ore were discovered in the Peruvian Andes several years ago. It is to this source that vanadium steel owe their present commercial status. Scientists in the employ of the French Government first settled the question "Does vanadium improve the quality of steel?" They proved that the addition of a small percentage of vanadium, never above $\frac{3}{4}$ per cent., gives to steel a remarkable increase in strength without impairing its ductility. This result cannot be secured from any other element used in the composition of steel. Carbon, for example, increases the strength up to a certain point, but causes the brittleness and even fails to strengthen when employed in large amounts, the result of further additions producing ordinary pig-iron.—M. M. Campbell.

U. S. SILVER PRODUCTION, 1914.

United States production of silver again reached a high mark in 1914. Preliminary estimates of the Geological Survey and the Bureau of the Mint indicate 67,929,700 fine ounces, valued at \$37,225,000. Final figures may be somewhat lower.

Increases were notable in Idaho, California and Arizona, and large decreases were recorded in Montana, Utah, Nevada and Colorado. Montana output fell off more than 1,500,000 ounces, owing chiefly to curtailed copper yield resulting mainly from European war, but also in part from labor conditions at Butte.

Demand for silver from India and China was disappointingly light in 1914, and London stocks accumulated, resulting in a poor market. Average price for the year was about 54.8 cents, or the lowest since 1911.

CAPITAL AND LABOR.

That the U. S. Steel Corporation has paid \$2,564,000 to workmen injured or to families of those killed was stated by Geo. W. Perkins, formerly of J. P. Morgan & Co., before the U. S. Federal Commission on Industrial Relations. "There were 2,092 men on our pension list at the end of 1913," said Mr. Perkins, "and the annual outlay is \$422,000."

Witness said that total wages paid by the corporation in 1913 were \$207,000,000. This averaged \$2.85 a day for all workers except executives. Mr. Perkins admitted that 22.5 per cent. of the men work 12 hours a day, but they do not labor continuously, resting every 30 minutes. In 1913, said the witness, the corporation paid \$660,000 for safety appliances.

Mr. Perkins advocated national control, through federal charter of corporations operating in more than one state.

"The profit-sharing plan is the missing link between labor and capital," he said. "Profit-sharing would go far to abolish industrial unrest."

Mr. Perkins defended combinations of capital and believed labor should organize for its own protection. "Labor should organize in keeping with all the laws," said he, "and business should organize in such a way that it cannot be made the target of legislation. The weak spot in labor unions is the same as in business, namely, a disregard of rights of others. Conditions are bad now because of the war, but when the war is over, conditions will be worse unless the tariff is changed."

COPPER.

Charles Hayden, who is in Boston, speaking of the present highly interesting situation in copper, says:

"The foreign demand for copper is enormous, and spot cash is being paid for it. Whether it goes to France, Russia, England or Japan we know not. Millions of pounds are being taken by the foreigners for quick delivery.

"The American demand is relatively light. The manufacturers are in a better position than are the producers to predict when this American demand will start up. If the American buyers should come into the market for large quantities of copper, it would compel an increase in production to 100 per cent. of capacity in order to prevent a runaway market.

"We do not know when the war will end, but we do know that the Government has commandeered all the copper in Germany, and all factories there have been practically closed down, running less than 5 per cent. of normal capacity. There were a lot of contracts made last May and June on which the copper is still undelivered. Under the present agreement this copper will have to be shipped immediately as soon as the war is over.

"There is no desire on the part of the producer, and the same is true of the consumer, to have a wild, runaway market, and production will undoubtedly gradually increase to the point of supplying consumers on a 14 to 15 cent basis with all the copper desired.

"Speaking for our own companies we prefer to produce at the present rate and get 14 cents for our copper than to increase production faster than the consumptive demand calls for and sell the larger output at a lesser price."—Boston News Bureau.

GEOLOGY OF FIELD MAP AREA.

The Canadian Geological Survey has published a memoir, No. 5, by John A. Allan, on the geology of the Field map-area, British Columbia and Alberta.

The area which is included on the accompanying geological map and discussed in the memoir, lies on the western slope of the Rocky mountains in the vicinity of, and especially to the south of the main line of the Canadian Pacific Railway in British Columbia. The map area includes over 400 square miles. The limits are 51 deg. 05 min. and 51 deg. 28 min. north latitude, and 116 deg. 15 min. and 116 deg. 35 min. west longitude. The district studied in the field begins at the continental watershed and extends westward to the Beaverfoot range, the most westerly range of the Rocky Mountain system. It lies largely within Yoho Park, which is reserved by the Dominion Government, and is located within East Kootenay district and Golden mining division. Field is the only town on the west slope of the Rocky Mountains along the railway line. Ice River valley, in which is exposed the alkaline igneous complex, is readily reached by a good pack trail from Field, or from Leancoil, which is 17 miles west of Field on the railway. From Leancoil, the trail follows up the northwest side of the Beaverfoot valley for a distance of 12 miles, where it crosses Ice River. This trail has been in use for almost three-quarters of a century; it was originally used by the Stony and Kootenay Indians, and is known as the "Kootenay trail." It continues southward up the Beaverfoot valley and down the Kootenay valley to Fort Steele.

The district in the vicinity of Field and Ice River, British Columbia, was chosen for geological research principally for two reasons: firstly, there is a complete section of the Cambrian series exposed in the various parts of the district. This proves to be the thickest Cambrian section yet studied in Canada, and is well exposed throughout its whole thickness. Attention has been drawn and special interest has been given to the district about Field during the last three years, on account of the remarkable and unique fossiliferous Cambrian horizons discovered by Dr. C. D. Walcott, Secretary Smithsonian Institution, Washington. These fossils are abundant in certain strata, and include many new genera and species.

Secondly, an alkaline intrusive complex in the Ice River district offers an important subject of research. This igneous complex adds another occurrence to the list of very interesting groups of alkaline rocks, which have been studied in great detail in many parts of the world, and which are quite important on account of their variation in mineral composition. This occurrence was also considered worthy of special study, since, with one exception, it is the only large intrusive mass yet known to occur in the Rocky Mountain system between the International Boundary at the 49th parallel, and at least as far north as the 54th parallel of latitude.

GERMANY'S OIL SUPPLIES.

"Even though all future supplies were cut off, Germany would have sufficient gasoline to satisfy requirements for two years," says Rotterdam correspondent of the National Petroleum News of Cleveland, Ohio.

"Over the average military stocks marketing and distributing companies must always keep a certain minimum quantity in storage tanks under agreement with the Government. On outbreak of war the stocks in hand above these 'iron stocks' were considerably above the average, and were augmented by at least

18,000 or 20,000 tons (close to 5,000,000 gallons) immediately rushed across the border from Holland during first few days following declaration of war. Import duty was at once removed, and certain concessions granted in connection with transport rates; a good price was paid for the spirit (gasoline). Germany was equally active on her southern frontier. The average railway rate from Roumania to Germany, between \$17 and \$20 a ton, was immediately reduced to \$10, and in some cases less. In the early stages of the war large quantities of mineral products, especially spirit, were rushed into Germany from Roumanian fields, and although the Roumanian Government is supposed to have stopped or at least reduced these exports to a negligible quantity, it appears that fair quantities are still finding their way into Germany, particularly from the Steana Romana and other German controlled interests.

"I understand that even if all future supplies were cut off, Germany has sufficient motor spirit to satisfy requirements of both military authorities and private users for not less than two years.

"With refined oil her position is not nearly so good. As things have been arranged, however, it is reckoned that for government purposes there are sufficient stocks to last two years; but in figuring this out, needs of the community have been considerably cut down. By Government order no seller is allowed to sell more than half a litre (barely a pint) a day to each private consumer. The position is practically the same with lubricating oil, and if possible an even stricter watch is kept on its use. Germany is a bit shy on lubricating oils, and the stocks she was able to confiscate in Antwerp were a god-send. While a good part of the Antwerp stocks were successfully shipped—mostly to England—before the fall of the city, the quantities the Germans were able to sequester were pretty considerable."

BRITISH COLUMBIA IN 1914.

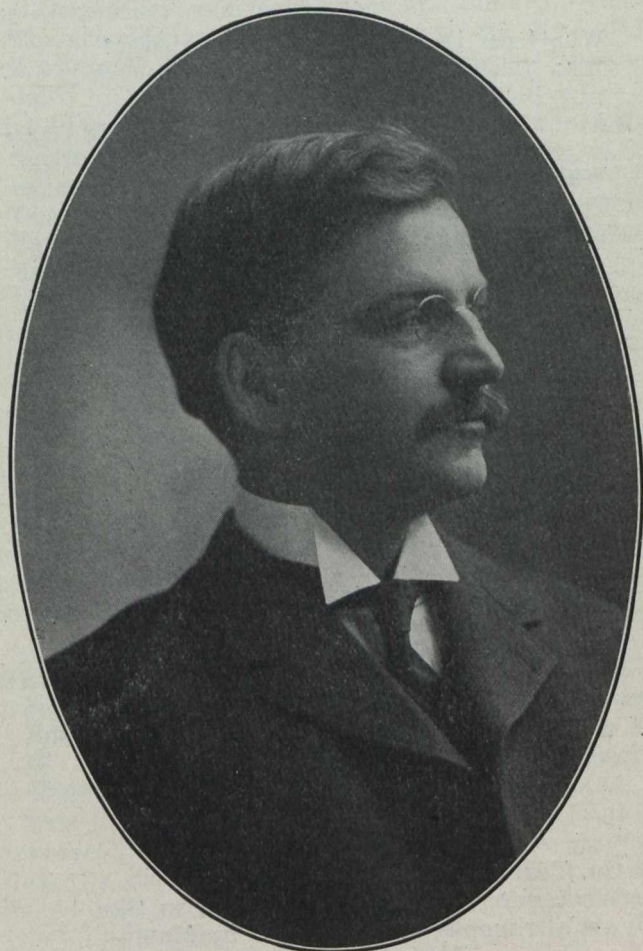
In a statement covering the activities of the Province of British Columbia during 1914, the Premier, Sir Richard McBride, says in part:—

"I find that the estimated output of British Columbia mines for last year is nearly \$26,000,000, as against a little over \$30,000,000 in 1913, or about 15 per cent. decrease. It must be remembered, however, that the average market prices of metals were much lower in 1914 than in 1913, which accounts for about \$1,250,000 of the decrease. The first six months showed a greater production than ever before during a similar period, and promised to make a record-breaker. The war had the effect of reducing the output and the closing of smelters for a time, and consequently affecting the output of coal. Recently, as the result of readjustment to new conditions, mining and smelting have been resumed, and we find that in Rossland, the Boundary and the Slocan there is less unemployment than in most other parts of the Province. Coal mining on the Island was affected by strikes during the early part of the year, and later again, as the result of the war, production was reduced. At the present time the output is about 6,750 tons per day, or about 61 per cent. of the capacity of producing mines. In this connection, let me say that the dividends of the mining companies of the Province in 1914, notwithstanding the war, have been \$1,690,000, as against nearly \$2,400,000 in 1913 and \$465,000 in excess of what they were in 1912. This, to me, is a remarkable showing in the circumstances."

ONTARIO'S NEW MINISTER OF MINES

George Howard Ferguson, B.A., LL.B., is a son of Dr. Charles Frederick Ferguson, who was member of the House of Commons for North Leeds and Grenville from 1873 to 1896. Born June 18th, 1870, at Kemptville, Ontario, he was educated at Kemptville High School, Toronto University and Osgoode Law School, and called to the Bar in 1894.

On April 14th, 1896, Mr. Ferguson married Ella Cumming, daughter of Alexander Cumming, of Buckingham, Quebec.



HON. G. HOWARD FERGUSON

Minister of Lands, Forests and Mines, Ontario

Mr. Ferguson was councillor for three years and reeve for three years of the village of Kemptville, and was elected to the Ontario Legislature at the general election in 1905. He was re-elected at the general elections 1908, 1911 and 1914, and appointed to the Hearst Cabinet as Minister of Lands, Forests and Mines, December 22nd, 1914.

Mr. Ferguson was a prominent figure in University politics in his undergraduate days, and has been much interested in politics ever since. He graduated from the University in 1891 with honors in Political Science and received the degree of LL.B. in 1892.

American papers say that makers of paints, glass, dry-batteries, etc., are complaining of scarcity of oxide of manganese. The price for what little remains available ranges from \$70 to \$100 per ton, according to size of order and conditions governing deliveries. The embargo by England is given as cause for the scarcity.

CANADIAN MINING INSTITUTE.

Mr Clifford E. Smith and Mr. A. G. Burrows, of Toronto, have given notice that at the annual meeting of the Canadian Mining Institute, to be held in March, 1915, they shall move and second the following amendments to the by-laws of the Institute:—

“That Section ‘27’ be struck out and the following substituted therefor:—

The word “Province” as hereinafter referred to in these by-laws shall be interpreted to mean each of the following divisions of the Dominion of Canada:

- (1) Quebec;
- (2) Ontario;
- (3) British Columbia, including Yukon Territory;
- (4) Alberta, including Saskatchewan and Manitoba;
- (5) Nova Scotia, including New Brunswick and Prince Edward Island.

“The councillors of the Institute shall be twenty in number, ten of whom shall be elected annually for a term of two years except as hereinafter provided for. The retiring councillors shall be eligible for immediate re-election.

“Each province shall be represented in council by a number of councillors proportional to the number of members entitled to vote resident in such province.

“Not later than the 15th day of October of each year, the council shall cause to be prepared a statement showing the number of members entitled to vote resident in each province as shown by the records of the institute on the 1st day of the said month of October. A copy of this statement shall be sent not later than the 1st day of November to each member of the council and to the secretary of each branch. The numbers as shown by this statement shall be used to determine the number of councillors to represent each province, in the following manner:

“The total number of members entitled to vote resident in Canada shall be divided by twenty, and the resulting figure shall be the unit of representation. The number of members entitled to vote resident in any province, divided by this unit of representation, shall determine the number of councillors to represent that province. In the case of fractional results, the provinces with the highest fractions shall be recognized until the necessary number of councillors is made up.

“Candidates for councillors must be resident in the province which they are nominated to represent.

“The elections for 1916 shall be arranged by council to make the representation as nearly as possible as herein stated. The councillors elected in 1916 shall hold office for one year only. Of those elected in 1917 ten shall retire in 1918, and the names of these ten shall be decided upon by council, but it shall be so arranged that as nearly as possible half the number of representatives from each province shall retire.

“That Section 33 shall be amended by adding after the word ‘standing’ in the sixth line the following:—

Nominations for councillors will not be valid unless signed by ten members in good standing who are residents of the province which the candidate is nominated to represent.

“That Section ‘34’ shall be amended by adding the following:—

The names of the candidates for councillors shall be arranged on the ballot in separate groups for each province to be represented, and the number to be elected for each province, as determined by section 27, shall be designated on the ballot. All members entitled to vote may vote for candidates in all provinces, regardless of where the member voting may reside, but

in no case shall a member vote for more candidates for any one province than the number designated on the ballot to be elected for that province.

"And that Section '35' shall be amended by adding the following:—

In the case of ballots cast for councillors, the decision as to who have been elected shall be arrived at independently for each province. The number of candidates to be elected for each said province, as stated on the ballot, who receive the highest number of votes shall be declared elected. In case of a tie, the scrutineers shall decide."

THE FLOTATION PROCESS.

A correspondent of the Boston News Bureau has contributed the following to that journal:—

While the new flotation process worked out by the Jackling metallurgical engineering staff has been introduced in the porphyry copper plants and the Butte & Superior mill on a small scale, it has been guarded with the greatest secrecy. Some of the results have leaked out, and in mining circles it appears to have produced as great an effect as the first discoveries of reducing the low grade copper on a big commercial basis.

