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A MERRY CHRISTMAS.

Five years have come and gone since the CANADIAN MINING JOURNAL first greeted its readers. In extending to our Canadian and foreign friends our heartiest wishes for a Merry Christmas, we do so with a full sense of the kind and consistent support that has been given the JOURNAL.

Christmas to all of us is a day of gladness. In the mining camp it should be the best day of the year. It is our sincere hope that the approaching Christmas will be bright and cheery in city, town, and camp.

WORKMEN'S COMPENSATION IN GERMANY.

The Toronto members of the Canadian Mining Institute have, through a committee, framed certain recommendations as to the manner in which employers' liability for the compensation of injured workmen is to be measured and determined. Circumstances do not permit us to discuss these recommendations at present. It may be timely, however, to glance at the way in which the problem is met in Germany. This is all the more appropriate for the reason that we are convinced that some form of compulsory state insurance will prove the only adequate solution of the question in Canada.

German state insurance laws are widely inclusive. Workmen and officials who are in receipt of salaries of \$750 per annum, or less, come under the provision. The total number of persons thus insured is about 13,000,000. Compensation for accident amounts to the tremendous sum of \$50,000,000 per annum. Nearly \$10,000,000 is paid yearly to the families of those killed.

To provide for this outlay the employers are required to organize themselves into associations. The decision of the association can be appealed to an arbitration court.

Until a period of thirteen weeks has elapsed from the date of the accident, no payment is made to the injured person. Support comes meanwhile from a fund to which the employers contribute one-third, and the employee two-thirds. When the accident is traceable to gross carelessness no compensation is paid. It may also be withheld where intentional wrongdoing can be proved.

In the event of death, the family of the victim receives a sum sufficient to cover burial expenses, or a single allowance equivalent to from 20 to 60 per cent. of the annual earnings of the deceased.

It is to be noted that where an injury is so serious as to call for special medical attendance, or to necessitate the services of a trained nurse, the rate of compensation equals the full previous earning capacity of

the injured person. Complete incapacity brings a compensation through life amounting annually to two-thirds of the last year's earnings.

Serious friction occurs in Germany over the question of medical services. Each group, or association, of employers employs its own doctors. These are not always acceptable to the men. In fact, this appears to be a constant source of trouble.

That practically all the expense should fall upon the employers does not seem equitable. The state, the employer, and the workman should share the burden. The interests of all three are inseparably blended. A plan that works injustice to the workman, harms both the state and the employer. In the long run a fair division of responsibility is the only means of achieving peace and harmony.

LEGISLATION ON EXPLOSIVES.

The last two or three years have witnessed a number of shocking accidents in coal mines and in dynamite factories in Canada. Time and time again the CANADIAN MINING JOURNAL has urged upon the Dominion Government the pressing need of restrictive legislation bearing upon the manufacture, handling, storage, and use of explosives. It was a matter of congratulation that last year the Mines Branch engaged Captain Desborough to look into the whole question of manufacturing dynamite and powder. At the conference held at Ottawa last autumn, Captain Desborough's recommendations were heard by representatives of all the Canadian manufacturing interests and by delegates from many large consumers. Subsequently a bill was drafted under the direction of the Mines Branch. This bill, entitled "An Act to regulate the manufacture, testing, storage, and importation of Explosives," has never become law. For certain reasons it was shelved last session. We had confidently expected that it would be submitted to Parliament this winter. Much to our disappointment we notice in the report of the House of Commons Debates, December 4th, a categorical affirmation by Premier Borden to the effect that the Government has no intention of introducing this session legislation regulating the manufacture, sale, and use of explosives.

It is incredible, of course, that the Dominion Government intends to drop the whole question. Possibly the pressure of business makes it seem necessary to postpone the consideration of the matter. But even this is inexcusable. Legislation is needed at once. At any moment the country may be shocked to learn of scores of lives lost through the improper handling or use of explosives. Such calamities can be prevented. Every civilized country does its utmost to remove the causes of such danger. In the name of humanity, we demand that Captain Desborough's report be acted upon at the earliest possible moment. Criminal negligence may not be too strong a phrase to use in the event of the matter being shelved.

THE MINERAL ALBERTITE.

Forty-seven years ago, Dr. Henry Youle Hind, one time professor of chemistry and geology at the University of Trinity College, Toronto, was requested by the Hon. S. L. Tilley, then Provincial Secretary of New Brunswick, to report upon the geology of that Province. Dr. Hinds' preliminary report was brought out in the year 1865. While it is wide in scope and interesting in almost every page, there are several chapters that, in the light of recent events, are of distinct historic value. To only one of these chapters shall we refer. We hope, later, to touch upon others.

Chapter V. of the report deals exclusively with the origin and geology of the Albert County shales and the mineral albertite. The bituminous shales have received much attention of late years, as also has the albertite. It is in this region also that Dr. J. A. L. Henderson, of London, England, has so successfully exploited the gas and oil measures. Dr. Hind's description of the Albert mine, where the mineral albertite was then being mined extensively, is, in these circumstances, worth noting.

From Dr. Hind's account we learn that, in the year 1849, Dr. Robb, accompanied by Professor Johnston, visited Albert County. Dr. Robb first noticed albertite in October of that year. He describes it as "a mineral pitch or hard bitumen." This is the first recorded discovery. The actual beginning of mining was due, later, to the bursting of a dam on a branch of Frederick's Brook, which exposed a series of massive lustrous veins of albertite. The mineral was christened by Dr. Robb.

Mining operations were in full swing in the year 1852, in which year an extraordinary law suit, Abraham Gesner vs. William Cairns, was commenced. The case hinged upon the character of albertite, the plaintiff contending that it was "true asphaltum"; the defendant holding that it was a coal. A vehement controversy ensued. Embattled scientists smote each other with turgid phrases. The lie direct was given and taken. At last Mr. Justice Wilmot, wearying of the flood of words, instructed the jury to retire. After the jury had deliberated long the decision was reached that the material was coal! Fortunately, this did not, as was at first feared, affect the case. Dr. Hind made several caustic comments upon the flexibility of scientists' convictions.

Let us return to the Albert mine. Dr. Hind's visit took place in October, 1864. It had then been working for twelve years. An inclined shaft had been sunk to a depth of 1,000 feet, continuously in bituminous shales. The relation of the albertite veins to the adjacent rock, according to Dr. Hind, was not determinable. That they were veins, and not beds, was evident. A great fissure filled with albertite had been worked out to the depth of 750 feet. In the fissure were numerous "horses" of rock. The places from which these "horses" had fallen were filled with al-

bertite. The thickness of the vein ranged 17 feet to nothing. Minute fissures filled with albertite ran in all directions into the walls. From this and other evidence, Dr. Hind rightly concluded that the mineral had been injected into the fissure in a liquid state under great pressure.

After traversing severely the diagnoses of contemporary geologists, Dr. Hind proceeds to show that there were two periods of injection of the material that produced albertite; that albertite is an inspissated or hardened petroleum, and that its source lies in rocks below the Albert shales, rocks probably of Devonian age. His lucid process of reasoning, space will not permit us to trace.

Certain paragraphs in the chapter under consideration discuss tentatively the geology of petroleum. These show that Dr. Hind was much in advance of his day and generation.

No other report of the learned and versatile doctor has more meat in it than this New Brunswick pamphlet. Our patient readers will hear more of it anon.

THE GYPSUM DEPOSITS OF THE MARITIME PROVINCES.

The latest monograph issued by the Dominion Mines Branch is a bulky volume on the gypsum deposits and industries of Nova Scotia and New Brunswick. The author is Mr. W. F. Jennison, who has had long experience in the gypsum-bearing regions of both Provinces.

The status of the gypsum industries in the Maritime Provinces may best be shown by comparing a few statistics. The total quantity of crude gypsum mined annually in the United States is something less than 2,000,000 short tons. Practically all the gypsum imported into the United States, amounting to about 450,000 tons per annum, comes from Nova Scotia and New Brunswick, and is shipped crude. The greater part of it is calcined and manufactured into wall plasters in plants along the New England coast. Relatively small quantities are turned into finished products in the Maritime Provinces.

As the Canadian mineral is of much higher quality than most of the available United States material, the American manufacturer has sought to protect his own market by securing duties of 35 per cent. and \$1.75 per ton respectively on manufactured and ground or calcined gypsum; while, as he desires the Canadian crude, only 30 cents per ton is imposed. The Canadian tariff, on the other hand, admits crude gypsum free, places a duty of 8 cents, 11 cents, or 12½ cents per 100 pounds on prepared wall plaster, and 10 per cent., 12½ per cent., or 15 per cent. on gypsum ground but not calcined.

It will be seen that the Maritime Province operators are in a good position to develop the domestic market for manufactured products, and still retain a large export trade in crude. Domestic finished pro-

ducts can be sold at less than \$4 per ton at the mill. The American products cannot be profitably disposed of in this country unless at least \$6.50 per ton is charged at the mill.

As with all such minerals, the real profit in the gypsum business lies in the grinding, calcining, and further preparation. The average price of crude lump is about \$1.10 per ton. The crude ground ranges from \$2.50 to \$3.10, and the calcined runs up to \$8.00 per ton. The cost of quarrying and of handling is very low. Manufacturing costs are extremely moderate. Transportation and marketing are the controlling factors.

There is no sufficient cause for the lack of expansion in this eastern industry. With all the advantages of tide-water shipment, of high grade deposits, of an already established trade in crude and a growing market for finished products, the situation deserves the immediate attention of Canadian investors.

We hope that Mr. Jennison's volume will stimulate interest in the immediate future.

ORGANIZED LABOUR.

The whole truth concerning the horrible series of crimes committed by the McNamaras and their fellow-criminals will probably never be known. Enough, however, has been revealed to show that behind the dynamitards was the carefully disguised influence of persons who were identified with the headquarters of organized labour. This does not mean that the labour organization officially approved the criminal activities of the McNamaras. But it implies certainly that labour organizations in the United States lend themselves to the machinations of the worst kind of nihilists.

This fact has a particularly cogent bearing upon Canada. For instance, the U.M.W.A. spent many thousands of dollars, over one million in all, in attempting to establish its walking-delegates in Nova Scotia. In this attempt, despite the use of most reprehensible methods, it failed.

This is but one instance of the desire of demagogues from the United States to control Canadian labour, to add to their own exchequer the revenues derivable from Canadian miners and other workmen.

We cannot see why Canadian workmen are not capable of managing their own affairs. Much less can we see what Canadian workmen can gain by permitting themselves to be governed by the paid agents of foreign organizations. A broad continental affiliation may be desirable. But actual assimilation must prove disastrous.

Canada has not been cursed with the hired assassin and the professional dynamitard. Why her workmen should contribute to the support of these classes in the United States is not clear.

EDITORIAL NOTES.

The milling costs at Stratton's Independence mill are about \$1.25 per ton of ore treated. The average recovery on \$3 ore is about 70 per cent., and the capacity of the mill is 4,500 tons monthly.

At Trollhattan, Sweden, an electric smelter has been operating to good effect on zinc-lead ore. The recovery on Broken Hill slime was 64 per cent. of the zinc, 74 per cent. of the lead, and 46 per cent. of the silver.

It is time that the Dominion Government reached some decision as to the status of the Department of Mines. If a capable and responsible minister is not given a separate portfolio we can predict a considerable disturbance.

Deep drilling in Porcupine has aroused much interest. It is announced that at Pearl Lake a depth of 1,200 feet was recently attained, and that ore of commercial value was discovered at that depth. This is good news, although, of course, it requires careful substantiation.

At the suggestion of the Denver Republican, a public Grubstake Fund amounting to \$10,000 was col-

lected under the auspices of a committee of the Denver Chamber of Commerce. Thirty-four parties of carefully selected prospectors were sent out to prospect certain localities remote from old camps. Valuable discoveries of gold, silver, lead, and copper were made. It is proposed now to form a Chamber of Commerce Company to develop the claims.

The last meeting of the Toronto Branch of the Canadian Mining Institute was one of the most profitable yet held. While the attendance of Toronto members was not as large as might be, there were several outside members present, including three from British Columbia. The presentation of the report upon Workmen's Compensation was the signal for a long debate. The report was not modified in any respect. It is soon to be submitted to Sir William Meredith.

The cut in the dividend of the Yukon Gold Company's dividend—from 2 per cent. to 1½ per cent.—is explained away by Mr. S. R. Guggenheim, who attributes the reduction to "the extraordinarily dull season prevailing in different parts of the world," and to the fact that two new steel dredges were not finished in time to be of much use. Glittering generalities don't go far towards soothing disappointed shareholders.

CORRESPONDENCE**THE ORIGIN OF PETROLEUMS.**

Editor, THE CANADIAN MINING JOURNAL:

Sir,—Permit me to thank you for your notice in your issue of November 1st, of the paper I contributed a short time ago to the Institution of Mining and Metallurgy on the origin of petroleum, and for your excellent short resume of some of the important points made by me in this paper.

But I would like to be allowed to take exception to the following remark in your article, viz.: "The chief bar to proper discussion, however, is the fundamental divergence in the postulates of each party." This remark most certainly applies to the defenders of the organic theories, who assume so many unsupported positions in this discussion; but I claim that it cannot justly be said that I postulate or assume when I back my position and arguments with so much evidence.

My opponents, the "organics," assume, for instance:

That hydrocarbon compounds (such as petroleum) must necessarily have an organic source, because they are carbon or organic chemical compounds. This is evidently an assumption, a postulate, founded merely on a play on words.

They also assume that the petroleum found in the "sands," evidently come from bituminous shales—that is to say, that the petroleum found in a certain kind of reservoir, "the sands," come from the bitumen found in another kind of reservoir, the shales. This position is asserted without evidence, and is a reasoning in a circle which can prove absolutely nothing as

to the origin of the petroleum, or bitumen, in either the sands or the shales.

They also assume that the petroleum are the product of distillation of "coals," or other organic remains, in the sedimentary strata; although the oil bearing strata are always found to be in the unaltered and undistilled state.

They also assume that the above distillation of organic remains can proceed at low temperatures—although all known processes of distillation are always the result of high temperatures.

They also assume that time—long time—can take, and has taken, the place of temperature in the distillation of certain of the organic remains entombed in the strata, and has thus slowly distilled them into petroleum. Why are not the coal beds and the unaltered sediments all distilled then? All of them have had ample time.

They also assume that, because some of the sediments are rich in fossils, these beds are bound, or were bound, to be highly bituminous—although, as every paleontologist knows, it is the rarest thing in the world to find bitumen or petroleum of any kind in a fossil. It is not found in one out of a million cases; and the geologist knows that the oil sands (some of which are enormously productive in petroleum), are not fossiliferous. In the above postulate, they take the assumed position that the soft tissues of animals are preserved and entombed with their shells or bones during the formation of strata, when we can observe every day in the actual processes of entombment in nature, that the very reverse is the case.

They also assume that petroleums can originate in fine-grained sediments, such as shales, and travel through the pores of these sediments for miles, laterally to accumulate under a distant anticline, when, if that was possible, it is quite evident that these petroleum products would, instead, travel up to the surface only a few hundred feet, or one-half or three-quarters of a mile away, at most, and escape. This postulate of possible migration and accumulation of petroleums through and from the mass of the surrounding sediments, is assumed against ample evidence furnished in every oil-field, that the sedimentary strata surrounding the oil-fields or pools, are absolutely impervious, since they keep the petroleum hemmed in their porous reservoirs, under very strong gas pressures always recorded in every field. If these surrounding sediments are impervious enough to prevent the gas from escaping, they cannot be the source from which this gas comes in. I have shown in my papers, that the "organics" use a number of other postulates without any more evidence in support than they can adduce for the assumptions mentioned above. It remains to be shown by them, that I have done likewise, and that I have proceeded also by "postulates." Let them take up one by one the facts and arguments which I have repeatedly advanced, and show that they are also assumptions—not founded on real evidence. I have been waiting for many years, to have some one do that, and would like to have him come forward at last. If not, I shall be forced to conclude that neither you, Mr. Editor, nor any one else, can prove that I have "postulated" or assumed in my presentations and discussions of this most important subject.

Yours, etc.,

EUGENE COSTE.

Ottawa, December 4th, 1911.

The Editor, CANADIAN MINING JOURNAL:

Sir,—Permit me to call your attention to an erroneous statement made by Mr. A. Gordon French, reported under the heading "Urges Bounty on Zinc," p. 779 in your December issue. The erroneous statement is as follows: "While in Ottawa, said Mr. French, he had been told that both Dr. Haanel and Dr. Ingalls had abandoned the problem," referring to the investigation of processes for the treatment of the complex zinc ores of British Columbia. Such is not the case. In fact, the investigation and experimentation are being pushed with earnestness and vigour.

In order to make more rapid progress in our enquiry, we have added to the staff by availing ourselves of the services of Mr. Dedolph, who has assisted Mr. Snyder in his electric smelting experiments at Nelson, B.C., and who is a metallurgist, well known in British Columbia.

Yours sincerely,

EUGENE HAANEL,

Director of Mines, Ottawa.

CONCENTRATION AT HUDSON BAY MINES.

Editor, CANADIAN MINING JOURNAL:

Sir,—I read with much interest the article by Mr. H. G. Young, in your issue of November 15th. Mr. Young describes very clearly the methods employed at his mine. There are one or two points, however, on which I would like to interrogate him.

