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CANADIAN MINING JOURNAL

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No. 4

In This Issue:

Porcupine Gold Deposits

The Nickel Refinery Letters

Recruiting Miners in Nova Scotia

*Rock Drilling in Calumet and Hecla
Mines*

Mining in Slocan District, B. C.

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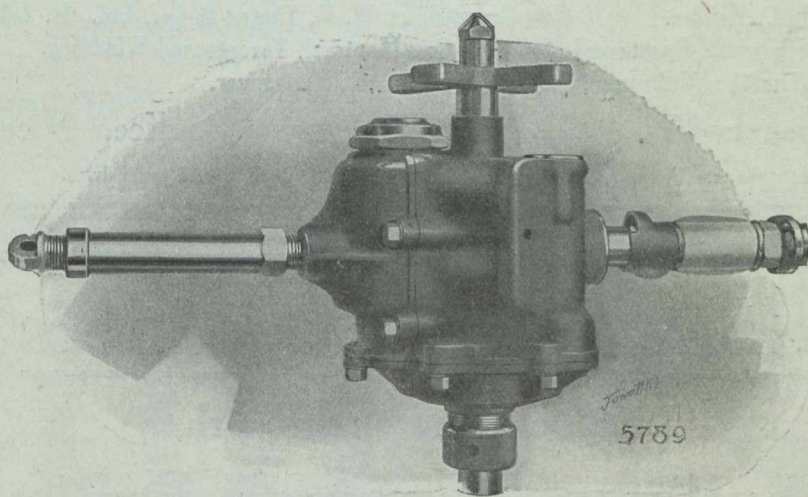
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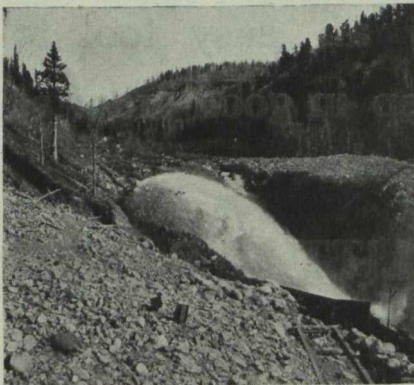
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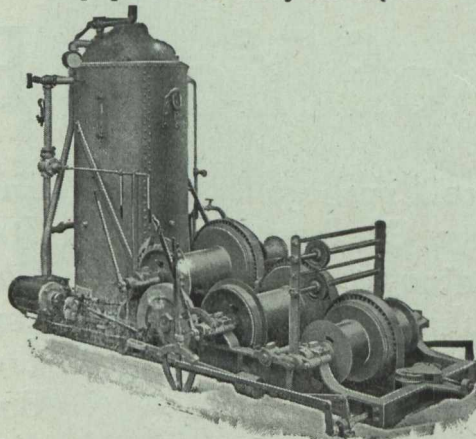
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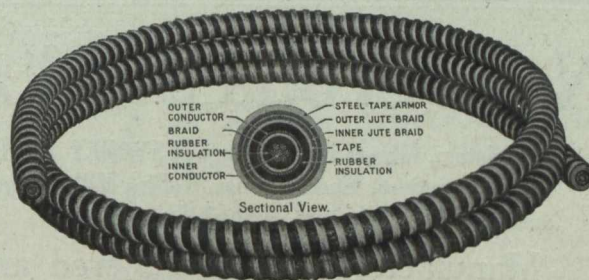
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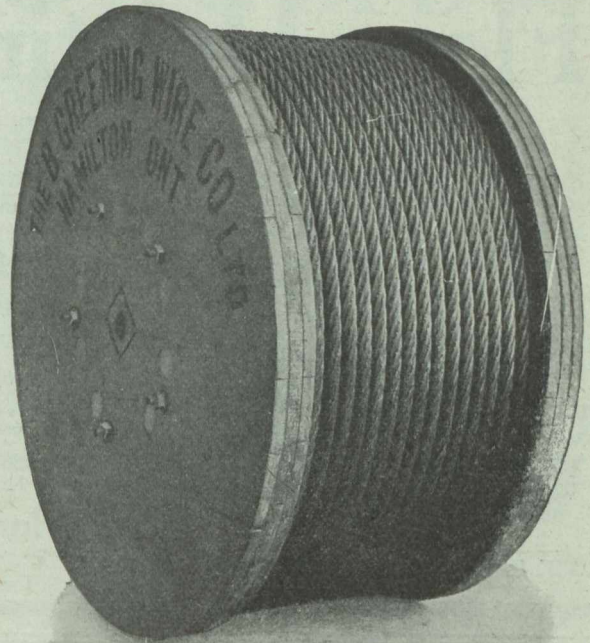
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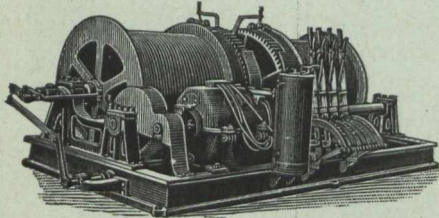
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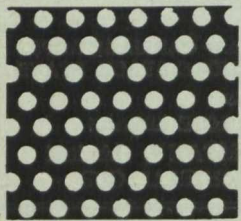
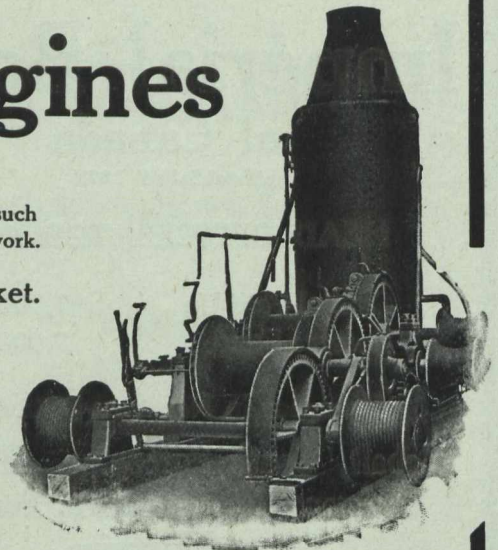
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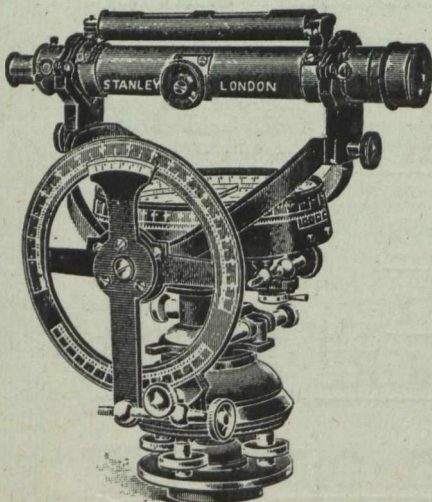
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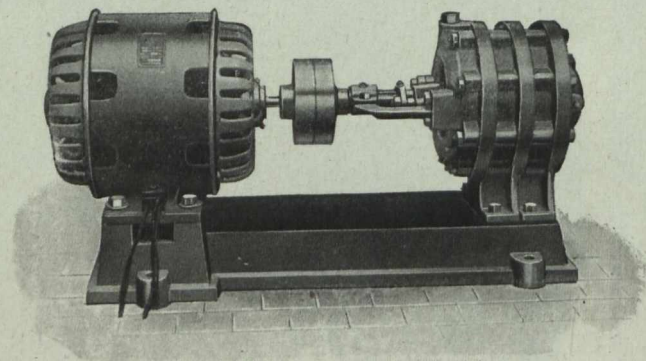
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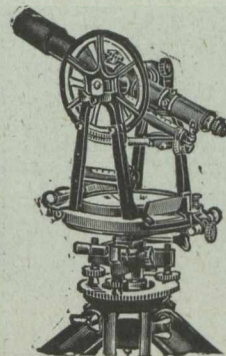
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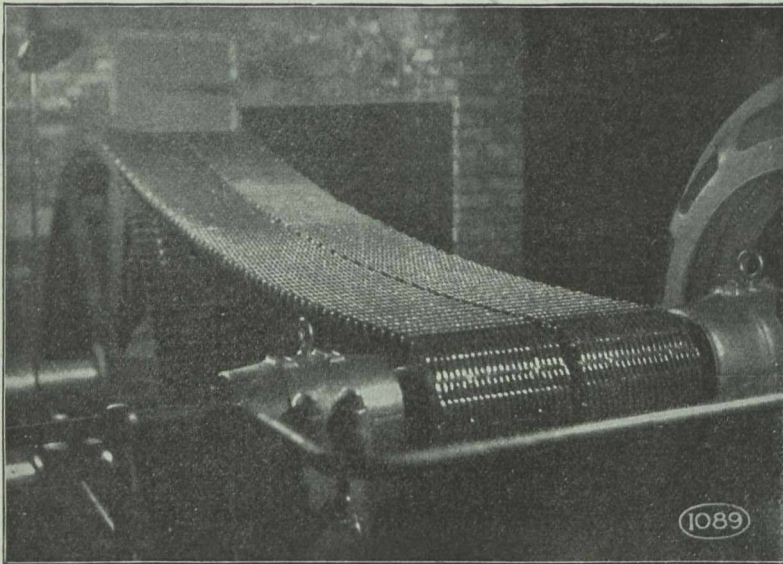
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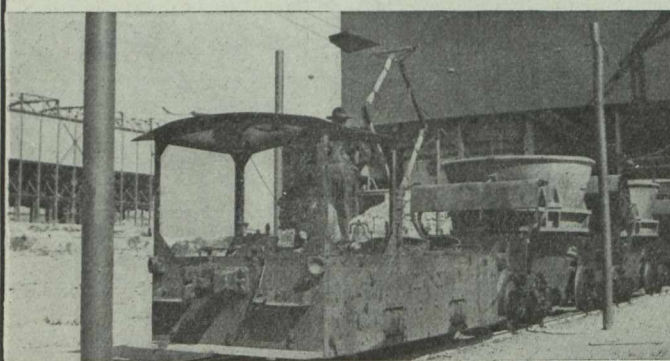
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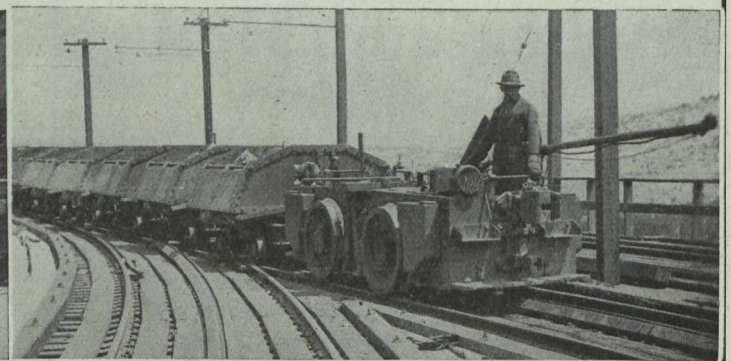
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THE CANADIAN MINING JOURNAL

VOL. XXXVII.

TORONTO, February 15, 1916.

No. 4

The Canadian Mining Journal

With which is incorporated the

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CIRCULATION

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EFFICIENCY IN MINING

It is never safe for one in charge of mining operations to assume that he is doing things in the best possible way. There is always a better and cheaper way which would yield the mine owners a larger profit.

The mine operator is expected to utilize the best known methods, to adapt them to his special needs and to improve on them. He is called upon to lower the cost of production without lowering the wages of employees. Such things are being accomplished in mining districts everywhere, and nearly every operator succeeds in making some improvements. The struggle against costs is always going on.

Occasionally the attempts to increase efficiency meet with very great success. An example of this is the development of the drill bit which during the past few months has doubled the rate of drilling in the mines of the Calumet and Hecla Company and increased the miners' efficiency by forty per cent. It has added to the production per man per day, increased the profit per ton and enabled the miner, without extra work, to earn higher wages. A description of this bit and some account of the results obtained with it, will be found elsewhere in this issue of the Journal.

The success of the Calumet and Hecla Mining Company is largely due to the ability of its officers and the men in their employ. General Manager MacNaughton has a record to be proud of. He is undoubtedly one of the most successful mine managers in America. He is ably assisted by General Superintendent John Knox Jr., who is in charge of the underground work.

A few years ago at the Superior mine, one of the Calumet and Hecla subsidiaries, Mr. Ocha Potter, the mine superintendent, began an efficiency campaign. He enlisted the services of several recent graduates of the Michigan College of Mines. These men began as miners and soon developed into efficiency engineers. The company recognized the value of Mr. Potter's work and appointed him chief efficiency engineer. His assistants, on graduating from the Superior mine, were attached to the staffs at other mines operated by the company. Among other things, they were largely instrumental in making the one-man drill a success in Michigan.

The efficiency department has been a very important factor in cutting costs. It has to its credit the development of many labor and time-saving devices. It had greatly increased the efficiency of the miner. The very great increase due to the improved drill bit is therefore a distinct triumph. Those responsible for it are deserving of great praise.

THE RECRUITING OF MINERS

There are few classes of men in Canada who have responded so well to the call for recruits as have the employees of mining companies. Men accustomed to meet danger in their daily tasks are not only quick to recognize danger from a new source, but willing and ready to meet it and to protect themselves and their comrades. They take their new responsibility easily and go forth to fight the Huns not only because they consider it their duty, but because they enjoy the prospect of being at the front where the danger is great and where they will match their skill and courage against that of the foe.

The miners at the front, and there are very many there now, have given a good account of themselves. Their experience has peculiarly fitted them for the work in the trenches. Their value as soldiers has been recognized and naturally the demand for miners has increased.

Since mine employees enlist so readily and make such useful soldiers, recruiting is brisk in the mining centres. Those in charge of properties have encouraged their men to enlist and are proud of their honor lists. The recruiting has seriously affected mining operations, of course. But the mining companies have made no complaint on account of their own losses and indeed it would ill become them to do so. Other industries have suffered similarly.

But many mining men do not hesitate to state that they consider the present methods of recruiting undesirable and not in the best interests of Canada and the Empire. Men who are engaged in the production of necessary materials are being taken from their work without substitutes being found to fill their places. The seriousness of this is well pointed out in this issue by our Nova Scotia correspondent, Mr. F. W. Gray.

Mr. Gray, as our readers well know, would not bring up such a matter for any but the best of reasons. The Canadian public seems to understand the necessity of producing large quantities of grain during the war; but to be comparatively ignorant of the need of mine products. Mr. Gray makes clear the situation in Nova Scotia and the need for governmental enquiry and action.

The annual meeting of the Canadian Mining Institute will be held in Ottawa March 1st, 2nd, and 3rd. Arrange your work so that you can attend. It is well worth while.

The management of the Buffalo mine has taken a leading part in developing processes for the treatment of the ores of the Cobalt district. Much interest is now being taken in flotation of Cobalt silver ores and it is not surprising that the Buffalo is among the first to put in a flotation plant. We hope that it will prove successful.

AN INACCURATE REPORT

The publication "Petroleum and Natural Gas Resources of Canada," by Frederick G. Clapp and others, Vol. II., just issued by the Department of Mines at Ottawa, is a typical example of the results of the disease which might be called "voluminosis" which is afflicting so many of our public reports. It may possibly be of service to point out some of the ways in which this disease manifests itself. In the first place the volume is made imposing in thickness by the simple expedient of leaving a very large margin around the printed matter on each page. Thus, the size of the page is $9\frac{3}{4} \times 6\frac{1}{4}$ inches. With these dimensions the text could easily occupy $7\frac{3}{4} \times 5$ inches or an area of $38\frac{3}{4}$ square inches, whereas, it actually only covers $6\frac{1}{4} \times 4$ inches or 25 square inches. Thus approximately one-third of each page is not utilized and thereby, of course, the thickness of the volume is correspondingly increased.