The new process is said to have demonstrated that Utah Copper, Chino, Ray and Nevada Consolidated can recover 6 to 7 pounds more copper to the ton than under the old process. The recoveries will amount to from 25 to 28 pounds of copper to the ton, and Utah Copper, when operating both its mills at capacity, will be able to show a cost as low as $4\frac{3}{4}$ cents a pound, according to the estimate made by the metallurgical engineer in charge.

The recovery of the by-products, silver and gold, will be almost doubled. It is said that at Nevada Consolidated, where one of the new machines is being used, the gold recoveries have been raised from \$1 to better than \$2 a ton. The recovery of all values is so complete that assay of tailings in some instances shows only 15-100ths to 25-100ths of $\frac{1}{2}$ per cent. copper contents. Thus it will be seen that better than 95 per cent. of the ore content is being extracted.

At the Butte & Superior where one unit has been operating, the management reports an increase in the earnings of \$13,000 a month. Utah Copper is said to have shown an increase of \$48,000 in one month with one of the new units, and Nevada Consolidated with one unit operating raised the recovery of the entire plant from 68 per cent. to about 71 per cent. As compared to as much as 16 pounds of copper per ton in the tailings, it is said that at present the tailings show only about $2\frac{1}{2}$ pounds of copper.

Some of these machines are in operation at each one of the Jackling mill plants. The engineer in charge of this installation says that all the mills will be completely equipped with the new process during the year, and that mining companies who have learned of the success of the new machines are giving orders faster than they can be turned out.

JAPAN BUYING COPPER.

It is reported that Japan has just purchased in the United States 25,000,000 pounds of copper and taken option upon another large lot.

There is some surmise that this is in connection with the manufacture of arms and munitions of war for account of Russia.

NOT GERMANY.

(Theodore C. Williams, in Life.)

Who first put steam to ship and car
And conquered space on land and sea?
Who cabled thought through oceans far?
Not Germany.

Who first trapped microbes under glass.
Man's ambushed, deadliest enemy,
And bade foul plagues forever pass?
Not Germany.

Who from Daguerre his fame can steal?
Who finished for the world to see
"La Bicyclette," "l'automobile"?
Not Germany.

Who set the wheel where women spun
To million-fold machinery?
And what proud land bore Edison?
Not Germany.

Who laid on pain deep sleep and dark
To still life's utmost agony?
Who flashed world-o'er the wireless spark?
Not Germany.

Who first like eagle rode the air,
Columbus of that vaster sea?
Who first to earth's twin poles did fare?
Not Germany.

But higher yet what lands display
Darwin's supreme discovery,
The Curies, Lyell, Faraday?
Not Germany.

Who broke th' hereditary throne
Of kings, and set great peoples free?
What land to-day is freedom's own?
Not Germany.

Go, Teuton boaster! Humbly scan
What gifts thy peers have heaped on thee,
Art's triumphs were achieved by Man—
Not Germany.

In the special annual review number of The Engineering and Mining Journal, issued January 9, under the heading of "Metallurgy of Zinc in 1914," Mr. W. R. Ingalls gives information on two matters of especial interest to operators of lead-zinc mines in British Columbia. In regard to hydrometallurgical process he observes: "The hydrometallurgical work at Bully Hill, California, was checked, but only temporarily, the metallurgists of that company apparently thinking well of the results so far. Some plans regarded as promising are also being carried out by the Consolidated Mining and Smelting Co. at Trail, B.C. Both at Bully Hill and at Trail the idea is to sulphatize the zinc and electrolyze the solution." Included in the notes on Electric Smelting is the following comment: "The experimental work at Nelson, B.C., was discontinued, it being regarded as conclusively settled that an electric zinc-smelting furnace so small as one ton daily capacity is a commercial impossibility, while the satisfactory development of a larger furnace was regarded as too doubtful to be undertaken at Nelson."

BOOK REVIEWS

SURVEYING AND LEVELLING INSTRUMENTS, THEORETICALLY AND PRACTICALLY DESCRIBED—By William Ford Stanley—Fourth Edition, revised by H. T. Tallack—E. & F. N. Spon, Ltd., London, and W. F. Stanley & Co., Ltd., London.

The several editions of this work are a credit to the authors. The third edition represented forty-seven years of experience of the late W. F. Stanley. His life was devoted to the details of the subject and his written descriptions and instructions are authoritative.

The new edition has been revised by Mr. H. T. Tallack who ably assisted Mr. Stanley in his work.

PRACTICAL STAMP-MILLING AND AMALGAMATION—By H. W. MacFarren, with a Chapter on Arrangement and Construction of Stamp-Mills—By Charles T. Hutchinson—Mining and Scientific Press, San Francisco—\$2.00 Set—For sale by Book Department, Canadian Mining Journal.

This is the third edition of Mr. MacFarren's book. The first edition was written to give ideas and principles by which millmen might be guided. Since then the author has been engaged in many widely separated metal mining regions of the United States.

The new edition is an entire revision and enlargement, illustrated with 77 carefully selected cuts and drawings.

Mr. Hutchinson, who contributes to the new edition, was formerly manager of the mining machinery department of the Union Iron Works, and later for the Joshua Hendy Iron Works.

HEATON'S ANNUAL, 1915—The Commercial Handbook of Canada and Board of Trade Register—Edited by Ernest Heaton, J. Beverly Robinson and W. J. Dolson—Published by Heaton's Agency, 32 Church St., Toronto.

This book contains a fund of information for business men. The editors' aim is to make it the standard authority on the Canadian Customs, Tariff, Law and Regulations. The second half of the book contains general information in encyclopaedic form, with references for further enquiry.

A TEXT-BOOK OF PRACTICAL ASSAYING—By James Park, Director of the Otago University School of Mines—Charles Griffin & Co., Ltd., London—For sale by the Book Department, Canadian Mining Journal.

This little work comprises a series of lecture and laboratory notes originally prepared by the author for his own students. These notes have already appeared in New Zealand in two editions. The matter covers the customary two years' course in assaying.

In this new edition, the old matter has been carefully revised throughout, and much new matter added to bring the methods into line with recent technological practice.

The intention of the author has been to lead the student from the relatively simple operations comprised in the assay of gold and silver ores up to the determinations that pass insensibly into the quantitative analysis of simplex and complex substances; and while imparting manipulative practice and a knowledge of first principles to initiate the student into the technical methods of ore valuation.

In part I. instructions are given for the assay of gold and silver ores, gold and silver bullion, assay of platinum, silver, mercury, lead ores, tin, antimony, bismuth, copper, iron, manganese, zinc ores, chromite, nickel and cobalt ores.

In part II. instructions are given for the estimation of chlorine, sulphur, arsenic, phosphorus, potassium cyanide, barium, calcium, strontium, tungsten, titanium, thorium, molybdenum, the analysis of cement, rocks, coals, sulphide ores, soils, manures, oil shale, water, alcohol, sugar and milk.

Part III. is devoted to methods of qualitative analysis.

HURONIAN BELT CO.

Some months ago the Associated Gold Mines of Western Australia, Limited, which has provided a large amount of the capital of the Huronian Belt Co., Limited, in conjunction with it obtained an option over the North Thompson and Keeley mines.

The last payment in connection with the North Thompson property was made in November last, and a new company was recently formed in England, known as the North Thompson (Associated) Gold Mine, Limited, to work it. The directors of that company are: Capt. H. B. Hooper, chairman, Ed. Hooper, E. T. McCarthy, Hermann Landau, F. H. Hamilton, Alfred H. Collier, Benjamin Brookman and Dr. J. M. Bell, managing director.

The option on the Keeley mine has not yet been exercised, but is still in force.

Besides the two interests above mentioned, the Huronian Belt Co., Limited, has options over the Murray Mogridge claims near Wolf Lake, and owns in addition claims in a number of other districts in Northern Ontario, as well as in the far North-West, near Great Slave Lake, where the company sent an expedition last summer.

The Huronian Belt Syndicate, Limited, passed out of existence in March, 1914; all its interests being acquired by the Huronian Belt Company, Limited, which has a capital of £200,000. The directors of the new company are: F. H. Hamilton, of the firm of L. Ehrlich & Co, chairman; E. Turk, E. T. McCarthy, Scott Lings, Capt. H. B. Hooper, and Dr. J. M. Bell, managing director.

Messrs. L. Ehrlich and Company are very largely interested in the Associated Gold Mines of Western Australia, Limited.

Mr. J. Obalski, who has been elected chairman of the Chambre de Commerce for 1915, is a well-known mining engineer. He was born in France in 1852, educated in that country, and came to Canada when a young man. He was appointed Superintendent of Mines for the Province of Quebec in 1881, and held the position for twenty-eight years. He has explored the whole of the Province, and has written extensively on mining matters. At the present time he is practising his profession as a mining engineer in Montreal.

The International High Speed Steel Company, of 478 Pearl Street, New York City, has acquired a tract of nine acres of land at Rockaway, New Jersey, on which it will erect a large steel plant for the manufacture of its "Bulldog" brand of hollow and solid mining drill steel in all sections, shapes and sizes; and also of high speed tool and automobile steels of every description. It is expected that the plant will be in operation by April and will, when completed, give employment to several hundred men.

ACCIDENTS IN COAL MINES

According to John Casey, in a paper presented at the last annual meeting of the Mining Society of Nova Scotia, carelessness or neglect in timbering at the working-face is at the bottom of the great majority of fatal accidents in mines, and this point should be given very serious consideration. It bears directly on the safety of the miners, drivers, and in fact of all underground workmen. Although timbering at the working-face has for its main object protection of life, it also is a subject of importance in connection with the conservation of coal, the cost of production and economy of time and labor.

"The duties of mine timber are two. First, to give support to the loose and overhanging coal or stone; and, second, to give warning of any movement of the roof and the danger that is imminent. In timbering, the time and place of setting are items of greater importance than the number of individual timbers set. There must be no delay in setting props under loose pieces of stone or coal, or the safest way is to take it down altogether. Systematic timbering and spragging at the working-face will do much towards reducing the number of fatal accidents. The question of when, and where, sprags and props should be set, is one which should not be left entirely to the judgment of the individual miner. While he should be at liberty to put up additional props when he thinks they are needed, he should not be permitted to set them more than a specified distance apart, as timbering not properly done causes the roof to settle unevenly, bringing about dangerous conditions. Experience shows that accidents occur from falls of stone from an apparently strong roof, in which no slip or crevice could previously be observed. Hence roof and working-face can be made secure only by timbering and spragging systematically and at the proper time.

"In mining, as in most other industries, the vast majority of fatal accidents occur from one of three causes, namely, ignorance, carelessness or disobedience. Many of our mine workers, being more or less inexperienced, are often extremely ignorant of dangerous conditions. Others, even though experienced and thoroughly realizing their danger, evince a strong tendency to put off taking precautions against a known risk until a later and more convenient time, often until too late. These men rashly disobey the instructions of their superiors when told to take down a certain piece of stone or coal, or to set a sprag, or to put a prop under a boom that has only one prop under it. This class of men will complete loading a box before setting the second prop under the boom and will leave the mine without having performed their duty at all. There are also many intelligent miners to-day who have but an imperfect knowledge of the simple rudiments and principles of prop timbering, as they make no study of the nature of the roof under which they work, and have never thought of its mode of action. They look upon faults and dislocations as cutting out the coal and making the work of mining through them more laborious, but fail to reflect that these same slips and dislocations increase the danger.

"We all have, no doubt, noticed miners setting a prop or sprag under a fault or "trouble," just as they would shore up an old building. It does not occur to them, as it does to the careful and observant miner, that this same sprag should act as a silent but faithful monitor against impending danger; and in many cases it is the miner's own neglect that is responsible

for his injury. There is an old saying that time and tide wait for no man, and synonymous with this proverb is the fact that a falling piece of coal or stone waits for no miner to load away his coal before setting a prop to it, which might be needed to make his place safe.

"Not long ago a miner's worth was judged by the time in which he cut his coal, the quota of boxes sent away, and the distance driven in a month. These things, as we all know, are good and extremely necessary in their place, but they should not override the first consideration of safety. How often does the overman or shot-firer in his daily examination of places, find small infractions of the law which might have caused accident and which he passes over with a slight reproof! Frequently a miner is found mining with no sprags to support the piece of coal under which he is undercutting. He is not discharged as he should be, he is not prosecuted; he merely receives a slight reprimand, and he probably does the same thing again before very long. The excuse offered by the overman, for not inflicting a more severe punishment, is that if the man were discharged he would find work in a nearby colliery, and as men are needed in his own mine, he might as well keep him.

"I am sure you will agree with me when I say that it is not from the want of laws that there are so many accidents; and as disrespect of these laws is the direct cause of accident, we cannot hope for a better state of affairs until convictions in the courts for violation of the laws become more general. Therefore I contend that back of all our serious accidents is the disrespect for law and authority. Lack of discipline will destroy the the most magnificent organization; and there cannot be discipline where there is not both fear and respect for our mining laws. Therefore let everyone insist on the enforcement of these laws, and there is no more certain way of reducing fatalities.

"From our own experience in dangerous work, accidents do not, as a rule, repeat themselves so often in other parts of the mine as they do at the working-face. Take for instance the driver, if he should be caught between a box and a low boom, or if a landing tender is caught between a full and an empty box because of insufficient space between the roads, these causes are instantly remedied and the accident does not repeat itself. When the coal at the working-face is not timbered and spragged properly, and the laws are being continually broken, accidents must be expected until steps are taken which will enforce the keeping of the law.

"Few miners learn the lesson their acts and habits should teach them, and fewer still can ever be expected to profit by the lessons taught them through the misfortunes of their fellow-workmen. This habitual disregard of safety is an element of human nature that must be recognized as ever present, and one that it is needless to go into at length.

"Instead of wasting time in enlarging upon a well-known failing of mankind, let us have the suggestions of practical men on the ways and means of improving conditions that now exist at the working-face. I would also strongly advocate the adoption of a system and rules tending to eliminate as far as possible the fallible human factor which is responsible for the occurrence of many of the fatal accidents in mines. Furthermore it has occurred to me from time to time that the time-worn slogan "Safety First" be superseded by "Discipline First." The idea is one that will

probably commend itself to many or perhaps to all of us. While it appears revolutionary in character it offers a more evident basis for procedure, and there are many who will consider it to be an attack at the real root of the trouble.

"The question of accidents in mines and their causes, when thoroughly considered, leads us to ask how may they be reduced and prevented. To every practical mining man, nothing is plainer than the fact that every mine worker must assume certain legitimate risks common and incidental to his calling. A mining company does not run an insurance business, or guarantee protection of life to any employee they may have, beyond perhaps liability for accidents due to neglect or mismanagement of officials, or inefficient equipment. The responsibility of the mine worker begins when he enters the mine. He must exercise reasonable care, observe proper precautions and obey absolutely the Coal Mines Regulation Act and the rules of his colliery. In the past we have been working toward greater safety. About 50 per cent. of the accidents occurring in the operation of the mines are due to lapses of discipline. A miner will gamble with fate and take a chance, and we shall probably never be able to eliminate these causes of accidents."

ASBESTOS.

Mr. W. J. Woolsey, of Thetford Mines, has the following letter in the Jan. 23 issue of the Financial Times, Montreal:
Editor Financial Times:

Sir,—During a recent conversation with an esteemed financial authority he remarked that "the name asbestos is now a rag in the market," and in view of the nature of the present period of adjustment it might be opportune to present a few of the inherent virtues of the industry as they are likely to develop during future business expansion, and in this letter I would advance the claim on our attention of establishing, as far as expedient, the manufacture of the raw material here in Canada.

A series of discussions on this point with representative men in the industry elicited expressions of opinion ranging from "desirable but difficult," to something which might be interpreted to imply imbecility for not having attained the distinction long ago.

It is useless to repine over the fact that a sum much in excess of what is required to establish this industry has been worse than wasted during the past five years.