In the first place, why use a 16-mesh screen, when there is no after-grinding of the ore?

In the second place, why use stamps at all, if the ore is amenable to treatment at such a coarse mesh?

Of course, Mr. Young's answer may be easy enough. I shall appreciate a full one.

Yours, etc.

Madoc, Ont.

G. H. GILLESPIE.

BOOK REVIEWS.

THE TECHNICAL ANALYSIS OF BRASS AND THE NON-FERROUS ALLOYS — BY WILLIAM BENHAM PRICE AND RICHARD K. MEADE — 267 PAGES — PRICE, \$2 — PUBLISHED BY JOHN WILEY & SONS, NEW YORK, AND THE RENOUF PUBLISHING COMPANY, LTD., MONTREAL.

It has been estimated that on the rolling stock of American railways alone there is over \$21,000,000 invested in bearing metal. This sufficiently accurate approximation gives one some idea of the importance of right technical control of the manufacture and use of alloys.

The book whose title appears above purports to cover the whole field of the chemical analysis of brass and the non-ferrous alloys.

In chapter I., engineering alloys are dealt with generally. Chapter II. takes up apparatus for electro-chemical analysis. After these introductory chapters, there come fifteen successive chapters, describing the methods of determining each metal used.

The last 110 pages are occupied with careful outlines of applied examples of alloy analysis.

The general plan of the book is well conceived. The arrangement is logical, clear, and convenient. Pos-

sibly enough general facts about alloys are not included. But, on the whole, the book is by far the best presentation of the subject that we have seen.

GEOLOGY OF THE LAKE SUPERIOR REGION —

"Monograph 52 of the United States Geological Survey, entitled 'The geology of the Lake Superior Region,' by C. R. VAN HISE and C. K. LEITH, is now ready for distribution. This monograph represents the first attempt of the Geological Survey to cover the geology of the entire region in a single volume. It contains 641 quarto pages and includes chapters on all the iron and copper producing districts and full descriptions of the iron and copper ores. It is accompanied by accurate maps of all the producing districts and a general geologic map of the region. The illustrations number 49 plates and 76 text figures, comprising maps, sections, diagrams, and half-tone reproductions of photographs of ores and minerals. The price is \$2.50, the cost of publication. Remittance should be made by postal or express money order to the Director, United States Geological Survey, or in cash—the exact amount."

In this concise and unappreciative way the director of the United States Geological Survey announces the publication in revised and condensed form of a vast amount of painstaking study of the iron and copper deposits of Lake Superior. The geological map covers approximately 181,000 square miles, of which about three per cent. are of commercial importance as ore-bearing areas. The region includes the native copper mines of Keweenaw Point, the most important of their kind in the world. There are also included the Marquette, Menominee, Gogebic, Mesabi, and Vermilion iron ranges, not to mention several smaller ones, which make the region the most important iron ore centre in the world.

All of these regions are described in detail, with excellent coloured geological maps and numerous illustrations. A full chapter is given to "the pre-Animikie iron districts of Ontario," wherein the geology and iron ore occurrences of the Lake of the Woods, Steep Rock Lake, Atikokan, Mattawin, and Michipicoten districts are described. Another chapter describes the geology and ores of the Gunflint Lake and Loon Lake areas of the Animikie, and makes comparisons with the Mesabi.

In a chapter on the Keweenaw series the geology of Lake Nipigon, of Nipigon and Black Bays, of Michipicoten Island, and of the east shore of Superior is discussed.

Chapter XVII., of 110 pages, on iron ores, is a most important exposition of ore deposits. Conditions of sedimentation and methods of secondary concentration are discussed. There is also a description of the iron formations, methods of exploration, ore reserves, methods of mining and transporting. The statement is made that 7,200,000 feet of diamond drilling has been done on the American iron ranges in the search for ore, at a cost of at least \$21,600,000.

Another chapter discusses in an equally thorough manner the origin of the copper ores. A short chapter deals with the silver ores, confined almost wholly to Ontario. Chapters are included on the general geology, on the physical geography, on the history of mining, on the plaitocene geology, and one giving a full bibliography.

To all students of the pre-Cambrian areas of Canada, and to engineers and others interested in the exploitation of iron or native copper ores, the volume is invaluable.

PERSONAL AND GENERAL

Mr. Frank Loring, with two assistants, is examining the St. Anthony mine, Sturgeon Lake, Ontario.

Mr. W. M. Brewer has retired from the management of the Matanuska Gold Mines, Ltd., with mining property in Alaska.

Mr. H. P. Davis has returned to New York. He will presently visit Cobalt, Swastika and Porcupine to gather material for his annual review.

Mr. A. D. Miles, who represents the Canadian Copper Company, has taken an office in the new Standard Bank Building, King Street west, Toronto.

Mr. George F. Loudon has retired from the directorate of the Scottish Ontario Gold Mining Syndicate, Limited, Colonel William Clark, of Glasgow, has been appointed in Mr. Loudon's place.

Mr. J. M. Ruffner, manager of the North Columbia Gold Mining Company, operating hydraulic placer-gold mines in Atlin camp, British Columbia, has gone to his home in Cincinnati, U.S.A., for the winter.

Mr. John Hopp, who owns four or five placer-gold mines in the Barkerville section of Cariboo district, British Columbia, and whose hydraulicking operations are on the largest scale of any in the district, is spending the winter on the coast.

Mr. D. L. H. Forbes, mining and metallurgical engineer, has opened an office at 306 Manning Chambers, 72 Queen Street west, Toronto. In addition to his private practice, Mr. Forbes will undertake metallurgical testing and designing on behalf of the Merrill Metallurgical Company of San Francisco.

Mr. Anthony J. McMillan, liquidator of the Le Roi Mining Company, Ltd., has gone to London, after having spent several weeks in British Columbia and the adjoining State of Washington, in connection with the disposal of the company's mining and smelting properties.

Mr. J. W. D. Moodie, of Salt Lake City, Utah, U.S.A., has been appointed general manager of the Britannia

Mining and Smelting Company, Ltd., in the place of Mr. Robert H. Leach, resigned. Mr. Moodie has been general manager of the Tintic Mining and Development Company and the Yampa Smelting Company, both operating in Utah.

Messrs. W. E. Carter and Alexander H. Smith, both well-known Toronto mining engineers, have formed a partnership, under the name of Carter and Smith. The temporary Toronto address is "care of CANADIAN MINING JOURNAL, Toronto. The firm's northern address is South Porcupine. Both Mr. Carter and Mr. Smith have a thorough knowledge of Canadian mines and ore deposits.

Mr. O. B. Smith, jr., superintendent of mines of the Granby Consolidated M., S. & P. Co., Ltd., lately returned south, after having spent some time at the company's Hidden Creek copper mine, Observatory Inlet. Mr. George W. Wooster, treasurer and director of the company, and Mr. Wakely A. Williams, superintendent of the company's large smelting works, are both back at Grand Forks, B.C., from visiting the Hidden Creek property.

Mr. W. H. Trewartha-James has resigned the position of general manager of the Tye Copper Company, Ltd., with mines and smelting works on Vancouver Island, British Columbia. He left Victoria for England about the middle of November. Mr. W. J. Watson, manager of the company's smeltery, has been appointed acting general manager. Messrs. T. H. Wilson (chairman), Harry von Berg, and J. Hancke, directors of the company, all of London, have lately been visiting the company's offices and properties.

Mr. Robert H. Leach has resigned as general manager of the Britannia Mining and Smelting Company, after having during several years successfully directed development work at the company's mines on Britannia Mountain, Howe Sound, British Columbia, and the varied experimental work done in the works at Britan-

nia Beach in connection with the milling and concentration of copper ores. He will spend the winter in Southern California, whence he has gone for a few months' rest and recreation.

Mr. R. G. Drinnan, formerly general superintendent of the Crow's Nest Pass Coal Company, was in Toronto during the first week of December. He was one of several British Columbian members who attended the meeting of the Canadian Mining Institute (Toronto branch), meeting at the Engineers' Club on Saturday, December 2nd. He has returned to Vancouver for the winter.

Mr. Colin Campbell, of Campbell and Deyell, attended the last meeting of the Toronto branch of the C. M. I., and spoke briefly upon the formation of the

Porcupine branch, the organization meeting of which will be held in South Porcupine on December 16.

Upon his return to British Columbia from Pittsburg, Pennsylvania, whence he went with Mr. R. F. Tolmie, Deputy Minister of Mines for British Columbia, Mr. Robert Strachan, district inspector of mines, Hosmer, Crow's Nest Pass, made a full and comprehensive report on the proceedings he witnessed at the United States National Mine Safety Demonstration, and as an outcome of which he has made recommendations to the Provincial Minister of Mines, with a view to the further improvement of several matters connected with the coal mining industry in his (Mr. Strachan's) inspection district.

The Gypsum Deposits of Nova Scotia

By W. F. JENNISON, M.E.*

Description of Deposits.

The deposits present much variety of colour and texture. The greater part in texture may be classed as compact or crypto-crystalline, with lesser quantities of granular or saccharoidal. In some places considerable quantities of selenite occur, showing folia, sometimes a foot or more across and transparent throughout, as shown in Plate III.; and the fibrous varieties are seen in many places associated with the gypsum and marls, Plate IV. Crystals of selenite are often found disseminated irregularly through the gypsum beds. A characteristic example of this is shown in Plate V., usually in groups or bunches, sometimes in veins of importance.

Anhydrite often occurs in extremely variable proportions in many of the deposits, with great irregularity, and the occurrence of this mineral, which is practically valueless, with the gypsum, often interferes with the economic operation of the quarries.

The following brief description of the gypsum deposits of Nova Scotia, with analyses furnished by Mr. F. G. Wait, chemist for the Mines Branch of the Department of Mines, is intended to give essentially the conditions of most economic importance, rather than to deal at length with the geological conditions of each deposit, which are very similar.

Sheet No. 2, Aspy Bay, Victoria County.

Extending from the Atlantic Ocean, inland about six miles, in a somewhat triangular shape, occurs one of the most important gypsiferous areas on the island of Cape Breton. Its occurrence, comprising nearly 8 square miles, is in comparatively low lands surrounded by hills of the older Pre-Cambrian rocks, often 1,000 feet in height, and it is practically all underlain with gypsum.

Two rivers, the North Aspy River and the Middle River, run through this area, exposing cliffs having a height from 40 to 70 feet, and their meadows make a very easy gradient from the deposit to the sea.

*Abstracted from monograph, "Report on the Gypsum Deposits of the Maritime Provinces," issued by the Mines Branch, Ottawa.

The exposures are extensive. The rock is white, and mottled white and grey, compact crystallization showing some little anhydrite, which carries petroleum in small (pea size) cells at the base of exposure.

At present the deposits are inaccessible for want of a harbour. The natural outport would be North Pond, at Dingwall. This pond, which has sufficient depth of water for shipping purposes, has been separated from the ocean by the washing of sand and gravel up from the ocean bed, forming a narrow bar across the entrance, and thus closing to navigators one of the best harbours on the coast.

Sheet No. 4, Cheticamp, Inverness County.

On this sheet will be seen a gypsiferous belt, skirting the metamorphic hills from the mouth of the Cheticamp River on the north to well below Friar Point on the south, a distance of over 13 miles, and at no place a greater distance than 2 miles from the sea coast. Its width varies from about 600 feet to over 2,500 feet.

The principal outcrops occur on the southeast side of Aucoin or Mill Brook, about 3 miles from the northern extremity, and at Grand Etang harbour, about the same distance from the southern extremity.

Between these two points, and their extensions both north and south, the gypsum is mostly concealed, but is traceable by the characteristic sink holes and hummocky ground, under an overburden of clay.

The northern exposures, shown in Plate VIII., on the east side of Aucoin Brook, are composed of a series of precipitous cliffs, from 60 to 180 feet high, above the level of the brook, and forming a narrow plateau parallel to and at no great distance from the base of the great plateau of northern Cape Breton.

The southern exposure occurs near the head of Grand Etang harbour, where the high cliffs of white compact gypsum outcrop near the water's edge.

The northern exposures have been developed by the Great Northern Mining Company, who have established a plaster mill near the face of the cliff. This area alone contains very extensive deposits of gypsum, made up of different beds interstratified with limestone. The first or lower bed, overlying the metamorphic series, consists of a compact variety of snow-white and white gypsum; resting on this is a bed of

carboniferous limestone having an average thickness of about 100 feet; above the limestone is a very extensive bed of grey and white selenitic gypsum. The valley of the Mill Brook is all underlain with gypsum, and covered with from a few inches to a few feet of red clay; on the western side the gypsum again crops out with considerable prominence.

The high bluff of selenitic grey and white gypsum is often cut by vertical veins of pure transparent selenite, running parallel to the strike, with veinlets or stringers cutting off horizontally. One of these veins has a width from 8 to 20 feet, and may be traced for at least half a mile.

Sheet No. 11, Mabou, Inverness County.

In this section there are numerous gypsiferous areas which are more or less available for commercial purposes. They comprise a total area of 6.55 square miles.

At Finlay point, on the sea coast, and about one mile north of Mabou coal mines, occur cliffs of excellent white compact gypsum from 35 to 50 feet in

texture, and has associated with it fine crystals of selenite.

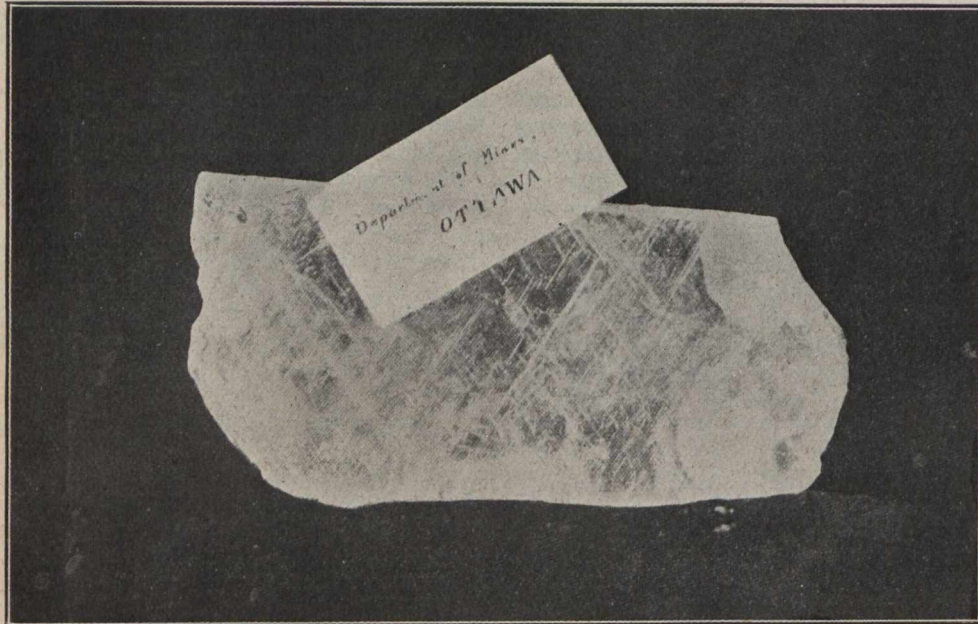
Sheet No. 12, Smith Island, Inverness County.

On this sheet occur three small gypsiferous areas consisting of 212.8 acres. The largest and most important of these is that of 148.8 acres, on Smith Island.

This island is situated about one mile from the mainland, and opposite Port Hood. Its topography is low, and the exposures, which in the greater part are on the exposed side of this island, appear as extensive beds associated with shales and carbonate of lime, and may be traced from shore to shore by broken land and pits or sink holes.

The gypsum occurs in alternating layers with the carbonate of lime and marls, the latter carrying extensive quantities of fibrous gypsum.

At Ragged Point, and at Cape Susan, at one time, was an area of considerable importance, which has been, by erosion of the sea, divided into two, having a total area of 64 acres. The occurrence here, like



Transparent crystal of Selenite.

height. This area extends along and borders the sea coast for nearly $3\frac{1}{2}$ miles. The exposures here are large, and every indication points to an extensive deposit of gypsum of a quality suitable for all ordinary manufacturing purposes, but the sea coast is rugged, and very little protection could be given to shipping. To operate this deposit it would, therefore, be necessary to make the shipping point at Mabou harbour, a distance of $3\frac{1}{2}$ miles over a rather difficult pass.

At Mabou harbour the most important deposits are located, and known as the Col. Snow property, and the Beaton property.

The rock is exposed in cliffs from 45 to 60 feet high, and consists almost wholly of a white compact gypsum, with smaller quantities showing microscopic crystals of selenite. Small quantities of anhydrite may be seen at the base of the cliffs.