A more serious result of the craze for volume is seen when we come to examine into the matter of the work in question. It soon becomes evident that accuracy has been sacrificed ruthlessly. Thus, a glance at the map showing the gas and oil fields in south-western Ontario, proves that neither in the form or position of these fields has any consistent attempt at accuracy been made. Almost without exception the gas and oil fields are given an egg shape on this map, so that the whole presents the appearance of a collection of bird's eggs of various sizes, and is actually not much more useful than a last year's bird's nest. These fields have not this form in nature, but are quite irregular. The Petrolia oil field is delineated in the form of an elongated egg or castor oil capsule, actually it is shaped like a ham. Every township in the counties of Welland, Haldimand and Norfolk, fronting on Lake Erie had its productive gas wells. This is not shown by the map. None of the egg-shaped areas indicated in Haldimand county are extended down to Lake Erie, whereas, the facts are that for some miles in length not only are there scores of gas wells drilled along the lake shore, but also the bed of the lake was leased in front of the townships of Rainham and Walpole and several dozen wells were drilled for gas in this territory with good results. The statement is even made in the text (p. 142) that many wells had been drilled in Lake Erie. Of course, a little thing like a contradiction between the text and the map would not affect the hunter after volume.

The positive assertion is made (p. 222) that no gas field has ever been found in Wentworth county. There are, however, quite a number of good gas wells in Binbrook township, in this county. Here the text and map are in accord, but both are wrong.

In reading the text of the volume under discussion one is not inspired with confidence in the care taken by the authors. A great deal of it is, of course, not readily capable of being checked except by one having

special knowledge of the matter dealt with. Some things, however, are obviously wrong. Analyses are given in several cases which cannot be correct, as they show constituents which do not exist in natural gas. Carbon monoxide, hydrogen and heavy hydrocarbons or illuminants it may safely be said are never found in natural gas. The best chemists, even twenty or thirty years ago, never gave them. This has been thoroughly demonstrated by Burrell and Seibert (Bulletin 42 U.S. Bureau of Mines). Yet we find substantial percentages of these things cheerfully given by our authors. In a couple of instances a mark of interrogation is put after the constituents under discussion as on p. 321, but there can be no doubt that an analysis of natural gas showing 8 per cent. hydrogen should be discarded altogether as we would ignore an analysis of a steel rail if it gave 8 per cent. of lead or tin. In other cases as on pp. 334 and 340 these impossible constituents are given without any question mark. Surely there must be some way of curbing this kind of thing before we are smothered by the mass of publications ever flowing from the press.

MR. BURROWS' REPORT ON THE PORCUPINE AREA

The Ontario Bureau of Mines has just issued a third report on the Porcupine Gold Area, by Mr. A. G. Burrows. It is accompanied by two excellent geological maps; one, on a scale of 2,000 feet to one inch, showing the greater part of Tisdale and Whitney townships, and one, on a scale of 1,000 feet to one inch, showing in greater detail the two chief producing centres.

During the past few years Mr. Burrows and his assistant, Mr. P. E. Hopkins, have done a great deal of careful work in Northern Ontario gold fields and particularly in the Porcupine area. The result of their recent field work is now available and anyone interested in the district should find the maps and report very useful. The maps are a credit to these gentlemen and to Mr. W. R. Rogers, the Bureau's topographer.

Elsewhere in this issue will be found some extracts from Mr. Burrows' report, a copy of which may be obtained by application to the Bureau of Mines, Toronto.

With this publication on the Porcupine Area are bound a description of the Kamiskotia Lake Area, by Messrs. Burrows and Hopkins, and a short article on Water Powers in the Porcupine Area, by Mr. W. R. Rogers. Water powers are a very important factor at Porcupine, as in nearly all Ontario mining districts.

According to the "Toronto World", "the nickel company's profit was over \$20,000,000 last year, not to mention a free stock dividend to the shareholders." If the World's statement is reliable, and if "the company" means the International Nickel Company, that company's stock is selling at an absurd figure. We incline to the belief that the World's estimate of profits is a little high.

In view of the frequent statement that mining uses up our natural resources, while agriculture does not, the following notes by Mr. W. J. Dick, of the Commission of Conservation, are interesting:

"In 1914 the wheat production of Canada amounted to 158,223,000 bushels—the average yield per acre being about 15.37 bushels. Allowing two pounds of straw as removed for every pound of grain, and taking the average analysis of wheat and straw, the following amounts of plant-food were removed from the soil during that year by the wheat crop alone: Nitrogen, 300,000,000 pounds; phosphoric acid, 95,000,000 pounds; potash, 137,000,000 pounds.

"While the virgin soils of Western Canada and especially the very deep rich soils of Manitoba, continue for years—and in some cases for many years—to produce heavy yields even under continuous cropping, they are by this process gradually depleted, and as the supplies of plant food become reduced, the signs of exhaustion will be manifested in decreasing returns. As a matter of fact this depletion is already manifesting itself. To maintain fertility, the valuable constituents taken from the soil must be returned to it."

Every intelligent farmer knows that each crop takes valuable constituents from the soil. Fortunately we can, by mining, replace some of the more necessary ones. We mine phosphate in the Southern States and make sulphuric acid from pyrite mined in Ontario to treat this phosphate to make a soluble substitute for the phosphates removed from the soil by the crops. The farmer is aided by the mining industry in more ways than he realizes.

Elsewhere in this issue will be found a provisional programme of papers to be presented at the annual meeting of the Canadian Mining Institute. The papers on concentration of ores by flotation should prove especially interesting.

INTERNATIONAL ENGINEERING CONGRESS 1915

The Committee of Management, International Engineering Congress, 1915, announces that the volume on Mechanical Engineering is ready for distribution and the members who have subscribed to this volume will soon receive it.

The other volumes will be issued as rapidly as possible. Owing to the large amount of material to be reprinted, and the thousands of copies to be bound, the work cannot be carried on with greater speed. However, it is hoped that within two months the entire set will be completed.

Members who did not send in their final selections may be disappointed in not securing all the volumes they might have had in mind, and at this date the Committee has decided to close the lists for certain volumes which have been sent to the press. It may be possible to supply members who would apply at this late hour with copies of volumes which have not gone to press.

TOUGH-OAKES.

According to the "Cobalt Nugget" the dove of peace was conspicuous by its absence at the meeting of the Tough-Oakes Mining Co., which was held in the company's offices two weeks ago. The cause of dissension among the shareholders, as far as can be learned, was a desire for a new directorate and the possession of a controlling interest in this gold mining company. When the solicitor of the company, Mr. Kearney, was asked for a report of the meeting by a Nugget representative, that gentleman stated that there was no annual meeting held. "Not enough shareholders represented to make a quorum," was the way he put it. Only three of the directors were present.

When the hour of opening the meeting had arrived Mr. Foster announced that as the number of shareholders necessary for a quorum were not present any proceedings on the part of the meeting would be illegal, according to the by-laws of the company. The shareholders, or some of them at least, evidently were of a different opinion and went on with the business.

In the election of the directors the following gentlemen were elected: Messrs. Harry Oakes, R. J. Robins, J. W. Morrison, W. H. Wright, J. B. Holden, Albert Burt, and J. Y. Murdock. At a subsequent meeting Mr. Oakes was appointed president, Mr. R. J. Robins, vice-president, and Mr. Albert Burt, secretary-treasurer.

In an interview, Mr. Foster stated emphatically that there had been, legally, no meeting of the company. According to the by-laws of the company, one-third of the issued stock must be represented before a stockholders' meeting could be held and business transacted. Before the meeting the number of shares represented was counted up and it was found that less than one-third of the issued stock was represented. Mr. Foster states that he called attention to the fact but the form of the meeting was gone through by a number of those present notwithstanding. Mr. Foster stated that he remained in the chair throughout the meeting, but as the business done was not in accordance with the by-laws, for the reason stated in the foregoing, another meeting will have to be called at a later date, the business done in a regular way, and the officers for the year elected.

DAVIDSON.

The five Davidson claims in northern Tisdale are under option to Mr. R. H. Lyman until April 1st. These claims include the Davidson, upon which the Crown Chartered did all the development in the last year they were working, but they are now entirely released from that company. A shaft was sunk and a body of milling ore was developed on two levels. How extensive that milling ore is was not discovered before the Crown Chartered ran out of funds and the work ceased.

The claims are in two groups, one adjoining the Crown Chartered claims and one about half a mile to the north.

Mr. Lyman has his option direct from the court winding up the Crown Chartered affairs. There is yet some money owing from the old company to various creditors, but Crown patents will be issued when the first payment is made on the property.

It is most probable that New York capital will be interested.—Northern Miner.

PIONEER MINER IS DEAD.

Kenora, Feb. 7.—A pioneer mining man, Mr. Oliver Daunais, died here Saturday after a short illness, at the age of eighty years. The early portion of his life was spent in Port Arthur district, when Silver Island mine was startling the mining world about 1879. At one time he was owner of the Silver Mountain, Beaver and Rabbit Mountain mines, three of the most promising silver properties in the district. About 1894 he was attracted to the Lake of the Woods region, where he secured several promising gold claims. He leaves a wife, four daughters and three sons.

KITCHIGAMI GOLD

According to the "Northern Miner," a Michigan company called the Kitchigami Gold Development Company is diamond drilling the western group of Gordon claims at Goodfish upon which they have an option. A diamond drill has been taken in and is now running. The object of this work is to pick up the extension of the Costello vein system, one of the four claims taken up adjoining the Costello.

The directorate of this new company includes John Daniel, Dr. John McRae, Chas. Chynoweth, James T. Fisher, and Edwin J. Hall, all of Calumet; Henry Baer, of Hancock; and John A. Doelle, of Houghton.

Mr. C. T. Botsford, who makes his headquarters in Haileybury is in direct charge of the work. The company was organized under Arizona state laws with a capital of \$300,000 divided into 150,000 shares of a par value of \$2.

NIPISSING.

Cobalt, Feb. 9.—During the month of January Nipissing mined ore of an estimated value of \$169,802, and shipped bullion from Nipissing and Custom ores of an estimated net value of \$148,730. The high-grade mill treated 81 tons and the refinery shipped 251,676 ounces of fine silver. The low-grade mill treated 5,278 tons.

McIVOR.

Toronto, Feb. 10.—Two 50 h.p. boilers and a 5-drill compressor were shipped last week into the McIvor property in the western extension of Kirkland lake. The property was first discovered last summer and consists of six claims. It has one well defined lead which has been stripped for a considerable distance and the shaft which was done by hand, is down 30 feet.

DOME.

The regular quarterly dividend of 50 cents per share on Dome has been declared. It is payable on March 1st to shareholders of record Thursday, Feb. 17. Dividend disbursements will amount to \$200,000 and will make a total of \$600,000 paid on the common stock, or 15 per cent.

DOME LAKE.

The cyanide plant for the Dome Lake Mining Co. was shipped from Toronto some time ago, and its arrival is expected there any day now.

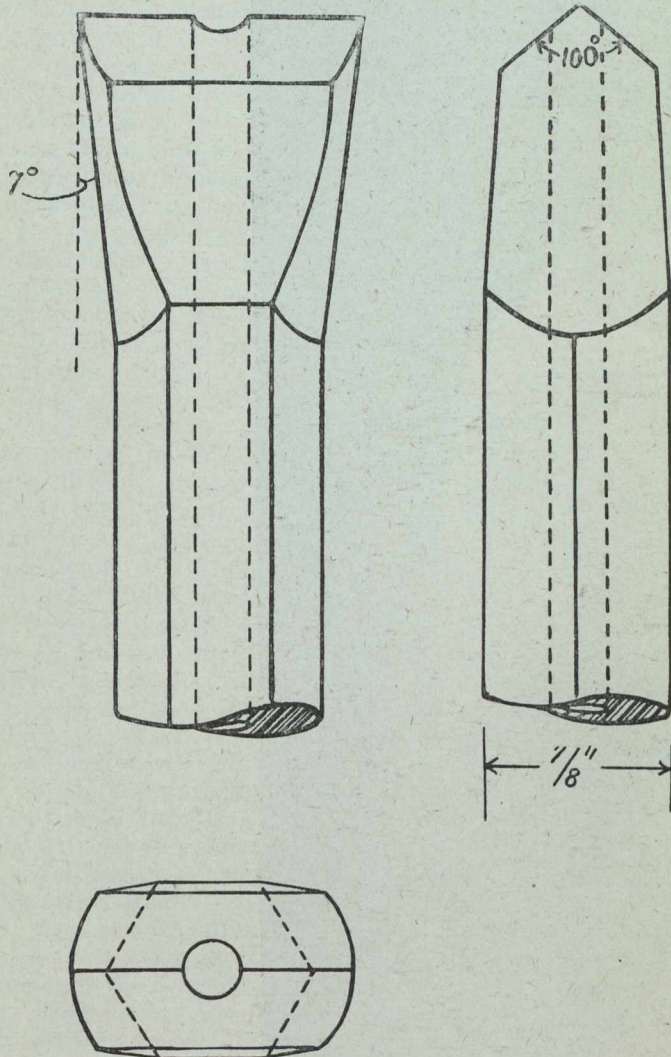
McINTYRE.

Operating profits of the McIntyre-Porcupine Gold Mines during January are officially given out as \$38,400.

THE CARR BIT

A DRILL BIT WHICH HAS INCREASED THE EFFICIENCY OF CALUMET AND HECLA MINERS 40 PER CENT.

The Calumet & Hecla and subsidiary companies operating in the Michigan copper district are producing about 660,000 tons ore per month and have an enviable record for efficiency in all departments. The announcement therefore that the use of a new type of drill bit has increased efficiency by 40 per cent. well deserves the attention of those who are responsible for the economical operation of mines. Knowing that our readers would want to hear more about this bit,



Single Carr Bit on $\frac{3}{8}$ in. hexagonal steel

we asked for a description of it and some account of the results obtained.

Mr. James MacNaughton, second vice-president and general manager of the Calumet & Hecla Mining Company, has kindly sent us, for our readers, the following notes prepared by Mr. O. Potter, chief efficiency engineer of the company.

The Carr bit was first called to the attention of the Calumet and Hecla Mining Co. by the Ingersoll-Rand Co. who had used it with considerable success at a mine in the south. As originally designed it did not prove to be very efficient in the Michigan copper mines and it was only by changing the various angles of the bit, reducing the size of drill steel used, and insisting upon very accurately made bits, that satisfactory results were finally obtained.

The theory of the bit is that if the two edges of the wings of the bit are kept out to the full gauge diameter of the cutting edge, then these edges act as reamers—the cutting edges doing the rough chipping—and the diameter of the hole is maintained. This makes it possible to start a hole with a very small diameter and drill it to a considerable depth at a great relative speed.

The experimental work in the efficiency department early proved the theory that the drilling speed of any given machine under constant conditions varied inversely with the volume of rock cut, or in other words with the square of the diameter of the hole.

It is the possibility of starting a hole with a very small diameter and drilling it to a considerable depth with but very small loss in gauge that makes the Carr bit valuable. As a matter of fact it is found that the Carr bit drills but very little faster than the ordinary cross bit if the gauges are the same.

The reaming quality of the wings of the Carr bit make it possible to change the gauge of the drills only one-sixteenth inch for each 22 inch run of steel on the amygdaloid lode mines and in the case of the Osceola lode the change in gauge is only one-sixteenth inch every second run, or 44 inches. On the Calumet conglomerate lode, which is very hard, the gauge is changed one-sixteenth inch every 12 inches, one foot being the standard run on this lode. A "Cross-Carr" bit, built on the same principle as the Carr bit, has recently been developed for use on the conglomerate lode. It is found that it "fitchers" less readily than the single Carr bit owing to the tendency of the latter to wedge in the fissures and cracks which are characteristic of the stopes in this lode.