The facts before us are these: In your issue of July 4th, 1914, one of your correspondents denied the existence of an asbestos monopoly in Canada, but admitted it for an annual production of 3,000 tons crude. Considering this figure as low and adding our production of long fibre we may claim 10,000 tons, which is either used in the pure state by foreign manufacturers or adulterated by the injurious (for our interests) admixture of foreign materials. The manufacture of these 10,000 tons here would present the following advantages:

1. Increase our exports.
2. Afford a larger labor market. It may be here observed that the labor expended on the long grades of fibres is greatly in excess of that used on shorter grades.
3. Advantageously complement the present industry.

Opposed to these may be mentioned:

1. Force discovery of competing deposits. Of this there can be no more likelihood than in the past.

2. Rouse envy of present consumers. To this it is apparent that the consumer has no direct interest with the manufacturer and only requires the best value for his money.

3. Cannot compete. Our export duty on pulpwood was the applied remedy in a quite parallel case, and import duties could have no force in countries where there were no like industries to protect.

The probability of finding substitutes for our product would not be greater, would, in fact, be lessened, for the reason that our own manufacturers would be more interested to find new uses and to conserve the old ones than foreign manufacturers. It is apparent, too, that our dependence on other countries is in inverse ratio to the number using our goods.

Finally, there is the probability of wounding the feelings of our friends, though we surmise the family relations within the Empire would permit of speedy adjustment, and if the U. S. is not a part of the Empire—well, they obtained all the advantage accruing from the organization of our pulp wood industry.

Yours, etc.,

W. J. WOOLSEY.

MINING SOCIETY OF NOVA SCOTIA.

At a regular meeting of the Council of the Mining Society of Nova Scotia, held on the 12th of December, 1914, it was resolved that in view of the unusual conditions occasioned by the war, and following the lead of engineering societies throughout the Empire, the Council consider it inadvisable to hold the customary annual meeting and dinner in 1915, and hope that this decision will meet with the approval of the members. It is felt that the social features and the expense entailed upon the Society and the individual members would be inappropriate at the present time or in the immediate future.

An annual meeting will be held as directed by the by-laws for the election of officers and the transaction of such business as it may be necessary to deal with.

CANADIAN MINING INDUSTRY.

The Canadian mining industry has suffered less perhaps than any other enterprise, excepting that of agriculture, by the prevailing adverse conditions. During 1914 British Columbia mines produced metals valued at \$26,000,000, or about \$4,000,000 less than in 1913. The value of Porcupine gold output was \$5,750,000, or \$1,500,000 more than during the year previous. The production of Cobalt silver was valued at \$23,850,000 or about \$4,500,000 less than in 1913. The lower price of silver accounted for half of the decrease in value of the latter metal.—Bradstreet's.

CALGARY OIL.

According to the Financial Times, Montreal, Dr. Eugene Haanel, Director of the Dominion Mines Branch, told the annual meeting of the Commission of Conservation, in Ottawa this week, that in his opinion the discoveries made so far in the Calgary oil field, and the prospect of future discoveries, do not warrant or afford any guarantee for people to invest their money.

COPPER RANGE.

All three Copper Range Consolidated mines, Michigan, now are working full time. The men have been assured that this policy will continue for three months at least. After that date further action is dependent upon the metal situation.

THE TRADE IN CONTRABAND.

Washington, Jan. 24.

The United States Government to-day issued a lengthy defence of its interpretation of the rights and duties of a neutral in the European war.

A document, five thousand words long, prepared by President Wilson, Secretary Bryan and Counsellor Robert Lansing of the State Department, after several days of consultation, was made public in the form of a letter from the Secretary of State to Senator Stone of Missouri, Chairman of the Senate Committee on Foreign Relations.

While the letter is a reply to an inquiry from Senator Stone for information as a result of complaints made in the press and in letters from various parts of the country charging the Washington Government with unfairness to Germany and Austria, it also is intended as a pronouncement of policy on some questions of neutrality previously unexplained.

After answering separate and specific charges and calling attention to the fact that the United States has promptly taken to task Great Britain as well as Germany, and every Government which in any way has infringed upon the rights of this country, the letter concludes with the following declaration on the much discussed question of exportation of war munitions:

"If any American citizens, partisans of Germany and Austria-Hungary, feel that this Administration is acting in a way injurious to the cause of these countries, this feeling results from the fact that on the high seas the German and Austro-Hungarian naval power is thus far inferior to the British. It is the business of a belligerent operating on the high seas, not the duty of a neutral, to prevent contraband from reaching an enemy. Those in this country who sympathize with Germany and Austria appear to assume that some obligation rests upon this Government, in the performance of its neutral duty, to prevent all trade in contraband, and thus to equalize the difference due to the relative naval strength of the belligerents. No such obligation exists; it would be an unneutral act, an act of partiality, on the part of this Government to adopt such a policy, if the Executive had the power to do so.

"If Germany and Austria-Hungary cannot import contraband from this country it is not, because of this fact, the duty of the United States to close its markets to the allies. The markets of this country are open upon equal terms to all the world, to every nation, belligerent or neutral."

In a general way the letter sets forth that rules of neutrality have been promulgated by the American Government without discrimination, and have been applied with equal fairness to all concerned.

Some of the complaints, as summarized by Senator Stone, are answered in the letter point by point, substantially as follows:

"Acquiescence without protest to the inclusion of copper and other articles in the British lists of absolute contraband"—It is here stated that every seizure of American copper has been followed by a prompt protest, and that the inclusion of "unwrought copper" in the list of absolute contraband is under consideration, though the Government "necessarily finds some embarrassment in dealing with the subject," because of a declaration by the United States in the past placing "all articles from which ammunition is manufactured" on its contraband list, including copper among such materials.

"Submission without protest to interference with American trade to neutral countries in conditional and absolute contraband."—History shows, says the letter, that in every war the superior naval power has interrupted neutral commerce more or less, but those who complain are referred to the American note of protest of December 26th despatched to Great Britain.

"Submission without protest to interruption of trade in conditional contraband consigned to private persons in Germany and Austria, thereby supporting the policy of Great Britain to cut off all supplies from Germany and Austria."—Again the letter calls attention to the note of December 26 to the British Government contending for "the principle of freedom of trade in articles of conditional contraband not destined to belligerent forces."

"Submission to British interference with trade in petroleum, rubber, leather, wool, etc."—As petroleum can be used in propelling submarines and rubber is essential for big motors used by armies, the United States Government "has not yet reached the conclusion that they are improperly included in a list of contraband."

"The United States has not interfered with the sale to Great Britain and her allies of arms, ammunition, horses, uniforms and other munitions of war, although such sales prolong the conflict."—No obligation, it is contended, exists either in international law or in the domestic law of the United States to prohibit private trade in these articles."

POWER SHORTAGE AT COBALT.

Cobalt, Jan. 23.

Until the spring thaw sets in in the middle of April there will be serious curtailment of production in the camp owing to the shortage of power. The Northern Ontario Light and Power Company, which has the power monopoly in Cobalt, gave notice to the mine managers a few days ago that owing to the very short rainfall last fall they would be obliged to make some arrangement whereby the load on their three electric plants on the Montreal and Matabitchouan rivers would be relieved.

Commencing to-morrow the Coniagas and two other mills in the camp will close down for a week, and until spring the thirteen mills in the camp will in turn close down one week out of every month.

The precipitation in New Ontario last year was the lowest ever known in Northern Ontario. During the year 1914 the Fountain Falls plant was added to the other plants of the company. The plant at Fountain Falls has a capacity of 2,580 horse power. Besides the latter acquisition arrangements were made by the company to store water in case of necessity; but even with the increased capacity and better facilities the unusual conditions prevailing could not be overcome. The power company under normal conditions has a capacity of 17,000 electrical horse power, including 10,000 h.p. at the Matibichouan plant and 3,500 at Hound Chutes. With the present low water the greatest available volume of power is 10,200 h.p. The mills of the camp alone take 5,000 h.p. and with the curtailment of this amount by 25 per cent. the situation will be relieved.

LA ROSE.

The financial statement of La Rose Consolidated Mines as of January 1, 1915, shows cash, ore in transit and at smelters and on hand amounting to \$1,214,400, of which \$985,891 was in cash. Dividend payable January 20 called for \$187,500.

SUMMARY REPORT GEOLOGICAL SURVEY, 1913.

The Geological Survey summary report for the year 1913, has just been received. It is a volume of 400 pages accompanied by several geological maps.

The Directors report discusses changes in personnel, organization, International Geological Congress, field work, Canadian Arctic expedition, and progress of divisions.

Reports from the several divisions are as follows:—

Upper White River district, Yukon, by D. D. Cairnes; Rainy Hollow mineral area, B.C., by R. G. McConnell; South-Central Graham Island, B.C., by J. D. MacKenzie; Recent Development at the Hidden Creek mine, Observatory Inlet, B.C., by R. G. McConnell; The Lime Belt, Quadra (South Valdes) island, B.C., by D. D. Cairnes; Britannia mine, Howe sound, B.C., by R. G. McConnell; Sharp Point hot spring, Vancouver Island, B.C., by C. H. Clapp; Geology of a portion of the Duncan map-area, Vancouver Island, B.C., by C. H. Clapp and H. C. Cooke; Geology of the Sooke special map-area, Vancouver Island, B.C., by H. C. Cooke; The geology of the alunite and pyrophyllite rocks of Kyuquot Sound, Vancouver Island, B.C., by Charles H. Clapp; Notes on mining developments in the Similkameen District, B.C., and on a reported occurrence of oil at Kelowna, B.C., by Charles Camsell; Rosland Mining Camp, B.C., by Chas. W. Drysdale; Reconnaissance in East Kootenay, B. C., by Stuart J. Schofield; Coal areas in Flathead Valley, B.C., by D. B. Dowling; Geological notes on the Sheep River gas and oil field, Alberta, by D. B. Dowling; North Saskatchewan River coal areas, Alberta, by D. B. Dowling; Willowbunch coal area, Saskatchewan, by Bruce Rose; Gypsum and Salt in Manitoba, by A. MacLean and R. C. Wallace; The calcareous drift and lacustrine deposits in Rainy River District, Ontario, by W. A. Johnston; Stratigraphy of the Niagara escarpment of southwestern Ontario, by M. Y. Williams; Geology of a portion of Sudbury map-area, south of Wanapitei Lake, Ontario, by W. H. Collins; Southeastern portion of Buckingham map-area, Quebec, by M. E. Wilson; The drift on the Island of Montreal, by John Stansfield; Marine submergence at Montreal, Covey Hill, and Rigaud Mountain, by J. W. Goldthwait; Geology of Orford map-area, and the southern part of the "Serpentine Belt," Pottton township, Quebec, by Robert Harvie; Granites of the Eastern townships of Quebec, by A. Malliot; The succession of faunas at Levis, Quebec, by P. E. Raymond; Geology of the Moncton map-area, New Brunswick, by W. J. Wright; Geology of the St. John map-area, New Brunswick, by Albert O. Hayes; Physiography and surficial geology of Nova Scotia, by J. W. Goldthwait; Geology of the Port Mouton map-area, Queens County, Nova Scotia, by E. R. Faribault; Geology of the gold district of Pleasant River Barrens, Lunenburg county, Nova Scotia, by E. R. Faribault; The Windsor-Pennsylvanian section on the Strait of Canso, Nova Scotia, by Jesse E. Hyde; Geology of Clyburn valley, Cape Breton, by W. J. Wright; Clays of British Columbia and Alberta, by Heinrich Ries; Report on progress of investigation of clay resources, by Joseph Keele; Report of the vertebrate palaeontologist, by Lawrence M. Lambe; Report of the invertebrate palaeontologist by E. M. Kindle; Report by Lancaster D. Burling; Palaeobotany, by W. J. Wilson; Mineralogy, by R. A. A. Johnston; Borehole records (water, oil, etc.), by E. D. Ingall; White River map area, Yukon Territory, by W. E. Lawson; East Sooke and Flathead coal

basin map areas, by F. S. Falconer; Bridge River map area, British Columbia, by E. E. Freeland; Windermere map area, British Columbia, by A. G. Haultain; Crownsnest sheet, British Columbia and Alberta, by A. C. T. Sheppard; Thetford and Black Lake map area, Quebec, by D. A. Nichols; New Glasgow map area, Nova Scotia, by B. R. MacKay; Triangulation work, by S. C. McLean.

CANADIAN MINING INSTITUTE.

A meeting of the Toronto branch of the Canadian Mining Institute was held on Saturday, Jan 23, at the Engineers' Club.

A committee consisting of A. J. Young, W. G. Miller and A. M. Hay reported in favor of holding the annual meeting, March 3rd, 4th and 5th, at the King Edward Hotel. The three members of this committee were appointed a committee to make all necessary arrangements for the annual meeting.

It is understood that there will be no smoker this year. The banquet will be held on the second evening of the meeting and should therefore be largely attended.

There was a general discussion, introduced by Mr. J. M. Clark, on the question of taxation of mining properties.

The next meeting of the branch will be held on Feb. 6, when it is expected that the new Minister of Lands, Forests and Mines of Ontario, Hon. G. H. Ferguson, will be present.

TIMISKAMING.

Cobalt, Ont., Jan. 22.

The discovery on the Timiskaming is proving to be of very considerable importance. The vein, which was found on the 530 ft. level of the Beaver, was drifted upon for one hundred feet in bonanza ore before it was followed across the line into the Timiskaming.

On this latter property it has now been followed for forty feet, and the vein is still good in the face and five inches wide. This is already one of the largest shoots of ore ever found on the Timiskaming. Over nine tons of ore has been broken out of this vein. The wall rock is also excellent milling ore.

Two crosscuts are now being run to connect the new find with the Temiskaming direct, as now communication is only to be had through the Beaver workings and all ore is coming up the Beaver shaft.

The discovery is to the west of any previous find, and opens possibilities in the territory that was previously regarded as not too promising.—Journal of Commerce.

1914 GOLD OUTPUT.

The gold mining industry of the United States had a prosperous year in 1914, and regained its normal condition, inasmuch as early returns indicate an output greater by nearly \$4,000,000 than that of 1913. H. D. McCaskey, of the United States Geological Survey, who is authority for these figures, adds that production in 1913 was lower than for several years past; and even in 1914 the output was considerably below that of any year in the period 1908-1912, when the high-water mark was reached. For 1914 preliminary figures of the United States Geological Survey and Bureau of the Mint indicate a total gold yield of \$92,823,500.

NEW YORK MEETING A. I. M. E.

February 15th to 17th, 1915.

The committee in charge of the New York meeting of the American Institute of Mining Engineers, 1915, has been actively engaged in preparing for the entertainment of members. An interesting and agreeable programme is assured.

The following papers have been accepted. Others have been received and some of them will, no doubt, be accepted and distributed in advance of the meeting. In accordance with the ruling of 1914, and thereafter, no paper will be placed on the programme unless received in time for advance printing and distribution, except by special action of the Committee on Papers and Publications.