Following east to Hillsborough, and south to Southwest Mabou, large gypsiferous areas occur, but consist in the greater part of concealed measures. Large outcrops of a very soft, grey, and dark grey, granular gypsum, suitable only for land plaster, occur at Hillsborough. At Southwest Mabou the rock is similar in

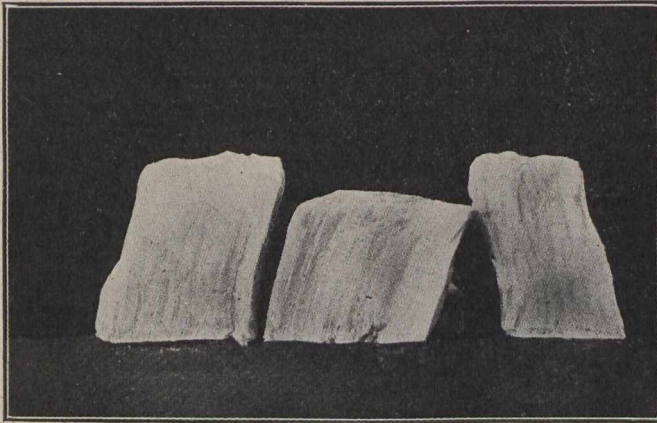
Smith Island, has few outcrops, and the gypsum and limestone are closely associated. Large quantities of marl are also prominent.

The close proximity of these areas to the railway and coal fields makes them desirable for manufacturing purposes.

Sheet No. 15, Malagawatchkt, Inverness County.

On the south side of Denys basin is a narrow gypsiferous area skirting the shores of the Bras d'Or lakes from McKenzie Brook on the northwest, to about half a mile southwest of Matheson's wharf, and continuing southwest by numerous small islands and peninsulas to West Bay. In this area of 6.44 square miles, including that portion of sheet No. 16 southwest of Denys basin, numerous outcrops of gypsum are seen as at Plaster Island, and on the River Denys road, George Island, Green Island, and Floda Island.

Many of these outcrops are of little importance, being low and having but small quantities above sea-level. Several, however, have sufficient prominence to be considered as available supplies. The exposure on Donald McKinnon's farm, River Denys road, has a



Fibrous Selenite Crystals.

height averaging 50 feet, with a length of 275 feet. This deposit, and its extension 2½ miles northwest to Plaster Island, shows probably the most important deposit in the whole area. At Plaster Island the exposure is from 10 to 40 feet in height on the shore, and covers an area of 4 to 5 acres.

In texture and colour, this rock is a soft white compact variety, having some anhydrite associated with it.

Sheet No. 16, Washabuck Peninsula, Victoria County.

This area includes the deposits at McKinnon harbour, Ottawa Brook, Washabuck River, Nineveh, Little Narrows, Maciver point, Deadman point, McKay point, Boulaceet harbour, Lieutenant pond, Iona, Jamesville, Red point, and south side Whycocomagh Bay. The total area is 25.54 square miles. Here all varieties of texture and colour may be found. The exposures are many and large. Anhydrite occurs frequently, outcropping in large irregular masses. This is especially true at Nineveh, and at Washabuck, the former showing a perpendicular face of 60 to 80 feet and a length of over 800 feet. At the latter place it shows on a road leading from Washabuck River to Little Narrows, for nearly a mile in width.

At Ottawa Brook, the Newark Lime and Cement Company, of Newark, New Jersey, U.S.A., started operations in 1908. They have opened up several deposits, and built a railway connecting them with their shipping pier, constructed on the north side of Great Bras d'Or Lake.

The rock at some of the points opened up, although a soft white compact variety, shows much disturbance, being badly fractured and folded; due to local pressures—probably the conversion of anhydrite into gypsum. At another point, only a few hundred feet distant, a dark carbonate of lime is seen graduating into gypsum. The lower left corner shows the lime, with streaks of snow-white gypsum. The right and upper side is a soft white compact variety of gypsum, showing very little disturbance.

At Little Narrows (south side), on the properties of M. J. McAskill and widow McAskill, very large exposures are seen. At the latter the face is about 100 feet high and over 600 feet long; the rock is an excellent quality of soft white compact variety with but few irregularities. It is situated on St. Patrick channel, about one mile from the shipping point, to which a practically level route could be secured.

Composition is shown by the following analyses:

	Per cent.	Per cent.
Lime	33.30	33.67
Sulphuric anhydride	46.00	46.00
Water, loss on ignition	21.16	20.70
Insoluble mineral matter	0.24	0.20
	<hr/>	<hr/>
	100.70	100.57

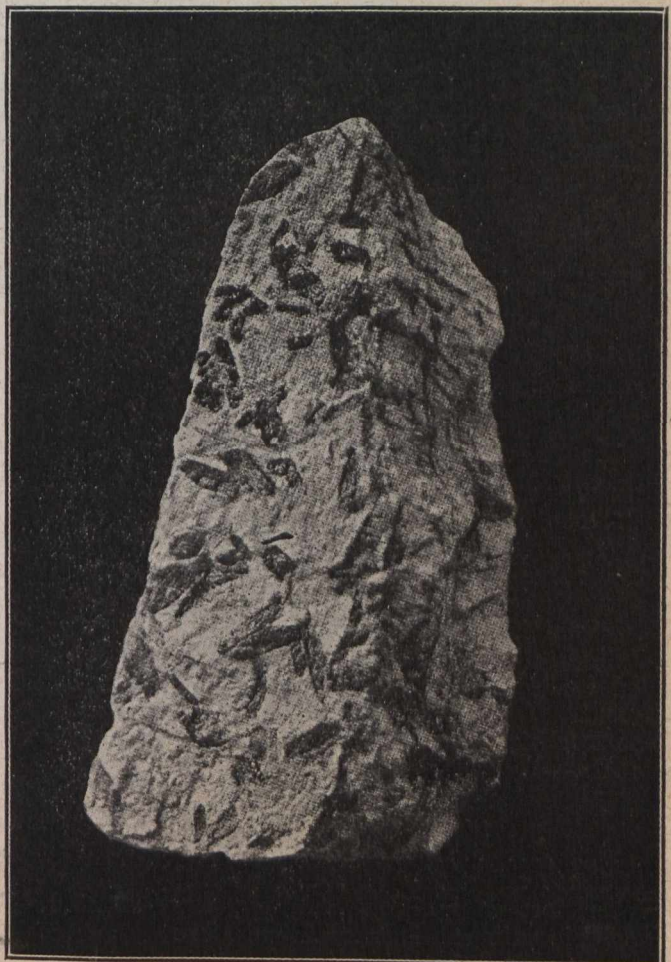
Sheet No. 18, Port Bevis or Big Harbour, Victoria County.

From Baddeck Bay on the west to St. Ann Bay on the east may be considered as one continuous gypsiferous bed, having an area of 15.83 square miles.

It contains many important outcrops of both gypsum and anhydrite. On the shores of the Great Bras d'Or Lake, west of Port Bevis, extensive cliffs of anhydrite occur. Another cliff, 70 feet high and 650 feet long, is shown in Plate X. The prominence of this mineral is greater on or near the shores of the lake, and again at the contact of these measures with the older rocks, and may be a conversion from gypsum by metamorphic action.

The farther it is possible to get from these points the freer the deposit seems to be from anhydrite. Thus, it is seen that the best exposures of gypsum are found at the head of Baddeck Bay, about 1 mile from deep water shipping, where very little disturbance is apparent. These exposures occur in a valley where there are extensive outcrops of soft, white, compact gypsum, without any appearance of anhydrite.

At Port Bevis a few years ago the Victoria Gypsum Company carried on extensive operations, but



Gypsum with embedded selenite crystals.

owing to increasing occurrence of anhydrite at depth, this place was abandoned. This is also true of a point west of Plaster mines, where a small quarry was operated many years ago (1875) by Mr. Duncan MacDonald, of Montreal, who exported annually about 5,000 tons. It has been noticed that both of these quarries are in the region of most disturbance.

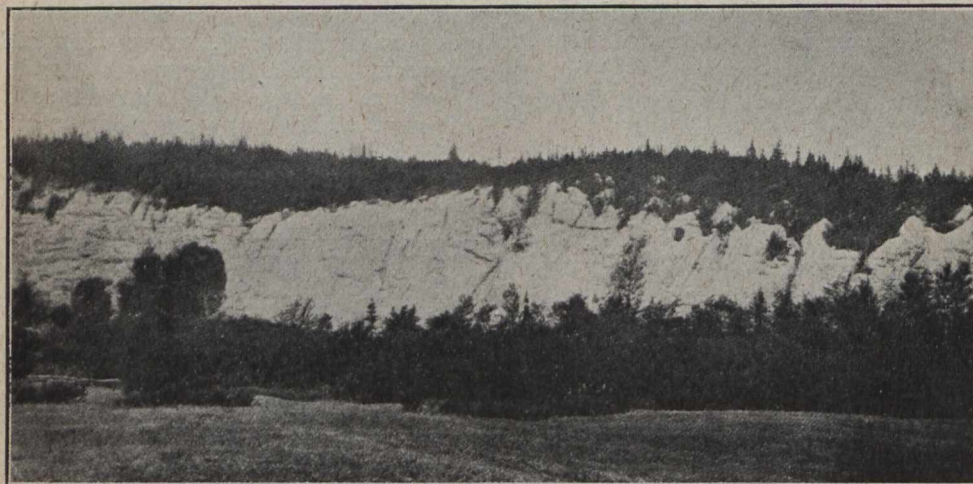
Sheet No. 20, St. Ann, Victoria County.

In this section, at Goose cove and at Oregon, 4½ miles from the mouth of North River, occur small gypsiferous areas. At Oregon there are 134 acres; at Goose cove two areas, having a total of 230 acres. At the former place the measures are all concealed; at the latter large exposures from 40 to 60 feet in height are seen. One of these has been opened up and operated for several years by the Victoria Gypsum Company. It is situated 3½ miles by rail from their shipping pier at Munroe point. The rock in colour is white, light grey, and mottled white, the white having prominence. The outcrops indicate a soft compact variety, and operations prove this to be true to a depth of 30 to 40 feet; but during the sum-

Sheet No. 25, Madame Island, Richmond County.

This sheet comprises not only the deposits of Madame Island, but of Port Richmond, on the north side of Lennox passage, and a very small deposit near Pirate harbour in Guysborough County, making a total gypsiferous area of 6.57 square miles.

The most important of these deposits is that on the north side of Madame Island, and the south side of Lennox passage, where there is a large gypsiferous area of 3.77 square miles. The outcrops of gypsum in this area having most prominence are situated about 1½ miles west of Lennox Ferry landing, and about 1 mile from the shore. At this point the exposures cover many acres in area, and have a height of from 30 to 70 feet. Here, years ago, H. C. Higginson, of Newburgh, New York, operated a quarry, and exported large quantities of the crude material to the United States. The gypsum is a white compact variety; but it has, irregularly associated with it, much anhydrite. The occurrence of this mineral, no doubt, had much to do with the closing of the quarry, although there still remain large quantities of good gypsum. This,



Cliffs of anhydrite, Great Bras d'Or lake, C.B.

mer of 1908, while sinking on the floor of the quarry, anhydrite was discovered in considerable quantities.

Sheet No. 23, Tom River, Richmond County.

On the southeast side of Great Bras d'Or Lake is a gypsiferous area of 2.7 square miles, comprising Campbell cove, Hay cove, and McNab Creek, in which occur several outcrops of gypsum. Some of these outcrops consist of a very excellent, snow-white, compact variety, resembling alabaster; while others, especially at Tom River, show an excess of lime. It is free from all evidence of anhydrite, and is easily accessible to water shipment.

The following analyses show the average quality of the rock:—

	I.	II.
	Per cent.	Per cent.
Lime..	32.95	34.04
Sulphuric anhydride	46.64	44.28
Water, loss on ignition	20.93	21.07
Insoluble mineral matter .. .	0.13	0.67
	<hr/>	<hr/>
	100.65	100.06

together with excellent natural shipping facilities, and the increasing demand for the product, should be an impetus to reopen and operate this extensive area.

Analysis:—

	Per cent.
Lime	33.33
Sulphuric anhydride	45.32
Water, loss on ignition	20.92
Insoluble mineral matter	0.22
	<hr/>
	99.79

Sheet No. 26, Askilton, Inverness and Richmond Counties.

In this section we have what may be known as the Hastings area, of 75 acres, at Port Hastings; the Beaver Dam Lake area of 1.6 square miles on the border line of Inverness and Richmond counties, and about 4½ miles east of Point Tupper; the Askilton area of 1.8 square miles, at Askilton, 3½ miles from the Intercolonial Railway, or about 6 miles east of Port Hastings. Also a small area about 1½ miles south of Askilton, of 302 acres, on Inhabitants River.

The Inhabitants River area, and the Beaver Dam Lake area, have very little importance, being situated

in low ground. The Beaver Dam Lake is only traceable by the pits or kettle holes, and hummocky ground. In the banks of Inhabitants River small outcrops are seen, but both areas seem to be covered heavily with clay.

The Askilton area is the most important in this section from all points of view. It has large outcrops, some as high as 70 feet above drainage level, and the greater part is an excellent white compact variety, with smaller quantities of granular.

The Strait of Canso, the natural outport for the deposit—being an open port all the year—makes this deposit desirable, especially to those who export large quantities of crude rock, as it is the nearest deposit to a winter port in the province.

The following analyses from samples of the different deposits will serve to show the average composition of this rock:—

ward to Beaver Brook, and to Irvin Lake. At Pitch Brook the gypsum is light grey in colour, and has a compact texture. Many years ago the deposits were operated, and the product exported to the United States. At Beaver Brook the rock is a compact white variety, with some alabaster showing in some of the exposures; however, anhydrite has prominence. Ascending the river on the western side there is a small area known as Stephens area, where a good white compact variety of gypsum is seen, associated with soft reddish blue marls. Here is the largest deposit of fibrous gypsum known in the provinces, occurring in veins running through the marls in all directions, often 12 inches and 18 inches wide, and when cleaned from the associated marls is very pure. In 1869, these deposits were operated for the fibrous variety, and a mill was erected at Noel, 15 miles from the deposit, at a cost of \$12,000, for manu-



The Cove Quarry at Cheverie.

	I.	II.
	Per cent.	Per cent.
Lime	40.48	33.80
Sulphuric anhydride ..	55.48	46.08
Water, loss on ignition	3.90	19.86
Insoluble mineral matter ..	0.44	.....
	100.30	99.74

No. I. and II. Average samples, Hastings area.

Sheet No. 40, Shubenacadie River, Colchester and Hants Counties.

At the mouth of the Shubenacadie River, on the east side, occurs a black Carboniferous limestone, known as black rock, carrying small veins of manganite. Succeeding this is a series of soft marls and sandstones, filled with veins of reddish fibrous gypsum running in all directions, and it is not until Pitch Brook is reached that we meet solid gypsum exposed in prominence. Here, about 1 mile from the shore, occur massive beds, which extend almost continuously east-

facturing the product into terra alba. These works were destroyed by fire the following year, and all operations abandoned.

Proceeding up the river, on the west side, the next deposit of importance is that of Capt. John Graham, just above and opposite Eaglesnest point. This, formerly known as Big Rock, presented a snowy white front to the river, and for many years was operated for export purposes.

It is a massive bed arranged in layers and bent in conical shape; the base and interior showing anhydrite, and the whole resting on a base of Carboniferous limestone. It is here the Windsor series of the lower Carboniferous crosses the boundary line (Shubenacadie River) into Colchester county, and at this point it has a width of less than 1 mile, and west, about 1½ miles, it tapers to a mere connecting link, but soon widens again on the Fivemile and Kennetcook Rivers. Proceeding on the western side of the river, 1 mile south of the Fivemile River, again the gypsiferous area is met with in prominent outcrops of gypsum,



No 64

which are almost continuous for several miles. At Rose point, Urbania, and Admiral rock, massive white beds are exposed on the river bank, from 40 to 60 feet in height; and not only at the river bank, but from one to three miles west prominent exposures occur of excellent quality.

Crossing the river near Fort Ellis point, and descending again on the eastern side, large exposures are seen; but not in such prominence as those on the opposite side of the river. At Green Oak, on the property of Thos. Phillips, large and prominent exposures of white, snow-white, and blue gypsum occur, in compact crystallization. This property is near the river, where shipping facilities are good, and in the past was operated quite extensively. Again, on the property of G. W. Dart, and Tupper Fisher, outcrops occur, but here an excess of carbonate of lime is shown. The gypsiferous area included in the above description is 14.14 square miles in extent.

It will be seen by the above that in this section there is practically an unlimited supply of gypsum of good quality; and at one time considerable business was done exporting the crude material, but many causes have militated against the successful operation of these deposits. Operations were carried on in the days of small sailing vessels owned by those who were familiar with the tides of the Shubenacadie River, but as the size of vessels increased, and before the steamboat was known on this river, the plaster trade became controlled by a few, and these deposits were the first to suffer. To those interested in this trade it may be worthy of note to mention that the tide at the mouth of the Shubenacadie rises 30 feet in three hours and recedes in the same length of time. At Eaglesnest point the bore at high tide is often 10 feet high.

The following analyses will serve to show the different qualities of rock in this section:—

	I.	II.
From Beaver Brook—	Per cent.	Per cent.
Lime	36.80	33.20
Ferrie oxide and alumina ..	0.40	.....
Sulphuric anhydride	51.44	46.40
Water, loss on ignition ..	11.73	20.79
Insoluble mineral matter ..	.....	.....
	<hr/>	<hr/>
	99.87	100.39

No. I. The interior of a boulder of anhydrite which has been exposed for about 25 years.

No. II. An outside coating about 1-inch thick taken from No. 1.

GYPSUM DISTRICT "E."

Sheet No. 41, South Maitland, Hants County.