Holes are also being drilled to a greater depth than was practicable with the bits formerly in use. Present practice is to use 12 and 14 ft. drills in stopes on most of the amygdaloid lodes and 14 and 16 ft. drills on the Osceola lode. The 10 ft. drill is the longest in use on the Calumet conglomerate lode, because of the "fitchery" character of the ground. It has been found that these longer holes are much more economical in the use of powder, saving about 20 per cent.

Carr bits drilling a "rounder" hole, it is easier to extract drills from the holes and therefore it was soon found advisable to use anvil block chucks with plain shanks on the steels, thus doing away with the necessity of putting lugs on the drills as had been the practice since the introduction of the Leyner machine. Drill breakage and the resulting loss of drill steel has consequently been greatly reduced. The anvil block chuck and the resulting plain shank on the drill steel made it possible to use smaller and lighter steel and therefore still smaller holes than were practicable with the $1\frac{1}{4}$ inch round steel formerly in use.

One-inch hexagon steel has therefore become the standard at the Calumet and Hecla and subsidiaries, except on the Osceola lode and at the Superior mine where conditions were found to justify the use of seven-eighths inch hexagon steel. The Osceola lode has a present output of about 150,000 tons of ore per month and the Superior mine a little less than 20,000 tons. The amygdaloid mines using 1 inch steel have a monthly output of about 340,000 tons. The conglomerate product is at the rate of about 150,000 tons, but

the new bits have as yet been only partly introduced on this lode.

The drilling speed of the Carr bit on the smaller steels now used is just about double that of the old crossbit on the $1\frac{1}{4}$ inch round steel formerly used. By "drilling speed" is meant the depth of hole drilled per minute of **actual reciprocating time**. Since much of the work of the miner—such as rigging up, barring

about equal to the total efficiency of the miner of four years ago.

During the experimental work on the Osceola lode several machines were kept stopping with Carr bit drills, seven-eighths inch hexagon, using 16 ft. drills and a constant gauge all the way down. That is, the starter and 16 ft. drill had the same gauge. These bits were all hand-made, however, and it was decided



Operating a Leyner Drill with old style bit in, the Calumet and Hecla Mine

loose, changing drills, etc.—is not at all affected by the bit, his efficiency is not increased in proportion to the increase in drilling speed of the bit. However, there has been an actual increase in every mine, after a few weeks use of the bit, of about forty per cent. in actual efficiency, and this without any extra effort on the part of the miner. The miner, however, has been made a beneficiary of the improved conditions and is receiving considerably better pay as a result.

During the past four years many improvements have been made in drilling methods among the Michigan copper mines and it is rather interesting to note that the increase of 40 per cent. due to the Carr bit is just

that for general conditions it would be better to give the drills some slight change in gauge in order to allow the blacksmith a little lee-way. In actual practice the drill sharpener is expected to keep the gauges accurate to one-thirtysecond inch, and this is being done very successfully.

Considerable difficulty was experienced at first in making these bits of the required accuracy owing to the peculiar warped surface of the side of the wing. This required special dollies, dies, gauges, etc., the details of which were worked out by Mr. M. M. Morrison of the Calumet and Hecla Mining Co. No. 5 Leyner sharpeners are used exclusively on this work.

COAL PRODUCTION OF NOVA SCOTIA AND THE EFFECT OF RECRUITING

By F. W. Gray

The second report of the Departmental Committee appointed to enquire into the effect of recruiting on coal production in Great Britain gives the percentage of mine workers who have enlisted since the beginning of the war at 22.5 per cent. of the total mine employees. Rather curiously this figure is practically identical with the percentage of enlistment among the mine workers of Nova Scotia, and in several other particulars events seem to be following the same course in Nova Scotia that they have taken in the coal-mining districts of Great Britain. In the British coalfields the production of coal was so seriously diminished as to create alarm, and in the spring of 1915 a Committee of Enquiry was appointed. As a result of the recommendations of this Committee it was decided that certain classes of colliery workers should be classed as munition workers, or as "starred" men, and for some time past all enlistments from among these specified classes (which include all underground workers) must have the approval of Special Enlistment Tribunal. The composition of this Tribunal is such as to render it free from all suspicion of undue influence from either master or workmen. A similar tribunal, with rather wider powers, decides whether French miners shall remain at home to work for the country in the mine, or shall go to the trenches. Both in France and in Britain it has been recognized that there is a point beyond which the diminution of coal production cannot drop without serious impairment of the military power of the nation, and it seems that the time has come to enquire whether this point has not been reached in Canada. The matter is too grave to be dealt with by those intimately interested in the production of coal, it is not a matter for coal-master or for colliery worker, it is a matter for the leaders of the nation, for governmental enquiry and action.

The time is rapidly approaching, has almost arrived in fact, when the shortage of coal will begin to limit the manufacture of munitions and industrial activity in Eastern Canada.

A very serious situation may be predicted for Montreal and the St. Lawrence towns generally next summer, if the coal outputs continue to decline as they have done during the past four months. Two factors will militate against taking coal to Montreal next summer. First, the shortage and fabulous rates of hire of freighting steamers, and second, the drop in the actual production of coal. The first named factor will operate equally against American coal coming by the Great Lakes route, and the second factor may also apply to United States coal as well as to Nova Scotian coal, if the threatened labor troubles occur around the first of April. In all probability, however, there will not be any strike of the coal-miners in the United States, as our friends across the border may be trusted to compose their differences while business remains so good as it is to-day, and while the demand for munitions and the shortage of labor in the United States coal fields causes a continuance of the present brisk demand for coal.

It must be admitted, however, that a shortage of coal from the Nova Scotia collieries can be partially, if not wholly, filled from the United States, but, apart

from the obvious injustice to the Nova Scotian coal companies and the permanent injury which may result to their business and the future welfare of the colliery workmen of Nova Scotia, it may well be questioned, from a national standpoint, whether it is a good thing to become too entirely dependent upon the United States for our coal supply.

It is not generally realized how long established an industry the mining of coal is in Nova Scotia. Cape Breton coal was sold in Boston and New York long before the development of the vast coal fields of Pennsylvania, Ohio, and Illinois, and before anthracite coal came into general use in the New England States.

It is an instructive commentary on present-day events that the English shareholders of the General Mining Association—the pioneer of coal-mining in North America—were from the first imbued with the idea of establishing a profitable trade in coal between Cape Breton and the New England States. Mr. Richard Brown, the general manager of the Association, writing in 1871, remarks: "It must, undoubtedly, have been a great disappointment to the General Mining Association to find in 1857 that, after a struggle of thirty years, in which neither trouble nor expense was spared, the sale of Cape Breton coal had made such little progress in the United States."

Reluctantly, these forerunners of our own spacious days came to the conclusion—again quoting Mr. Brown—that the General Mining Association "must look chiefly to the British provinces for a market for their Sydney coal, where its character is well-known and appreciated, and that they will find it to their interest to foster the trade by selling at low prices to regular customers, thereby securing a fair profit on their outlay, perfectly free from the fluctuations, and consequent losses, attendant upon a foreign trade, liable at any moment to be suspended by a hostile tariff."

In these far-sighted words Mr. Brown outlined the policy which has enabled the coal mines of Nova Scotia to increase the sales of coal from 294,000 tons in 1857 to 6,500,000 tons in 1913. Since the time that this shrewd forecast was written what a change has come about! The coal production of the United States in 1857 was 13,340,000 tons, to-day it nears 600,000,000 tons annually, and the coal resources of the Republic prove to be vaster the more they are prospected. In 1857 the coal production of Canada was not more than 300,000 tons; to-day it is under 15,000,000 tons annually, and in comparison with the coal deposits of the United States, the Dominion is but meagrely supplied with this great fundamental asset of national supremacy. To-day, Canada imports as much coal as she mines herself, and, if our own production declines, in proportion to that declension we become dependent upon the United States.

The relations of the United States to Canada during one hundred years past, and at the present time—Representative Mann to the contrary notwithstanding—are such as to preclude any serious danger of warfare between the sister nations, allied as they are by language and ideals, by common origin and mutual regard, but nevertheless the independence of any

people is ultimately based on its power to support itself by internal resources. Dependence upon another nation inevitably leads to national weakness, particularly is such dependence is by a small nation upon a larger and more powerful one. This is being daily exemplified by the progress of the war.

Coal is the basic munition of war, ranking next to men as a prime necessity of armed force. If political lines of demarcation were a negligible factor, a glance at the map of North America would show that the natural sources of coal supply for the central provinces of Quebec, Ontario and Manitoba, is from the States of Indiana, Ohio, Pennsylvania, and Virginia, and, conversely, that the New England States could be most economically supplied with coal from Nova Scotia.

Yet for better or for worse, we believe for better, the line of demarcation exists, and, from the Canadian point of view, coal that comes from the United States is an import, and a commodity that under certain rather improbable, but not altogether inconceivable circumstances, might be placed under an embargo.

When we see the unnatural groupings of nations that the hostilities in Europe have brought about, and the manner in which unwilling combatants have been forced by almost incredible circumstances to wage war by force of arms or by economic pressure upon former allies and comrades in arms, nothing can be taken for granted, and it becomes increasingly evident that nations which desire to persist can rely only upon their strength in arms and the natural resources within their frontiers.

The United States supplies Canada with some fifteen million tons of coal annually, and certain sections of the Dominion are absolutely dependent upon the United States for a coal supply. If for any reason this source of supply were cut off, all industry in these sections would be immediately paralyzed, and would so remain until arrangements could be made to bring coal from Nova Scotia and the Prairie fields. It is a singular, and might almost be considered an unfortunate circumstance, that the most thriving and populous areas of Canada should be devoid of coal-seams, but such is the case.

The vexed and interminable argument between free-trade and protection does not enter into these considerations, and they are simply put forward to emphasize the paramount importance that, under certain conditions, the all too meagre coal-fields of Canada might possess, and the importance of keeping the machinery of coal production from breaking down at this critical period of our national adolescence. Coal, as Lloyd George has truly said, is to-day the paramount lord of industry—and he might have added, with equal truth—of war also. The nation that possesses coal fields is rich, while the nation that has none is poor indeed; and, moreover, if the coal fields we have are not producing, we might as well be without.

The miner is one of the first of men to volunteer. He is a man habituated to danger, a man who daily takes his life in his hand. To a large extent he is always the guardian of his own life, and must ever be on the watch for danger that presents itself in many different shapes. The miner pits his senses and his mother wit against the elemental forces of nature, against falling roof, explosive and poisonous gases, the gigantic forces penned up in modern explosives, the darkness of the underground; against the fabled elements of water, air and fire. So he is ready at the

call to face the similar dangers of the falling trench, of modern high explosives, of poison gases devised by Teutonic "Kultur," that have Nature's compounds "beaten to a frazzle;" to face with equanimity the eerie darkness of sentry go and listening post before a vigilant and ruthless enemy. None of these things moves him, and it is a perfectly natural thing to those who know the miner to expect that he would answer the call with greater readiness than other men. And such has been the case.

The miners of Nova Scotia have enlisted in far greater proportion than the remainder of the population. The rural districts of the Province have not given men in anything like the percentage of men of military age that the miners have given. Home-keeping youths, it is said, have ever homely wits, and it seems as though the young men residing in the remoter agricultural and fishing districts of the country have not yet realized the gravity of the present emergency. This is partly because it has not been put before them. The recruiting activities of the Government have been concentrated on the industrial centres where men are most easily to be had, and in this respect the line of least resistance has been taken. It is true that to some extent the country districts have been drawn upon to provide men for the industrial centres, but there still remains a large number of suitable men in the country districts whose imaginations have been untouched by the call of their Country, who from ignorance of the danger remain detached and aloof from the spirit of the times.

Canada has promised 500,000 men to the defence of British ideals and democracy, and all but the faint-hearted believe that what she has promised will be given, but there is a danger that we may blunder into the same quagmire that frustrated our hopes in the summer of 1915, when it was discovered that men in the field were helpless without munitions. One of the advantages of the conscript army is that the General Staff can place men in the place where they will be most useful to the nation, and one of the disadvantages of the voluntary system is that it does not allow the exercise of the full efficiency of the nation viewed from the staff point of view. The Derby scheme in Great Britain was an attempt to reconcile the voluntary system with the efficiency of the conscript system, hence the "starring" of munition workers, and the placing of unmarried and young men before the married and older men.

No sane man would wish to discourage recruiting or to do anything that would hinder for a single moment the coming of the final victory that we all so ardently desire. And it is with the desire that the efforts of Canada shall be directed with single aim and the greatest possible effect towards the extirpation of the Prussian menace that these considerations are put forward. As previously pointed out, it is not a matter for master or for man, but it is a matter for the careful consideration of the leaders of the nation. There are reasons, on which it is not well to be too explicit, why we should not become entirely dependent upon United States coal. The choice, as the writer has previously ventured to maintain, is resolving itself into one between men and munitions. Having said so much, and having dared the onus of being regarded as one who discourages recruiting, the writer feels that he has discharged his responsibility in presenting truthfully and faithfully the danger that threatens the production of coal in Nova Scotia, and the incalculable train of circumstances that inevitably follows thereon.

THE PORCUPINE GOLD AREA*

By A. G. Burrows.

The Porcupine gold area, which for the past six years has held the attention of the mining public, is situated on the Hudson Bay slope of northern Ontario. The latitude of Niven's First Base Line of 1899, which forms the south boundary of Tisdale and Whitney townships, is 48 deg. 27 min. 54 sec.; consequently the area is somewhat farther north than the Canada-United States boundary in Manitoba and other western provinces. The camp is in the Timiskaming judicial district. Lying along the southern fringe of the great clay belt of northern Ontario, it adjoins a prospective farming country. In this belt many townships have been laid out in six or nine-mile squares and subdivided into concessions and lots; in the gold area itself and in the adjoining country to the north, many half lots containing 160 acres each have been granted to veterans as homesteads.

Since the second report on this area published by the Ontario Bureau of Mines was written there has been practically no extension of the gold-bearing area. At various times there has been considerable activity in some of the outlying regions, but up to the present no finds have been made that compare with those of Tisdale township. Outlying areas which have attracted attention in the past two years are those situated in McArthur, Turnbull and Robb townships.

It is remarkable that the earliest discoveries at Porcupine have been developed into the largest producers. The outstanding mine is the Hollinger, named after its discoverer, Benjamin Hollinger. The discoveries on Pearl Lake by Alexander McIntyre developed into the McIntyre mine, and that of John Wilson in the south-east part of Tisdale into the Dome mine. The large producing mines are all confined to Tisdale township, and the majority of these are in the vicinity of Pearl lake.

The principal towns of the area are Timmins, South Porcupine and Schumacher. The other townsites which have been established in what was thought favorable locations have not been successful. The town of Timmins is most progressive, and is growing rapidly. The town is situated on a sand and gravel ridge overlooking the Mattagami valley, at an elevation of about 110 feet above the river.

To the north-west and west of Timmins a number of farms are being cleared along the Mattagami river. It is desirable to have a great part of the townships immediately north of the Porcupine gold area, which are in the clay belt, settled, as the farmers will have a near-at-hand market for their produce.

A branch line of railway connects the Porcupine camp with the main line of the Timiskaming and Northern Ontario railway. The line from Porcupine junction to Timmins is 33½ miles in length, and the distance from Timmins to Toronto is 485 miles. When through trains are running the journey requires about 20 hours.

The First Prospecting.