Basil Prescott, Geology of Main Mineral Zone Santa Eulalia District; Paul. Billingsley, The Boulder Batholith of Montana; W. H. Corbould, Cloncurry Copper District; James Humes, Mining Methods at Park City, Utah; Frank H. Kneeand, Safety with Mining Machinery; Howard N. Eavenson, Safety Methods and Organization of United States Coal and Coke Company; S. Le Fevre, Housing and Sanitation at Mineville; Charles V. Seastone, Hydro-Electric Development of Peninsular Power Co.; J. W. Gwinn, Underground Haulage and Storage Battery Locomotives in the Bunker Hill and Sullivan; Courtenay de Kalb, Some Defects of U. S. Mining Law; F. E. Marcy, Notes on the Design of Wet Crushing Ball Mills; Boyd Dudley and R. H. Richards, The Flow of Sand and Water Through Spigots; Arthur B. Foote, An Improved Form of Cam for Stamp Mill; Manuel Eissler, Copper Smelting in Japan; Boyd Dudley, Jr., A Study of the Chloridizing Roast, etc.; Louis V. Bender, Coal Dust Fired Reverberatories at Washoe Reduction Works, Anaconda, Mont., 1914; David H. Browne, Coal Dust Fired Reverberatory Furnaces of Canadian Copper Co.; I. N. Knapp, Mud Ladened Water as Used in Drilling Wells by the Hydraulic Rotary Method; M. E. Lombardi, Improved Drilling Methods on Coalinga Oil Field, Cal.; Philip W. Henry, Depreciation as Applied to Oil Properties; Roswell H. Johnson, The Role and Fate of the Connate Water in Oil and Gas Sands; S. J. Hardison, Dehydrating Oil Plant of the Nevada Petroleum Co., Cal.; M. L. Requa, Comparative Cost of Rotary and Standard Drilling; Douglas Bunting, The Limits of Mining Under Heavy Wash; Chas. T. Malcolmson, Recent Developments in the Coal Briquetting Industry; Edward G. Norton, The Origin of the Louisiana and Texas Salines; W. B. Phillips, Are There Possible Sources of Potash Salts in Texas; Thos. L. Watson & J. Sharshall Grasty, Barite of the Appalachian States; N. B. Davis, The Plasticity of Clay and Its Relation to Mode of Origin; G. K. Burgess and Sir R. Hadfield, Sound Steel Ingots and Rails; F. C. Langenberg and R. G. Webber, Structure and Hysteresis Loss in a Medium Carbon Steel; C. A. Heberlein, Mining and Reduction of Quicksilver at Oceanic Mine, Cambria, Cal.

The following list of papers have been accepted by the Committee on Papers and Publications since the preceding classified list was prepared:

L. W. Bahney, Method of Determination of Gold and Silver in Cyanide Solutions; Charles H. MacDowell, German and Other Sources of Potash Supply; W. R. Shimer, Effect of Rail Finishing Temperatures on Their Physical Properties and Microstructure; P. B. Scotland, Mining Methods of the Arizona Copper

Co., Ltd.; F. C. Newton, Effect of Zn_3Ag_2 upon the Desilverization of Lead; B. F. Tilson, Testing and Application of Hammer Drills; Howard R. Hughes, A Modern Rotary Drill; Alfred H. Brooks, The Petroleum Fields of Alaska; Joel H. Watkins, White Burning Clays of the Southern Appalachian States; R. E. H. Pomeroy, Reverberatory Smelting Practice at Nevada Consolidated; James F. Kemp, The Mavari Iron Ore Deposits, Cuba; Walther Mathesius, High Blast Heats in Mesaba Practice.

A Ladies' Committee has been appointed and is actively engaged in preparing for the entertainment of visiting ladies during the time of the meeting. Lunches are to be served between the technical sessions, to which all ladies are invited.

HOLLINGER.

The annual general meeting of the shareholders of Hollinger Gold Mines, Limited, will be held at the president's office, rooms Nos. 306 and 307, Dominion Express Building, Montreal, on Tuesday, Feb. 2, 1915, at 3 p.m.

The balance sheet, made up to Dec. 31, 1914, is as follows:

Hollinger Balance Sheet	
December 31st, 1914.	
	Assets.
Capital Expenditures—	
Mining Properties	\$2,500,000.00
Plant. Brought forward from 1913..	\$500,000.00
Additions during 1914	305,621.11
	\$805,621.11
Less depreciation for 1914	165,621.11
	640,000.00
Development. Brought forward from 1913.	\$175,000.00
Additions during 1914	24,862.17
	199,862.17
Deferred Development Charges	123,688.32
Town Real Estate	2,950.00
	\$3,466,500.49
Current Assets—	
Cash on hand and in banks	\$370,468.44
Debentures, Town of Timmins	89,273.28
Accounts receivable	21,163.68
Materials and supplies on hand	117,949.34
Insurance and charges paid in advance	4,278.09
Guarantee deposits	500.00
	603,632.83
Bullion Assets, Etc.—	
Bullion shipped, not paid for	84,961.76
Bullion on hand	89,000.00
Solutions on hand	24,700.00
Precipitates on hand	2,700.00
Litharge, slags and miscellaneous	105,500.00
	204,861.76
	\$4,274,995.08
	Liabilities.
Capital Stock	\$3,000,000.00
Current Liabilities—	
Wages unpaid	\$53,024.81
Accounts payable	69,694.41
	122,719.22
Contingent Liabilities	15,532.75
Subscription to Patriotic Fund	10,000.00
Surplus—	
Premium on shares sold, re-invested in plant as per 1913 annual report	\$144,248.44
Less written off 1914 plant (part only)	144,248.44
	Profit and Loss Account—
Forward from 1913	\$ 544,214.36
Less adjustments	2,778.24
	541,436.12
Profits Jan. 1 to Dec. 31, 1914.	1,786,679.66
	\$2,328,115.78
Less Patriotic Fund Subscription.	10,000.00
1914 Plant Depreciation, not shown above	21,372.67
Dividends paid, 1914	\$1,170,000.00
	\$1,201,372.67
	1,126,743.11
	\$4,274,995.08

OBITUARY.

On January 2, Evan Evans, district mine inspector with headquarters at Fernie, Crowsnest district, British Columbia, died at the Crow's Nest Pass Coal Co.'s Coal Creek colliery from asphyxiation, caused by inhaling noxious gas while endeavoring to examine a mine in which an explosion had occurred a few hours previously. The late Mr. Evans was a native of Wales; he was 41 years of age, unmarried, and did not have and relatives living in Canada, but leaves a sister, believed to be resident in England. He was for some years employed in Crowsnest coal mines prior to his appointment in 1910 or 1911 as a mine inspector under the British Columbia Department of Mines. He was, in 1902, a member of the first Board of Examiners of candidates for certificates of competency as overmen ever held in the Crowsnest district. The following tribute to his character is reprinted from the District Ledger, published at Fernie, B.C.:

"Evan Evans was a man of sterling worth and fixed integrity, and the more intimate one become with him the more his qualities were appreciated. The deceased inspector was one of the most conscientious men acting in the capacity of inspector in this district and, so far as he was able to, did his duty with a fearlessness and disregard of criticism that was recognized by all. At every inquest in connection with mine fatalities in this district he was in attendance and he displayed a thoroughness and practical knowledge that on more than one occasion brought to light facts that might otherwise have been overlooked or disregarded. The mine-workers realized that they had in Evan Evans a man who tried to do the right thing even if the department for which he worked and the coal companies did not appreciate such microscopic thoroughness. Of a quiet and retiring disposition, more given to study than to light diversions, he was constantly endeavoring to increase his store of knowledge, and it may be remarked incidentally that even as a miner working at the face he made a fixed and firm determination to attain to the position which he ultimately reached, and in which capacity he was so manfully fulfilling his duties when he met his death."

COBALT SHIPMENTS.

Ore shipments from Cobalt camp for the week ending Jan. 22 totaled 463,760 lb. Of the six cars of ore shipped, five were of high-grade material. The bullion shipments for the same period consisted of 68 bars, shipped from two mines and containing 85,739 oz. and valued at \$42,860.50.

La Rose with two cars of high grade was the heaviest shipper during the week, the total from this mine reaching 70 tons. The Seneca-Superior Mining Company, from the Peterson Lake, sent out 32 tons of high grade to Deloro. The Mining Corporation of Canada, and the McKinley-Darragh, were the other high grade shippers, the former sending one car from the Townsite-City mines. Dominion Reduction, with a 43 ton car, was the only low grade shipper of the week.

Cobalt Comet and Crown Reserve, both shipping for the first time in 1915, were the only bullion shippers for the week. The former sent out 41 bars on Monday, valued at \$25,000, while the latter appeared on Wednesday with 27 bars valued at \$17,000. The bullion shipments are lower than the previous week, when a new record from the camp was established in number of ounces shipped in bullion form.

The ore shipments for the week were:

La Rose	140,620
McKinley-Darragh.	84,400
Dominion Reduction Co.	87,500
Peterson Lake—	
Seneca Superior	63,660
Mining Corp. of Canada—	
Townsite-City.	87,580

Total. 463,760

The bullion shipments were:

Cobalt Comet	41	51,739	\$25,860.50
Crown Reserve	27	34,000	17,000.00
	68	85,739	\$42,860.50

Bullion shipments for the year are:

Nipissing.	406,663.04	\$198,248.23
Dom. Reduction ...	47,502.00	23,750.00
Crown Reserve	34,000.00	17,000.00
Cobalt Comet	51,739.00	25,860.50
O'Brien.	16,066.00	8,023.00
Mining Corp.	3,306.00	1,635.00

559,276.04 \$274,516.73

—Cobalt Nugget.

GUGGENHEIM FAVORS PROFIT SHARING.

New York, Jan. 21.—Before the Federal Commission on Industrial Relations, Daniel Guggenheim said: "We have met with our men and allowed them to make suggestions for the betterment of their conditions, and all such suggestions as were feasible were adopted."

Mr. Guggenheim came out in favor of a profit-sharing scheme by which workmen would share in profits of the corporation.

Witness said he is a director of the American Smelting and Refining Company, the Guggenheim Exploration Company, the Pacific Copper Company, the Mexican Union Railroad, the Great Northern Railroad, and many other corporations and banks.—Journal of Commerce.

INTERNATIONAL NICKEL CO.

New York, Jan. 23.

The large block of the International Nickel Co. stock purchased some time ago by Dominick and Dominick, from one of the members of S. H. P. Pell & Co., in addition to another lot of the same stock, which Dominick and Dominick acquired, has all been disposed of to investors. This would seem to indicate the presence of real investment buying. The stock has since advanced in price to above 110.—Journal of Commerce.

NEW BRUNSWICK RESOURCES.

The St. John Board of Trade has been endeavoring to bring before the public the need for government experts providing early and accurate information with respect to the extent and locality of mineral resources, or of any by-product which may be produced from the mineral or agricultural resources of the Province of New Brunswick for industrial uses.—Journal of Commerce.

Messrs. Heron & Co., members Toronto Stock Exchange, 16 King Street west, Toronto, have issued their 18th annual tabular summary, covering the leading Canadian mining companies. The "Summary" shows the capitalization, shares issued, acreage, shipments, dividends paid to date and present rate, number of shares traded in during the past year and price range to date, of all the active and many inactive stocks.

PERSONAL AND GENERAL

Mr. G. G. S. Lindsey, president of the Canadian Mining Institute, left Toronto last week for England. He expects to return in good time for the annual meeting in Toronto, March 3-5.

Dean Ellis of the Faculty of Applied Science, University of Toronto, lectured on "High Explosives" at a meeting of the Royal Canadian Institute in Toronto on Jan. 9th.

Mr. Thomas B. Allen is in Toronto.

Mr. Wm. B. Joyce has been elected a director of the Kerr Lake Mining Co., to succeed the late Wm. G. Nickerson.

Mr. Claud C. Hoover, is at the head of the American Belgian Relief Commission.

Mr. Harold Whittingham, who a few years ago was in the employ of the Nipissing Mining Co. at Cobalt, has returned from Sardinia to England, and enlisted as a lieutenant in the artillery service.

The friends of the late Dr. Samuel Franklin Emmons have established a fund whose income may be used in support of a fellowship to promote investigations in the branches of geology which were cultivated by him, more especially on the economic side. The funds have been placed in charge of the trustees of Columbia University, but the choice of the fellow and the expenditure of the income are entrusted to a committee consisting of Professors James F. Kemp, John D. Irving and Waldemar Lindgren.

Mr. T. H. Rea has returned to Toronto from Porcupine.

Mr. James McEvoy, who was one of those nominated for the office of vice-president of the Canadian Mining Institute, has declined the nomination.

Mr. Thomas Gibson has been elected president of the Lake Superior Corporation, succeeding Mr. J. Frater Taylor.

Mr. W. E. Segsworth is at Porcupine.

Dr. Eugene Haanel, director of the Mines Branch, has been elected vice-president of the Faraday Society.

Mr. Herbert Carmichael, for many years until his retirement two years ago, Provincial Assayer for British Columbia, recently returned to Victoria, B.C., from a long visit to Great Britain.

Mr. S. Duncan Ellis who early last year left Toronto to fill a position on the engineering staff at the Braden Copper Co.'s mines in Chile, has gone to England to enlist for active service in the British army on the European continent.

Mr. Thomas Graham, Chief Inspector of Mines for British Columbia, has returned to his headquarters in Victoria, after having spent two weeks investigating matters in connection with the death of District Mine Inspector Evan Evans on January 2, at the Crow's Nest Pass Coal Co.'s colliery in Southeast Kootenay.

Mr. Douglas Lay, formerly superintendent for the Van-Roi Mining Co., with silver-lead-zinc mine and concentrating mill near Silverton, Slooan, B.C., is now in charge of the Josie group of mines and concentrating mill of the Le Roi No. 2, Ltd., at Rossland, during the absence of Mr. Ernest Levy, manager, who left British Columbia about the middle of January on a visit to England.

Mr. Dudley Michel, instructor in first aid to the injured among metalliferous miners in British Columbia, will this month follow up the good work he last summer inaugurated at the Granby Consolidated Co.'s big mines at Phoenix, Boundary district of British Columbia, and afterward will proceed to Hedley and Prince-

ton, in Similkameen district, to arrange for the instruction in first aid of miners in those parts of the province.

Mr. Paul Johnson, a metallurgist who for many years operated in North America, in Mexico, United States, British Columbia and Alaska, just before the breaking out of war in Europe returned to his home at Lund, Sweden, from an extended tour through Germany and other parts of the continent.

THE COLLIERIES.

Great interest was taken in the doings of the war concert party of "stars," who went out to the front to entertain the wounded soldiers in the base hospitals. A correspondent in the Wigan Observer points out that the opening performance of "That National Theatre at the Front," as Mr. Seymour Hicks called his party, was given in the Casino Hospital, at Boulogne, two and a half hours after the party's arrival. "Surely," adds the correspondent, "no member of the party can ever before have faced so strange and yet so sympathetic an audience. A temporary stage, draped with and surmounted by the flags of the Allies, had been erected at one side of the room, and in front of it were rows and rows of beds, each with its wounded occupant. Some were so seriously injured that they could not even raise their heads to see their entertainers, but none were so bad that they could not enjoy the all too short programme. Here and there groups of convalescents in their blue uniforms, and of nurses in their scarlet caps, made splashes of color that relieved the vista of white counterpanes. All the artists appeared in the dresses in which they travelled." After describing the contributions of the various artists to the entertainment programme the writer goes on to say that the house liked Mr. Will Van Allen's violin and banjo playing, but they roared when he went on to funny stories, and the beds shook over his story of how one of the Kaiser's spies, seeing the miners come up near Wigan, wired "Stop the war; the English are bringing up men from Hell."

TO MINE LIGNITE.

Regina, Sask., Jan. 22.

In order to develop the immense fields of lignite coal in the southern part of Saskatchewan, the formation of a company, composed of Regina business men, is being proceeded with.

Experimental work to test the value of such an undertaking has been carried out in association with the Government of the Province, and the preparatory steps of installation have been taken.

The company proposes to erect plants where the lignite can be carbonized and briquetted and prepared generally for industrial and household use.

The immediate necessity was obvious, of putting to use the immense quantities unmined in the Province, and of preparing a plant to convert the coal to proper industrial form, so as to compete with Eastern and Western coals now imported, while local deposits were lying intact.—Journal of Commerce.

GEOLOGICAL SURVEY PUBLICATIONS.

The Geological Survey has issued three bulletins of its Museum Bulletin series. These are: No. 6. Prehistoric and present commerce among the Arctic Coast Eskimos, by V. Stefansson; No. 7. A new species of *Dendragapus* from Southern Yukon Territory, by P. A. Taverner; The Huronian formations of Timiskaming region, Canada, by W. H. Collins.