The eastward continuation of the Kennetcook River valley is the valley of the Fivemile River, both rivers having their origin in close proximity, the Kennetcook flowing westwardly to the Avon, the Fivemile River eastwardly to the Shubenacadie. The Dominion Atlantic Railway (Midland division) follows these valleys for nearly 30 miles west of the Shubenacadie River, which makes the gypsum deposits in this section very accessible.

On this sheet there are three gypsiferous areas, comprising a total of 9 square miles.

The most important of these is that at Latties Brook, which is a continuation of the Windsor series

eastward. It is here that the Windsor Plaster Company has a quarry and gets a partial supply for its calcining mill at Windsor. The quarry is situated near Burtons station, on the south side of the railway, and has an exposed face 40 feet high, covered with from 10 to 15 feet of clay. Attempts have been made, with a considerable degree of success, to remove this clay by the hydraulic method.

The rock is a white compact variety, well suited for the manufacture of plaster of Paris. This bed may be followed westward for some miles, but there are only a few outcrops, the greater part being concealed under a heavy overburden of clay. North, about 1 mile, near the public highway, prominent outcrops are again seen, but the rock is not as good in colour or texture as at Burtons.

Going east from Burtons we meet precipitous cliffs, from 75 to 140 feet in height, and over 2,000 feet long, on the Lawrence property, at Andrew Hayes (known as The Cave), and on the Royles property. On the Geary property, about 150 feet north of the railway and having a strike about parallel with it, is another exposure, with a length of 1,400 feet, and an average height of 85 feet.

On the Hayes property, the upper parts of the cliff show considerable disturbance, and are badly folded and contorted; while near the base the beds are more even in structure. The rock on this face shows considerable anhydrite, but on the south or opposite side of the ridge, where the rock has more covering, it is a good white gypsum, with some greyish white and blue associated. The face continues westwardly, with practically the same height, to the Lawrence property, and has a stratification more horizontal and even. In other conditions it is similar to the Hayes property.

On the Geary property, the rock again shows disturbance, with considerable anhydrite, and veins of dark carbonaceous and reddish gypsum of inferior quality cutting through it.

The natural shipping port for the deposits of this area would be the Shubenacadie River (distant from 3 to 5 miles), but it would necessitate the construction of a shipping pier above the railway bridge. Unfortunately, not sufficient attention was given to draw efficiency in the construction of this bridge, and the provision then made for this purpose is not suitable for modern shipping; and, therefore, makes what would be otherwise desirable gypsum properties (not only the above described, but several others on or near the Shubenacadie River), practically inaccessible for export purposes.

The next area of importance is that at Glencoe, which was mentioned in the description of sheet No. 40. It is to the south, and some distance from the valley of Fivemile River and on very much higher ground. The shipping port for this is on the Shubenacadie River, about 2 miles above the mouth of the Fivemile River.

Going north on this sheet to Selma, near the head of Cobequid Bay, there occurs a small isolated gypsiferous area of 1.7 square miles. The topography of this is generally low dike lands, and the outcrops, which have but little prominence, occur about 2 miles from the shore. The rock is a grey slaty structure, with small quantities of white granular.

(To be Continued.)

Notes on Workmen's Compensation Act

(Written for the CANADIAN MINING JOURNAL by
R. G. Drinnan.*)

[EDITOR'S NOTE.—At the request of the JOURNAL, Mr. Drinnan has outlined his views upon the Workmen's Compensation, as applied to mining. Mr. Drinnan's long experience in the coal mines of Western Canada lends specific value to his opinion. Since the Toronto branch of the Canadian Mining Institute is taking up the same subject, this contribution is more than ordinarily timely.]

It is generally conceded that workmen engaged in hazardous occupations should be recompensed for loss sustained by injury. Further, that the means of awarding this compensation be such that it can be obtained promptly or without recourse to the law courts. The Workman's Compensation Act comes nearest to fulfilling these conditions; but there are some objectionable features in it which might be modified in any new Act.

In the first place, the burden the Act imposes must be borne entirely by the employer. Naturally, he protects himself by placing his "risk" with an insurance company. The insurance company (a soulless corporation) is therefore responsible for the payment of claims. It is the business of the insurance company to make it as difficult as possible for a workman to obtain compensation. It is done in this way:—

The Act presupposes that in cases of dispute as to liability the parties will agree on an arbitrator. Seldom do they agree, and it is often necessary to ask the chief justice of the province to appoint one. It lies with the workman claiming compensation to ask for this appointment by the court and that necessitates the services of a solicitor. Law costs then begin to accumulate and although the award may be in his favour the workman never receives the full amount awarded. It is often less than half this amount when the sum claimed is small. The object of this is to make a workman accept as payment of his claims an amount smaller than the Act allows him as a compromise against having to take arbitration proceedings. Clearly this is one of the things the Act was intended to circumvent.

Another way of settling claims under the Act is to appoint a committee, an equal number from each side, with power to appoint an arbitrator if they fail to agree. In practice this works out better for the workman, as he always gets paid the full amount of the award. The weakness of this arrangement lies in the fact that the workmen's representatives on the committee are elected by popular vote and generally they feel that to retain popularity they must succeed in obtaining some compensation for every claim presented.

The better plan I believe would be to have an arbitrator appointed by the Government and paid by it. He does not necessarily need to have a legal training. Ordinary common sense and some practical knowledge

of conditions of work in the various industries involved are the requisite qualifications.

In the second place, accidents are more numerous since the passing of the Act. This may be accounted for to some extent by the fact that minor accidents are now reported; but the more serious accidents have not decreased. This is not the fault of the employer because the Act is an incentive to him to take every precaution and exercise all due care for the safety of his workmen—where the appeal to humanity failed the added liability has largely succeeded. The fault lies to a large extent with the workmen themselves. They know the Act protects them financially in case of injury, and this adds to the temptation when working on contract to increase their earnings by taking greater risks. Even a workman who has nothing to gain by taking risks is liable to become more careless when this knowledge is present.

To remedy this, to put a check to foolhardiness on the part of the workmen, something different from the saving clause of "serious neglect and wilful misconduct" will have to be adopted. To prove serious neglect you must show that the workman neglected to do something he knew he should have done. To prove wilful misconduct you must show he did something he was told he should not do. The Act places the onus of proof on the employer, and it rarely happens that he can establish any such proof. A broader meaning should be given to this term, not to deprive the workman of compensation, but to check needless risk and carelessness.

In the third place, the Act should make it compulsory for workmen to report all injuries, no matter how trifling, sustained by them in the course of their employment, before absenting themselves from work, so that it can be investigated on behalf of the employer. Compensation has been paid for loss sustained by injury when there has been considerable doubt as to where and when the injury actually occurred.

In the fourth place, the Act should be more explicit in the matter of a medical referee in cases of temporary incapacity. Workmen will mangle and abuse themselves to the extent of delaying recovery from injury while they are being paid compensation. Some means of checking this should be devised.

While the doctors who are attending the injured workman are paid by the workmen and appointed by them, it will be impossible to get them to handle this matter impartially. When a workman sustains injuries necessitating the payment of compensation he should at once be placed under the care of an independent doctor and when discharged by him payment of compensation should cease. Any failure to comply with instructions from this doctor should be cause for non-payment of compensation.

The medical referee should be a permanent appointment therefore and not one called in only in cases of dispute after the workman is supposed to have recovered.

*Mining Engineer, Vancouver, B.C.

The Bluebell Mine, Kootenay Lake, B.C.

At the last general meeting of the Western Branch of the Canadian Mining Institute, held at New Denver, British Columbia, on September 13, Mr. S. S. Fowler, general manager for the New Canadian Metal Company, Limited, owning the Bluebell mine, situated on the east shore of Kootenay Lake, B.C., read an interesting and instructive paper, entitled "Costs and Conditions at Bluebell Mine, B.C." The costs submitted were those over a period from July 1, 1909, to March 31, 1910, inclusive. They cover the cost of extracting from the mine 43,067 tons of ore, plus 100 feet of drift deadwork, and of concentration of that quantity of ore, together with general expenses. The detailed statements of costs will not be available for publication until after they shall have been printed in the Quarterly Bulletin of the Canadian Mining Institute, but the following excerpt from the paper may be given:

The Bluebell mine is situated in a peninsula which projects from the east side of Kootenay Lake, B.C., and its orebodies, outcropping at 100 feet or less above the water-level, are attacked through an adit whose portal is within 100 yards of a wharf at which all supplies are received and from which all product is shipped. Adjacent to the portal are located the concentration plant and shops; and the office, laboratory, and living quarters, save certain cottages, are within 200 yards thereof, while the greatest distance from which the ore so far developed has to be hauled does not exceed 300 yards. It will be seen, therefore, that accessibility is practically perfect.

The living quarters comprise (a) several 4-roomed cottages, all plastered and painted, situated not more than 500 yards from any part of the work, provided with light and water, and each surrounded by a fenced plot of ground about 60 by 120 feet. These are rented at \$12 per month each, to employees with families. (b) A bunkhouse containing 27 bedrooms and two recreation rooms. All these are plastered and painted and open on to covered verandahs, there being no internal passages. No more than three men occupy any one room. (c) A dry-house adjoins the bunkhouse and contains in one room six shower baths with cement floors and ample sinks, laundry tubs, and hot and cold water. In a connecting room are lockers for each employee, properly ventilated and provided with steampipe below. Toilets are in a small, separate, but conveniently placed building, and are fitted with flush closets on a cement floor. All buildings are steam-heated when necessary. (d) Within 50 yards of the bunkhouse is the boarding house, with seating capacity for 100 men. In the basement of this building is a post office, and a small store supplied with the common necessities of the employees; but no employee is either compelled or influenced in any way to trade here.

The dining room is ceiled and painted white and amply lighted on north and south sides, thus being made a cheerful place, the influence of which on the dispositions of those who use it, to say nothing of their appetites is notably favourable.

An easily accessible field, situated some 300 yards from the living quarters, is much used for sports, such as baseball and football. Several of the men have maintained their own canoes or small motor boats in the near-by bays.

Without reference to the natural and quite exceptional beauty of the location, such are the physical conditions surrounding the lives of those who work at Bluebell. It need hardly be said that they attracted the best class of men, who, when once they secured a position, were, with few exceptions, wise enough so to conduct their work and behaviour as to keep it.

On the part of the management, there has been no attempt at paternalism. It prohibits nothing but canvassers, gamblers, and too much intoxicating drink. It does nothing and provides nothing which can be regarded as charity. The result has been that while it is probable that all hands know that low costs are essential to a continuance of operation, we gathered together a staff and force that possesses what I may call a collective conscience, the working of which has contributed in large degree, no doubt, to the low costs in this country of high wages and expensive materials.

Wages. Practically all work was done by day labour rather than by contract, and the wages paid and regarded as "standard" for the district, were as follows:

For eight hours:

Foremen	\$5.00 to \$6.00
Shift-bosses	4.00 to 4.50
Machine miners and helpers	3.50
Hand miners	3.25
Millmen	3.00 to 4.00
Smiths and helpers	3.50 to 4.00
Compressormen	4.00
Muckers, etc.	3.00
Carpenters and machinists . . per hour	50

Nine hours—

Outside labourers	3.00
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The approximate average wages for all classes was \$0.433 per hour.

Cost of Ore-Extraction.—All development charges were placed to debit of "capital" or previously written off, so the following statement includes nothing for the cost under the head of development.

As stated before, the ore was attacked through an adit-level and all stoping was done from above it; consequently no charge for hoisting, pumping, or other vice are on the surface. Mesabi transportation costs expense incidental to working from shifts appears.

The orebodies are found in the upper part of a stratum of crystalline limestone of undetermined thickness, striking north and dipping west at about 35 deg. The deposits, of which only two have been worked, while they have a sharply defined and strong roof, are irregular in plan and section and are to be classed as large in size, the workings as a whole taking the form of chambers as much as 100 feet wide, in a north-south direction, and, say, from 10 to 50 feet or more in height. This means large and free-working faces. Wherever necessary or advisable, pillars of ore have been left from time to time, for the support of roof; but subsequently some of them have been removed without difficulty or danger. In this manner, timbering for support has been successfully avoided and, practically, the only wood in the mine is in chute-timbers and track-ties. While several raises through limestone underlying ore have been put up to serve as ore-passes, the irregularity of parts of the deposits

has necessitated much shovelling and wheeling, thus off-setting to a considerable extent the main advantages of large working faces and no timbering. As a rule, the ore may be said to "drill" and "break" well, although most of the low-grade material is so full of quartz crystals as to cause excessive wear on the steel.

Power is derived from a water supply under a static head of more than 700 feet, and compressed air is used on two 3¼-inch piston drills and one hammer drill. Generally, one of the former was in use during three shifts per day, one for two shifts, and the hammer drill, ordinarily, only one shift. These machines, with three or four hand miners in narrow work, kept the output of the mine up to the requirements of the mill, about 160 tons per day. I regret to say that I have no adequate record of the drill shifts nor the lineal feet of hole drilled.

Haulage is done in trains of five 16-foot cars drawn by a horse, except as to a few occasional cars run out by hand at night. The cars were commonly loaded by the muckers, who also assisted the driver in making up trains by various loading-chutes.

The normal underground crew consisted of:

Foremen and shift-bosses	2
Timberman.....	1
Driver	1

Miners.....	14
Muckers, etc.	15
Total	33

Here followed the detailed tables of costs and some comment on the nature of the ore.

Summary—

	Per ton.
Ore extraction	\$0.984
Concentration and shipping	0.498
General	0.376
Total.....	\$1.858

In conclusion, let me say that whilst the result just given is to be regarded as very satisfactory under the conditions set forth, it must be remembered that the figures indicate neither a profit nor a loss. They do not consider the necessity of continuance of development of the mine, the provision of funds for further construction if found desirable, nor are they concerned at all with those items of expense the determination of which is a function of the directors — particularly amortization and interest, which are very important factors in the final test of the value of a mine.

Hollinger Reserve Mines of Porcupine

(Written for THE CANADIAN MINING JOURNAL.)

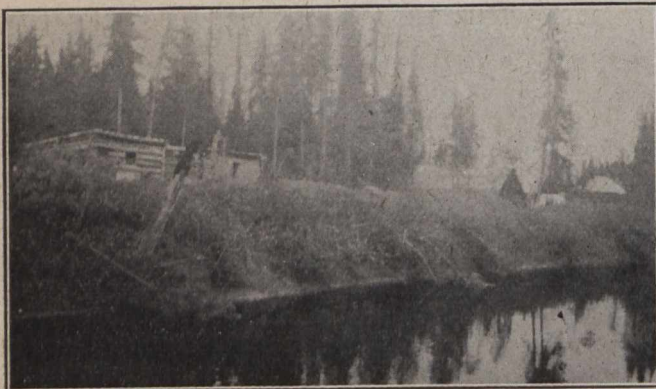
About three miles in a direct line south-west from the village of Timmins, in the township of Tisdale, is the Hollinger Reserve mine in Ogden. The company owns fourteen claims in the various Porcupine townships, totalling 560 acres. Apart from the necessary annual assessment work, all efforts of the management are being concentrated on the six claims in Ogden, which form a rectangular block of land lying on the banks of Mountjoy Creek. This little river has a width of about fifty feet, furnishes all necessary water

covered with a forest of large pine and spruce, that will furnish a sufficient supply of timber for building and mining purposes; while the electric transmission line from Wawaitin Falls, on the Metagami River, will run directly across the property, so that power may be readily and cheaply obtained.

For the most part, this section of Porcupine is fairly level; but three of the claims on the Hollinger Reserve are marked by a rocky eminence that is "pillow-like" in form. It is on this exposure that most of the prospecting has been done, and it is here that the gold discoveries have been made. On the adjoining low-lying country, the rock is hidden by an over-burden of stratified gravel and sand, and further work will be necessary to see whether it also contains similar gold-bearing veins. But the veins now uncovered extend in all directions, and visible gold has been found at intervals along the strike.

The Hollinger Reserve, it may be recalled, was originally acquired by Bennie Hollinger, the discoverer of the famous Hollinger mine, and one of the prospectors that cut through the Porcupine bush. Such engineers as Messrs. J. B. Tyrrell and J. G. Harris, men who have studied carefully the geology of the district, and who are thoroughly familiar with the mineralization of Northern Ontario, agree that it offers substantial possibilities.

The mineral conditions of these properties would indicate that all of these rocks are of the Keewatin age and the existence of the heavily mineralized rock below has doubtless been caused by the presence of harder and more resistant rocks, so that it seems not improbable that other layers, or areas, of schist may be found throughout the sand and gravel covering on the balance of the property.