In 1906 some work was done by prospectors on a vein near Miller lake and a few hundred feet from the present Hollinger veins. Evidently, seeing no gold, and having no assays made, they abandoned the property. In the same year claims were staked in Shaw

township on what is described in the application as a "vein of sugar quartz and hematite iron." This is of interest since the so-called vein is simply the upturned edges of the Keewatin iron-formation.

In 1908 claims were staked by H. F. Hunter on the east shore of Porcupine lake. Gold was found sprinkled through the quartz and schist in a sheared zone.

It was not, however, until the following year that the spectacular discoveries of J. S. Wilson, on what is now the Dome property, caused a rush to the district, and in a few weeks practically all of Tisdale and a great part of adjoining townships and unsurveyed territory were staked.

Much work was performed during 1910 and 1911 in the townships near Porcupine lake, and while gold was discovered in a great number of places, it was not shown in the great majority of cases to be in sufficient quantities to warrant the erection of reduction plants. In the succeeding years there has been very little activity in the outlying parts of the area, but the success attending operations at the producing properties in Tisdale township may lead to further exploration. Such prospecting should be carried on with the object of finding large low-grade deposits rather than confining attention to the narrow high-grade veins, several of which have already been found in this area and have not been worked with success.

Since the discovery of gold in this area there have been repeated forest fires which have destroyed much timber. The worst fires in recent years occurred in 1911. About the middle of May of that year a fire completely destroyed the surface plant and buildings of the Hollinger mine.

The greatest fire of the year occurred on July 11th, when, after a prolonged dry season, a hurricane from the south-west brought up a fire. The surface workings and buildings of the Dome, West Dome, Vipond, Standard, Preston, East Dome, North Dome and several other properties were entirely destroyed by fire. The town of South Porcupine was completely wiped out, and almost all the part of Pottsville which escaped the fire of July 2nd. The north part of Porcupine (Golden City) was also destroyed. This fire was attended by a great loss of human life, 71 in all having lost their lives either by being burned, suffocated or drowned. The destruction of the surface plants by this fire retarded the production of the camp for almost a year.

In the parts which have escaped the fires there is a dense growth of timber, including white and black spruce, jack-pine, birch and poplar. It is interesting to note that a growth of young tamarac is replacing the old tamarac trees, which have all been destroyed in recent years by the large saw-fly. An occasional charred stump among the green timber, when gold was first found, showed that most of the forest is of second growth, the area having been ravaged by fires years ago.

Early Examination of Region.

Previous to 1909, the area was little known. There were practically no reports upon it except from explor-

*Extracts from the third report by A. G. Burrows, published by the Ontario Bureau of Mines.

ers and geologists who were attached to survey parties sent out by the Ontario Department of Lands, Forests and Mines.

The main part of the camp is situated along an old portage route, from the Mattagami river to Night Hawk lake, which had been used by the Hudson's Bay Company officials for a couple of centuries.

In 1896 E. M. Burwash examined the country along what was then the Algoma-Nipissing boundary line which was run as far as the south-east corner of Whitney township in that year. He noted the occurrence of quartz veins, carrying traces of gold, at various points on the line. One of these veins he found on what is now the east boundary of Shaw, and only a few miles south-east of the main area. He remarked that the country was a promising one for the prospector but for the drift.

In 1899 W. A. Parks reported on the geology of the portage route from the Mattagami river to Night Hawk lake by way of Porcupine lake. He, like Burwash, noted the occurrence of gold in some quartz veins, particularly in the south-west portion of Whitney township, obtaining assays from a trace to \$1.00 per ton. In his summary Mr. Parks remarked: "I regard the region south of the trail to Porcupine lake as giving promise of reward to the prospector."

Geological descriptions of areas, including and adjacent to the Porcupine area, are to be found in the reports of the Bureau of Mines for 1903, 1904 and 1905 by Messrs. Kay, McMillan and Kerr, respectively.

In October, 1909, Jas. Bartlett made a brief examination, for the Bureau of Mines, of the early discoveries of the area.

All the gold deposits at Porcupine are believed to belong to the same period of ore deposition. They occur in rocks of Keewatin, Timiskaming, pre-Algoman and Algoman age while the mineralization was probably in Algoman times. Some writers on this area have attempted to make a classification based on structural resemblance in certain of the deposits. It may be said that each deposit has peculiarities of its own, but that in general there are characteristics common to all. For example, all the deposits will in parts show such structures as simple vein, lode, irregular masses of quartz, and mineralized schist. These structures are largely dependent on the character of the enclosing rock, whether schistose, greatly foliated, or massive. Some deposits have been formed near the contact of the quartz-porphry with other rocks, but this feature is not sufficient in itself to warrant such deposits along contacts being classified separately. For example, at the Dome mine the deposit exposed in the large open pit is considerably north of the contact and in the conglomerate and slate, whereas a deposit underground to the south of No. 2 shaft and only a few hundred feet away has the quartz-porphry as the hanging wall.

While a certain amount of fissuring was present at the beginning of the ore deposition, it is believed that the deposits formed at that time were enlarged by metasomatic replacement. Evidence of replacement of the wall rock can be seen at many of the mines and is particularly well shown at the Dome Lake mine.

The irregular fissuring has produced a great variety of quartz structures, varying from the tabular, though often irregular or lenticular, vein which may be traced several hundred feet, to mere veinlets, often only a fraction of an inch in width and a few feet in length, which ramify through a rock that has been subjected

to small irregular fissuring. This latter variety is well illustrated in the fissuring of ankerite bands, so characteristic of some of the gold deposits of Porcupine. Irregular and lenticular bodies of quartz often occur which may have a width of ten or twenty feet, but which die away in a distance of fifty feet. Again, there are dome-like masses of quartz which are elliptical or oval in surface outline. In some parts at least these masses can be seen in contact with underlying rocks at a low angle, which would suggest that they are broad lenticular masses which have filled lateral fissures in the country rock. The most conspicuous dome masses were those of the Dome property, where the two largest were about 125 feet by 100 feet. A fissure may be vertical and irregular at some points. At others it may incline at a lower angle to the horizontal or take on a more or less lenticular form.

The term "vein" as used in this report is not confined to the filling of a single fissure with well-defined walls, for this type of vein is rather the exception in the Porcupine area. The fissuring has been so irregular that a "vein" in one part may consist largely of quartz, and in another part of numerous veinlets of quartz and intervening schist, greatly resembling a stockwork; again, the main part of a vein may be almost vertical in attitude, but many veinlets, as branches from the main vein, may extend laterally into the country rock. It is often found that the values are obtained in parts of the vertical vein which have been subjected to a later movement and enrichment, whereas the lateral veins have little or no value. This is illustrated in the No. 1 vein at the Rea mine.

The relationship of the strike of the veins to that of the enclosing rock is often difficult to determine, since generally along the veins there has been shearing of the country rock which may conform to the general direction of the strike of the veins. However, by determining numerous strikes in the schist away from the veins, it is seen that the majority of them are inclined to the strike of the enclosing rocks. In dip the veins vary from vertical to nearly horizontal. In No. 1 shaft of the Hollinger the vein is practically vertical, while a series of narrow quartz veins, 6 to 18 inches wide on the Lindburg claim, have a dip at the surface of only 20 degrees. The prevailing dip of the schist in the Porcupine area is to the north at a high angle, and frequently the veins dip distinctly to the south across the cleavage of the schist. While it is apparent that most of the deformation of the country antedates the vein formation, nevertheless there is a decided tendency in many cases for the fissuring to be influenced by the direction of schistosity, which is also a direction of weakness; hence we find veins having a more or less lenticular structure, the strike of which closely corresponds to that of the country rock.

It will generally be found that where the lenses are broad the schistose wall rock is approximately parallel with the lens; whereas the narrow portions of vein between lenses frequently cut across the schist.

Lenticular veins occur chiefly where the country rocks have been intensely sheared or rendered schistose, as around Pearl Lake. Usually when there has been less disturbance the veins are more likely to have a marked difference in strike from the enclosing rock—as around Three Nations lake and the porphyry area south of Simpson lake. It may be stated that the larger and usually lenticular veins of the area occur where the rocks are extremely schistose, while the narrower, better defined veins occur as stringers from these main lenticular veins, or in less disturbed areas.

The quartz-porphry on the Preston, Fogg (L.O. 325) and other claims in Deloro township along its north boundary is more massive than that near the Dome or around Pearl lake, while the greenstone is also much less altered to schist than in other parts. Consequently the veins are narrower and have not the lenticular structure so characteristic of those deposits at Porecupine which are in schistose rocks. Most of these veins have a strike nearly north and south across the mass of quartz-porphry. They lack the banded structure so frequently seen in the Pearl Lake area. Coarse gold associated with zincblende and pyrite occurs in some of the narrow veins, many of which are only a few inches in width. Owing to the narrowness of these rich veins, and the massive character of the porphyry rock which shows little impregnation with gold-bearing solutions, difficulty has been experienced in finding ore bodies of commercial importance.

Distribution of Veins.

While gold-bearing veins occur over a wide area and are often isolated, it is seen, from a number of those already discovered, that they occur in groups along certain lines. For instance, in Tisdale township there are at least three distinct areas where the fissuring has been most pronounced. One such area extends from the south-east end of Miller lake, on lot 11, in the second concession, in a north-easterly direction for three miles, and includes such veins as the Porecupine Crown, Millerton, Hollinger, Acme, McIntyre, Jupiter, Rea, and in addition others with visible gold. The average strike of the veins here is north-east and south-west. An exception is a vein on the Porecupine Crown, which strikes north and south.

Another series, including the Smith, Davidson, Crown Chartered and Dobie, occurs in the north-east part of the township. To these should be added the Scottish Ontario, Mullholland, Hughes and Gold Reef, which are in the north-west part of Whitney township. The general direction of these veins is east and west.

Again, in the south-east part of the township is a group including the Dome Lake, West Dome, Dome, and Dome Extension, with a general strike north of east.

Occurrence of the Gold.

A field examination shows that there is an irregular distribution of the gold in the quartz veins. Very often it occurs along dark streaks in the quartz, along the contacts of quartz and schist, or around patches of dark colored mineral in the quartz. At the surface, rich portions of veins are often indicated by rusty streaks or patches, while at depth the rusty character gives place to dark grey, black or greenish colors.

Under the microscope the gold is generally found in areas which have been greatly crushed or in the quartz or schist bordering on these areas.

The prominent minerals which occur in the crushed areas are pyrite, calcite, dolomite, sericite, chlorite, tourmaline and quartz. It is thought that most of the gold has been deposited along with pyrite from the impure solutions which circulated in the minute fissures and crushed areas of the primary quartz of the veins. The quartz of No. 1 vein of the Hollinger mine shows numerous dark streaks in parts of it and often across the width of the vein. These are generally short and irregular in distribution. Iron pyrites and often galena occur with the gold. Microscopically, the quartz occurs in fairly large grains, contains liquid and gas inclusions, and has been subjected to secondary pressure and granulation along the margins of the

grains. The iron pyrites often occurs in well-shaped crystals which have been formed subsequent to the crushing. These fine dark streaks may have resulted from a solidification and shrinkage of the quartz forming filmy cracks, which may have become slip or crushing planes along which the richer gold-bearing solutions were deposited at a later period. These minute dark streaks in the quartz are frequently slickensided, and this character may often be seen in hand specimens, as from Rea or Vipond mines.

It should be noted that where cracks or fracture planes have been produced in a quartz vein and subsequently filled by minerals from solution, secondary quartz can be distinguished with difficulty, if at all, from the original quartz. Hence it is not always possible to say whether visible gold in such a vein occurs in the original or in secondary quartz.

Often a vein may show a width of ten feet but the fractured portion may be only a few feet, or even inches, wide along either wall. In this portion there may be many streaks of dark mineral which are often parallel, giving a banded character to the ore, as in many of the veins in the north part of Whitney and Tisdale, namely, at the Mullholland, Scottish Ontario, Davidson and adjoining properties. A similar banded structure is seen at the Rea mine. At these properties tourmaline is the principal mineral of the streaks. The gold may occur along these lines or in the intervening quartz, which is often much crushed and filled with later minerals. Several sections were examined, which showed grains of gold apparently enclosed in the primary quartz, but the occurrence is much less prominent than where gold occurs in the crushed areas.

It is important to note that practically all the veins which are gold-bearing contain considerable carbonate of varied composition. Wherever the enclosing rocks are schistose they always carry carbonate and frequently effervesce with cold hydrochloric acid. Much of the carbonate of the veins has been absorbed from the wall rock, while portions have been formed from ascending solutions which circulated in the veins. Pyrite and grains of gold frequently occur in the carbonate.

Carbonate in the form of ankerite constitutes the main portion of veins at the West Dome, Apex, and in parts of Deloro township. This carbonate is distinctly earlier than the quartz veinlets which intersect the ankerite veins. Both the ankerite and quartz have been fractured and veinlets of later carbonate deposited in them.

Sulphides and other Minerals.

The following sulphides have been recognized in veins at Porecupine: iron pyrites, copper pyrites, pyrrhotite, arsenical pyrites, galena and zincblende. Of these the most abundant is iron pyrites, which occurs in some quantity in all the gold-bearing veins. Copper pyrites, galena and zincblende, although also widely distributed, occur in minor quantity. Pyrrhotite is the chief sulphide in the veins which are being developed in No. 4 shaft of the Dome Extension. Arsenical pyrites occurs in quantity in the quartz veins at the McAuley-Brydge property in Bristol township.

Only one telluride has been recognized, occurring in the quartz-carbonate deposit at the Powell claim, M.E. 20, in Deloro township. A chemical test of the mineral gave the following percentages: silver, 61.88 per cent.; gold, 0.10 per cent., with strong reactions for tellurium, corresponding to the mineral hessite. Native gold

occurs as a later constituent in minute seams in the hessite. Robt. Harvie reported the telluride "petzite" in quartz-ankerite deposits at Opatatika lake in the province of Quebec. The presence of telluride in a quartz ore, containing considerable pyrites, from the Mikado mine, lake of the Woods, has lately been recognized in the laboratory of the Provincial Assay Office.

The rare mineral scheelite has been found in small quantities in several properties around Pearl lake. This is the second occurrence noted of this mineral in Ontario, it having been reported on the dump at the Victoria mines, near Sudbury.

Since the whole surface of the area has been deeply eroded during recent glacial periods, there is now little evidence of secondary enrichment. The enrichment is very superficial, extending only from a few inches to a few feet in depth. The outcrops of the veins and wall rocks are usually discolored or decomposed, due to the oxidation of the iron pyrites and the ferrous carbonate in the ankerite or other iron-bearing carbonates. Cubes of iron pyrites are occasionally obtained at the surface, while copper pyrites and arsenopyrite also occur near the surface. Where the veins have been oxidized to any depth, there are generally some very recent water courses in evidence. Developments so far have shown that, after this very superficial zone has been penetrated, the character of the vein material has remained the same as far as mining operations have continued, namely about 1,000 feet.

WILL ERECT NICKEL REFINERY IN CANADA.

OTTAWA, Feb. 7.—The correspondence in regard to nickel, given below, was laid on the table of the house of commons by Sir Robert Borden to-day.

Ottawa, Dec. 29, 1915.

To Ambrose Monell, President International Nickel Co., New York:

My Dear Sir,—As you are doubtless aware, the question of refining nickel in Canada has engaged public attention in recent years. Since the outbreak of war there has been a particularly strong feeling that, apart altogether from any commercial aspects, there should be established in this Dominion a nickel refinery sufficient at least to supply all the requirements of the British Empire under any conditions and in any emergency.

I trust that the erection of such a refinery will receive careful consideration and active attention of your company. As Canada produces about 85 per cent. of the world's supply, it seems both desirable and necessary that such action should be taken as soon as possible. In making this suggestion I am not unmindful of the difficulties which you have explained to me on more than one occasion, but which I hope the ability and resourcefulness of the company's directors and officers may successfully overcome.