SPECIAL CORRESPONDENCE

COBALT, GOWGANDA, SOUTH LORRAIN

Timiskaming.—The discovery on the 530 ft. level of the Timiskaming mine is proving up very satisfactorily. The vein was followed across the Beaver line, where it has been worked for ninety feet into the Timiskaming mine, and it has now been opened up there for 40 ft. Altogether nine tons of ore, reminiscent of the palmy days of the Timiskaming, has been mined from the vein, and at the middle of the month it was still 5 in. wide in the face and of the same grade of ore. Operations in the walls of old stopes are also revealing a very satisfactory tonnage of milling ore.

Casey.—Encouraging results are being obtained in the new workings of the Casey Cobalt mine. A shaft has recently been sunk in order to verify the existence of a mineralized zone discovered by diamond drill operations. There is here an overburden of 100 ft. of clay, which makes surface operations impossible. The new shaft is situated more than 1,400 ft. from the old shaft. A new vein 6 in. wide carrying some silver values has just been cut and will now be drifted upon.

Mining Corporation.—Another step has been taken towards the consolidation of the three mines of the Mining Corporation of Canada. Mr. Chas. Watson, who has for some time been the manager of the Cobalt Townsite and the City of Cobalt, has now been given charge of the Cobalt Lake Mining Company in succession to Mr. M. B. R. Gordon, who has had charge of the latter mine for several years. The Cobalt Lake ore is still being concentrated in the Cobalt Lake mill, and will probably continue to be; but the mill will be under the direction of Mr. M. Fairlie, who now is superintendent of the Cobalt Reduction plant, where the Cobalt Townsite and the City of Cobalt ore is being treated. The three companies adjoin and, if necessity arises, can be worked conjointly with economy and ease. The City and Townsite ore is now coming up the shaft near the Cobalt Reduction mill, where a new steel head frame was erected last fall. Economies will, no doubt, be effected by the consolidation in management.

Savage.—At 55 ft. the new vein on the 140 ft. level of the Savage is patchy, although a fair milling grade can be obtained for the 50 ft. upon which drifting has been done. The ore when the winze was commenced at the 140 ft. level was very rich, and so continued in the winze for twenty or thirty feet.

Boucher.—The first shipment of ore from Elk Lake for many months was included in the list for December. This ore came from the Boucher property, adjoining the Fleur de Lis, and consisted of eight tons, said to be of good grade. The only other property working near Elk Lake is the Mapes Johnston.

Crown Reserve.—The annual report of the Crown Reserve Mining Company will show a total production of 1,500,000 oz. Only a few thousand ounces of this production came from the Carson vein, which has now been almost worked out. Narrow stopes are now being put up on ore to within a few feet of the bottom of Kerr Lake, which is now dry of all but mud and boulder clay. The discovery on the Silver Leaf continues to be good and the winze is still in good ore.

Wettlaufer.—The annual report of the Wettlaufer Lorrain Silver Mines shows that the company has still on hand \$29,680, with which it is intended to take up prospects and commence developments. A suitable

property has not yet been found for the investment of this money, although many prospects have been investigated by the company's engineer. At the mine in South Lorrain a watchman is being kept and the mine has only been allowed to fill up to the fourth level. The only company now working in South Lorrain is the Pittsburg Lorrain syndicate operating the Currie property.

Canadian Mining Institute.—At a very well attended meeting of the Cobalt branch of the Canadian Mining Institute, Mr. R. B. Watson, of the Nipissing and La Rose mines, led the discussion on the "The Essential features of a Report on a Mining Prospect."

Mr. G. G. S. Lindsey, president of the Institute, was the guest of the evening. Mr. Lindsey said that it had been one of the desires of the Institute to complete and round off the organization through the Dominion. Now, after some negotiations, the Nova Scotia Mining Society had decided to join with them. The Institute summoned up its courage and went down to Nova Scotia and stormed the citadel and induced the older society to throw in their lot with them upon equal terms, the Nova Scotia Society to retain its identity as a separate organization within the Institute. Mr. Lindsey also spoke of the institution of the monthly bulletin, which he believed had been a real step forward. It had indeed dissipated a difficulty with the Rocky Mountain branch of the Society.

Although the balance sheet of the Institute this year would show a favorable balance, they could not expect to maintain it unless they got many new members to replace the many who had gone to fight for the Empire in Europe; and he was proud to say that one-tenth of the membership had gone. The Institute is remitting their fees and subscriptions while they were on active service, and the revenue so lost must be regained by the obtaining of new members. The Institute had also done much to obtain a uniform mining law for the whole Dominion.

Mr. R. B. Watson started the discussion on the topic of the evening. He stated that too often mining reports were full of scenery, water power, dump room, timber and geology, omitting what was most essential, an assay plan. Geology particularly was often used to pad out a report and make it look like something. An assay plan was absolutely essential if there was any ore at all. If there was an assay plan it could be checked up, if there was not the judgment of the engineer had to be relied upon solely.

On a prospect, if there was only the outcrop to work upon, it was necessary to sample it carefully on the surface, drift or adit, summarize results and bring it to a conclusion. A report to be worth anything must be definite. Ninety per cent. of the reports would be for buyers and the buyer wanted to know if the property was a good buy at the price asked. It is a bad fault of a good many mining reports that they do not say anything definite. If it is not possible to sample, all an engineer could say was that it was a good prospect with possibilities.

A report should be short and to the point, and the information should be based on facts and not on conversation. The facts should include location, the amount of development, how far from railway or road, the working costs, the probable profits on grade, and then a little geology as to what the formation had produced in that particular district.

Mr. Watson gave a good example of an assay plan, and Mr. G. G. S. Lindsey led a lively discussion, mainly on the relations of the prospector and the purchaser of mining prospects.

PORCUPINE AND KIRKLAND LAKE

Tough-Oakes.—The construction of the mill for the Tough-Oakes mine at Kirkland Lake has been completed, and most of the heavy machinery is in place. There are various adjustments to make and the mill will not be running much before the beginning of March, which is its contract time. The mill has been designed by Mr. Johnston of the Nipissing, and extraction will be made by the continuous decantation process, which has proved so successful at the Porcupine Crown mine and other properties in the gold country, where it has been installed. Contrary to expectations, no metallurgical difficulties have been encountered.

Underground operations recommenced this week. Two drills were operating on January 18th, and more will be put on as they are required. The small mill has been treating dump ore consistently all winter.

Alexo nickel.—Shipments of nickel ore from the Alexo mine continue to be sent out with great regularity. In the month of December 875 tons of ore left the siding near Porquis Junction for the Mond Nickel smelter at Coniston.

The McIntyre is now sinking the shaft below the 500 ft. level. Two drills are now working in the No. 4 shaft, which will be carried to the 600 ft. level without delay. From the lowest levels crosscuts will be run to cut the various veins worked on the upper levels.

The Trethewey Mining Company has taken an option on two claims adjoining the Huronian mine, which is situated midway between Larder Lake and the Tough-Oakes mines. A prospecting equipment will be placed upon this property and development commenced. The Huronian mine is now working, both mine and mill power having been obtained from the plant of the Goldfields, Limited, at Raven Falls.

Rutherglen.—At Cobalt and Porcupine results obtained from the assay of samples of the Rutherglen ore have not been very encouraging. It was mainly for gold that the assay was made, and values were uniformly low. The orebody on the Clark property is stated by an engineer who has examined it to be of good width, however, and quite a number of prospectors are looking over the country.

Hollinger.—The increase in the Hollinger dividend was fully justified by the condition of the property. The rate is now 4 per cent. every 28 days, or 1 per cent. more than previously. It will mean a disbursement of \$120,000 as against \$90,000 every four weeks, which the statements issued by the company show can easily be attained. The greater part of the expenditure on the new power plant has been made and the reduced costs from the larger tonnage should gradually pull down costs.

BRITISH COLUMBIA

Mining Bulletins.—During the field season of 1914 several mining engineers were employed by the British Columbia Department of Mines to investigate mining conditions and obtain information relative to development of mining properties in the districts to have their attention, respectively. On November 1, *The Canadian Mining Journal* published (p. 721)

some notes concerning observations by Mr. Wm. Brewer, of Victoria, outlining his impressions of parts of Skeena and Atlin mining divisions. A bulletin, giving a detailed account of Mr. Brewer's trip through those divisions and much information descriptive of numerous mines and mineral claims he visited will shortly be issued by the Provincial Bureau of Mines.

A bulletin entitled "The Mineral Resources of the Lardeau and Trout Lake Mining Divisions," this being a report of those divisions prepared for the department by Mr. Newton W. Emmens, is already available for gratuitous distribution. This bulletin comprises some 65 pages of text, diagrams, etc., and its illustrations also include a number of excellent half-tone reproductions of photographs of mines and the country in which they are situated, together with sketch maps of the two divisions covered by the report. These illustrations serve to give a good idea of the topography and general physical conditions of the regions under review, and are helpful to those seeking information about mines and mining in that part of the big district of West Kootenay from which was derived approximately 40 per cent. of the \$17,700,000 on official record as representing the value of the metalliferous mineral production, of the province in 1913. In the case of each division, general information is given under the various subheads of accessibility, topography and geology, and then the numerous mining properties are dealt with as being in certain mineral zones. In many instances sketches of mine workings are given, and in the text are frequently included notes of assay value of the ore opened in the workings described. Altogether the bulletin should prove useful to many having more or less interest in the mineral resources of a district of which comparatively little has been printed in official publications. In 1903 Mr. R. W. Brock did some field work for the Geological Survey in this part of British Columbia but, so far as has come under the notice of the writer his detailed report, if he prepared one, was not published. There are known to be included in the mineral resources of these divisions gold, silver, and lead, and a few mines have been productive commercially, but between lack of adequate transportation facilities and of capital for development, the latter especially, nearly the whole of the Lardeau country has been in large measure neglected so that its production has been small. It is hoped, though, that the particulars of this promising region now placed before the public will attract the attention of men who will spend money in mining development and turn to profitable account the ores occurring in variety and, it is believed, in commercial quantity as well.

East Kootenay.

Approximate figures of the production in 1914 of lead-silver ore from mines in Fort Steele mining division of East Kootenay are as follows: St. Eugene, 950 tons; Sullivan Group, 35,500 tons. Both mines are owned by the Consolidated Mining and Smelting Co., which ships the ore to its smelting works at Trail. The approximate metal contents of the 36,450 tons of ore produced last year were 24,863,000 pounds of lead and 492,000 oz. of silver. While exact figures are not yet received for 1914, those given above will afford a basis for comparison with the published returns for 1913, contained in the following excerpt from the "Report of the Minister of Mines" for that year: "In 1913 the Sullivan mine was worked steadily with

a force of about 100 men, and shipped to the Trail smeltery 31,189 tons of ore, containing 324,729 oz. silver and 17,175,905 pounds of lead." More than 3,000 ft. of underground development work, chiefly drifting and cross-cutting, was done in this mine in 1914, and about 4,500 ft. of diamond drilling.

West Kootenay.

Ainsworth.—More than a dozen mines in Ainsworth mining division shipped ore last year, but only a few of them in considerable quantity. The largest producer was the New Canadian Metal Co., owning and operating the Bluebell lead-silver mine and concentrating mill at Riondel, on the east shore of Kootenay Lake, opposite the town of Ainsworth. Up to the time of suspension of operations early in August, as a result of European war complications, well on for 50,000 tons of ore had been concentrated; the product was shipped to Trail. The chief development work done in the mine during the year was that of sinking to and opening what is known as C level, which is about 200 ft. below the level of Kootenay Lake. Usually nearly 100 men are employed in mine and mill.

The Consolidated Co. shipped from its No. 1, Highland, Maestro and Banker mines, all situated in Ainsworth camp, ore and concentrate that contained more than 200,000 oz. of silver and 3,000,000 pounds of lead. Development work done in the mines was, in round figures, as follows: In the Highland 2,200 ft., in the No. 1, 1,270 ft., in the Maestro and Banker (adjoining properties) 750 ft. Little work was being done in these mines at the close of the year, but operations will be resumed as soon as conditions in connection with the sale of the metals they yield shall again be favorable. There was a small production of zinc ore from three mines in this division, but in most instances the product was silver-lead ore.

Slocan.—At least 20 mines in Slocan division were on the 1914 shipping list and half a dozen of those are situated in Slocan City division. Only a few made an appreciably large output, though; those in the central part of Slocan division were the Rambler-Cariboo, Slocan Star, Ruth-Hope, Richmond-Eureka, Surprise, and Wonderful, while those near Slocan Lake were the Standard, Hewitt, and Van-Roi. Returns are so incomplete that only an estimate of production can be made just yet. Approximate figures are: Silver, 1,600,000 oz.; lead, 17,000,000 pounds, and zinc 6,500,000 pounds. Of the mines in Slocan City division, the Consolidated Co.'s Ottawa mine shipped 188 tons of ore containing 30,000 oz. of silver, and the Eastmont, owned by the Ellis Silver Mining Co., of Toronto, 149 tons of silver-lead ore.

Nelson.—More than a dozen mines contributed to the 1914 mineral production of Nelson mining division. Those that produced chiefly gold were the Motherlode, owned by the Motherlode Sheep Creek Mining Co., which is understood to be controlled by Mr. John McMartin and associates, of Ontario, and the Queen, both in Sheep Creek camp. An application for information concerning the Motherlode was not replied to, but the manager of the Queen courteously supplied the information that the gold bullion recovered from that mine during the year was nearly \$100,000 in value, most of the mining having been done on No. 6 level where the ore ranged in width up to 35 ft. Beside stoping, there was done about 200 ft. of drifting. Then on the second level of the Alexandra claim of the Queen group some 270 ft. of drifting was done. This claim is stated to show gold ore of high grade, though

not in such large quantity as in the Queen mine. Among other gold properties worked are the California, Granite-Poorman, and Venus, all within a few miles of Nelson, but their production was very small last year; near Ymir the Yankee Girl, was the only shipper, with a much smaller output than in 1913, operations having been restricted to development the greater part of the year, while the Ymir-Wilcox continued development but made no production; in Erie Camp, the Relief mine was operated and made an output of gold, but the quantity was not ascertained. The Silver King, near Nelson, shipped 13,400 tons of copper-silver ore to Trail, and the British Columbia Copper Co. sent to its smelting works at Greenwood nearly 8,000 tons of copper ore from its Queen Victoria mine, situated seven or eight miles west of Nelson. The Emerald, H. B., and Zincton, all within a few miles of Salmo, together shipped to Trail about 3,600 tons of lead ore, beside which some 350 tons of zinc carbonate ore was shipped to the United States from the H. B. and Zincton.

Rossland.—The Consolidated Mining and Smelting Co.'s mines in Rossland camp, namely, the Centre Star and Le Roi groups, together shipped 270,300 tons of ore to Trail last year, of which 173,600 tons was from the former and the remainder from the latter. Metal contents were, in round figures, 128,000 oz. of gold, 109,000 oz. of silver and 4,375,000 pounds of copper. The shipments from the Le Roi No. 2 Co.'s Josie group totalled 15,385 tons, of which more than 1,000 tons was concentrate; contents are estimated at gold 12,000 oz., silver 25,000 oz., and copper 763,000 pounds. There was no other production worth mention from this camp during the year.

Revelstoke and Lardeau.—The old Lanark mine, in Revelstoke mining division, after having been idle for many years, made a small shipment, of 106 tons, of silver-lead ore to Trail. Placer mining in the Big Bend of the Columbia country, also in Revelstoke division, was disappointing. In the Lardeau, the Ajax and Silver Cup were shippers of a few carloads of silver-lead ore.

Other districts will have mention in my next letter.

CANADIAN TRADE INQUIRIES.

The following were among the inquiries relating to Canadian trade received at the Office of the High Commissioner for Canada, 17 Victoria street, London, S.W., during the week ending January 8th, 1915:

A London firm wish to get into touch with Canadian shippers of magnesite.

A Scottish firm desire to get into touch with Canadian manufacturers of boiler tubes, 2 in. to 4½ in. in diameter in lengths from 18 ft. to 25 ft. long, either iron lap welded, steel lap welded, or solid drawn steel; also boiler stay tubes with screwed ends.