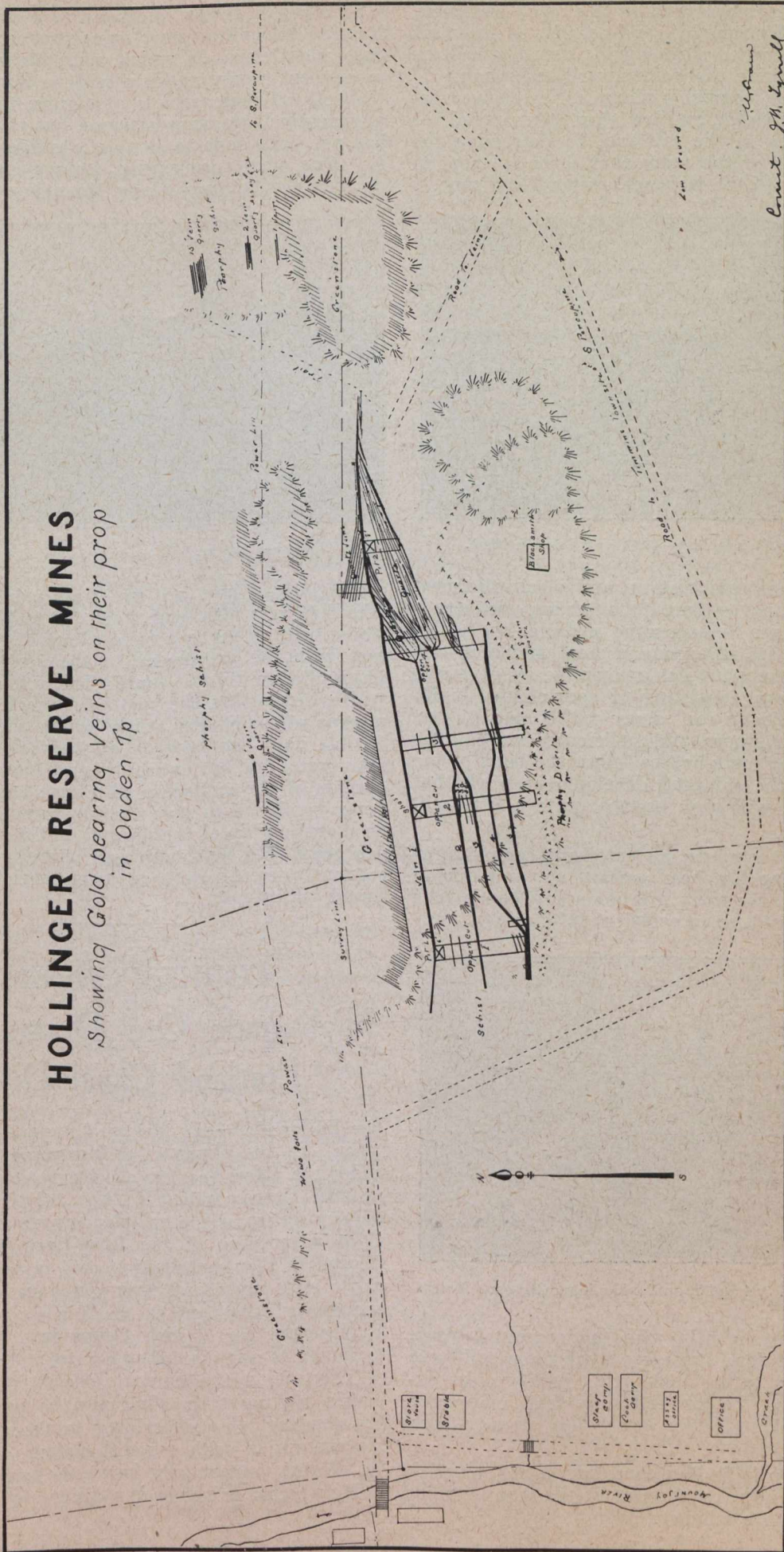


Mountjoy River, running through Hollinger Reserve Properties.

power, and when a few jams of timber have been removed, will be navigable all the way to the Metagami River.

The Ogden properties of the Hollinger Reserve are in a direct line with the Hollinger mineralized belt, and are connected with the better known camps of Porcupine by a good wagon-road cut through the forests and corduroyed across the swamps. They are

HOLLINGER RESERVE MINES
Showing Gold bearing Veins on their prop
in Ogden Tp



The veins already uncovered on this rocky eminence, have been carefully sampled, and as soon as the main shaft will have reached a reasonable depth, it will be possible to determine their downward extension.

In addition, the company plans an extensive diamond-drilling campaign, and has already arranged for several drill holes in the lowland, to determine the western extension of the veins that seem to crop up in a direct line with the Hollinger mineralized zone.



Cook and Sleep Camps of the Hollinger Reserve Mine.

Probably the most picturesque, and surely the most healthy location in the Porcupine mining district, is that of the Hollinger Reserve mine, so far as the health and happiness of its mine management and crew are concerned. The company has a complete set of camps and mine buildings, consisting of cook-camps, bunk-houses, offices, storehouses, assay office and stables, which are fully equipped and sufficiently large. The mine buildings and bunk-houses follow the bank of the creek, and with the enlarged development work that is being planned, will soon become quite a little village.

During the past summer, an extensive campaign of surface prospecting has been carried on, and during the winter most of the work will be underground. The company is in possession of sufficient information, how-



Showing Veins Nos. 3, 4 and 5, on the Hollinger Reserve Mines.

ever, to direct intelligently the underground work. It is hoped that before April, the work done will have proven up a body of ore that will justify more extended operations. To this end a six-drill compressor is to be installed. Electric power has already been arranged for.

Ogden township is finding considerable favour with mining men just now, on account of the many strikes made during the late summer.

In addition to its holdings in Ogden, the Hollinger Reserve Mines Company owns properties in both Tisdale and Deloro, on which, with the exception of the assessment work, nothing will be done until spring. On both of these groups of claims, there are several apparently large veins exposed, but sufficient stripping has not been done to sample intelligently the property. One most encouraging feature may be noted regarding the holdings along Mountjoy Creek. Surface



Ben Hollinger on the left, and No. 2 Vein Hollinger Reserve.

indications.—There are five main veins, avering from 2 to 6 ft. in width, and from 250 to 350 ft. in length. These veins occur in a band of schist, which is in contact with the greenstone to the north, and the porphyry-diorite to the south. The schist is 125 ft. in width, separating the two formations. There are numerous other smaller veins, which show visible gold. Visible gold can be seen at intervals along the five main veins for the entire distance uncovered, and the opinion of the engineers who have examined the property combined to give the impression that the veins as shown on top of the ground will merge in one large ore body both vertically and laterally, and that consequently considerably greater enrichment will be found with depth.

CORRESPONDENCE

High-grade Ore Deposits of the Portland Canal District.

The Editor CANADIAN MINING JOURNAL—

Sir,—In the JOURNAL of November 15 you publish under the above heading a contribution from "An Occasional Correspondent." Now, the purpose of this communication is not to take any exception to the obvious advertising of the Rush-Bagg group of claims secured in that contribution, but to ask you to permit me to state my regret that you have seen fit to allow anonymous reflections on the fairness of the Provincial Mineralogist for British Columbia. Surely it is not too much to ask that when serious reflections are made in print upon Government officials, the name of the person making them shall also be published, so that his standing be made evident to the public, and from his connection with mineral claims, or whatever else be affected, opportunity be at the same time given to judge whether or not he is a disinterested and impartial critic.

If you will open your copy of the Annual Report of the Minister of Mines for British Columbia for 1910 you will find at the bottom of page K 66 the three lines your correspondent first quoted; then turn over three pages, and you will find the second three lines quoted. No explanation was given that between the two sentences quoted as text, there are about 1,800 words of context. Further, the second three lines quoted are a specific reference to a portion of the Portland Canal mining camp that has since been proved to be exactly what the Provincial Mineralogist expressed the opinion it would be, namely, "comparatively low-grade concentrating propositions." In fact, milling and concentrating experience has since proved that the average value recovered has been even less than that mentioned by the Provincial Mineralogist in his report. The fitness of such a manifestly unfair critic to pass opinion on the fairness or otherwise of others is, in my judgment, very doubtful.

It is not my intention to here call in question the existence of high-grade ore deposits in the part of Portland Canal mining camp your anonymous correspondent appears to be deeply interested in. I may, however, direct attention to a few points bearing upon the subject. Your correspondent, immediately after alleging that the statement of the Provincial Mineralogist "is manifestly unfair and wholly unwarranted," states that his purpose is "to remind the investing public that the ores of Portland Canal are not all low grade; that the initial expense of operating high-grade properties is negligible in comparison with the cost of necessary equipment for exploiting low-grade ore; and it is by no means proven which class of properties in this district will develop the best dividend-payers."

Just so; it is not proved that high-grade ore occurs in quantities. A little later he tells of "rawhide ores," and says the minimum assay value of such ore under present transportation facilities would be in the neighbourhood of \$50 per ton," though what "present" or any other "transportation facilities" have to do with assay value is beyond my ken. Later, he tells that Rush and Bagg's camp is at an altitude of 2,000 ft. and is reached by horse trail 3½ miles from the Portland Canal mill (from which, I have been informed, there has long been a good wagon road to Stewart, and now there is a railway). Under such conditions it would seem that a few energetic claim owners could have this year, if not last, managed to ship some of the \$50 per ton ore, if they have any quantity worth shipping. It is not the men who rely upon high assay returns from, perhaps, picked specimens, who make a prosperous camp, nor those who wait for someone to come along to buy undeveloped claims, but the men who will get out ore, under even much greater difficulties than your Rush-Bagg correspondent outlines, and if it lack such energetic claim-owners the "high-grade" portion of the Portland Canal camp may be expected to continue to be non-productive.

In conclusion, I would remind your correspondent, first, that the opinions expressed in his official report by the Provincial Mineralogist have thus far been found, if anything, too favourable, and, next, that after "these high-grade deposits," of which he (the correspondent) writes, shall have been developed and made productive on a commercial basis, to use his own closing words, "it will be early enough to pass judgment upon their value."

E. JACOBS.

Victoria, B.C., December 1, 1911.

Coal on Vancouver Island, B.C.

(By E. Jacobs, Victoria, B.C.)

A consular report relative to coal on Vancouver Island, British Columbia, sent to Washington, D.C., and quoted from by mining journals and newspapers, being inaccurate in one or two details, the following excerpt from a paper on "The Undeveloped Coal Resources of Canada," submitted by Mr. D. B. Dowling, of the Geological Survey of Canada, to the Annual Meeting of the Canadian Mining Institute held in the City of Quebec last March, will show accurately the situation, as presented by Mr. Dowling, who is one of the leading coal geologists of the Dominion and probably the most fully informed concerning the coal resources of Western Canada. In passing, it may be stated that the table containing an estimate of the area of known coal-bearing lands of British Columbia and their probable coal-content, which Mr. Dowling included in his paper above mentioned, was reprinted in the "Report of the Minister of Mines, British Columbia," for 1910 (p. K 176). This table shows an estimated aggregate area of 1,351 square miles, containing 40,221,000,000 tons of coal, in the following proportions: Anthracite, 61,000,000 tons; bituminous, 39,674,000,000 tons; lignite, 490,000,000 tons. It is not unlikely a revision of the figures, taking into account the results of explorations made during the year 1911, would now give a larger area and estimated coal-content to fields

situated in the Skeena country, and, perhaps, also to parts lying north of Cariboo, but no extensive changes are known to have taken place that would similarly affect Vancouver Island coal-fields. Concerning the latter, Mr. Dowling wrote:

"KOSKEEMO AREA AT HEAD OF QUATSINO SOUND.

"The area occupied by rocks of lower Cretaceous age covers 10 square miles. Borings in certain localities have demonstrated that over sections of the area a 3-ft. seam is mineable. The coal is bituminous of good grade. Area, 5 square miles, with 3-ft. coal, equals 9,000,000 tons.

"SUQUASH AREA.

"This was, perhaps, the first of the Vancouver Island coal areas to be mined. The Hudson's Bay Company operated a mine near Port McNeill for a few years prior to 1851. The coal seams are thin, none found being, perhaps, more than two feet in thickness. The area occupied by Cretaceous rocks is large—14 miles along the coast and about three miles wide (not including the extension beneath the sound)—42 square miles. As the richness of the area is not proven the estimate is made for:—Area, 10 square miles; thickness of coal, 3 ft.; equals 19,000,000 tons.

“COMOX AREA.

“The northward extension of this area has not been determined. Of the part known, Mr. Richardson enumerates the following coal seams:—

- “Brown’s River, 7-ft. seam.
- “Union Mine, 10 ft. and 4 ft. 4 in. coal.
- “Trent River, 3 ft. and 3 ft. 8 in. coal.
- “Baynes Sound Mine, 6 ft. and 5 ft. 10 in. coal.
- “Minimum area, exclusive of that at northern end or under Baynes Sound, 300 square miles, having an estimated thickness of coal averaging 6 ft., equals 1,152,000,000 tons.

“NANAIMO AREA.

“In the Nanaimo area two seams of workable thickness are mined. The upper is called the Douglas and the lower the Newcastle seam.

“The Douglas seam, near Nanaimo, is about 8 ft. in thickness, but increases to the west to a maximum thickness of about 14 ft.

“The Newcastle seam varies from 17 ft. west of Nanaimo, to 10 ft. at the Wellington collieries, but may be said to average about 5 ft. over the major portion of the field. The basin extends south to Haro Straits, and, including the submarine portion between the islands, represents an area of about 350 square miles. Borings on Saturna Island demonstrate the presence of the coal at the southern extremity of the basin.

“Estimate of content, allowing 6 ft. each for the two seams, would give a total of 1,344,000,000 of coal.

“COWICHAN AREA.

“This is a smaller basin, of about 50 square miles, lying south-west of and adjacent to the Nanaimo coal-field. The area appears to contain beds of greater age than those bearing coal in the Nanaimo field. Small portions, where the upper measures occur, may prove productive, but for this area a small estimate only is warranted—9 square miles, 4 ft. of coal, equals 23,000,000 tons.”

The consular report now under notice is quoted as having stated that “Last year the Nanaimo field produced 1,615,160 tons of coal.” This would appear to be an erroneous statement. The following figures have been taken from the “Annual Report of the Minister of Mines” for 1910:

Western Fuel Company—	Tons, 2,240 lbs.	
No. 1 Shaft and Protection Island.	364,689	
Northfield (Breachin)	148,181	
		512,870
Canadian Collieries (Dunsmuir), Ltd.—		
Comox (Cumberland)	518,426	
Extension	380,482	
		898,908
Pacific Coast Coal Mines, Ltd.—		
Fiddick (South Wellington)	171,971	
Suquash	2,839	
		174,810
Vancouver-Nanaimo Coal Mining Co., Ltd.—		
(New East Wellington)	29,442	
		29,442
Total production (Vancouver Island) ...		1,616,030

Of this gross production 1,094,765 long tons were produced from mines in what Mr. Dowling regards as being the Nanaimo district—including the Western Fuel Company’s several mines, Extension Colliery, Fiddick Colliery, and New East Wellington Colliery. Of the remaining 521,265 tons, Comox mines produced 518,426 tons, and Suquash 2,839 tons.

It may be stated, in conclusion, that both the Western Fuel Company and the Canadian Collieries (Dunsmuir), Limited, are opening new coal mines and making large expenditures in additional plant, machinery, and other facilities for production of coal in considerably increased quantity, while the Pacific Coast Coal Mines, Ltd., is also providing for an enlarged output, though in smaller degree than the older companies.

The Economy of Power

By L. P. HAMMOND.*

In lode or quartz mining, and in placer mining on a large scale, the cost of power is a most important factor in the cost of operation, and the difference between the cost of operation and the selling price of the product of the mine is the only basis upon which the real success if the mining venture can be measured. Mining is a business governed by the same rules that apply to any other business, and the success of an undertaking in mining is not by any means entirely determined by the assay value of the ore found. There are four accepted ways of obtaining power for mining in our mountains.

First, steam power plants. Until recently most of our mines were operated with steam power plants, using, in a majority of cases, coal for fuel. The cost of this coal varied all the way from \$3.00 a ton in mining districts like Leadville, where coal can, in many cases, be delivered directly from railroad cars into the mine’s coal bin, up to \$15.00, and even \$18.00 a ton, where the coal has to be hauled or packed long distances from the railroad. It would be hard to

place any average cost figure on wood burned for fuel, but it is safe to say that considering two cords of wood the equivalent of one ton of coal for steam-making purposes, in very few places have operators been successful in obtaining wood at a lower cost than the equivalent of \$5.00 per ton for coal.

The second method is the use of a gasoline engine. In general, this method of obtaining power has been limited to out of the way, remote districts and the use of power for prospecting purposes, and consequently on a very limited scale.

The third method is the use of water power. This has been decidedly limited, partly because of the relatively high first cost of developing and equipping such a power, and partly because few of our mountain streams prove a reliable source of power during the winter months.

The fourth and last method is in the purchase of custom electric power. Colorado is now particularly fortunate in the extent to which the distribution circuits of custom electric power companies cover its mining districts.

*From the Colorado School of Mines Quarterly.

In considering the reduction in mining costs effected by this extensive power service the elements of the cost of power must be considered. These are an annual fixed charge, involving a reasonable percentage to cover:

First. A fair return to the investors upon the money wrapped up in the equipment.

Second. Another percentage charge by which the original cost of the equipment is spread over a number of years of the probable useful life of the equipment, in other words, writing off the cost of the original equipment by distributing it over a number of years operation.

Third. Percentage charges to cover insurance and taxes upon the equipment. The sum of these charges constitutes an annual fixed charge, which endures and must be counted as part of the cost of operation whether or not the equipment is used.

Next comes the cost of labour, since except in very small power plants it is, of course, necessary to provide men for the care and operation of the equipment. It should be borne in mind that so long as the plant is operating at all, this labour cost is also a fixed cost, that is, it does not fluctuate with the amount of energy actually generated by the plant.