R. L. Borden.

International Nickel Co., 43 Exchange Place, New York, Jan. 7, 1916:

The Right Hon. Sir Robert Borden, Ottawa, Canada:

Dear Sir,—Replying to your letter of December 29th, we beg to state that we understand the high purpose in your expressed desire to have a nickel refinery installed in Canada, and we greatly appreciate the spirit in which you have brought this matter to our attention.

We will grant your request, and erect in the Dominion of Canada, at such point as seems in our judgment to be the most economical for operation, a plant for the refining of nickel of such initial capacity as will secure to Great Britain and Canada within themselves a product of finished nickel to the extent of their requirements.

It will cost more to refine nickel in Canada than at the present point of operation. This disadvantage to us as manufacturers, however, is overshadowed by the imperial necessity you emphasize, that sufficient nickel shall be refined in the Dominion of Canada to enable the British Empire to have under its control sufficient nickel refining capacity to meet its demands.

As soon as the weather permits we will promptly undertake the selection of a suitable site for such operations, which in our opinion will be somewhere on the Canadian Atlantic seaboard.

A. Monell, president
The International Nickel Company.

Ottawa, Ont., Jan. 10, 1916.

To A. Monell, President International Nickel Co., New York:

My Dear Sir,—I beg to acknowledge with thanks your letter of the 7th inst., and I note with a great deal of satisfaction the intention of your company to establish a plant for the refining of nickel in Canada. I trust that the plant will be of such initial capacity as to secure not only to Great Britain and Canada, but to the whole empire, a product of refined nickel to the extent of all possible requirements.

R. L. Borden.

The International Nickel Co., New York, Jan. 27, 1916.
Sir Robert Borden, Ottawa, Canada:

Dear Sir,—We beg to acknowledge receipt of your letter in regard to our proposed plant for the refining of nickel in Canada.

As the consumption of nickel in the British Empire outside of that consumed in Great Britain and Canada is insignificant in amount, an initial plant capacity to secure to Great Britain and Canada within themselves a product of nickel to the extent of their known requirements will meet your expressed desires.

The refinery will be designed in units, so that even further units can be added as the future requirements may determine.

W. A. Bostwick,
Assistant to the President.

CONIAGAS.

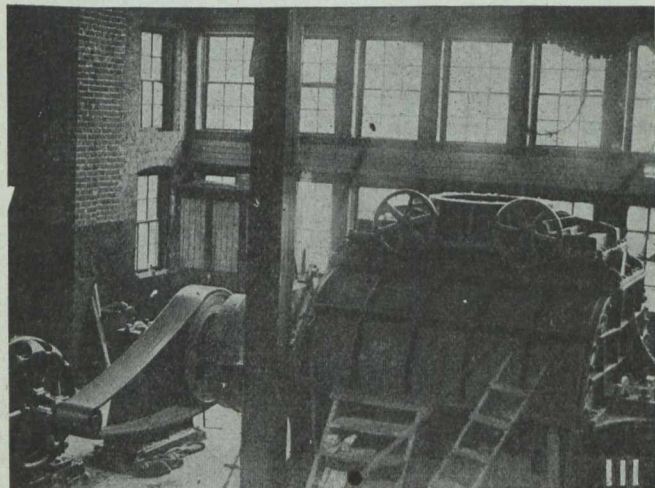
Cobalt, Feb. 5.—The remainder of the machinery required for the new Cyanide mill at the Coniagas was received yesterday. Delays in securing transportation on account of the war, has held back the completion of the mill by about six weeks or more, but now that everything is in hand there is only the piping to be connected before the plant is put in operation.

WRIGHT CLAIMS.

Cobalt, Feb. 5.—It is understood that the Cartwright interests have purchased the Wright claim which adjoins the Adanac, and that the first payment has been made. On the Wright claim some surface work has been done on a 6-inch calcite vein and several other smaller veins exposed by trenching. On the six-inch vein a fifty-foot shaft has been sunk.

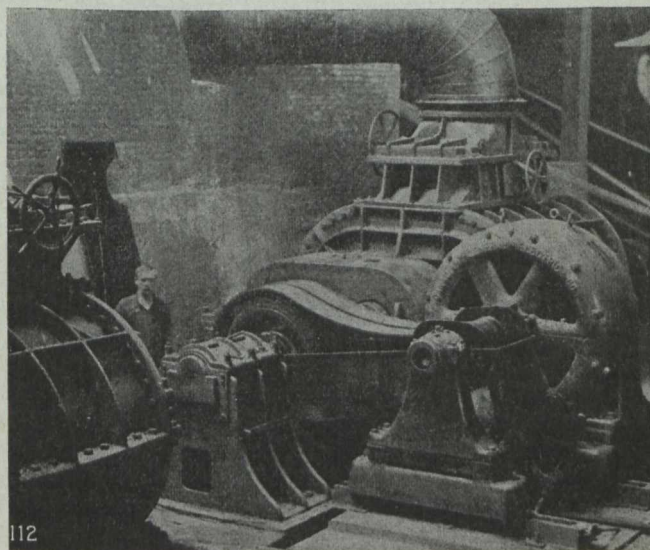
RENOLD CHAIN DRIVES FOR BLOWERS

We have received from Jones & Glasco an illustrated pamphlet briefly describing a very interesting and important application of Renold Chain Drives. These drives solved a difficult transmission problem in a very large Canadian plant. The company in question had three Roots blowers (two single and one double



One of two 150-H.P. Renold Chain Drives operating double-ended Blower.

ended) and wished to re-arrange them to provide space to install a fourth. The blowers were driven from individual electric motors by leather belts and were already arranged to occupy the minimum space consistent with the efficiency of this form of transmission. Obviously more compact drives were required, but satisfaction also depended on the drives being efficient and flexible. Direct connection, with existing motors was out of the question, while the impulsive nature of the load made gears quite unsuitable.

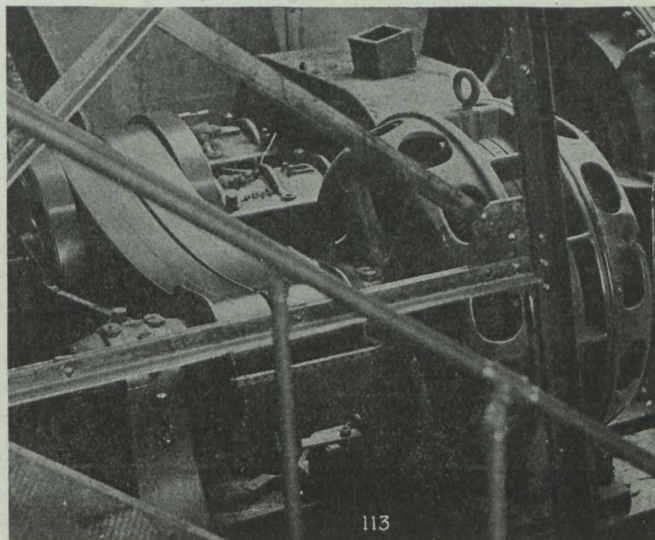


300-H.P. Renold Chain driving a No. 9½ Roots Blower (showing top half of gearcase removed.)

The difficulties were overcome by the Renold Silent Chains which are here illustrated.

In the case of the 150 H.P. Drive illustrated the following data clearly show the great saving of space obtained by the use of the Renold Chain.

	Original Belt Drive.	Renold Chain Drive
Centres.....	25' 0"	6' 6"
Pulley or Wheel diam.....	12"	9½"
Wheel diam.....	57"	44½"
Width.....	24"	12"



200-H.P. Renold Chain Drive (top half of gearcase removed).

Proportionate savings of space were obtained in the case of all the Drives. It should be noted also that owing to the efficiency of the chain drive being 98.2% the power required to drive the blowers is reduced to the minimum.

When it is considered that a mishap to these blowers, which we believe are the largest of their kind in Canada, means a shutdown of practically the entire plant, the installation of these chains by this Canadian company is the strongest evidence of the reliability of the Renold Drive.

The company's engineers reported after these Drives had been running 21 months continuously night and day: "Drives running well and giving every satisfaction."

OPHIR.

Cobalt, February 2.

Diamond drilling is now well under way at the Ophir property. The work is being done from the lowest level, and the object is primarily to ascertain the distance down to the contact. It is the intention to continue the present shaft down to the contact, and it is necessary that the distance should be known before ordering the new hoist. It is expected that the diamond drilling operations should be completed within a week or ten days.

LA ROSE.

Toronto, February 11.

According to Kiely, Smith & Amos, the La Rose Co., of Cobalt, has taken over the Maiden MacDonald claims in the Township of Deloro. A gang of men has started building mining camps and getting ready to diamond drill and sink test pits on the showings.

TRIUMPH.

Tenders have been called by the Triumph Mines Company at Porcupine for the sinking of an incline shaft on the company's claims near Schumacher.

THE SLOCAN DISTRICT, BRITISH COLUMBIA, IN 1915

By E. Jacobs.

The Slocan district of British Columbia comprises two mining divisions, namely, Slocan and Slocan City divisions. Within the boundaries of the former are situated all the larger producing mines of recent years; the latter is in what is known as the "dry ore belt," the ores occurring in it generally containing high value in silver but not much lead, with gold in some ores assaying from \$1 to \$7 a ton.

Slocan Mining Division.

Ore production in 1915 was, on the whole, on a similar scale in Slocan division to what it was in 1914, that is as regards silver-lead ore. The total of silver-lead ore and concentrate received in 1914 at the Consolidated Mining and Smelting Co.'s smeltery at Trail from mines in the Slocan division was 14,352 tons; in 1915 the total was 13,047 tons, but in addition there was 1,500 or 1,600 tons shipped to the United States from the Surprise mine which up to October 28th had milled approximately 9,000 tons of ore and had shipped 1,415 tons of silver-lead ore and concentrate and 2,660 tons of zinc concentrate. Taking into account the lead-zinc ore milled as well as the silver-lead ore, there is little doubt that later returns will show that there was a considerably larger quantity of ore mined in Slocan division in 1915 than in 1914.

Several of the mines that produced ore in 1914 were not on the 1915 list, notably the Richmond-Eureka and the Van-Roi, and the much smaller shippers Antoine, Cinderella, Colonial, Evening, Freddie Lee, Lone Bachelor, and Noonday. Against these, however, may be placed others that in 1915 were added to the shipping list, namely, the Galena Farm, Idaho-Alamo, Mountain Con, Reco, Wakefield, and several smaller shippers, including the Buffalo, Mercury, Molly Hughes, and Rio.

The mines from which more than 100 tons of ore each was received at Trail in 1915 were as under:

	Tons
Hewitt-Lorna Doone	641
Idaho-Alamo	115
Lucky Thought	101
Mountain Con	129
Rambler-Cariboo	2,160
Ruth-Hope	553
Slocan Star	986
Standard	7,936
Wonderful	199
Sundry small shippers	227

Total, Slocan division, receipts at Trail. .13,047

The smaller shippers were as follows: Black Grouse 11 tons; Buffalo 14 tons; Galena Farm 29 tons; Home Rule 2 tons; Ivanhoe 18 tons; Mercury 17 tons; Molly Hughes 18 tons; Reco 73 tons; Rio 13 tons; and Wakefield 32 tons.

Bear Lake to Sandon.—Work was resumed at the **Lucky Jim**, after a conditional settlement of financial troubles. There is much zinc ore developed in the mine. Arrangements were made for concentration of ore at the Ivanhoe mill, Sandon, but three days after milling of the ore was commenced the mill was destroyed by fire. Several weeks later Mr. J. P. Keane, who had been operating the Ivanhoe mill as a custom plant, arranged to use the zinc-concentrating plant near Rosebery, Slocan Lake, and before the end of October Lucky Jim ore was being concentrated there.

The **Rambler-Cariboo** shipped 2,160 tons of silver-lead ore and concentrate to Trail in 1915, against 1,934 tons in 1914. In addition, zinc concentrate was sent to the United States to a reported total quantity of 934 tons. An application by mail to the president of the company, a Spokane business man, for some information relative to the year's operations and results did not meet with even the ordinary courtesy of acknowledgment, so, as the officials at mine and mill were not free to give particulars, none were obtained. The Rio, above the Rambler-Cariboo, was further developed by lessees, who mined and shipped a few tons of ore. Late in the year development work on the Soho group in the same neighborhood, was arranged for.

About Sandon and Cody.—Development of the deep of the Payne mine was continued; the raise from the 1,500-ft. level, which is a crosscut adit driven about 3,600 ft. into the mountain, to the old 800-ft. level was completed and an intermediate level opened from the raise to cut ore followed down 34 ft. in a winze from the 800-ft. level, which object was achieved.

The Ruth Mines, Ltd., operating the Ruth and Hope groups of claims, near Sandon, continued driving a lower crosscut adit (No. 5) commenced in August, 1914, extending it to about 1,700 ft. from the portal. Some 400 ft. of drifting was done and for half that distance there was a small shoot of ore, sometimes clean and at others mixed ore. It was expected that a raise 450 ft. to No. 4 level would be completed by the end of the year. The company's concentrating mill at Sandon was remodelled, an aerial tramway was constructed from the portal of No. 5 to the mill, and in the autumn ore-concentration was resumed after a long period of inactivity at the mill. The Ruth silver-lead concentrate averages 135 oz. silver a ton and 60 per cent. lead; the zinc product contains 120 oz. silver a ton and 37 per cent. zinc.

The position at the **Slocan Star** mine, as indicated by the company's published reports, is substantially better than at the end of 1914. During the calendar year 1915 there was received at Trail from this mine 986 tons of silver-lead ore and concentrate; besides this there was some zinc concentrate shipped to the United States. Production in 1914 up to the time of suspension of operations in August on account of the war, comprised 868 tons of lead ore and concentrate shipped to Trail, and 664 tons of zinc concentrate. The grade of ore and concentrate is shown in the following excerpts from the annual report for the fiscal year ended October 31, 1915: "Shipments of crude ore from development for the year were: Lead ore, 204 dry tons assaying 83.94 oz. silver to the ton, 59.86 per cent. lead, and 6.94 per cent. zinc, and 43.40 dry tons zinc ore, assaying 12,015 oz. silver to the ton, and 43.65 per cent. zinc." "The mill ran 251 shifts of 11 hours and milled 17,837 tons of dry ore, an average of 71 tons a shift, producing 665.5 tons of lead concentrate averaging 66.55 oz. silver a ton, 58.33 per cent. lead, and 8.15 per cent. zinc; also 1,400 tons zinc concentrate assaying approximately 15 oz. silver a ton and 32 per cent. zinc. Milling cost averaged 37½ cents a ton of ore milled, and mining and tramming \$1.55 a ton, making a total of \$1.92½ a ton for mining and milling." Included in the superintendent's report was the information that "on No. 2 level there is a strong vein

of zinc blende from which ore containing 45 per cent. zinc can be sorted. On No. 8 level a shoot of ore 60 ft. long has been opened. It is wide and consists of mixed ore, with bunches of clean ore. . . . Stopes 810 and 811 are showing a much better class of concentrating ore as well as considerable crude (shipping) ore. The new ore being opened on No. 9 is the downward continuation of the shoot on No. 8; no doubt it will also be found on No. 10. There is a large quantity of zinc ore in levels Nos. 2, 3, 4 and 5, part of which can be mined at a profit with zinc at its present price." Shareholders in the company have been told that it is estimated by two mining engineers who examined the mine that with zinc at five cents a pound there is in the mine, available for extraction, zinc ore to the value of \$590,000. Since the annual meeting was held in December, the shoot of good ore opened on No. 9 level has been found to continue down to No. 10, which opens for stoping a comparatively large area of virgin ground. Before the end of the year a sale was made of the accumulated zinc concentrate and, too, a three-year contract for the zinc output of the mine was entered into. With the object of increasing the saving of the valuable metal contents of the milling ore and to facilitate operating the mill continuously throughout the year, the directors of the company have authorized the installation of a tube-mill, the construction of another tramway, and the provision of plant for more power.