A correspondent in the Province of Ontario interested in a large deposit of auriferous arsenical pyrites is desirous of getting into touch with likely purchasers in Great Britain.

A Nova Scotia correspondent makes inquiry for names of importers of pit props.

A firm at Newcastle-on-Tyne wish to get into touch with Canadian firms likely to be interested in a patent method of laying dust and preventing explosions in coal mines, and of laying dust and preventing miners' phthisis in gold mines.

A London correspondent wishes to secure agencies for the sale of Canadian products, including manufactured goods, lumber, minerals, agricultural produce, etc.

MARKETS

TORONTO MARKETS.

Jan. 25—(Quotations from Canada Metal Co., Toronto)—
 Spelter, 7 cents per lb.
 Lead, 4¾ cents per lb.
 Tin, 40 cents per lb.
 Antimony, 17½ cents per lb.
 Copper, casting, 15 cents per lb.
 Electrolytic, 15 cents per lb.
 Ingot brass, yellow, 10c. per lb.; red, 12 cents per lb.
 Jan. 25—(Quotations from Elias Rogers Co., Toronto)—
 Coal, anthracite, \$8.00 per ton.
 Coal, Bituminous, \$5.25 per ton.

GENERAL MARKETS.

Jan. 22—Connellsville coke (f.o.b. ovens)—
 Furnace coke, prompt, \$1.60 per ton.
 Foundry coke, prompt, \$2.00 to \$2.20 per ton.
 Jan. 22—Tin, straits, 35.12½ cents.
 Copper, Prime Lake, 14.00 to 14.25 cents.
 Electrolytic copper, 13.90 to 14.00 cents.
 Copper wire, 15.00 to 15.25 cents.
 Lead, 3.70 cents.
 Spelter, 7.12½ cents.
 Sheet zinc (f.o.b. smelter), 9.50 cents.
 Antimony, Cookson's, 18.00 to 18.50 cents.
 Aluminum, 18.75 to 19.25 cents.
 Nickel, 40.00 to 45.00 cents.
 Platinum, soft, \$44.00 to \$45.00 per ounce.
 Platinum, hard, 10 per cent., \$47.00 to \$49.00 per ounce.
 Bismuth, \$2.75 to \$3.00 per pound.
 Quicksilver, \$52.00 per 75-lb. flask.

SILVER PRICES.

January—	New York.	London
	cents.	pence.
9.	48⅞	22¼
11.	49⅞	22⅞
12.	49⅞	22⅞
13.	49¼	22¼
14.	49⅞	22⅞
15.	49	22¼
16.	48¾	22¼
18.	49	22¼
19.	49	22¼
20.	49	22¼
21.	49⅞	22¼
22.	48½	22⅞

STANDARD MINING EXCHANGE.

Cobalt—	Toronto, Jan. 23, 1915.	
	Sell.	Buy.
Bailey. . . . .	.01¾	.01½
Beaver Consolidated . . . . .	.30	.28½
Buffalo.	1.05	.75
Chambers-Ferland. . . . .	.16¼	.15¾
Coniagas.	5.75	5.00
Crown Reserve . . . . .	.80	.76
Foster. . . . .	...	.02
Gifford. . . . .	...	.01
Gould. . . . .	.01⅞	.01½
Great Northern . . . . .	.04¾	.04⅞
Hargraves. . . . .	.01¾	.01¼

Hudson Bay	40.00	...
Kerr Lake	5.00	4.65
La Rose . . . . .	.80	.70
McKinley-Darragh-Savage. . . . .	.56	.50
Nipissing.	5.80	5.60
Peterson Lake . . . . .	.26	.25½
Right of Way . . . . .	.02½	...
Seneca Superior	1.50	...
Silver Leaf . . . . .	.02¾	.01
Silver Queen . . . . .	...	.01½
Timiskaming. . . . .	.19	.18½
Trethewey. . . . .	.15	...
Wetlaufer. . . . .	.05	.04
York, Ont. . . . .	.07	.05

Porcupine—

Apex. . . . .	...	.01¼
Dome Extension . . . . .	.08	.07¾
Dome Lake . . . . .	.33	.31
Dome Mines	7.05	6.65
Gold Reef . . . . .	.04½	.03½
Hollinger.	23.00	22.40
Jupiter. . . . .	.11¾	.11½
McIntyre. . . . .	.25	.24
Pearl Lake. . . . .	.03⅞	.03⅞
Porcupine Crown . . . . .	.90	.85
Porcupine Gold, ex-r. . . . .	.00½	.00¼
Porcupine Imperial . . . . .	.02	.01½
Porcupine Pet . . . . .	.15	...
Porcupine Tisdale. . . . .	.01½	.00¾
Porcupine Vipond . . . . .	.29¾	.29¼
Preston East D. . . . .	...	.01¼
Rea Mines . . . . .	...	.18
Teck-Hughes. . . . .	.09¾	.09
West Dome . . . . .	...	.06

GRANBY.

Granby now has six of its eleven furnaces in operation. At the new Hidden Creek smelter two of the three furnaces are running while operations have been resumed at four of the eight units of the old smelter at Grand Forks. For several months Granby's production was turned out by two furnaces at Anyox while the entire Grand Forks plant was idle.

December and January are always poor months for Granby owing to climatic conditions. After Feb. 1 it is expected that the company will turn out a more nearly normal production from the furnaces in operation, with costs improving proportionately.

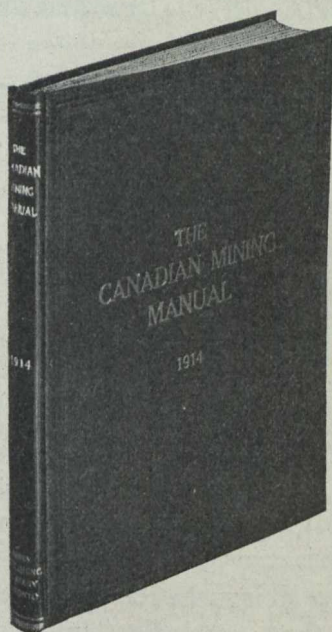
Directors of the company have held their January meeting, but took no action on dividend. The subject did not come up for serious consideration. Building up the company's cash is now desired, although with improvement in copper metal prices, a resumption of dividends by mid-year is not improbable.—Boston News Bureau.

NIPISSING.

The following is a brief financial statement of the affairs of the Nipissing Mining Co., Ltd., (the Operating Company) as of January 2nd, 1915:—

Cash in Bank.	\$ 437,524.82
Bullion in transit.	518,468.07
Ore on hand and in process and bullion ready for shipment	440,786.00
	<hr/>
	\$1,396,778.89

NOW READY



We have just published the "Canadian Mining Manual, 1914." This is a handbook of information concerning the mining industry in Canada.

The first part of the book gives general information concerning the chief minerals produced in the Dominion, and reviews by provinces.

The second part "Mining companies operating in Canada," gives useful information concerning location and character of properties, capitalization, officers, results of operations, etc. Companies are listed alphabetically and also according to product. This is an invaluable reference book for those who have machinery or supplies to sell to mining companies.

The book of 280 pages is well illustrated, printed on good paper, and bound in cloth. The price is \$2.00 post paid. Shall we send you a copy?

**Book Dept., Canadian Mining Journal,
44-46 Lombard Street, Toronto**

Fairbanks Scales

Made weighing accurate. Built for all classes of material they will weigh accurately within the limitations accepted by common practice. The Fairbanks Springless Dial Scale with its quick reading dial, will save from 20 to 50% of your time.

Fairbanks Morse Pumps

For high or low pressure with valve pot pump end or otherwise. They are made in styles to suit any purpose and to handle any liquid or semi-liquid. They are extremely simple in construction and all parts are absolutely interchangeable.

Valves

Fairbanks-Valve discs may be replaced in one minute without disconnecting the line. All Fairbanks Valves are packed with Plametto Packing.

Track Tools

Gauges, Drills, Shovels, Picks, Hammers, Railway Motor Cars, Industrial Track.

Engines

Fairbanks-Morse Oil and Gasoline Engines are always chosen by Government and individual alike, when power is required in isolated communities. They will serve you well and economically.

Electric Motors

For distant control or heavy service the Fairbanks-Morse Internal Starter Motor, is unequalled. They are very economical and will take less power to start under full load than any other type of motor.



MINING equipment must be, above all, reliable, always ready for work when needed, and capable of withstanding the severest service.

It is just such equipment that we offer for your consideration.

Each line is built by leaders in it's field and is above all strong and reliable.

Let us submit quotations on goods to fill your various requirements

Pipe

Byers Genuine Wrought Iron Pipe gives uniform, dependable, continuous service. It is remarkably free from sudden failures and is ready for almost any emergency.

Barrett Jacks

The original Barrett Jacks are known to everyone as the strongest and most durable Jacks made.

Hoists

Steam, Gasoline or Power driven, our hoists are powerful and simple. They will not easily get out of order and will stand the roughest service.

Dump Cars

For good workmanship and material there are no cars made better than the Orenstein Arthur Koppel, from track to the last rivet they are recognized by engineers as leaders.

Machine Shop Supplies

Machine Tools of every description, lathes, drills, saws, grinders, etc. Each line built by leaders in their field. Cleveland Twist Drills and Reamers, Little Giant Taps and Dies, Forges, Yale & Towne Blocks. A complete machine shop can be supplied from anyone of our warehouses.

Elevating Machinery

We are prepared to quote prices on complete elevating and conveying machinery whether chain, belt or spiral hangers, pulleys, shafting, bearings, belt, etc.

The Canadian Fairbanks-Morse Co. Limited

Montreal	St. John	Quebec	Ottawa	Toronto	Hamilton	Fort William
Winnipeg	Regina	Saskatoon	Calgary	Edmonton	Vancouver	Victoria

Canada's Departmental House for Mechanical Goods

PROFESSIONAL DIRECTORY.

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

ENGINEERS, METALLURGISTS AND GEOLOGISTS.

Dominion of Canada. Ontario Astley, J. W. Cohen, S. W. Campbell & Deyell. Carter, W. E. H. Evans, J. W. Ferrier, W. F. Forbes, D. L. H. Graham, S. N.	Gwillim, J. C. Handley, John. Hassan, A. A. Haultain, H. E. T. Hille, F. Loring, F. C. McEvoy, Jas. Scott, G. S. Segsworth, Walter E. Smith, Alex H.	Smith, Sydney. Maurice W. Summerhayes. Tyrrell, J. B.	Smith, W. H. Ross, J. G.
	Quebec Burchell, Geo. B. Cohen, S. W. DePencier, H. P. Hardman, J. E. Hersey, Milton L. Johnson, W. S.	British Columbia Brown & Butters. Fowler, S. S.	FOREIGN-New York Canadian Mining & Exploration Co., Ltd. Colvocoresses, Geo. M. Dorr, Jno. V.N. Hassan, A. A.

ASSAYERS, CHEMISTS AND ORE TESTERS.

Dominion of Canada Ontario Belleville Assay Office. Campbell & Deyell Heys, Thos. & Son	Canadian Laboratories, Ltd.	Dr. J. T. Donald	Foreign-New York Ledoux & Co.
	Quebec Hersey, Milton Co., Ltd		

ENGINEERS, METALLURGISTS AND GEOLOGISTS.

ASTLEY, J. W. Consulting Mining Engineer, 24 King Street West, TORONTO, CANADA. Phone M, 129, Code: Bedford McNeill	CARTER & SMITH Consulting Mining Engineers Hermant Building, 19 Wilton Ave. TORONTO W. E. H. Carter B.A. Sc. Alex. H. Smith, M.I.M.M.	FERRIER, W. F. Mining Engineer and Geologist 204 Lumsden Bldg., Toronto, Ont. General Manager, Natural Resources Exploration Co., Limited.
BROWN & BUTTERS Mining Geologists and Metallurgical Engineers PRINCE RUPERT, B.C.	COHEN, SAMUEL W., E. M. Consulting Engineer, Room 601, Dom. Express Bldg. Montrea General Manager, Crown Reserve Mining Co. Ltd. Cobalt, Can.	FOWLER, S. S. Mining Engineer, NELSON, B. C.
BURCHELL, GEO. B. Mining Engineer Lignite and Bituminous Coal Mining Examinations and Reports 505 MCGILL BLDG., MONTREAL Cable Address "Minchel" Phone Main 6737	Colvocoresses, George M., Mining Engineer General Manager Consolidated Arizona Smelting Co., Humboldt, Ariz.	FORBES, D. L. H. Mining & Metallurgical Engineer Chuquicamata, Chile Chief Construction Engineer for Chile Copper Co.
Canadian Mining and Exploration Co., Ltd. Consulting Mining Engineers. Mines and Prospects Purchased and Financed. 42 Exchange Place, New York Canadian Offices : Traders Bank Building, Toronto Drake Block, Victoria, B.C.	DEPENCIER, H. P. Consulting Mining Engineer ROOM 613, DOMINION EXPRESS BLDG., MONTREAL. PHONE MAIN 4984 P. O. BOX 763	GRAHAM, STANLEY N., B.Sc. Mining Engineer HALIFAX, N.S.
EVANS, J. W. Mining Engineer, Mines and Mining Properties exam- ined and reported upon. BELLEVILLE, ONTARIO.	GUESS & HAULTAIN Mining & Metallurgical Engineers 123 Bay Street TORONTO CANADA	

PROFESSIONAL : DIRECTORY.

CONTINUED FROM PRECEDING PAGE.

ENGINEERS, METALLURGISTS AND GEOLOGISTS.

GWILLIM, J. C.

Consulting Mining Engineer,

KINGSTON, ONT.

LORING, FRANK C.

Mining Engineer,

Home Life Building, Toronto, Ont.

Cobalt, Ont.

JOHN V. N. DORRConsulting and Metallurgical
Engineer
30 Church Street - New York City
and
First National Bank Building,
Denver, Colorado.**H**HANDLEY, JOHN

Mining Engineer and Metallurgist

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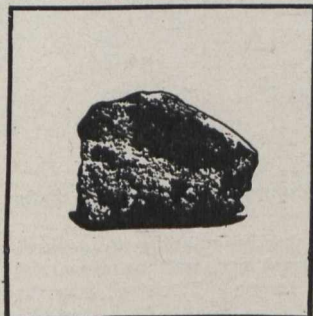
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DEPARTMENT OF MINES GEOLOGICAL SURVEY.

PUBLICATIONS

The Geological Survey has published maps and reports dealing with a large part of Canada, with many local areas and special subjects.

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Most of the older reports are out of print, but they may usually be found in public libraries, libraries of the Canadian Mining Institute, etc.

REPORTS RECENTLY ISSUED:

CANADA

Prospector's Handbook No. 1. Notes on radium-bearing minerals, by Wyatt Malcolm.
Summary Report of the Geological Survey for the year 1912.

NEW BRUNSWICK and NOVA SCOTIA

Memoir 20. Gold fields of Nova Scotia, by W. Malcolm.

QUEBEC

Memoir 41. The "Fern Ledges" Carboniferous flora of St. John, New Brunswick, by Marie C. Stopes.
Museum Bulletin No. 3. The Anticosti Island faunas, by W. H. Twenhofel.

Memoir 39. Kewagama Lake Map-Area, Quebec, by M. E. Wilson.

ONTARIO

Museum Bulletin No. 5. A Beatrice-like Organism from the Middle Devonian, by Percy E. Raymond.
Memoir 40. The Archaean Geology of Rainy Lake Re-studied, by Andrew C. Lawson.

NORTH-WEST PROVINCES

Memoir 47. Clay and Shale Deposits of the Western Provinces, Part 3, by Heinrich Ries.

Memoir 52. Geological Notes to Accompany Map of Sheep River Gas and Oil Field, Alberta, by D. B. Dowling.