Then comes the cost of fuel—coal, wood, gasoline—as the case may be. This will vary in some proportion to the amount of power actually generated, but not in direct proportion thereto, because the machinery of a large power plant is much less efficient at a small load than at a load approximating the capacity of the plant. In other words, it is necessary to put more fuel per unit of energy produced into a large plant working on a small load than into one working at the capacity of the plant. In addition to the cost of coal delivered at the coal mine, plus the cost of freight, plus the cost of handling from the railroad to the bins, there is another factor calculable in dollars and cents, and this factor is the extent of supervision that must be given by the mine manager to secure an adequate and reliable source of supply. Under the climatic conditions that prevail in our mountains, especially during the winter, one can readily see why in mining operations this is in itself a very considerable factor.

Next comes the cost of repairs on the power plant equipment, and last of all the cost of oil, waste, and miscellaneous supplies. It will be seen that the cost of power consists of a fixed cost, irrespective of the percentage of its capacity at which a plant is worked, and a variable cost which fluctuates to a considerable extent with the amount of work done by the plant.

Where custom power can be obtained the user thereof is certain of a continuous supply of power; he does not have to worry about snow-bound or washed-out railroads, about the quality of the fuel used, nor about obtaining and keeping skilled engineers. He does not have to see that men are at the mine an hour or two before the miners go to work in order to be certain that steam is up and custom power can not go to town to spend a holiday and fail to report for duty on the following morning.

When it comes to the first cost of equipment of the property a very great saving is invariably effected. Of course, conditions vary widely, but it is safe to say that the first cost of electrically equipped mining machinery or the installation of electric motors to drive a mill will range from 33 $\frac{1}{3}$ per cent. to not more than 66 2-3 per cent. (with 50 per cent. as a fair average) of the cost of putting in steam-operated ma-

chinery with the necessary boilers. The steam end of the machinery with the boilers will cost, installed, not less than \$100.00 per horse-power; while the installation of electric motors to accomplish the same work will cost not more than \$40 per horse-power, and of course, a horse-power is the same in energy whether produced by an electric motor or by steam or gasoline engine. Here is a saving on a moderate sized equipment of \$60.00 per horse-power. If we allow the very moderate overhead charges of 15 per cent. per annum, we already have a saving in our operation of \$9.00 per horse-power per year, on the fixed charges alone before any energy whatever has been used.

The rates of the different power companies vary considerably as does the method of rate making, but it is safe to say that in almost every instance the cost of custom electric power is considerably below the cost of the necessary coal and labour to produce the same amount of energy by steam.

Another important element is that without custom electric power few of the moderate sized and small mines would use electricity because of the high first cost of the small, isolated electric plant. The facility with which electric power can be distributed to different pieces of machinery with relatively small loss of energy in such transmission is of particular importance where power is used to operate so many different machines at so many different points as in the mining industry. For instance, consider the use of the small mine pump operated by steam from boilers at the surface. To carry the steam down the shaft to the pump a great deal of the energy of the steam is lost by radiation and condensation, and such a pump will require fully three times as much steam per horse-power generated in its engines as would be required by a first-class engine located on the surface near the boiler. On the other hand, electricity can be carried down the shaft to the bottom at very high efficiency.

The manager of the Wilson Mining Company, at Robinson, Summit County, reported that during the heavy water periods it cost from \$1,200 to \$1,500 a month for coal for the operation of the pumps, and this with coal at about \$5.00 per ton. The pumps were converted to electric operation with a resulting cost of less than \$250.00 per month for power. At a large mine in Leadville, the operators of which do not care to be quoted as to their unit costs, hoisting from 600 feet depth with a steam hoist cost six and a fraction cents per ton. This company is now served with an electric hoist at the company's standard rate and the mine is now hoisting from 700 feet depth at a cost of about 2 $\frac{3}{4}$ cents per ton.

The Central Colorado Power Company is the first company in the state to publish its rates for service and to adhere thereto rigidly. Its standard rate is a combination rate, consisting partly of a flat rate per horse-power used and partly of a meter or energy rate, based on the actual consumption of power. In the custom power business the purchaser of power likes to purchase his power strictly on a kilowatt hour-basis, paying for just what energy he actually consumes. On the other hand, the custom power company likes to sell all its energy strictly on a flat basis, that is, at a given charge per horse-power of maximum demand per month, irrespective of the extent to which the service is used. Neither basis is fair alike to the power company and to the consumer, and the reason for this can be made very plain by a brief example. Supposing you yourself were in the custom power business possessing a plant with a capacity of 1,000 horse-

power. In this event you would probably have an investment of something like \$75,000 on which you would have to earn in addition to your coal, labour, repairs and supplies cost, a fixed charge of 15 per cent. per annum, in order to cover your entire cost. Suppose a man came to you and wanted to contract for power on a meter basis, and having arrived on a price per horse-power, you then proceeded to sell him 1,000 horse-power. Now, if he used this power only two hours a day, he would tie up the entire capacity of your plant, and at the same time would use only 1/12 of the energy you could generate with this investment, and in so doing he would use 2,000 horse-power hours per day. On the other hand, suppose another man came to you for power and used only 100 horse-power of your capacity, but operated 20 hours a day. He would also use 2,000 horse-power hours a day, exactly the same amount of energy as would be used by the first man, but the second man takes only 1/10 of your plant capacity. Obviously, you could not afford to sell each of these two men power at the same rate per horse-power hour. Likewise, the man who wanted 1,000 horse-power for only two hours a day could not afford to pay you the same price per horse-power month as could the man who wanted service for 20 hours per day. Consequently, the trend of all modern rate-making in custom power service is towards a compromise between these two conditions. The Wisconsin Public Utility Commission has done most excellent work in arriving at fair methods of negotiation between custom power plants and their consumers, and this commission has invariably ordered the custom power companies to base their charges partly on a flat rate on the maximum demand for power by any one customer and partly on the energy that a customer actually used. Under such a method of rate-making the cost of power to a consumer depends on what is called "load factor." The "load factor" is the percentage representing the relationship of the average load throughout a given period to the maximum load at any one time in that period.

I am not in possession of all the rates quoted by custom power companies in Colorado, but the rate of The Central Colorado Power Company, which is the largest of the several companies mentioned, is as follows:

FIXED CHARGE.

Per month	Per H. P. of Maximum Demand.
For the first 100 H. P.	\$3.25
For the next 400 H. P.	2.25
For the next 500 H. P.	1.75
For all additional H. P.	1.00

ENERGY CHARGE.

Add for all energy used as shown by meter 13 mills per kilowatt hour for the first 40,000 kilowatt hours used each month, and 5 mills per kilowatt hour for all additional energy.

This rate works out as follows: If the maximum demand be 100 horse-power, and the annual load factor 60 per cent., the cost of power is then \$90 per horse-power year, and the cost of \$90 per horse-power year at 60 per cent. load factor is 2.3 cents per kilowatt hour, a kilowatt being the same amount of energy as in 1 1/2 horse-power, and a kilowatt hour being the amount of energy involved in the use of 1 1/2 horse-power steadily for one hour.

If the maximum demand be 200 horse-power, and the load factor 60 per cent. the cost of The Central Colorado Power Company's service is about \$72.00 per

horse-power year, which is the same thing as \$1.85 cents per kilowatt hour.

If the maximum demand be 500 horse-power, and the load factor 60 per cent., the cost of the Central Colorado Power Company's service would be \$57.00 per horse-power year, or about 1.45 cents per kilowatt hour.

It will be found that these rates are even lower than those given to custom power users throughout the East, where the cost of generating power is naturally much less than in our mountains, because of both climatic and geographical conditions.

An instance of the saving in mining costs effected by this power service is given in the case of the large Iron-Silver Mine at Leadville, where, after conversion from steam to electric drive, the manager reports a saving of 48 per cent. in the cost of pumping, and of 38 per cent. of his hoisting costs.

In the mining and milling of low grade ore bodies, power becomes a very high factor in the total cost. A former manager of the American Zinc Extraction Company's custom mill at Leadville (mill treated low grade complex lead, zinc and iron ores) reported that in his operation the cost of power constituted 25 per cent. of his total cost. The availability, therefore, of a reliable and cheap power is certain to do much toward the developing, mining and milling of low grade ore bodies that makes most for substantial and prosperous mining communities.

ELECTRIC SMELTING OF ZINC-LEAD ORE IN NORWAY AND SWEDEN.

The electric smelting works at Sarpsborg, Norway, and Trollhattan, in Sweden, have been taken over by an English company. At these works it is intended to treat complex sulphide ores and the mixed sulphides of lead, zinc, copper and iron so frequently found in many parts of the world, but at present of little commercial value in consequence of treatment difficulties. An abundant supply of hydro-electrical power will be available in these works, as the countries are well supplied with rapid rivers and large lakes at high altitudes. Reports by Messrs. J. C. Moulden and F. W. Harbord have been supplied, which state that the electric furnace employed has carbon electrodes, and the heating and melting of the charge is effected by resistance with a current of low voltage. In the first furnace 2.8 tons of roasted ore can be treated in 24 hours. The horse-power per furnace is 350, and at Trollhattan the cost of power by the hydro-electric company runs to 30s 3d per horse power year. There are 11 furnaces. The roasted ore, coke or anthracite dust, and flux are charged into the furnace, and most of the zinc and some of the lead is volatilised. The greater proportion of this is condensed as a crude spelter with high lead content, but much of it is precipitated as metallic fume and oxide, and has to be returned to the furnace in subsequent charges. The lead that is not volatilised is reduced as liquid metal, and it contains a considerable proportion of the silver. Matte is formed of the iron, copper, and sulphur, if present in the ore, and some of the lead, zinc and silver passes into it. Some lead also escapes with the slag. The crude zinc is refined in other electric furnaces, and the final zinc product is exceptionally pure, averaging 99.9 per cent., commanding a premium price in the market. During Mr. Harbord's experience at Trollhattan 518 tons of roasted Broken Hill slime, 19 tons of calamine, 22 1/2 tons of zinc-lead powder, produced

previously produced 160.8 tons of crude zinc, which, on refining, yielded 112.4 tons of pure zinc, 24.7 tons of lead and 36 tons of zinc-lead powder. In addition, 41 tons of lead tapped contained 141 ozs. of silver per ton and 17 tons of "leak" lead, assaying 27 ozs.

silver per ton, was recovered, also 9 tons of skimmings containing lead, zinc and silver. The recovery from the various sources was 64 per cent. of the zinc, 74 per cent. of the lead, and 46 per cent. of the silver, not counting the metal in the powder.

Character of Ore Deposit and Probable Milling Methods at Porcupine.

(Written for the CANADIAN MINING JOURNAL by Louis W. Huntoon.*)

The following article on the Porcupine district of Ontario is intended primarily to discuss the ore deposits and future prospect of the camp, the character of the ore, and the probable milling methods which will ultimately be introduced.

Location and Extent.

This district, which has attracted such world-wide attention, due to the phenomenal rich strikes of gold ore, can now be reached by rail from Toronto, a distance of 473 miles. It is located north of Toronto, North Bay, and Cobalt, on the Hudson Bay slope of Northern Ontario. The district is many miles square, although most of the prospecting and development work has been confined to the township of Tisdale.

History.

Previous to three years ago the district was a vast wilderness and little was known of it. The main part of the camp is situated along an old portage route used by the Hudson Bay Company officials for a couple of centuries. In 1896 Mr. E. M. Burwash, and again in 1899, Mr. W. A. Parks, noted the occurrence of quartz veins carrying traces of gold. These observations were published by the Bureau of Mines, with the remark that the country was a promising one for the prospector. In 1906 some prospecting was done near the Hollinger vein, but evidently as no free gold was seen, and as no assays were made, work was abandoned, and it was not until 1909 that the spectacular discoveries were made on the Dome prospect by J. S. Wilson. This discovery caused a rush to the district, and in a few weeks practically all of Tisdale (36 square miles), and a large part of the adjoining townships were staked out in mining claims. These spectacular surface showings inflated the value of claims to such an extent that they changed hands at mine prices before the properties had been prospected and caused such remarks as: The price at which properties are held is determined by the number of specks of gold, and in some cases the price appears to be \$50,000 per speck. One broker in Toronto stated that he had no trouble in selling properties, providing he could guarantee a cropping of rock, which is significant, inasmuch as many claims were located in swamps or on land which had a very heavy overburden of soil. During the excitement mining companies were organized and capitalized in the millions, and from the favourable reports published on the camp and by mining companies, it was easy to dispose of such stock at a handsome profit to the promoters. It is to be hoped that some day in the near future, laws will be

enacted to protect the public against investments which are so over-capitalized, by requiring the promoters to furnish security, such as mortgage bonds, together with the stock for all cash invested, and that these bonds shall be paid off from the first profits derived from operating. Much of the stock of the Porcupine camp, as well as the stock of other mining districts, is worth no more than the paper upon which it is written. Only last summer many companies allowed the information to be circulated that mills were being designed and the machinery ordered, on which information the price of the stock was advanced. There were but two mines at the time these reports were circulated which had sufficient ore developed to warrant the erection of mills.

Last winter all supplies, including machinery for two mills, were hauled into the camp over the frozen lakes and snow, and this spring at the "break up" it was almost impossible for a man to walk into the camp. This fall opened with a railroad into the camp, and the Government is to be complimented on the speed with which this tremendous undertaking was accomplished. The Government is also building wagon roads through the forest, and by next summer it should be possible for a visitor to be transported by carriage around the camp. The forest fires of the summer destroyed both the Hollinger and Dome mills. The latter company duplicated its order, and the second mill has been delivered by rail to the property, and should be operating the early part of 1912.

Prospecting, Exploring and Development.

The camp is but two years old, and during this period a large amount of money has been invested in prospecting, exploring, and developing.

The method of prospecting, similar to that of the Cobalt district, consists of surface trenches and striping. When a vein is located it is stripped and examined for specks of free gold. The surface showings are carefully guarded, as it was on these that the properties and stock were sold. At one property visited the specks were so few that it was necessary to use a tape measure to locate them, and still the reports received in New York from the manager of this property were most favourable. Another property with a surface showing of a small pocket of quartz carrying free gold, was selling last summer on the New York curb at a valuation of over \$800,000. The exploration work on this property consisted of a shallow shaft located in the country rock. The ore body showing on the surface has not been found in depth after further sinking and crosscutting, although another pocket of quartz carrying values has been developed. The results from this exploratory work ap-

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parently have not been favourable, as the value of the property has decreased on the curb to \$309,000.

After the veins are discovered, and sufficient money raised to explore the property, shafts are sunk. A rule which should always be followed on such uncertain deposits in exploration work is to stay with the ore. Only in a very few instances has this rule been followed. The inference is that the promoters, sinking shafts in the country rock, did so for stock speculation and for fear of destroying the beautiful showings of free gold. Diamond and shot core drills have been largely used throughout the camp, and the information derived has been most valuable.

The two principal properties which have been developed are the Dome and Hollinger mines. These properties may be classed as mines, and the capital stock of the companies will be returned with interest to the stockholders. There are only a few other properties upon which development work has been done, and before classifying them as mines, considerable more work will be required with the possible exception of one or two.

Ore Deposits, Future Prospects of Camp.

The ore deposits are of the fissure type, occurring in the Keewatin schists, Huronian conglomerate, and in Langmuir township, a contact vein between granite and schist is reported assaying from \$4 to \$8 per ton. The rock formations of Porcupine have been subject to much greater metamorphism than in Cobalt, resulting in some deposits of much greater extent. The Keewatin has been altered to schists and in places so badly crushed that it resembles a conglomerate. The veins forming the ore bodies cover a wide area, occurring in groups along certain lines of fissuring, although often isolated. In the township of Tisdale the results of the prospecting have shown three distinct areas.

In the vicinity of Pearl Lake the line of fissuring extends for about three miles, and has a general strike to the northeast. The Hollinger mine and some good prospects which warrant thorough prospecting, are on this line of fissuring. On this same line are also many small isolated veins which may furnish sufficient ore for a centrally located customs mill, but very few properties will warrant the erection of individual mills. A recent report on one of these properties contains the following: "The surface has been partially prospected by approximately 10,000 feet of trenching and stripping. Twenty-three veins have been discovered." This statement reminds one of the annual reports issued by the Cobalt mines and tends to prove that the area of fissuring is wide, that the individual veins are scattered, and most of them will probably be limited in extent. Before such deposits warrant the building of mills, they should contain sufficient fully developed ore to repay such an investment.

Southwest of Porcupine Lake the surface shows that the formation has been badly crushed and fissured. In this district we have the Dome mine, where the disturbance is over an area of six hundred by eight hundred feet, producing the large deposit of ore developed on the Dome property. This ore body consists of quartz veins in the disturbed formation. The general strike of the formation is north of east, and on this line, and also to the northeast, small scattered veins have been discovered, but only a large amount of stripping, followed by exploration work, will determine if they are of any commercial value.

North and northwest of Porcupine Lake we have our third area of fissuring. The general strike is east

and west. The ore bodies in this section consist of scattered deposits of comparatively limited tonnage, which, when developed, may furnish sufficient ore for a customs mill. In June the surface indications were that no one property would warrant the building of a mill although further exploration work may possibly develop a large mine.