The management of the **Surprise** mine shipped its lead as well as its zinc product to the United States in 1915. Shipments of lead ore from this mine to Trail in 1914 totalled 516 tons, but not any was sent there in 1915. Returns of shipments made since the end of October have not yet been received, but the output of the mine for ten months was approximately 9,300 tons, of which about 9,000 tons was milled, the remainder having been sorted lead ore shipped crude. The total quantity shipped to October 28 was 1,415 tons of lead product (30 cars of concentrate and 7 cars of crude ore), and 64 cars containing 2,660 tons of zinc concentrate. The estimate for November and December, made at the end of October, was that 1,500 tons more would be shipped, say 1,000 tons of zinc and 500 tons of lead product. Zinc concentrate was shipped to the Empire Zinc Co., Collinsville, Oklahoma, and the lead product to the American Metals Co., Newark, New Jersey. It may be of interest to note that the average metal contents of the ore milled were silver 27.8 oz. to the ton, zinc 19.7 per cent. and lead 8.7 per cent.; the average recovery was of silver 78 per cent., zinc 57 per cent., and lead 92.5 per cent. The ore was concentrated at the Ivanhoe mill, Sandon, until fire destroyed that concentrator; afterward the Rambler-Cariboo mill was used for an agreed part of each month. The owners of the Surprise mine are Congressman Wm. Kent, of Kentfield, Marin Co., California, and Mr. Alex. Smith, of Toronto, Ontario.

The Noble Five group was not among the ore shippers in 1915, but deep-level development was continued under the direction of Mr. Paul Lincoln manager. The crosscut adit, which was in about 900 ft. at the close of 1914, was extended to 2,300 ft. from the portal. At 1,890 ft. in the Noble Five vein was reached; a strong vein, 16 ft. wide, heavily mineralized chiefly with iron. It was drifted on 150 ft. and it still retained its size and character, but was explored too far west to enter the oreshoot opened in the old Noble Five workings 1,200 ft. above. Late in the year the adit was being further extended to cut the

Last Chance vein 2,000 ft. below where it was worked by the Last Chance Co., which some years ago mined much ore from it. In January the crosscut entered the Last Chance vein at 2,700 ft. from the portal of the adit. The adit is 2,500 ft. lower than the apex of the ridge above and east of Cody gulch. It is planned to raise from the adit to workings in which milling ore is known to occur. Among the objects in view in driving this low-level crosscut is to avoid the danger to which employees are every winter exposed in the snowslide season, a number of men having lost their lives when going to or from the upper camp during the long period since the Noble Five was opened; further, when the raise shall be through to the upper workings, it will be practicable to operate the mine throughout the year, and, as well, to handle the ore at lower cost than that which includes keeping in working order the aerial tramway from the upper outlet from the mine down to the mill in the valley below. It is of interest to know that the machine drills used in the crosscut adit mentioned are operated by air compressed at the mill in Cody and delivered through 3,000 ft. of pipe to the portal and thence more than 2,000 ft. to the working face.

The Noonday, situated a mile or so west of Cody, is opened by three adits. No. 1 reached the vein at 75 ft. in; No. 2 at 165 ft., and No. 3 at 290 ft. The vein has been drifted on 350 ft. N.E. and 800 ft. S.W. on No. 2 level, above which there is about 100 ft. of stoping ground. No. 3 is 140 ft. vertically or 160 ft. on dip of vein below No. 2; when visited in October the drift south-west on No. 3 was in 120 ft., with about 100 ft. more to be driven to get under the oreshoot opened in No. 2. A wagon road was constructed last year up to the mine, and buildings have been erected for the accommodation of the men employed.

A vein on the Airdree fraction, next to the Freddie Lee, situated above the Colonial, at a high elevation on the mountain across the gulch from the Noonday, was followed for two or three hundred feet and some high-grade silver-lead ore taken out, but the ore shoot had been small along the drift run up to the end of October. From the Mountain Con, in the mountains to the southward, there was shipped one car of high-grade ore in May and two cars in October. Of the latter, one car of 43 tons averaged 1.022 oz. of silver to the ton and 41 per cent. lead (another statement gave 1.063 oz. silver and 44 per cent. lead), and the other car, of 42 tons, 689 oz. silver to the ton and 20.5 per cent. lead. Six men were working leases on the Reco; four of them on the Reco vein and two on the rich Reco-Goodenough vein. Ore had been taken out and was waiting for snow for rawhiding down to Sandon. The Dunedin was worked through what is known as the No. 4 tunnel of the Reco. Work on the Twilight was chiefly driving a new tunnel to get under a shallow shaft in which, at 20 ft. depth there is a showing of good ore.

Above Sandon, work was continued on the **Wonderful**, the face of the drift being about 350 ft. below the surface, in a nice vein in which galena occurs in irregular bunches. The ore shipped averaged about 90 oz. silver to the ton and 50 per cent. lead. Leasers worked on the Yakima, of the Ivanhoe group, and got out a little ore. Three men worked last summer on the Lone Bachelor.

Three Forks and Alamo.—About two carloads of **antimony** ore was brought down to Three Forks from the Alps-Alturus group, distant 13 miles and situated at the head of a tributary creek of the north fork of

Carpenter creek. One carload was shipped to England and, it was reported lately, the second car was sent to Chicago. No particulars of metal contents were published. A find of dry silver ore on the Black Grouse was made in the autumn and a shipment of 11 tons was made to Trail. McPherson was at work above the Jo Jo, near the McAllister. Over the divide, in the extreme western part of the Ainsworth mining division, is situated the Panama, on which a crosscut cut the vein at 60 ft. in; after drifting for 400 ft. a winze was sunk 40 ft. and a drift run for 60 ft. at that depth. The ore extracted lately averaged about 250 oz. of silver to the ton, while that mined earlier ran only 150 oz., so a general average of 200 oz. is estimated. From a 60-ft. shaft, sunk in the vein, 1,800 sacks of ore, about 63 tons, was taken out earlier. That ore contained a little lead.

Thos. Avison and associates took out from the Idaho about 300 sacks of silver-lead ore and did a little development work in this mine. From the neighboring Alamo mine, they extracted 900 sacks of ore and did some work from No. 3 tunnel, chiefly raising and stopping.

(To be continued)

CANADIAN MINING INSTITUTE.

The eighteenth annual meeting of the Canadian Mining Institute will be held in the City of Ottawa on Wednesday, Thursday, and Friday, March 1st, 2nd and 3rd, 1916. The Institute's headquarters will be the Chateau Laurier Hotel, to the manager of which application should be made for accommodation. The Hotel quotes reduced rates for room accommodation for those attending the meeting. The Eastern Canadian Passenger Association has conceded special transportation privileges to members and their friends attending the meeting, based on the lowest first-class fare for the round trip on certificate plan.

Among others the following papers will be presented for discussion:—

"Flotation Processes," by T. A. Rickard; "Flotation at the Anaconda Mines," by E. P. Mathewson; "The Concentration of Molybdenite as applied to Canadian Ores," by Henry E. Wood; "The Flotation of Bornite," by H. W. DuBois; "Some Effects of the War on the Mining and Metallurgical Industries of Canada," by A. Stansfield; "Canadian Supplies of Iron and Steel in Relation to Munitions of War," by Thos. Cantley; "The Coal Resources of Canada with Special Reference to the Metallurgical Industries," by J. B. Porter; "The Coal Situation in Canada," by W. J. Dick; "The Magnesite Industry in Canada," by Howells Frechette; "Discovery of Phosphate of Lime in the Rocky Mountains," by Frank D. Adams and W. J. Dick; "The Zinc Occurrences at Notre-Dame des Anges, Que.," by J. A. Baneroff; "Canadian Gold and War Finance," by Adam Shortt. This subject will also be discussed by J. Murray Clark, K.C.; "Rock Crushing Tests at McGill University," by J. W. Bell; "Some Conditions Affecting Education in Mining and Metallurgy," by J. C. Gwillim; "Mining Education," by L. D. Burling; "Mineral Deposits of the Buckingham District," by Morley E. Wilson; "Concentration of Ontario Magnetites and the Sintering Thereof," by an official of the Mines Branch of the Department of Mines; "Copper Mining in Alaska," (illustrated with colored lantern slides), by H. W. DuBois; "Petrolia, Past and Present," by J. Stansfield.

The annual dinner will be held at the Chateau Laurier on the evening of Thursday, March the 2nd.

By the courtesy of Dr. J. Bonar, Deputy Master, members will be afforded the opportunity of visiting the Royal Mint. Arrangements have been made for visits, under the guidance of members of the Local Committee, to the Ore-Dressing Laboratory and Fuel Testing Station of the Mines Branch, of the Department of Mines; to the Victoria Museum and to the National Gallery.

PERSONAL AND GENERAL

Mr. A. A. Hassan, who recently opened an office in Washington, D.C., is prospecting gold deposits in Montgomery Co., Maryland. Three diamond drills are now in operation on the properties.

Mr. W. F. Ferrier has returned to Toronto from the West.

Mr. W. E. H. Carter is in Toronto.

Mr. W. A. Bostwick, assistant to the president of the International Nickel Company, was in Sudbury last week.

Dr. W. G. Miller, of the Ontario Nickel Commission, will sail for England this month.

Mr. J. B. Tyrrell sailed for England on February 9.

Mr. B. Babayan is in Toronto.

Mr. A. B. Clabon is in Toronto.

Mr. J. Houston has resigned as manager of the Schumacher mine to accept position as assistant manager at the Dome mine, South Porcupine.

Mr. G. F. Trethewey has been appointed manager of West Dome mine, Porcupine.

Mr. C. E. Foster is in Toronto.

Mr. Frank Loring is in Toronto.

Mr. P. A. Robbins has returned to Timmins after attending a meeting of directors of Hollinger Mines, Ltd., in Toronto.

INTERNATIONAL NICKEL CONTRACT.

New York, Feb. 12.—International Nickel Co. has closed a contract with Great Britain for a very large tonnage of nickel, to be delivered in monthly instalments over one year. This contract is by far the largest single contract ever signed by the Nickel Company. It is understood that it will require over 20 per cent. of the company's production in the course of a year. The contract will crowd capacity of the company's plants to the limit. Effect of the contract will be felt in the current quarter as deliveries will begin very soon.

MORE POWER FOR KIRKLAND LAKE.

During the past few weeks negotiations have been under way for additional power for the Tough-Oakes and other properties north of Cobalt. It is expected that the Northern Ontario Light and Power Company will extend its line to Kirkland Lake. This will solve the power question for many properties and will undoubtedly lead to the early development of many promising prospects along the T. & N. O. Ry.

NEW GEOLOGICAL MAPS.

The Geological Survey, Ottawa, has published recently the following maps: 137A, and 138A, Arisaig, Antigonish Co., Nova Scotia, to accompany a report by M. Y. Williams; and 112A, Vananda, Texada Island, British Columbia, to accompany a memoir by R. G. McConnell.

SPECIAL CORRESPONDENCE

PORCUPINE, KIRKLAND LAKE AND SWASTIKA

Porcupine Crown.

Porcupine Mines, Limited, held the annual meeting in Montreal recently and gave a summary of the financial conditions of the property which has already been published in the daily press. The net value of the production for the year 1915 after deducting mint charges was \$613,565. 46,419 tons was milled, of which 41,326 came from the mine and 5,093 tons from the tailings of the first amalgamation mill. 23,964 tons of broken ore is on the timbers in the mine. 4,965 feet of prospecting and development was driven and 2,616 feet of diamond drilling was done. The average value of the heads of mine ore was \$14.46. The average value of tails was .3336 cents; the average extraction was 97.07 per cent. The ore reserves showed a decrease for the year, but the company earned \$240,000,000 in dividends and \$57,873 was added to the surplus, making a net surplus of \$269,977. Ore valued at \$400,000 was blocked out, giving the property ore reserves at the present time amounting to \$1,250,000. At the 700 ft. level there has just been opened up an orebody two feet wide of high grade ore. Previously in this drift the vein had shown but low values. Milling costs were down to \$1.09 cents a ton and entire operating costs were lowered considerably and the percentage of extraction increased. Mr. S. W. Cohen notes that nearly all the ore developed during the year has been south of the main fault. This ore has changed its characteristics. Instead of being one big vein of quartz it now shows stringers of quartz distributed through mineralized schist. The grade per ton has been materially lowered, but the tonnage which can be stoped out at a profit is much higher.

Tough-Oakes.

Much interest has been taken in the proceedings at the annual meeting of the Tough-Oakes Mining Company at Haileybury. It has been known for some time that there would be a test of strength between the Foster and Tough interests and the English interests backed by Mr. Harry Oakes and Dr. Robbins of the Canadian Tough-Oakes Company. There are no less than 280,000 shares of the Canadian Tough-Oakes tied up in law suits in the English courts. The meeting was called to order with Mr. C. A. Foster in the chair. He ruled that according to a by-law of the company which provided that one-third of the issued stock of the company must be represented at the meeting no legal meeting could be held, and he moved that the proceedings be adjourned until such time as the annual meeting could be held legally with sufficient stock represented.

At the meeting there was 143,956 shares represented, whereas there are 531,500 shares issued, therefore one-third necessary to give a quorum was 177,166 shares. It was upon this fact that Mr. Foster and his supporters take their stand that the meeting was not legal. Mr. Harry Oakes and his supporters did not accept this view of the situation. They held that the by-law called for one-third of the issued stock which it was possible could be represented at the meeting. If this interpretation were put on the by-law they had sufficient stock to hold a legal meeting. They therefore proceeded to hold a meeting and elect officers. Mr. Harry Oakes was elected president, Dr. R. J. Robbins vice-president, and Messrs. J. W. Morrison, W. H.

Wright, J. B. Holden, Albert Burt and J. Y. Murdoch directors. Upon this directorate there are represented both the Tough interests and the English interests of which Mr. Latilla is head. At the present time of writing there is a deadlock. Mr. Harry Oakes as president of the new company gave notice to the bank that cheques for the Canadian Tough-Oakes Co. could only be issued under his name and that of Dr. Robbins. The bank, under instructions of Mr. Foster and his supporters, could not accept this interpretation. A deadlock is thus involved.

Dome.

The eight foot, thirty inch ball mill which has been installed at the Dome is doing remarkable work. It is receiving preferential feed, the ore to it having to pass through a two and a half inch ring. Under these circumstances it is treating between 420 and 450 tons a day, and the great increase in production last month at the Dome was largely due to this fact. In the official announcement of the Dome some results at the 700 ft. level were made known. These are sufficiently startling. A crosscut runs through 27 ft. of ore averaging \$9.60, while the extension of this crosscut showed 58 ft. of \$4.30 ore. A drift going south on the same level is now in \$12 ore, how much the official report does not yet say. The bullion production for January was \$176,590. This was the largest production of bullion in any one month and compares with \$160,050 in December, which was the largest production previously. The tonnage milled amounted to 31,600 and the average value per ton was \$5.58. 1,480 tons more was treated than in any previous month, and production was greater by \$15,640.

Davidson.