Memoir 53. Coal Fields of Manitoba, Saskatchewan, Alberta and Eastern British Columbia (Revised Edition) by D. B. Dowling.

Museum Bulletin No. 4. The Crowsnest Volcanics, by J. D. MacKenzie.

Memoir 61. Moose Mountain District, Southern Alberta (Second Edition), by D. D. Cairnes.

BRITISH COLUMBIA

Memoir 32. Portions of Portland Canal and Skeena Mining Divisions, Skeena District, B.C., by R. G. McConnell.

Memoir 51. Geology of the Nanaimo Map-Area, by C. H. Clapp.

YUKON AND NORTH-WEST TERRITORIES

Memoir 31. Wheaton District, Yukon Territory, by D. D. Cairnes. Maps not yet published.

MAPS RECENTLY ISSUED:

CANADA

Map 91A. Geological map of the Dominion of Canada and Newfoundland. Scale 100 miles to 1 inch.

NEW BRUNSWICK AND NOVA SCOTIA

Map 27A. Bathurst and vicinity, Gloucester County, New Brunswick. Geology.

Map 39A. Geological Map of Nova Scotia.

Map 118A. Pleasant River Barrens Gold District, Lunenburg County, Nova Scotia.

Map 121A. Franey Mine and Vicinity, Victoria County, N.S.

QUEBEC

Map 93A. Kewagama, Abitibi and Pontiac, Quebec.

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NORTH-WEST PROVINCES

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BRITISH COLUMBIA

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YUKON AND NORTH-WEST TERRITORIES.

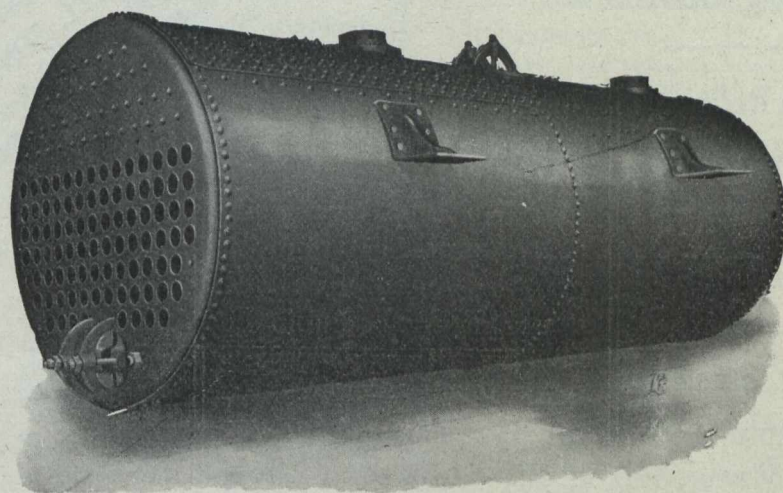
Map 113A. Canadian routes to White River District, Yukon, and to Chisana District, Alaska.

NOTE.—Maps published within the last two years may be had, printed on linen, for field use. A charge of ten cents is made for maps on linen.

The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon. Letters and samples that are of a Departmental nature, addressed to the Director, may be Mailed O.H.M.S. free of postage.

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Jeffrey Mfg. Co.
Mussens, Ltd.
Northern Canada Supply Co.
- Car Pullers—**
Dodge Mfg. Co., Ltd.
- Cement Machinery—**
Jenckes Machine Co., Ltd.
Northern Canada Supply Co.
Peacock Bros.
- Chains—**
Jeffrey Mfg. Co.
Peacock Bros.
Jones & Glasco
Mussens, Ltd.
Canadian Fairbanks-Morse Co.
Northern Canada Supply Co.
Dodge Mfg. Co., Ltd.
- Chain Blocks—**
The Herbert Morris Crane & Hoist Co., Ltd.
Mussens, Ltd.
- Chemists**
Canadian Laboratories.
Campbell & Deyell.
Thos Heys & Sons.
Milton Hersey Co.
Ledoux & Co.
- Coal—**
Dominion Coal Co.
Nova Scotia Steel & Coal Co.
- Coal Cutters—**
Jeffrey Mfg. Co.
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.
Peacock Bros.
Mussens, Ltd.
- Coal Handling Machinery—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Coal Mining Exposives—**
Curtis & Harvey (Can.), Ltd.
- Coal Mining Machinery—**
Mussens, Ltd.
Can. Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited.
Peacock Bros.
Jeffrey Mfg. Co.
- Coal Punchers—**
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.
Mussens, Ltd.
- Coal Washeries—**
Jeffrey Mfg. Co.
Mussens, Ltd.
Peacock Bros.
- Collars—**
Dodge Mfg. Co., Ltd.
- Compressors—Air—**
Jenckes Machine Co., Ltd.
Fraser & Chalmers of Canada, Limited.
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.
Mussens, Ltd.
Peacock Bros.
Northern Canada Supply Co.
The John Inglis Co., Ltd.
- Concentrators and Jigs—**
Fraser & Chalmers of Canada, Limited.
James Ore Concentrator Co.
Mussens, Ltd.
Canadian Fairbanks-Morse
Jenckes Machine Co., Ltd.
- Concrete Mixers—**
Mussens, Ltd.
Peacock Bros.
Northern Canada Supply Co.
- Condensers—**
Fraser & Chalmers of Canada, Limited.
Smart-Turner Machine Co.
Peacock Bros.
Northern Canada Supply Co.
The John Inglis Co., Ltd.
- Converters—**
Fraser & Chalmers of Canada, Limited.
Jeffrey Mfg. Co.
Northern Canada Supply Co.
Peacock Bros.
Mussens, Ltd.
- Conveying Machinery—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Conveyor—Trough—Belt—**
Hendrick Mfg. Co.
- Coupling—**
Dodge Mfg. Co., Ltd.
- Cranes—**
Smart-Turner Machine Co.
Peacock Bros.
Mussens, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
M. Beatty & Sons, Ltd.
- Cranes—Electric—**
The Herbert Morris Crane & Hoist Co., Ltd.
Mussens, Ltd.
- Cranes—Overhead Traveling—**
Mussens, Ltd.
Herbert Morris Crane & Hoist Co., Ltd.
- Crane Ropes—**
Mussens, Ltd.
Allan, Whyte & Co.
Thos. & Wm. Smith.
B. Greening Wire Co., Ltd.
- Cranes—Swing Jib—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Cranes—Wall—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Crushers—**
Jenckes Machine Co., Ltd.
Fraser & Chalmers of Canada, Limited.
Peacock Bros.
Lymans, Ltd.
Can. Fairbanks-Morse Co.
Mussens, Ltd.
Hadfields Steel Foundry Co.
- Cyanide Plants—**
Jenckes Machine Co., Ltd.
Fraser & Chalmers of Canada, Limited.
Roessler & Hasslacher.
Thos. & Wm. Smith.
Peacock Bros.
- Derricks—**
Smart-Turner Machine Co.
S. Flory Mfg. Co.
M. Beatty & Sons, Ltd.
Mussens, Ltd.
- Diamonds (for Diamond Drills)—**
Abe. Levine.
- Diamond Drill Contractors—**
Diamond Drill Contracting Co.
Smith and Travers.
- Dredging Machinery—**
Peacock Bros.
M. Beatty & Sons.
Mussens, Ltd.
- Dredging Ropes—**
Allan, Whyte & Co.
Fraser & Chalmers of Canada, Limited.
B. Greening Wire Co., Ltd.
- Drills, Air and Hammer—**
Jenckes Machine Co., Ltd.
Can. Ingersoll-Rand Co., Ltd.
Mussens, Ltd.
Jeffrey Mfg. Co.
Sullivan Machinery Co.
Peacock Bros.
Northern Canada Supply Co.
- Drills—Core—**
Can. Ingersoll-Rand Co., Ltd.
Standard Diamond Drill Co.
- Drills—Diamond—**
American Diamond Rock Drills.
Sullivan Machinery Co.
Northern Canada Supply Co.
- Drill Steel Sharpeners—**
Can. Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
Mussens, Ltd.
- Dump Cars**
Sullivan Machinery Co.
Mussens, Ltd.
- Conveyors—Belt—**
Mussens, Ltd.
- Drills—Electric—**
Mussens, Ltd.
Can. Ingersoll-Rand Co., Ltd.
- Dynamite—**
Curtis & Harvey (Canada), Ltd.
Canadian Explosives.
Northern Canada Supply Co.
- Dynamos—**
Can. Fairbanks-Morse Co.
Northern Electric Co., Ltd.
- Electric Cranes—**
The Herbert Morris Crane & Hoist Co., Ltd.
Mussens, Ltd.
- Elevating and Conveying Machinery—**
Jenckes Machine Co., Ltd.
The Herbert Morris Crane & Hoist Co., Ltd.
- Ejectors—**
Mussens, Ltd.
Peacock Bros.
Can. Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
- Elevators—**
Jeffrey Mfg. Co.
M. Beatty & Sons.
Sullivan Machinery Co.
Northern Canada Supply Co.
Can. Fairbanks-Morse Co.
Mussens, Ltd.
Peacock Bros.
- Elevator Cups—**
Dodge Mfg. Co., Ltd.
- Engineering Instruments—**
C. L. Berger & Sons.
Peacock Bros.
- Engineers and Contractors—**
Fraser & Chalmers of Canada, Limited.
Roberts & Schaefer Co.
- Engines—Automatic—**
Smart-Turner Machine Co.
Peacock Bros.
The John Inglis Co., Ltd.
- Engines—Gas and Gasoline**
Fraser & Chalmers of Canada, Limited.
Mussens, Ltd.
Alex. Fleck.
Sullivan Machinery Co.
Smart-Turner Machine Co.
Peacock Bros.
John Inglis & Co., Ltd.
Can. Fairbanks-Morse Co.
- Engines—Haulage—**
Mussens, Ltd.
Fraser & Chalmers of Canada, Limited.
Peacock Bros.
Can. Ingersoll-Rand Co., Ltd.
- Engines—Marine—**
Smart-Turner Machine Co.
Peacock Bros.
The John Inglis Co., Ltd.
- Engines—Oil—**
Peacock Bros.
Can. Fairbanks-Morse Co.
- Engines—Steam—**
Fraser & Chalmers of Canada, Limited.
Smart-Turner Machine Co.
S. Flory Mfg. Co.
Peacock Bros.
M. Beatty & Sons.
Mussens, Ltd.
Can. Fairbanks-Morse Co.
The John Inglis Co., Ltd.
- Fans—Ventilating—**
Fraser & Chalmers of Canada, Limited.
Sullivan Machinery Co.
Peacock Bros.
Mussens, Ltd.
- Feeders—Ore—**
Fraser & Chalmers of Canada, Limited.
Mussens, Ltd.
- Fixtures—Counter Shaft—**
Dodge Mfg. Co., Ltd.
- Flights—**
Hendrick Mfg. Co.
- Floor Stands—**
Dodge Mfg. Co., Ltd.
- Friction Clutches—**
Dodge Mfg. Co., Ltd.
- Friction Hoists—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Forges—**
Mussens, Ltd.
Can. Fairbanks-Morse Co.
Northern Canada Supply Co., Ltd.
- Forging—**
M. Beatty & Sons.
Smart-Turner Machine Co.
Peacock Bros.

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Main Western Office - VICTORIA, B.C.

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QUEBEC:	-	-	-	-	-	Montreal
ONTARIO:	Toronto,	Cobalt,	South Porcupine,	Port Arthur,		Kingston
MANITOBA:	-	-	-	-	-	Winnipeg
ALBERTA:	-	-	-	-	-	Edmonton
BRITISH COLUMBIA:	Vancouver,	Victoria,	Nelson,			Prince Rupert

Factories at

Beloil, P.Q.	Vaudreuil, P.Q.	Windsor Mills, P.Q.
Waverley, N.S.	James Island, B.C.	Nanaimo, B.C.
Northfield, B.C.	Bowen Island, B.C.	Parry Sound, Ont.

Canadian Miner's Buying Directory.—(Continued from page 28.)