Character of Ore.

An examination of the veins and ore of the district indicates that the original fissures were filled with quartz containing no values. At some later period the quartz was again fissured and fractured, and the gold deposited together with quartz in the interstices. In the gold quartz we generally find ankerite, which appears to have been one of the important precipitating agents. It is a fact that the greatest quantity of gold is along the fracture planes, which in some ores, such as Rea, gives a streaky character to the ore. The distribution of the gold is very irregular and occurs chiefly along one or both walls of the quartz, providing it has not been thoroughly fractured. The unfractured portions of the veins, so far as could be learned from inquiries and observations, contain no values. The pyrite associated with the quartz, according to the Government report, is auriferous and one sample assayed \$10.40 in gold. The mine operators in the district state that the pyrite contained in the gold quartz is auriferous, but that that contained in the country rock is not. The irregular mineralization of the veins is responsible for the statement of engineers and geologists, that the district will develop into a low grade camp. The ore as hoisted will probably be low grade, but there is no reason why the "run of mine" should not be hand picked and a high grade ore sent to the mill, thereby reducing costs and increasing capacity and efficiency.

Milling.

Before a large milling plant is erected, it is much safer to erect and operate a small and complete testing plant during the development of a mine, and from the information derived from this plant to design the large mill. It is practically impossible on most ore bodies to select one or two car loads of representative ore to be tested in an ore testing plant, as the samples should be taken from all portions as the development advances. If thorough tests are not made before the erection of the final plant, it is often necessary at a great expense to rearrange the entire plant, adding to and taking from the plant installed. The general character of the ore and ore deposit will often furnish valuable information, and especially so when compared with like ores of other districts. It is from observations made in the district and comparing the work of other districts that the following suggestions are offered.

The milling method adopted by the Dome mine, as published in the CANADIAN MINING JOURNAL, is as follows: Hoisting, breaking through two gyratories, and conveying to stamp mill bins. The second operation consists of stamping, plate amalgamation, classifying, tube milling, plate amalgamation, classifying, and de-watering. The third operation is cyaniding in Pachuca tanks, and the last is the recovery and refining of the gold from the cyanide solutions.

It would appear that the first two operations might be altered, thereby greatly increasing the capacity and efficiency of the mill.

Preliminary Hand Dressing.

The character of the deposits are such that a large amount of country rock or waste rock must be mined

with the ore. If this waste rock can be distinguished from the gold-bearing quartz, and presumably it can, it is far less expensive with such ores to discard the waste by hand than to put it through the mill. Specimen ore can be recognized and it may also be advisable to sack this both underground and on the surface for special treatment, as is done at various properties.

Reviewing hand sorting operations in various large camps we find the following: At the gold mines in South Africa, where more attention has been given to hand sorting of gold ores than in any other district, the ores are sized before picking, so as to increase the efficiency. The amount of waste discarded by hand in this district will average approximately 20 per cent. A great many of the mines are discarding over this amount. At the Ferreira mine, in South Africa, a net saving of \$1,167,000 was made in ten years, and during 1903 and 1904 the annual net saving was \$125,000. The annual reports from all of the mines in this district show large savings from hand dressing. In the Tonopah district of Nevada, where wages are four dollars per day, special ore sorting houses have been erected. One of the first of these was that erected by the Tonopah Mining Company, where 11 per cent. of waste is discarded at a cost of 80c. per ton of waste. The ore sorting consists of feeding the run of mine to a 1½-inch grizzly, from which the oversize is discharged to an ore bin. The ore from here is fed to a picking apron just below the bin gates. This arrangement costs practically nothing to install, as it is only a slight addition to the ore bins and is very efficient. The Tonopah-Belmont plant is of recent construction and contains ore sorting belts. Such an arrangement, the advantage of which is closer sorting, is more expensive to install. From 15 to 20 per cent. of waste is discarded at a cost of 68c. per ton of waste. At the West End mine very close sorting is required, as the ores are shipped to the smelters. The cost at this plant is \$1.57 per ton of waste discarded. In the Cripple Creek district of Colorado, where labour is also high, special ore sorting plants have been erected, and it is due to these plants that many of the mines have been successfully operated.

At the following properties both high grade ore and waste rock are separated by hand: At the North Star mines in California, the rich gold ore is picked out by the specimen bosses and run through the mill at the end of the month just before making the clean-up. In the Cobalt district the waste rock is discarded by hand and the high grade ore is carefully picked out and sacked for shipment or for special treatment. In the lead silver district of Idaho, we find that hand dressing has only been introduced within the last few years and that it has been most successful in increasing the capacity and efficiency of their plants by discarding waste rock and sacking the high grade lead-silver ore underground and also sorting it out from the picking belt.

In the above districts, where labour is high, hand sorting has been most profitable, not only reducing the cost of operations, but also increasing largely the capacity of the mills. From the character of the deposits in the Porcupine district, hand dressing should be very carefully considered, and with the smaller mines it is the only method by which they can be operated at a profit.

Crushing and Pulverizing.

Rapid progress is being made in fine crushing, and the flow sheets of gold mines are being altered the world over to increase the capacity of the stamp mill.

For several years past the weight of stamps in use in South Africa has been gradually increased from 1,000 to 2,000 pounds, whereas in this country the increased weight is not so pronounced. At the Dome mine it is the intention to use 1,250-pound stamps, which, with a few exceptions, are the heaviest in use in America. The use of coarser discharge screens to increase the capacity is very common, and this, in turn, necessitates the installation of some form of pulverizer. Tube mills taking the feed from the stamps have been in favour, but lately the Goldfield Consolidated Company of Nevada has installed Chilean mills between the stamps and tube mills. The installation of six 6-foot Chilean mills, at a cost of \$75,000, has increased the capacity of 100 stamps from 6 tons to 8.5 tons. The installation of stamps and tube mills, together with the necessary changes for this increase in capacity, would have cost \$175,000. The following comparison of costs is interesting:

	Two-stage	Three-stage
	Reduction.	Reduction.
Stamping	13.4 cts.	13.4 cts.
Chilean mills .....	.....	10.6 cts.
Tube milling	30.0 cts.	16.6 cts.
	<hr/>	<hr/>
Total, per ton	43.4 cts.	40.6 cts.

Not only has the installation of Chilean mills and accessories cost \$100,000 less, but the cost of operating is also 2.8c. less per ton.

Concentration.

The Porcupine ores carry a small percentage of auriferous pyrite which is liable to increase with depth. Experience has shown that most ores containing free gold and auriferous pyrite give a higher recovery by concentrating and amalgamation and treating the sand and concentrates separately.

Reviewing the practice in other camps, we find the following: At the Perseverance mine, Juneau, Alaska, the gold ores carry only 2 per cent. of pyrite. These ores are stamped, amalgamated, and concentrated. The concentrates assaying \$30 per ton are then amalgamated in pans and re-concentrated. The results at this property are reported to be most satisfactory. At the Alaska-Treadwell mill, on Douglas Island, the ores up to a year ago were stamped, amalgamated, and concentrated, and the concentrates, assaying about \$30 per ton, were shipped to a smelter. Since then the concentrates have been pulverized in tube mills, passed over amalgamating plates if necessary, and cyanided, resulting in a large saving on the cost of treatment per ton. The ores on the Goldfield Consolidated mine of Nevada have given considerable trouble, due to a large percentage of the gold being carried in pyrite, which could not, without special treatment, be recovered by amalgamation or cyaniding. Their original mill consisted of stamping, amalgamating, tube milling, concentrating, and cyaniding of the tailings. The concentrates were shipped to a smelter at a heavy cost for freight and treatment. After considerable experimenting, it was found by first treating the concentrate with an acid solution, that 94 per cent. of the gold could be recovered by cyaniding, thereby reducing the cost ma-

terially. This special process is in use at the present time.

The advantages to be derived by concentration before cyaniding, are increased capacity of the plant, very often a slightly increased extraction, and increased profits. By concentrating after amalgamation any coarse grains of gold which are coated with a film, preventing amalgamation, and pyrite containing gold, are removed. This leaves a clean sand containing fine gold, which can be run through the cyanide tanks rapidly with a high extraction, thereby decreasing the number of tanks required. The concentrates which contain gold not amenable to amalgamation can then be shipped to the smelter or be given a special treatment and a high extraction obtained.

Theoretical Example.

The following theoretical example may serve to bring out the advantages to be derived by preliminary hand picking and concentration of ores. Given a gold ore assaying \$10 per ton, from which 90 per cent. can be recovered by amalgamation and by cyaniding of the tailings. The capacity of the plant to be 100 tons per day, and four days to be allowed for cyaniding. The plant will then require a tank capacity of 400 tons. Allowing \$2 for mining and \$2 for milling, our net daily profits will then be \$500.

If from the above ore 25 per cent. of waste rock, assaying \$1 per ton, can be hand picked at a cost of \$1 per ton of waste, we can then increase the ore mined $33\frac{1}{3}$ per cent., or from 100 to $133\frac{1}{3}$ tons per day, and from this we will have 100 tons to feed to the mill, assaying \$13 per ton. Assuming that a recovery of 50 per cent. can be made by amalgamation, that 4 per cent. of concentrates, assaying \$30 per ton, will be produced, that the sands free from pyrite and coarse gold can be cyanided in two days with a recovery of 95 per cent. of the gold contained in the

sands, that a recovery of 90 per cent. of the gold in the concentrates can be extracted by a special treatment requiring six days, at a cost of \$1 per ton for this special treatment, we then find from our table that our profit has been increased \$247.83 per day, and that a tank capacity of only 216 tons will be required, as against 400 tons tank capacity by treating direct.

Conclusions.

In conclusion, the writer wishes to say that this article is not written to criticize the mills being designed and erected by companies in the Porcupine district, who are employing metallurgical experts, but merely to call attention to certain observations made when visiting the camp in June. Hand dressing has not been practised to any large extent in America until within the last few years, as it has always been assumed that the labour costs were entirely too high. Abroad, and especially in Germany, hand dressing is practised on a very large scale. With properly arranged plants hand dressing of waste rock from gold ores is far less expensive in most cases than milling. The references made to crushing and concentrating are improvements which have been introduced in gold milling within the last few years.

Results Hand Dressing-Concentrating.

	Tons	Time	Total
Run of Mine	100	4 days	400 tons

Tank Capacity Required.

	Tons	Time	Total
Run of Mine	133		
Mill ore	100		
Sands	96	2 days	192 tons
Concentrates	4	6 days	24 tons
Total	133	1.62 days	216 tons

Profit Milling Direct.

	Tons.	Assay.	Value.	Costs.	Loss.	Recovery.
Mining	100	10.00	1000.	200	...	...
Milling	100	10.00	1000.	200	100	900
Total .....	...	.....	.....	400	100	900
Less Milling .....	...	.....	.....	100	...	...
Total Cost and Loss .....	...	.....	.....	500	...	...
Net Profit per day .....	...	.....	.....	500	...	...

Profit Hand Dressing—Amalgamation—Concentrating—Cyaniding.

	Tons.	Assay.	Value.	Costs.	Loss.	Recovery.
Mining	133	10.00	1333.	267.	.....	...
Waste Rock	33	1.00	33.	33.	33.00	...
Milling	100	13.00	1300.	200.	.....	650*
Concentration	100	.....	.....	10.	.....	...
Sands	96	5.52	530	...	26.50	503.50
Concentrates	4	30.00	120	4.	12.00	108
Total .....	...	.....	.....	514.	71.50	1261.50
Loss Milling .....	...	.....	.....	71.50	...	...
Total Cost and Loss .....	...	.....	.....	585.50	...	...
Net Profit per day .....	...	.....	.....	747.83	...	...

*Recovery by amalgamation.

SPECIAL CORRESPONDENCE

ONTARIO.

Cobalt, Gowganda, and South Lorrain.

Sir Henry Pellatt has secured a three months' working option on the 40-acre claim of the Dominion silver mines, near North Cobalt. A shaft has been sunk 30 feet on one of the veins and some time ago it was reported that silver had been discovered in it. A small plant will be installed and vigorous development ensue. It is also reported in this same section that the Santa Maria Mining Company, which has the Green Meehan under lease, has struck another body of ore.

The report of the Buffalo mill for the month of September reads: mill ran 550 hours, ore milled, 4,116 tons; average assay, 29.22 ounces; ounces recovered, 97,972; ounces of silver paid for during the month but shipped previously, 106,726.

In a report to the head office of the Trethewey, Mr. Chas. O'Connell reports a considerable improvement in the physical condition of that property. He states that while the mill is treating an average of a hundred tons per day, yielding approximately 2,000 ounces of silver, there is now in sight three years' supply of milling ore under ground and one year's supply on the dump. From the beginning of the year to October 31st, there had been shipped 491 tons, containing gross value of 299,121, as compared with 423 tons of gross value of \$275,070 during the same period of the previous year. The financial position of the company on November 10th was: cash in bank, due from smelters, and ore on hand, \$104,695.

The Beaver Consolidated has declared another dividend, payable on December 15th. It is of 3 per cent., and calls for a disbursement of \$60,000. The Beaver paid its first dividend after two and a half years of work on May 15th, and has now paid 8 per cent., or, altogether, \$170,000.

A. H. Brown, formerly of the Coniagas mine, Cobalt, and later manager of the Pike Lake Mining Company, at Swastika, has taken up his duties as manager of the Hudson Bay mine at Cobalt.

The McKinley-Darragh-Savage will pay its usual 10 per cent. dividend on January 1st. During the past year the McKinley-Darragh has paid 50 per cent. to shareholders, and has now returned 96 per cent. of its capitalization, or \$2,156,521.

The shipments from the Cobalt camp for the month of November read: McKinley-Darragh-Savage, 258.46 tons; Coniagas, 145.86; Cobalt Lake, 162.72; Crown Reserve, 48.93; Nipissing, 358.02; Buffalo, 87.73; Cobalt Provincial, 25.05; Hudson Bay, 97.32; La Rose, 252.36; Right of Way, 41.17; Cobalt Townsite, 23.59; Temiskaming, 67.78; Chambers-Ferland, 32.00; Colonial, 22.25; Kerr Lake, 111.97; Trethewey, 29.88; O'Brien, 32.02; Drummond, 90.00; total, 887.25. The only heavy shippers of low grade ore last month were the Nipissing and the Drummond, the great bulk of the ore being concentrates and high grade ore, with about \$190,000 in bullion.

Last month the Nipissing produced \$225,907 net, and shipped \$248,980. Of this production \$90,407 was of mine ore, while \$158,573 was contained in the bullion from the high grade reduction plant. While there were no new developments, the underground work on the property is proceeding very satisfactorily.

Porcupine and Swastika.

While every one is waiting expectantly for the long delayed report on the Hollinger, very favourable development is proceeding at the Miller Middleton, the next Timmins-McMartin-Dunlap flotation likely to go on the market. For 125 feet the drift at the 65-foot level is in an ore body of quartz and schist which on the first sampling ran \$8 to the ton. The face of the drift is still in values.

For the last month the market has hung fire until the publication of Mr. Robbins' report. As this is the first occasion on which the property has been thoroughly sampled, it is

awaited with the greatest interest. Meanwhile the work of construction is proceeding. Nearly all the camp buildings have been completed, and the mill is now up to the second story, although most of the machinery is not yet on the ground. Underground the position remains very much as it was four or five months ago. This is to say, there is 1,100 feet of drift in ore on the 100 foot level, with an average vein of eight feet. On the second level about 237 feet have been opened up, with values and width much the same. There is one more important lead located and opened up for 50 feet on the first level. This was 24 feet wide where it was cut, and as the whole of the drift is in solid quartz it is difficult to arrive at an average width. Another ore body cut consists of about a foot of quartz in a mineralized schist zone, and here it is the schist that carries the values. There is very considerable dissatisfaction with the progress that has been made lately on the Hollinger Extension branch. The Timmins syndicate, which is providing the money for the extension, was promised the railroad in at their townsite by November 1st at the latest, and now it is very probable that it will not reach that spot by February or March 1st. Many companies held back their orders for machinery until they saw that it would delay them very considerably if they did so, and they are now hauling over the roads.

In its No. 4 shaft the McIntyre has cut its vein at the 200 foot level. It is reported that the vein is at this particular point twenty feet wide, and that it runs \$19 to the ton. Work is proceeding fast with the construction of the ten stamp mill, the excavations have been made and all the machinery has been ordered. Meanwhile a considerable amount of ore has been put in sight.

The Bouzan properties on the boundary line between Whitney and Cody have been sold to the Intercolonial Gold syndicate, an association of Belgian capitalists.

The vein on the Hughes Porcupine mines at 20 feet has dipped back into the shaft. It here shows eight feet of quartz and contains a considerable amount of visible gold. Thirty men are employed in sinking the shaft and in putting up camp buildings.

Plans have been prepared for the development of the 14 claims owned by the Hollinger Reserve and a plant is being installed. To date merely surface work has been undertaken, but the veins so far uncovered are of good width and show gold.

The shear zone on the Davidson property at a hundred feet proves to be as extensive as on the surface. For a hundred feet the drift is in quartz and schist. Nothing has as yet been made public of the average values at this depth, but there is a considerable amount of gold visible in the specimens brought from below.