The five Davidson claims in Northern Tisdale are under option to Mr. R. H. Lyman until April 1st. It is understood that Mr. Lyman is acting for a New York syndicate. These claims include the Davidson, upon which the Crown Chartered did all the development in the last year they were working. The Crown Chartered has now nothing to do with these claims, but they are still in the liquidator's hands and the company taking them up must wipe out all debts. Before closing down, the Crown Chartered developed a body of mill ore on two levels on the Davidson. The mine was closed down before any definite figures could be obtained.

Porcupine Vipond.

At the 400 ft. level of the Porcupine Vipond there has now been cut one of the best orebodies yet discovered on that property. A crosscut was driven from the bottom of the winze to the shoot on the 400 ft. level. After cross-cutting for 60 ft., a few holes were driven into the side of the crosscut. The first few shots found ore and there is now developed about 10 ft. of ore which will run \$14.40 to the ton. Both in width of orebody and grade of ore it is far better than the average for the mine. Within the last three or four months profits on the Vipond have been smaller since the grade of ore showed a decrease, and the costs remained about stationary. If this new orebody develops as it is hoped it should be possible for the Vipond to raise its production to the level it attained in the summer of 1915.

Dome Lake.

In raising from the 300 ft. level to the 180 ft. level the Dome Lake has run into good ore. There was

good ore in the winze sunk for some distance below the 180 ft. level. It was then determined to run a raise from the 300 ft. level to the 180 directly in the ore shoot. For 31 ft. there was no ore. The management then decided to put some shots in the walls and a good body of ore is now being opened up. It is 6 or 7 ft. wide of eight or nine dollar ore and shows a considerable amount of free gold. It is now believed that the ore at the 180 ft. level was cut off by a slip, and that it will be possible to follow and develop it down to the 300 ft. level.

Kitchigami.

A Lake Superior company called the Kitchigami Gold Prospecting Company is diamond drilling the western group of Gordon claims at Goodfish lake. The object of this work is to pick up the extension of the Costello vein system. Mr. F. C. Botsford is in direct charge of the work. The company was organized under the Arizona State law, with a capital of \$300,000, divided into 150,000 shares of par value of two dollars. The men on the directorate of the company are all of Calumet and Houghton.

Hollinger.

Gross profits at the Hollinger for the thirteenth period of the year 1915 amounted to \$220,079. Milling cost showed a decrease of eight cents and mining costs were 12.1 cents down. Total costs fell 20.3 cents a ton. The mill ran 84.6 per cent of the possible running time, treating 41,538 tons, of which 29,947 tons were Hollinger ore and 11,591 tons Acme. The average value of Hollinger ore treated was \$10.37. Milling costs were down 0.984 a ton and mining costs 1.763 a ton.

Power Rates at Porcupine.

The power rates for most of the mining companies in the Porcupine district have been placed on a flat H. P. basis. Those companies whose contracts had run out have been on a basis of \$40 a h. p. on a three minute peak load basis. This is the basis upon which all companies have been working in Cobalt since the beginning of the year. This change does not effect the Dome and the Hollinger, which by power agreements for the life of the mine have rates which will give them a much lower power cost than this.

Although the snow fall has been so phenomenal in the Porcupine district, the power company is looking ahead for more storage. A dam is being built on the Grassy river to conserve water for the Sandy Falls plant, and a surveyor and party are seeing what possible additional storage may be obtained on the streams and rivers tributary to the Mattagami between Timmins and the Canadian Northern at Rouel.

Porcupine Branch, C. M. I., Meeting.

A very interesting meeting of the Porcupine branch of the Canadian Mining Institute was held in the Masonic hall, Timmins, on Saturday, Feb. 5th. Mr. Ames, superintendent of the Hollinger mill, opened a discussion with a little paper, in which he outlined an attempt to arrive at some method to estimate the comparative merits of crushing machinery. Mr. Ames said that in the Porcupine district the stamps had about the same number of adherents as the ball mill, but the tonnage treated was much larger with the stamps because the Dome and Hollinger and Porcupine Crown were all using stamps. Taking the case of the stamps as against the Hardinge mill, the stamps undoubtedly put through a greater tonnage per h. p., but did not put out quite as fine a product. It had been estimated that the ball mill made about 20 per cent. more fines.

Apparently by one method of computation the Hollinger mill has a little greater mechanical efficiency, but the question in regard to the Porcupine district has yet to be solved. A very interesting discussion followed.

Standard Reopened.

The National Lead and Zinc Co. in Porcupine has commenced work on the old Standard mine, and will at once commence to dewater the old workings. This company which has taken over the Standard, is known as the Porcupine Premier Mines, but it is understood that it is the National Lead and Zinc Co. which is concerned.

Dodds.

The Buffalo syndicate which has the option on the King Dodds claims at Kowkash have decided to sink a shaft to 150 ft. on the vein and are now asking for tenders for the work. It is interesting as constituting the first work of any importance in the Kowkash district.

COBALT, GOWGANDA AND SOUTH LORRAIN

Companies Storing Silver.

All mining companies in Cobalt are storing as much silver as possible in spite of the relatively good price of the white metal. This is due to the fact that the belief is very firm that silver will go to sixty cents and better in a very short time, and that more profits can be made by holding and storing silver than by selling it even now.

Adanac.

A strike below the 265 ft. level on the Adanac property promises to be the most important in Southeast Coleman in the past two years. In the winze at about 275 ft. the vein was very strong with a probability of permanency. When first encountered below the 200 ft. level, it only showed a little ruby silver. Some ore is now being picked from the vein, and the winze is being continued down. In view of the favorable development on the Temiskaming and the deep level mining on the Beaver, there is much activity in options on claims in Southeast Coleman. Geological conditions on a dozen or so properties near by are very similar to those on the Beaver and Temiskaming, and before it is discovered whether there is any ore below the lower contact of the diabase there will be many prospects working in this section of the camp.

Big Master and Laurentian Mines Under Option.

Cobalt companies are taking much interest in western Ontario properties. The Kerr Lake has for some time been developing the St. Anthony mine at Sturgeon Lake; now the Dominion Reduction Co. has taken a six months' option on the Big Master, Laurentian and H. B. 298 properties in the Manitou Lake district in the Lake of the Woods section. They have men at work dewatering and sampling these old properties. All the properties mentioned have been closed down for some time. The Big Master has been worked to the 285 ft. level, previous to 1904, when the lowest level was at 185 ft. \$36,000 in bullion has been extracted. The Laurentian is a much better known property and produced \$180,000 in gold. On the surface it was one of the most spectacular showings that has ever been uncovered in the Dominion. It was worked to the 490 ft. level. H. B. 298 is only a surface prospect containing an extension of the Laurentian leads.

BRITISH COLUMBIA.

Unusually severe winter conditions are somewhat hampering mining operations in districts situated at elevations where snow falls freely. East Kootenay, the various mining divisions of West Kootenay, the copper-mining camps of Boundary district, and the coal-mining regions of the Crowsnest district, Southeast Kootenay, are all affected by heavy snowfall and very sharp frost, so that for the time difficulty is experienced in keeping some of the mines in operation, while railway transportation is much impeded. However, the winter season is more than half over, or it should be in parts where it does not usually last more than three or four months, so relief is looked for as likely to come before many weeks shall have passed.

It is yet too soon to ascertain whether the estimate of mineral production made last month will be found to be approximately correct, which it is believed to be. Official statistics are not yet made up, returns from some of the mines being long in coming in, but in important instances it is found that earlier estimates are not far out.

Profits of B.C. Mining Companies.

The following statement shows the dividends declared by metalliferous mining companies, operating in British Columbia, during the calendar years 1914 and 1915, respectively:

Name of Company.	1914.	1915
Consolidated M & S. Co.	464,376	493,425
Granby Consol. M.S. & P. Co. ..	449,955	449,955
Hedley Gold Mining Co.	300,000	300,000
Le Roi No. 2, Ltd.		58,440
Motherlode Sheep Creek M. Co.		137,500
Rambler-Cariboo Mines, Ltd. ..		35,000
Standard Silver-Lead M. Co. ..	475,000	250,000
Totals	\$1,689,331	\$1,724,320

The amount of \$1,724,320 shown above as dividends for the year 1915 by no means represents the total of net profits during that year, for the published accounts of several of the companies for their respective last fiscal years make it clear that in those instances there were as well substantial sums placed to the credit of Profit and Loss accounts. The Consolidated Company's accounts to the end of September, 1915, showed net profits of \$795,411, while the calendar year's total of dividends declared was but \$493,425. The Granby Co., which did not have a full operating fiscal year, made a profit of \$929,165 and disbursed only \$449,955 in dividend distributions. The Hedley Gold Mining Co. in 1914 made net profits totalling \$388,229, while in 1913 the amount was \$405,255, yet the total of dividends paid in those two years was but \$660,000. As this company's production is nearly all gold and its gold-saving plant was added to in 1915, it is quite reasonable to assume that its net profits for that year were somewhere about \$400,000, which would leave a good margin above the amount of \$300,000 paid in dividends during the year. It is of interest to here note that the company's total receipts during five years, 1910-1914, were for that whole period \$3,563,908.45 and its expenditures \$1,794,625.03, which left a net profit (including \$40,692.90, interest received on money in bank) of \$1,769,283.42, of which last amount \$1,488,000 was paid in dividends. As the issued capital of the company is but \$1,200,000, it will be seen that the whole of the issued capital and 24 per cent. besides were returned to shareholders in five years, and 25 per cent. more was paid to them in 1915.

While little information is published usually relative to the net earnings of coal-mining companies operating in British Columbia, it is known that in the case of the Crow's Nest Pass Coal Co., if not in other instances, fairly satisfactory headway has been made in recent years. The following statement, for which the president of the company, Mr. Elias Rogers, was quoted as authority, was published lately: During the last three years the Crow's Nest Pass Coal Co. has paid off all its bills and accounts payable, amounting in 1912 to a total of \$1,081,690. The liability on these accounts was reduced to \$811,605 in 1913, to \$498,241 in 1914, and the balance was entirely cleared off in 1915. A further statement quoted was that "since January 1, 1915, the company has paid off all its indebtedness and it now has a substantial balance at its credit in the bank. All the bonds against its subsidiary companies have been paid, so that there are now no bonds outstanding against any of the companies, nor is there any preferred stock. As far as we can judge the prospects for the coming year are quite as good as, is not better than, the year just closed."

Regarding the outlook for 1916, it may be said that generally this is decidedly promising for a number of the larger operating companies, more so than at the beginning of several successive recent years. Prices of those metals that are subject to market fluctuations—silver, lead, copper, and zinc—are higher than at this time last year. The demand for these metals is active, and there are no similar considerable difficulties attending the marketing of these products such as had not been fully overcome at the beginning of 1915. In other respects conditions are favorable to production on an appreciably larger scale than in the year just closed, and not only for the metalliferous minerals but, as well, for coal and coke. Summing up the situation, then, there seem to be good grounds for expecting that the year now entered upon will prove a record year for mineral production in British Columbia. An unusually heavy snowfall should give an abundant supply of water for placer-gold mining next hydraulicking season; lode-mining will doubtless be on a larger scale than in any previous year; coal-mining will have the benefit of a bigger demand for coke, and probably for coal also; and miscellaneous products may be expected to be more freely used than during the time of uncertainty and hesitation that marked the greater part of 1915. Add to all these things the fact that there is no reason to fear labor difficulties, and the combination of favorable conditions seems to be such that this sanguine expectation of a year of enlarged production and profitable operation from and of the mines of the province would appear to be well warranted.

Ore Receipts at Trail.

The quantity of ore received at the smelting works of the Consolidated Mining and Smelting Co. during four weeks ended January 27, was 32,075 tons of which 26,522 tons was from the company's own mines and 5,553 tons was custom ores. The company's mines and their production were as follows: In East Kootenay; St. Eugene 59 tons, Sullivan 3,137 tons; total 3,196 tons. In Ainsworth camp; Highland 36 tons, No. 1 135 tons; total 171 tons. In Rossland camp; Centre Star group 14,073 tons, Le Roi 9,082 tons; total 23,155 tons. It will be observed that more than two-thirds of the ore was from Rossland mines. The details are as under:

East Kootenay—	Tons.	Tons.
Lead Queen	39	
St. Eugene	59	
Sullivan	3,137	
		3,235
Ainsworth—		
Bluebell	464	
Florence Co.	103	
Highland	36	
No. 1	135	
Utica	84	
		822
Slocan—		
Apex	26	
Black Prince	28	
Comstock	13	
Galena Farm	123	
Hewitt-Lorna Doone	79	
Meteor	15	
Noonday	29	
Ruth	38	
Slocan Star	77	
Standard	756	
		1,184
Nelson—		
Emerald	148	
Queen	65	
		213
Rossland—		
Centre Star Group	14,073	
Josie (Le Roi No. 2, Ltd.) ..	623	
Le Roi	9,082	
		23,778
Boundary—		
Sally	30	
		30
Yale (Kamloops)—		
Iron Mask	155	
		155
State of Washington, U.S.A.—		
Ben Hur, Republic	1,659	
Knob Hill, Republic	194	
United Copper Co.		
Chewelah	748	
Bonanza, Northport	48	
Lead Trust, Northport	9	
		2,658
		32,075

For the corresponding period of 1915 the total was 32,714 tons, in the following proportions: East Kootenay, 2,654 tons; Ainsworth, 58 tons; Slocan, 429 tons; Nelson, 534 tons; Rossland, 27,227 tons; Lardeau, 17 tons; Boundary, 106 tons; Yale, 8 tons; State of Washington, 1,681 tons.

PRODUCTION OF METALS AT TRAIL, B.C.

During the calendar year 1915 the production of metals at the Consolidated Mining and Smelting Co.'s smeltery and refinery at Trail, B.C., was, approximately, as under:

Gold, 146,732 oz.; silver, 2,900,639 oz.; Lead, 41,217,668 lb.; Copper, 5,573,965 lb.; zinc (not made public). These figures exhibit the total production of metals, including those from all custom ores some of which came from the State of Washington, as well as ores from the company's own big mines. The total quantity of ores and concentrates received at Trail in

1915 was 441,085 tons, of which 369,148 tons was from the company's own mines, 40,971 tons custom ores from British Columbia mines, and 30,966 tons custom ores from United States mines.

For purposes of comparison, the following figures of metal production are added, so that it may be seen what increases have been made lately:

	Fiscal year ended Sept. 30.	
	1914	1915
Gold, oz.,	129,083	148,891
Silver, oz.	2,568,301	2,230,500
Lead, lb.	34,617,318	40,177,910
Copper, lb.	3,645,997	5,306,184

It will be seen that the production of silver, lead, and copper was larger in the calendar year 1915 than in either of the fiscal years shown above.

WASHINGTON ORE RECEIVED AT TRAIL, B.C.

Ore receipts at the Consolidated Co.'s smelting works at Trail, B.C., from mines in the United States during the year 1915 were as under:—

From Republic—	Tons.
Ben Hur	15,243
Knob Hill	2,884
Lone Pine	1,594
Longworth	413
Pearl	117
Rathfon	335
San Poil	2,167
Surprise	2,390
Trade Dollar	129
Washington	22
Western Union	35
Wiseman	80
	25,409
Chewelah—	
United Copper	4,750
Bossburg—	
Bonanza	573
Bonanza—	
Inland	12
Colville—	
Old Dominion	41
Northport—	
Great Western	33
Boundary—	
La Plant	21
Meyers Falls—	
Sunday	34
Keller—	
Gold Cord	4
Nighthawk—	
Caaba	48
Jones	29
St. Anthony	5
	82
Bayview, Idaho—	
Conjecture	7
	30,966

With one exception, all the United States mines that shipped ore to Trail are situated in the State of Washington. As the total quantity received from Washington in 1914 was 19,594 tons, the increase for 1915 was 11,372 tons.

COPPER IN 1915.