- Furnaces—Assay—**
Lymans, Ltd.
Mussens, Ltd.
- Fuse—**
Peacock Bros.
Curtis & Harvey (Canada), Ltd.
Canadian Explosives.
Mussens, Ltd.
Northern Canada Supply Co.
Canadian H. W. Johns-Manville Co., Ltd.
- Gears—**
Smart-Turner Machine Co.
Northern Canada Supply Co.
The John Inglis Co., Ltd.
- Generators—**
Northern Electric Co., Ltd.
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Can. Fairbanks-Morse Co.
- Grease Cups—**
Dodge Mfg. Co., Ltd.
- Hangers—Cable—**
Northern Electric Co., Ltd.
Standard Underground Cable Co. of Canada, Ltd.
Dodge Mfg. Co., Ltd.
- Hand Hoists—**
The Herbert Morris Crane & Hoist Co., Ltd.
Fraser & Chalmers of Canada, Limited
- Heaters—Feed Water—**
Mussens, Ltd.
Peacock Bros.
- High Speed Steel Twist Drills—**
Mussens, Ltd.
Northern Canada Supply Co.
- Hoists—Air, Electric and Steam—**
Can. Ingersoll-Rand Co., Ltd.
Peacock Bros.
Mussens, Ltd.
S. Flory Mfg. Co.
Jones & Glassco.
M. Beatty & Sons.
Can. Fairbanks-Morse Co.
Fraser & Chalmers of Canada, Limited
Northern Canada Supply Co.
- Hoists, Chain, Electric and Pneumatic—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Hoisting and Conveying Machinery—**
Jenckes Machine Co., Ltd.
- Hoisting Engines—**
Peacock Bros.
Mussens, Ltd.
Can. Fairbanks-Morse Co.
Sullivan Machinery Co.
Fraser & Chalmers of Canada, Limited
Can. Ingersoll-Rand Co.
M. Beatty & Sons.
- Hoists—Gas and Gasoline—**
Mussens, Ltd.
- Hose—**
Canadian H. W. Johns-Manville Co., Ltd.
Mussens, Ltd.
Can. Fairbanks-Morse Co.
Northern Canada Supply Co.
- Jacks—**
Mussens, Ltd.
Can. Fairbanks-Morse Co.
Can. Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
- Jigs—**
Mussens, Ltd.
Roberts & Schaefer Co.
- Lamps—Acetylene—**
Mussens, Ltd.
Northern Canada Supply Co.
- Lamps—Safety—**
Mussens, Ltd.
Canadian Explosives.
Peacock Bros.
- Link Belt—**
Northern Canada Supply Co.
Jones & Glassco.
- Locomotives—Electric—**
Mussens, Ltd.
Jeffrey Mfg. Co.
- Locomotives—Steam—**
Mussens, Ltd.
- Metal Merchants—**
Henry Bath & Son.
Geo. G. Blackwell, Sons & Co.
Consolidated Mining and Smelting Co. of Canada.
Canada Metal Co.
- Monel Metal—**
Orford Copper Co.
- Motors—**
Mussens, Ltd.
Northern Electric Co., Ltd.
Can. Fairbanks-Morse Co.
Peacock Bros.
- Mule Stands—**
Dodge Mfg. Co., Ltd.
- Ore Sacks—**
Can. Fairbanks-Morse Co.
Northern Canada Supply Co.
- Ore Testing Works**
Ledoux & Co.
Can. Laboratories.
Milton Hersey Co., Ltd.
Campbell & Deyell.
- Ores and Metals—Buyers and Sellers of—**
Geo. G. Blackwell.
Consolidated Mining and Smelting Co. of Canada.
Orford Copper Co.
Canada Metal Co.
- Perforated Metals—**
B. Greening Wire Co., Ltd.
Fraser & Chalmers of Canada, Limited
Northern Canada Supply Co.
Hendrick Mfg. Co.
- Pick Machines—**
Sullivan Machinery Co.
- Picks—Steel—**
Mussens, Ltd.
Thos. & Wm. Smith.
Peacock Bros.
- Pillow Blocks—**
Dodge Mfg. Co., Ltd.
- Pipes—**
Consolidated M. & S. Co.
Peacock Bros.
Can. Fairbanks-Morse Co.
Mussens, Ltd.
Northern Canada Supply Co.
Smart-Turner Machine Co.
The John Inglis Co., Ltd.
A. M. Byers Co.
- Pipe Fittings—**
Can. H. W. Johns-Manville
Mussens, Ltd.
Can. Fairbanks-Morse Co.
Northern Canada Supply Co.
- Pneumatic Chain Blocks—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Pneumatic Tools—**
Can. Ingersoll-Rand Co., Ltd.
Jones & Glassco.
- Producer—Gas—**
Mussens, Ltd.
- Prospecting Mills and Machinery—**
Standard Diamond Drill Co.
Mussens, Ltd.
Can. Fairbanks-Morse Co.
Fraser & Chalmers of Canada, Limited
- Pulleys—Iron, Wood Spit, Iron Centre Wood Rim—**
Dodge Mfg. Co., Ltd.
- Pulleys, Shafting and Hangings—**
Fraser & Chalmers of Canada, Limited
Northern Canada Supply Co.
Dodge Mfg. Co., Ltd.
- Pumps—Boiler Feed—**
Can. Fairbanks-Morse Co.
Mussens, Ltd.
Northern Canada Supply Co.
Peacock Bros.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited
- Pumps—Centrifugal—**
Mussens, Ltd.
Smart-Turner Machine Co.
Peacock Bros.
Thos. & Wm. Smith.
M. Beatty & Sons.
Can. Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited
The John Inglis Co., Ltd.
- Pumps—Electric—**
Can. Fairbanks-Morse Co.
Mussens, Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited
The John Inglis Co., Ltd.
- Pumps—Pneumatic—**
Can. Fairbanks-Morse Co.
Mussens, Ltd.
Smart-Turner Machine Co.
Can. Ingersoll-Rand Co., Ltd.
Can. Fairbanks-Morse Co.
- Pumps—Steam—**
Can. Ingersoll-Rand Co., Ltd.
Mussens, Ltd.
Thos. & Wm. Smith.
Northern Canada Supply Co.
Can. Fairbanks-Morse Co.
Smart-Turner Machine Co.
The John Inglis Co., Ltd.
- Pumps—Turbine—**
Mussens, Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited
The John Inglis Co., Ltd.
- Pumps—Vacuum—**
Can. Fairbanks-Morse Co.
Smart-Turner Machine Co.
- Quarrying Machinery—**
Mussens, Ltd.
Jenckes Machine Co., Ltd.
Can. Cleveland Drill Co.
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.
- Roasting Plants—**
Fraser & Chalmers of Canada, Limited
- Rolls—Crushing—**
Mussens, Ltd.
Fraser & Chalmers of Canada, Limited
- Roofing—**
Ferguson Mfg. Co.
Dominion Bridge Co.
Mussens, Ltd.
Northern Canada Supply Co.
Can. H. W. Johns-Manville
- Rope Blocks—**
The Herbert Morris Crane & Hoist Co., Ltd.
Mussens, Ltd.
- Rope Wheels—**
Dodge Mfg. Co., Ltd.
- Rope Dressing—**
Dodge Mfg. Co., Ltd.
- Rope—Manilla and Jute—**
Jones & Glassco.
Mussens, Ltd.
Peacock Bros.
Northern Canada Supply Co.
Allan, Whyte & Co.
Thos. & Wm. Smith, Ltd.
- Rope—Wire—**
B. Greening Wire Co.
Allan, Whyte & Co.
Northern Canada Supply Co.
Thos. & Wm. Smith.
Fraser & Chalmers of Canada, Limited
Mussens, Ltd.
- Runways, Hand Operated—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Samplers—**
Canadian Laboratories.
Ledoux & Co.
Milton Hersey Co.
Thos. Heys & Son.
- Screens—**
Mussens, Ltd.
Jeffrey Mfg. Co.
Northern Canada Supply Co.
R. Greening Wire Co.
Peacock Bros.
Fraser & Chalmers of Canada, Limited
Jenckes Machine Co., Ltd.
- Screens—Cross Patent Flanged Lip—**
Hendrick Mfg. Co.
- Separators—**
Smart-Turner Machine Co.
Peacock Bros.
The John Inglis Co., Ltd.
- Shafting—**
Dodge Mfg. Co., Ltd.
- Sheets—Genuine Manganese Bronze—**
Hendrick Mfg. Co.
- Shear Legs—**
The Herbert Morris Crane & Hoist Co., Ltd.
- Shovels—Steam—**
Mussens, Ltd.
M. Beatty & Sons.
- Slime Tables—**
James Ore Concentrator.
- Smelting Machinery—**
Mussens, Ltd.
Peacock Bros.
Fraser & Chalmers of Canada, Limited
- Spiral Conveyors—**
Dodge Mfg. Co., Ltd.
- Sprockets—**
Dodge Mfg. Co., Ltd.
- Stacks—Smoke Stacks—**
Canadian H. W. Johns-Manville Co., Ltd.
Hendrick Mfg. Co.
- Stamp Mills—**
Jenckes Machine Co., Ltd.
Mussens, Ltd.
Can. Fairbanks-Morse Co.
Peacock Bros.
Fraser & Chalmers of Canada, Limited
- Steel Drills—**
Sullivan Machinery Co.
Mussens, Ltd.
Northern Canada Supply Co.
Can. Ingersoll-Rand Co., Ltd.
Peacock Bros.
Swedish Steel & Imp. Co., Ltd.
- Steel—Tool—**
Mussens, Ltd.
Thos. & Wm. Smith.
Can. Fairbanks-Morse Co.
N. S. Steel & Coal Co.
Swedish Steel & Imp. Co., Ltd.
- Surveying Instruments—**
Peacock Bros.
W. F. Stanley.
C. L. Berger.
- Switchboards—**
Northern Electric Co., Ltd.
- Take-ups—**
Dodge Mfg. Co., Ltd.
- Tanks—Cyanide, Etc.—**
Mussens, Ltd.
Peacock Bros.
Fraser & Chalmers of Canada, Limited
Jenckes Machine Co.
Hendrick Mfg. Co.
- Tramways—**
Mussens, Ltd.
- Transformers—**
Can. Fairbanks-Morse Co.
Northern Electric Co., Ltd.
Peacock Bros.
- Transits—**
C. L. Berger & Sons.
Peacock Bros.
- Transmission Rope—**
Dodge Mfg. Co., Ltd.
- Tractors—Oil—**
Can. Fairbanks-Morse Co.
- Trippers—**
Dodge Mfg. Co., Ltd.
- Tube Mills—**
Mussens, Ltd.
Peacock Bros.
Fraser & Chalmers of Canada, Limited
- Turbines—**
Peacock Bros.
Fraser & Chalmers of Canada, Limited
- Winding Engines—**
Mussens, Ltd.
Peacock Bros.
Canadian Ingersoll-Rand Co., Ltd.
- Wire Cloth—**
Mussens, Ltd.
Northern Canada Supply Co.
- Wire (Bare and Insulated)—**
Northern Electric Co., Ltd.
Standard Underground Cable Co., of Canada, Ltd.
- Zinc Dust—**
Roessler & Hasslacher.

BRITISH COLUMBIA

The Mineral Province of Western Canada

Has produced Minerals valued as follows: Placer Gold, \$72,704,603; Lode Gold, \$76,486,512; Silver \$35,832,546; Lead, \$29,696,585; Copper, \$80,818,051; Other Metals (Zinc, Iron, etc.), \$1,852,824; Coal and Coke, \$142,068,615; Building Stone, Brick, Cement, etc., \$20,974,184; making its Mineral Production to the end of 1912 show an

Aggregate Value of \$460,433,920

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 1888, inclusive, \$69,598,850; for five years, 1889-1893, \$15,079,632; for five years, 1894-1898, \$38,738,844; for five years 1889-1903, \$83,807,166; for five years, 1904-1908, \$116,153,067; for five years, 1909-1913, \$137,056,361.

Production During last ten years, \$253,209,428

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

THE HON. THE MINISTER OF MINES
VICTORIA, British Columbia

YOUR Fine Ores, Concentrates and Fluedust

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Many plants now in daily operation in U.S., Dominion of Canada, Republic of Mexico, Australia and European Countries. For particulars as to Licenses in Canada, Estimates, etc., address

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American Ore Reclamation Co.
71 BROADWAY, N.Y.

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*Has stood the test in Canada for Twenty
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Cobalt: The Canadian Rand Co., Ltd.

Victoria B.C.: E. G. Prior & Co., Ltd.

The Minerals of Nova Scotia

The extensive area of mineral lands in Nova Scotia offers strong inducement for investment.

The principal minerals are:—Coal, iron, copper, gold, lead, silver, manganese, gypsum, barytes, tungsten, antimony, graphite, arsenic, mineral pigments, diatomaceous earth.

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

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.

The Gold Fields of the Province cover an area of approximately 3,500 square miles. The gold is free milling and is from 870 to 970 fine.

Deposits of particularly high grade manganese ore occur at a number of different localities.

Tungsten-bearing ores of good quality have lately been discovered at several places and one mine has recently been opened up.

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

Fuel is abundant, owing to the presence of 960 square miles of bituminous coal and 7,000,000 acres of woodland.

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 upon application to

HON. E. H. ARMSTRONG,
Commissioner of Public Works and Mines,
HALIFAX, N. S.

LANDS OF THE ALGOMA CENTRAL & HUDSON BAY RAILWAY

Opened for Prospecting

Two thousand square miles of railway lands in the Lake Superior region that have been held in reserve during the construction of the A. C. & H. B. Railway are now open for public prospecting.

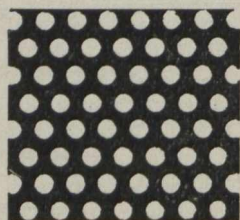
No license is required; staking, recording and assessment work practically as on Government lands. Perpetual mining rights obtainable under renewable leases on easy royalty. The lands are in alternate blocks with intervening areas of Government lands which are also open for prospecting. Two passenger trains daily through the district.

— FOR REGULATIONS, MAPS, ETC., APPLY TO —

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Manager, Lands Dept., A. C. & H. B. Ry.,

Sault Ste. Marie, Canada



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Elevator Buckets (plain and perforated).
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NEWCASTLE-ON-TYNE, ENGLAND.

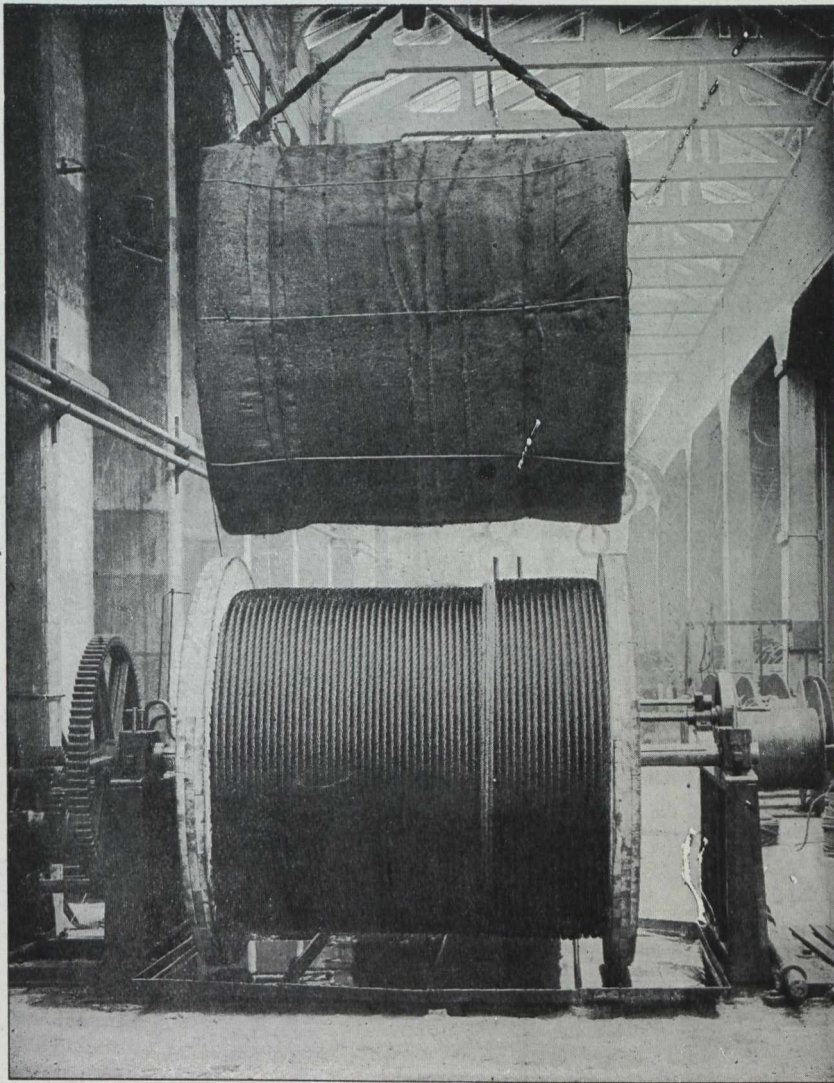
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For MINING:—

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Also Aerial Cableways,

Cranes, Dredges, etc.



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for dealing rapidly and efficiently with Wire Ropes of any weight.

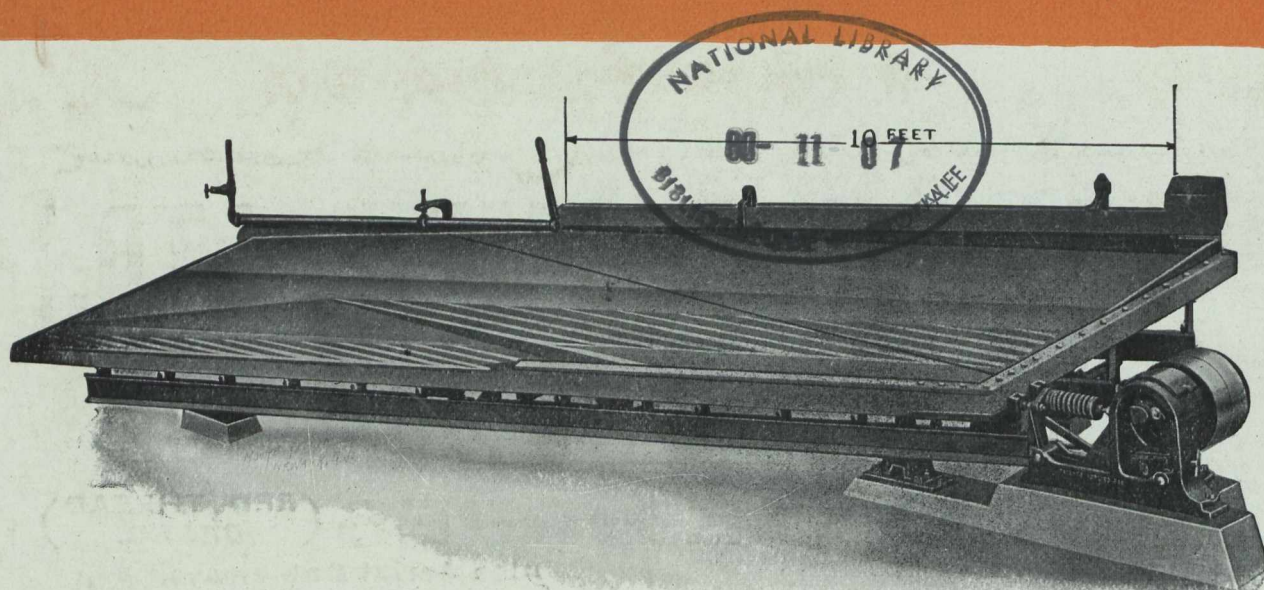
CANADIAN REPRESENTATIVE:

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