The production of copper in the United States in 1915 passed all previous records, according to the United States Geological Survey. At an average price of about 17.3 cents a pound the output for 1915 has a value of \$236,000,000, compared with \$152,968,000 for the output for 1914.

The figures showing smelter production from domestic ores represent the actual production of most of the companies for 11 months and an estimate of the output for December. According to the statistics and estimates received, the output of blister and Lake copper was 1,365,500,000 pounds in 1915, against 1,150,137,000 pounds in 1914.

The output of refined copper from primary sources, domestic and foreign, for 1915 is estimated at 1,647,000,000 pounds, compared with 1,533,781,000 pounds in 1914 and with the previous record production of 1,615,000,000 pounds in 1913.

At the beginning of 1915 there was about 173,600,000 pounds of refined copper in stock in the United States. This quantity added to the refinery production gives a total available supply of about 1,820,000,000 pounds of refined copper. On subtracting from this amount the exports for the first 10 months and the estimated export for the last two months, it is apparent that the supply available for domestic consumption is materially greater than the 711,624,000 pounds of 1914, no account being taken of stocks held at the close of the year.

The average price of copper for 1915 showed a marked increase over that of the preceding year, being about 17.3 cents a pound, compared with 13.3 cents in 1914.

Arizona made a record production, considerably exceeding the previous record production of 404,000,000 pounds made in 1913.

The output from Montana will be larger than the 236,800,000 pounds produced in 1914, but will not reach a record production for that state.

Michigan, after two years of reduced output, made a record production in 1915, reaching 242,000,000 pounds, as compared with 158,000,000 pounds in 1914.

Utah again shows an important increase over the previous record of 160,500,000 pounds produced in 1914.

The production of Alaska shows a relatively greater increase than any other section, with 83,850,000 pounds in 1915, as compared with 24,985,000 pounds in 1914.

New Mexico will make some increase over the production in 1914—64,200,000 pounds—and will set another record for that state.

California also will show a substantial increase over the previous year's output.

THE BURNSIDE DISPUTE.

Differences of opinion which originated over a deal in mining claims resulted last week in Mr. Justice Sutherland at Osgoode Hall handing out a judgment which occupied about one hundred typewritten pages. Chas. M. Henrotin, of Haileybury, sought to have set aside an agreement by which he assigned options on mining claims in the Townships of Lebel and Teck to Henry Cecil on condition that he received 7½ per cent. of all stock received by a company organized to work the mines, which amount was to total at least two-thirds of the total capitalization. The defendants were Clement A. Foster, Haileybury; Henry Cecil and the Burnside Gold Mines Co., Ltd. Henrotin claimed that the

agreement had not been lived up to, and asked that it be set aside. The defendant company on the other hand counterclaimed that plaintiff by improperly recording two cautions against the lands prevented the company from operating and completing organization, and thus occasioned \$50,000 damages. Mr. Justice Sutherland in his decision gave the plaintiff 30 days to make a declaration that an agreement of January 22, 1914, had been put an end to, and that he is entitled under the agreement of April 16, 1913, to 7½ per cent. of all stock received by Foster and Cecil, the proceeds of the mining claims, then a declaration would be made to that effect without costs. If not the action would be dismissed without costs and without prejudice to any further action under the agreement of April, 1913. The counter-claims would be dismissed.

CHAMBERS-FERLAND.

Cobalt, Feb. 5.—The importance of the recent strike on the Chambers-Ferland can be better understood when it is known that there is at the present time over two cars of screenings ready for shipping and 1,500 bags of high-grade also ready in the ore house. It is the intention of the management to prepare a carload of high-grade ore for shipment about the 15th of the month. The main vein has now been drifted on for about 100 feet and at the breast the vein looks equally as good as at the start. All the ore taken out so far has been in development and yesterday a start was made in stoping, so as to hurry the shipment of the car of high-grade. All the ore is being taken from the drift from the winze at the 426-ft. level.—Cobalt Nugget.

ACTIVITY IN TURNBULL, ROBB AND DELORO TOWNSHIPS.

The "Porcupine Herald" publishes the following notes in its issue of February 5:

The Gold Bullion Mines, Ltd., has bought the Porphyry Hill mine (Preston claims). Mr. C. L. Heath, of South Porcupine has been appointed manager. It is the intention to commence operations without delay.

The Porcupine Premier mine in Deloro is again being operated. Mr. Digby Grimstone is in charge.

Machinery is being taken in to the Lally mine in Robb township. Mr. Geo. H. Benson is in charge.

Some work is being done on claims belonging to J. C. Watson and Dr. McInnis and on the Wettlaufer, Mulheron, Pierce and Jamieson claims. Shaft sinking will be commenced soon on the Jamieson property.

SILVER PRICES.

	New York	London
	cents.	pence.
January—		
25.	57%	27¼
26.	57	27⅞
27.	56¾	26⅞
28.	57½	27½
29.	57⅞	27
31.	57½	27½
February—		
1.	56⅞	27
2.	56⅞	27
3.	56¾	26⅞
4.	57	27⅞
5.	57	27½
7.	56¾	27⅞
8.	56%	27

MARKETS

STOCK QUOTATIONS.

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

As of close of Feb. 7, 1916.

	New York Curb.	Bid.	Asked.
Atlantic Steel	50.00	....	....
Alta. Cons.	19.00	19.12	19.12
Butte.	7.87½	8.00	8.00
Can. Car	74.75	75.00	75.00
Chevrolet.	130.50	131.00	131.00
Cosden Oil	19.75	19.87½	19.87½
Can. Copper	1.75	1.87½	1.87½
Chandler Motors	91.50	92.25	92.25
Cambria Steel	79.00	79.12½	79.12½
Con. Ariz.	1.62½	1.68¾	1.68¾
Emma Copper	51.00	52.00	52.00
First National	6.75	6.87½	6.87½
Houston Oil	19.00	19.05	19.05
Howe Sound	6.62½	6.75	6.75
Inter Nickel (New)	51.50	51.62½	51.62½
Kennecott Copper	51.62½	52.00	52.00
Maxim Munitions	7.75	8.00	8.00
Midvale Steel	70.37½	70.50	70.50
Marconi.	3.62½	3.75	3.75
Mother Lode	22.00	22.25	22.25
Ray Hercules	3.00	3.12½	3.12½
Standard Shipbuilding	12.50	13.50	13.50
Submarine Boat	37.25	37.50	37.50
Tonopah Extension	4.68¾	4.75	4.75
White Motors	51.00	51.50	51.50

Porcupine Stocks.

	Bid.	Asked.
Apex.	.06¾	.06½
Dome Consolidated	.17	....
Dome Extension	.29	.29½
Dome Lake	.25	.26½
Dome Mines	28.00	28.50
Eldorado.	.00¼	.01
Foley O'Brien	.60	....
Gold Reef	.01¼	.01½
Hollinger.	29.00	30.00
Jupiter.	.22¾	.23
McIntyre.	.97½	.99
McIntyre Extension	.29	.29½
Moneta.	.10½	.11
Porcupine Crown	.81	.83
Porcupine Imperial	.03½	.04¼
Porcupine Tisdale	.01¾	.02½
Porcupine Vipond	.75	.76
Preston East Dome	.03½	.04
Teck Hughes	.17	.18
West Dome	.14	.14½
West Dome Cons. Min	.21	.21½

Cobalt Stocks.

	Bid.	Asked.
Adanac.	.50	.60
Bailey.	.05½	.05¾
Beaver.	.39½	.40½
Buffalo.	....	.90
Chambers Ferland	.25	.28½
Coniagas.	4.20	4.85
Crown Reserve	.46	.46
Foster.	.15	.16
Gifford.	.06¼	.06¾
Gould.	.00½	.01
Great Northern	.03½	.05
Hargraves.	.03½	.04
Hudson Bay	25.00	....
Kerr Lake	4.40	....
La Rose	.66	.68
McKinley	.47	.49

Nipissing.	7.20	....
Ophir.	.07	.08
Peterson Lake	.25¾	.26½
Right of Way	.05½	.06
Seneca Superior	.63	.66
Shamrock Cons.	.16½	.18
Silver Leaf	.02	.02½
Temiskaming.	.66	.67
Trethewey.	.16	.17
Wettlaufer.	.08	....
York Ontario	.00¾	....

NEW YORK MARKETS.

Feb. 8, 1916—Connellsville coke—

Furnace, spot, \$3.25 to \$3.50.

First half, 2.35 to \$2.50; year 1916, \$2.25 to \$2.35.

Foundry, prompt, \$4.00 to \$4.50.

Foundry, contract, \$3.25 to \$3.75.

Feb. 8, 1916—Straits, tin, f.o.b. 41.25 cents.

Copper—

Prime Lake, nom., 26.50 to 27.50 cents.

Electrolytic, nom., 26.50 to 27.50 cents.

Casting, nom., 25.00 to 25.50 cents.

Lead, Trust price, 6.10 cents.

Lead, outside, 6.10 to 6.20 cents.

Spelter, prompt western shipments, 19.17½ to 19.42½ cts.

Antimony—

English brands, nominal.

Chinese and Japanese, 43.50 to 44.00 cents.

American, 43.50 to 44.00 cents.

Aluminum—

No. 1 Virgin 98-99 per cent., 54.00 to 56.00 cents.

Pure 98-99 remelt, 52.00 to 54.00 cents.

No. 12 alloy remelt, 43.00 to 45.00 cents.

Nickel, 45.00 to 50.00 cents.

Cadmium, nominal, \$1.25 to \$1.50.

Quicksilver, nominal, \$275.00 to \$300.00.

Platinum—

Nominal, \$88.00 to \$100.00.

Cobalt (metallic), \$1.25.

Silver (official), 56¾ cents.

METAL PRODUCTS.

Owing to the withdrawal of all price lists by the leading manufacturers of brass and copper products, quotations appearing below are based on the outside market and are likely to change at any moment. All prices are nominal as follows:

Sheet copper, base, 33.00 cents.

Copper wire, base, 27.75 to 28.25 cents.

High sheet brass, base, 36.00 to 38.00 cents.

Seamless brass tubing, 41.00 to 43.00 cents.

Seamless copper tubing, 41.50 to 43.50 cents.

Brazed tubing, 43.00 to 45.00 cents.

Brass wire, 36.00 to 38.00 cents.

Brass rods, 36.00 to 38.00 cents.

Sheet zinc, f.o.b. smelter, 24.00 cents.

TORONTO MARKETS.

Feb. 11—(Quotations from Canada Metal Co., Toronto)—

Spelter, 22 cents per lb.

Lead, 7¾ cents per lb.

Tin, 47 cents per lb.

Antimony, 48 cents per lb.

Copper casting, 28 cents per lb.

Electrolytic, 28 cents per lb.

Ingot brass, yellow, 13c.; red, 15 cents per lb.

Feb. 10—(Quotations from Elias Rogers Co., Toronto)—

Coal, anthracite, \$8.00 per ton.

Coal, bituminous, \$5.25 per ton.

PROFESSIONAL DIRECTORY.

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

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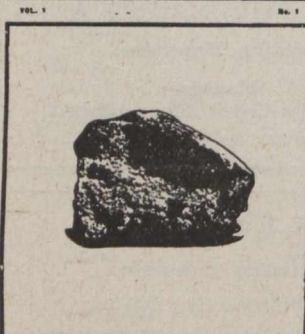
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 MINING JOURNAL**



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Recent Publications

- The Nickel Industry: with special reference to the Sudbury region, Ont. Report on, by Professor A. P. Coleman, Ph.D.
- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (Quebec). Vol. III. Report on, by W. A. Parks, Ph.D.
- The Bituminous Sands of Northern Alberta. Report on, by S. C. Ellis, M.E.
- Peat, Lignite and Coal: their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Report of the Mineral Production of Canada During the Calendar Year 1913, by John McLeish, B.A.
- The Petroleum and Natural Gas Resources of Canada: Vols. I. and II., by F. G. Clapp, M.A., and others.
- The Salt Industry of Canada. Report on, by L. H. Cole, B.Sc.
- Electro-plating with Cobalt. Report on, by H. T. Kalmus, Ph.D.
- Electro-thermic Smelting of Iron Ores in Sweden. Report on, by A. Stansfield, D.Sc.
- Non-metallic Minerals Used in Canadian Manufacturing Industries. Report on, by H. Frechette, M.Sc.
- The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—
- Fuel Testing Laboratory.**—Testing value of Canadian fuels for steam raising and production of power gas; analyses, and other chemical and physical examinations of solid, liquid and gaseous fuels are also made.
- Ore-Dressing Laboratory.**—Testing of Canadian ores and minerals, to ascertain most economical methods of treatment.
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- Ceramic Laboratory.**—Equipment is such that complete physical tests on clays and shale of the Dominion can be made, to determine their value from an economic standpoint.
- Structural Materials Laboratory.**—Experimental work on sands, cements and limes is also undertaken.
- Applications for reports and particulars relative to having investigations made in the several laboratories should be addressed to **The Director, Mines Branch, Department of Mines, Ottawa.**

GEOLOGICAL SURVEY

Recent Publications

- Memoir 34. The Devonian of Southwestern Ontario, by Clinton R. Stauffer.
- Memoir 50. Upper White River District, Yukon, by D. D. Cairnes.
- Memoir 56. Geology of Franklin Mining Camp, British Columbia, by C. W. Drysdale.
- Memoir 57. Corundum, its Occurrence, Distribution, Exploitation and Uses, by A. E. Barlow.
- Memoir 60. Arisaig-Antigonish District, Nova Scotia, by M. Y. Williams.
- Memoir 64. Preliminary Report on the Clay and Shale Deposits of the Province of Quebec, by J. Keele.
- Memoir 65. Clay and Shale Deposits of the Western Provinces (Part 4), by H. Ries.
- Memoir 66. Clay and Shale Deposits of the Western Provinces (Part 5), by J. Keele.
- Memoir 68. A Geological Reconnaissance Between Golden and Kamloops, B.C., along the Canadian Pacific Railway, by R. A. Daly.
- Memoir 69. Coal Fields of British Columbia, by D. B. Dowling.
- Memoir 73. The Pleistocene and Recent Deposits of the Island of Montreal, by J. Stansfield.
- Memoir 74. A List of Canadian Mineral Occurrences, by Robert A. A. Johnston.
- Memoir 76. Geology of the Cranbrook Map-area, British Columbia, by S. J. Schofield.
- Memoir 77. Geology and Ore Deposits of Rossland, British Columbia, by C. W. Drysdale.
- Memoir 78. Wabana Iron Ore of Newfoundland, by A. O. Hayes.
- Memoir 79. Ore Deposits of the Beavertell Map-area, by L. Reinecke.
- Memoir 81. The Oil and Gas Fields of Ontario and Quebec, by W. Malcolm.
- Memoir 82. Rainy River District of Ontario. Surficial Geology and Soils, by W. A. Johnston.
- Applicants for publications not listed above should mention the precise area concerning which information is desired.
- Maps published within recent years may be had, printed on linen, at the nominal cost of ten cents each.
- The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon. Letters and samples that are of a Departmental nature, addressed to the Director, may be Mailed O.H.M.S. free of postage.
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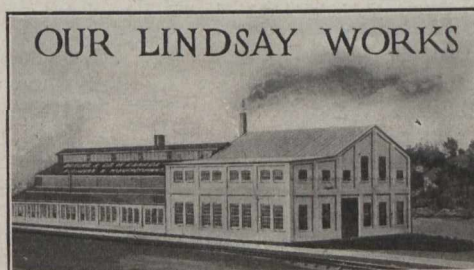
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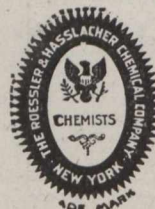
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