C. W. Duncan, for a Toronto syndicate, has optioned the Lilly claim at Swastika, and also two claims to the northeast of the Lucky Cross. Development work on the Lucky Cross at Swastika has yielded very satisfactory results. Down to about the 50-foot level, where the vein dipped out the shaft, there was a remarkable showing of visible gold in a quartz lead that was from four to five feet wide.

An average rate of a hundred feet a month is being made on the Pearl Lake property. During one week over 25 feet were drilled and shot out. The shaft is rapidly approaching the 200-foot level, where the first level will be cut.

The letter of H. L. Taylor, the new president of the Imperial Gold Mining Company at Porcupine, states that "within a year we believe we will have a mill and a mine." The secretary-treasurer's report shows a balance of \$3,958 in the treasury and 648,000 shares intact in a \$2,000,000 company. Two crosscuts are being driven at the 100-foot level.

The Boston Development Company is opening up its claims in Deloro, where it reports good results from its surface prospecting. Camps have been erected and eighteen men are now employed.

The Hon. W. H. Hearst, Minister of Lands, Forests and Mines, has promised, among many other things, to the miners and prospectors that the townships of Ogden and Deloro shall be taken out of the Temagami Forest Reserve, so that a prospector can get a patent for his claims. He has also promised more and better roads for the mining districts, and that permits to prospect in the Reserve should be issued at the Recorders' offices in the various districts where these sections are, instead of at Toronto.

Mr. Oscar Bergstrom has taken charge of the Rea Consolidated in place of Mr. Kingsmill. Mr. Bergstrom commenced his career in the mining world at an iron property in Sweden. The first camp he saw in America was Butte, and he has since travelled to nearly all the precious metal camps of the western States. He has held important posts at Leadville, Colo., in Alaska, and he reached this country from California, where he was in charge of the Calaveras gold mine, and also the Calaveras copper mine.

It is now known that while the vein at the 300 foot level of the Rea is from 35 to 40 feet wide, the values run discouragingly low.

Since the good prospecting areas round Porcupine became delimited the army of mineral seekers in Northern Ontario are roving still wider and wider afield. There are parties covering all the good ground between Porcupine and Sudbury, and there is a little rush to the Hurricanaw River, south of the Transcontinental. Also mild excitement has been caused in Cochrane by the statement that Chief Commando had discovered quicksilver on the Ground Hog River while out prospecting. Several men of some experience have seen samples from this section, and declare that it is promising. Quicksilver is found in the Nipissing ores in uncommercial quantities, which lends some colour of probability to the statement of the Indian.

BRITISH COLUMBIA.

On November 15th the Canadian Mining Journal included in the General Mining News it printed, the following news item: "Ferne, Nov. 3.—The Riot Act was read in Fernie last night by Mayor Bleasdel after a violent outbreak on the part of the miners, when a train arrived from Coal Creek with men on board who had gone to work in the mines without waiting until the agreement now under consideration at Frank had been signed and ratified. Large numbers of miners were on hand when the train reached here, and the men who had worked were greeted with hisses and derisive language. One man was hit upon the side of the face with a stone thrown by some one in the crowd." As no mention was made, on the other hand, of the general good behaviour during a long season of suspension of work of the great majority of the mine and coke-oven workers, common justice to them would seem to make it desirable that the following "Open Letter to Dr. Warnock, M.P., Ottawa," written by Mr. J. W. Bennett, editor and manager of The District Ledger, Fernie, the official organ of District No. 18, United Mine Workers of America, be also printed in the Canadian Mining Journal. It may be mentioned that copies of this letter were sent to Hon. Robert Rogers, Minister of the Interior (who has been credited with having brought together the Operators and Mine Workers and arranged a basis of settlement of the strike): Hon. T. W. Crothers, Minister of Labour; and Mr. A. S. Goodeve, member for Kootenay in the House of Commons. Under date, November 21, Mr. Bennett addressed Dr. Warnock as follows:

"Dear Sir,—According to press notices we see that you have put in notice of questions to be asked regarding the recent

disturbances in Fernie, and as the probabilities are that the reports you have obtained relative to this subject may have been more or less garbled, we felt it incumbent upon us as representing the mine workers throughout District 18, to state the case exactly as we know it to have existed.

"From April 1 to October 31 the quietness and respect for law and order shown by those out on strike was a surprise to everybody, more especially so when is taken into consideration the cosmopolitan character of those involved. We may say that every coal region of Europe has its quota of representatives, and in addition thereto a large element from southern Europe were employed here as labourers—such as Italians, Montenegrins, Roumanians, and other natives of non-coal-producing countries. The disturbances that occurred were exceedingly trifling and have been throughout, even when it was deemed necessary to read the Riot Act.

"When the report was telegraphed throughout the length and breadth of the land that the Hon. Robt. Rogers had settled the strike men came from widespread parts only to ascertain the news was premature. This, as was natural, had a tendency to create a feeling of resentment. Moreover, there was not a single piece of property belonging to the coal company destroyed or in any way injured. A few panes of glass were broken in the house occupied by the Barr family, who had received rations from the mine workers' organization until October 31 and then went to work. Four negroes who had been given permission by the local magistrate to carry firearms were also hooted and jeered at when they came off the train, one of them discharging his revolver, which, fortunately, did no damage. Another individual, named Potter, who had received consideration at the hands of the organization, followed the example of the Barrs.

"When the Riot Act was read four policemen of the city force were quite sufficient to prevent any congestion of traffic, and although there was a large crowd of people gathered together, the spirit prevailing was more of curiosity-mongering, attracted, as usual at a time when idleness prevails, to see what was going on. The reading of the Riot Act was treated more as a farcical joke.

"With the exception of the above incident and the occasional throwing of snowballs when the police escort of over 40 men were accompanying five who had been to work, there was really no disturbance.

"The above is a plain statement of facts of which you may make any use you see fit and make known the name and position of the writer."

Cariboo.—It has transpired that the placer-gold mining season of 1911 in Cariboo district was to some extent disappointing. Cold weather in the spring made a late opening of the season; then the snow melted quickly when the summer set in; finally, unusually dry weather was experienced throughout the autumn. These things combined to make the gravel-washing season very short, with the result that the quantity of gold recovered was smaller than had been expected. However, the number of properties on which placer-mining was done, and the additional construction and development work carried out in preparation for future operations, were both satisfactory, indicating that a larger total yield of gold may reasonably be looked for in the early future.

Atlin.—While detailed information relative to hydraulic operations on the several gold-bearing creeks in Atlin camp has not yet been received, a statement has been published to the effect that less gold was removed during the season lately closed than in that of 1910. The reason assigned is that some of the larger operators were occupied during part of the season in making improvements and extensions to plant, water-supply systems, etc., so did not wash so much gravel as they might otherwise have done. The betterments made, though, are stated to make the outlook better for the recovery of more gold next and following seasons.

Slocan.—The Standard Silver-Lead Mining Company's concentrating mill, built near Silverton, on the shore of Slocan Lake, is now operating. The mill has a crushing capacity of about 200 tons per day, but as yet concentrating machinery for only half that quantity has been put in. A considerable proportion of the ore is sorted out after having been crushed and is shipped to the smeltery in its crude shape, being high-grade ore. All the surface improvements decided upon when the Standard property was acquired from Messrs. Aylard and Finch by the company nearly a year ago have been completed. These include putting in a water-supply system for operating compressor plant and concentrating mill, an air compressor, for machine drill and other power purposes at the mine, the concentrating mill above-mentioned, and an aerial tramway from the mine down to the mill, a distance of about 8,000 feet. Shipment of ore and concentrate to the smeltery at Trail will, it is expected, be regularly maintained from now on.

Nelson.—At a meeting held at Nelson on November 21, a number of resolutions were passed with the object of advancing the interests of those engaged in mining lead and zinc ores. The gathering, though not as large nor representative as some mining conventions held in the province in earlier years, was attended by a sufficient number of men prominently associated with lead and zinc mining to make the recommendations of the meeting worthy of the serious consideration of the Federal Government. These resolutions, as reported in the local newspaper, included on urging the appointment by the Dominion Government of a commission to enquire into the method best suited to encourage and protect the zinc-mining industry and to consider the question of bonus or award and rendering financial assistance to any person or persons who shall "devise and carry to commercial success works for the reduction and refining of low-grade zinc-lead ores of this country which are not at present amenable to the ordinary methods of zinc concentration." Another asked the Government "to create a portfolio of mines, the Minister to devote his attention entirely to the industry," and to strengthen the case for this proposed most important change in the policy of the Government, the resolution was moved by a local lawyer, and seconded by a prominent fruit-grower, neither actively engaged in mining. The Dominion Government may be expected to regard so serious a departure from the present order of things as at least worthy of the earnest and united support of a far larger number of men closely connected with the operations of the mining and smelting industries than were present at the meeting under notice. The appointment of Messrs. W. E. Zwicky, Oscar V. White, A. J. Becker, and T.

W. Bingay on a committee to investigate the situation in regard to the desirability or otherwise of petitioning "for protection on lead and zinc, either in the shape of duty or bounty," is a matter for congratulation, for they are men deeply interested in this question, being actively engaged in connection with mining or smelting lead-zinc ores, and can speak whereof they know. Finally, the opinion may be here expressed that reference of these matters, relating essentially to the interests of the mining industry, to the Conservative convention, at that time sitting in New Westminster, for endorsement by men, few of whom know anything at all about the important subjects thus referred to them, was a move not worthy of the mining men of the country who, if they have a good case for support from the Federal Government in connection with one of the largest industries of the West, might reasonably be expected to present it on its merits, and not make it a subject for action by any purely political organization.

Coast.—It is stated that the Canadian Mining Operators, Limited, a Vancouver development company, of which Mr. Robert R. Hedley is technical adviser and mining engineer, has acquired twenty sections of coal land adjoining that of the B. C. Anthracite Company, in Ground Hog district, Upper Skeena.

Messrs. Harris Brothers, who are largely interested in the American Boy group of eight mineral claims, situated in Nine-mile Mountain camp, in the Hazelton (Skeena River) district, lately stated for publication that they think the Hazelton district contains more properties giving promise of becoming producers of rich ore than were known in Slocan district at a similar stage of development eighteen years ago.

The Natural Resources Security Co., Ltd., has lately been advertising that "An immense body of anthracite coal exists at the head waters of the Skeena, about 150 miles north of Hazelton. . . . It is stated that good coal seams are known to underlie over 2,100 square miles of territory, and that the estimated capacity of the field is 43,000,000 tons per square mile." As this works out at an aggregate content of 90,300,000,000 tons of coal, it may be pointed out that Mr. D. B. Dowling, of the Geological Survey of Canada, one of the most noted coal geologists of the Dominion, in a paper he contributed to the last Annual Meeting of the Canadian Mining Institute, gave a table showing an estimate of only 1,351 square miles of coal-bearing territory in the whole of British Columbia, and an estimated aggregate coal content of 40,221,000,000 tons.

GENERAL MINING NEWS.

QUEBEC.

Montreal, Dec. 4.—A meeting of the shareholders of the Canadian Venezuelan Ore Company, Limited, was held to-day at the Windsor Hotel. This company, which consists of Montreal, Halifax, and Toronto capitalists, has secured large deposits of iron ore of bessemer quality on the Orinoco River, Venezuela. Mr. W. B. Ford, formerly in charge of the mines of the Dominion Iron & Steel Company at Wabana, Newfoundland, is the resident manager of the company in Venezuela.

The officers elected at to-day's meeting were as follows: F. P. Jones, president; Sir William C. Van Horne, vice-president; Sir Max Aitken, G. B. Bosworth, H. S. Holt, Hon. A. K. Maclean, M.P., G. Fred Pearson, John D. Patterson, and W. D. Ross, directors.

Asked as to when the company expected to commence operations, Mr. F. P. Jones, the president, said:

"We have nearly all our machinery on the ground now and with the competent staff now in charge at Imotica, I expect we will be shipping ore early in the New Year."

ONTARIO.

Cobalt.—The Northern Ontario Light and Power Company, Limited, has been formed to take over the properties of the Cobalt Power Company, Limited, and its subsidiary companies, and the Cobalt Hydraulic Power Company, Limited. The company furnishes power and light in the towns of Cobalt, North Cobalt, Haileybury, New Liskeard, Cochrane, and Porcupine.

Porcupine.—Directors of the Temiskaming have been inspecting the North Dome property, the controlling interest in which has been acquired by the Temiskaming Company. A circular has been issued to Temiskaming shareholders, giving the details of the deal and announcing the passing of the Temiskaming dividend for the current quarter. The deal is sub-

stantially as The Star gave it a couple of days ago.

The Temiskaming take over 138,000 shares, for which they will pay \$229,000, or approximately \$1.66 per share. This amount is payable in instalments extending over 13 months.

The North Dome is capitalized at \$2,000,000, or 400,000 shares at \$5 per share. There are 171,459 shares in the treasury.

The Temiskaming directors announce that it is the intention to push developments on the property, and that arrangements have already been completed for the sale of sufficient of the treasury stock at \$1.66 per share, to provide necessary funds for some months to come.

Porcupine.—The most interesting news that has come out of Porcupine for some time was a despatch received by the Pearl Lake Gold Mines, Limited, recently from G. W. Thomson. It gave the first news of values at depth that has come from the camp. The Pearl Lake Company has been making an examination of its property by diamond drilling, and in several sections has encountered high values.

The despatch received yesterday was to the effect that in No. 3 hole at a depth of 1,164 feet, two feet of core assayed \$6, while one foot at 1,168 feet, assayed \$9. At 1,180 feet the core was still in mineralized schist.

The drilling is being continued and further developments are being awaited with the greatest interest.

Elk Lake, Dec. 4.—Another shipping mine is added to the list in this district, the Canadian-Gowganda, having let the contract for hauling a 50,000-pound car of high-grade silver ore from the mine to the T. & N. O. at Charlton. The car now being shipped was stowed out of the drifts in about four weeks by a small gang of men.

ALBERTA.

Lethbridge, Nov. 24.—To-night the price of coal for the coming winter will be fixed. This morning's train from the west brought Lewis Stockett, president of the Western Coal Operators' Association; J. K. Gram, of Coleman, Alta; William Whiteside, of Blairmore, Alta.; W. G. Smith, of Corbin; W. W. Wilson, of Fernie, and William Lloyd, of Frank, all in charge of mines at these points. They are meeting in the offices of the Alberta Railway & Irrigation Co., and P. L. Naismith, and they will finish the business of the association regarding the strike and recent decisions which will guide their transactions as an association in future.

BRITISH COLUMBIA.

Vancouver, Dec. 4.—A special from Merritt, B.C., says three men were killed in a chute of No. 7 level of No. 2 mine of the Nicola Valley Coal & Coke Co.'s Middlesboro properties on Sunday. They are Dusan Wurmirovitch, a Servian, aged 25; Robert Dishart, a Scotchman, aged 28; and Alex. Thompson, aged 17.

The accident occurred one hour after the second shift had started work. The bodies were found huddled around the fan. Thompson's work was turning the fan to force out the

foul air. The men were driving a tunnel to make an air way. It is the first accident since Charles Graham was superintendent.

UNITED STATES.

New York.—The Yukon Gold Co. has declared a quarterly dividend of 7½ cents a share—equal to 1½ per cent. This is a reduction from 10c. a share, or 2 per cent., from the last previous dividend. The dividend is payable December 30. Books close December 12th, and remain closed until January 9th, to provide for the annual meeting, which comes on January 8th.

In connection with the reduction, President Samuel R. Gugenheim makes the following statement:

"At a meeting of the directors it was decided to declare the quarterly dividend at the rate of 7½c., instead of 10c. per share, which has been paid formerly; that is, the directors have decided to place the company for the present upon a 6 per cent. per annum basis, instead of 8 per cent."

"The extraordinarily dull season prevailing in different parts of the world also affected Alaska and Yukon Territories, curtailing the hydraulic operations. The two new steel dredges, which had been built upon the property this season, were not finished in time to be of much benefit. The final figures for the season's operations are not at hand, but the advance statements indicate a net operating profit of approximately \$1,300,000, as against an estimated profit of \$1,500,000, which, if realized, would have allowed the continuation of dividends at the 8 per cent. rate."

Knoxville, Tenn., Dec. 9.—A dust explosion imprisoned about 200 men in the coal mine of the Knoxville Iron Company, near Briceville, 34 miles north of Knoxville, at 7.30 o'clock. The explosion is about two miles from the entrance to the mines.

The Federal mine rescue crew has been summoned. It is not yet possible to ascertain the number killed, but it is feared the loss of life will be very heavy.

Cripple Creek, Colo., Dec. 2.—The gold output from the Cripple Creek district for the past month amounted to \$1,356,966.50, with a gross tonnage of 77,204. This is a decrease of 513 tons, and an increase of about \$54,062 over the month of October. During the month the Homestake, Jo Dandy, and Isabella, low-grade mills of the camp, were closed down for divers reasons.

Leadville, Colo., Dec. 1.—The close of the eleventh month of the year finds the district in first class condition. With more work going on than for several years at the same period, more prospecting being done for new ore bodies and extensions of old ones, and during the period more shafts have been sunk and more tunnels driven throughout the district than has taken place in a number of years.

Los Angeles, Cal., Nov. 29.—October production, 7,283,434 barrels. Such is the official announcement of the yield of the California oil fields for the past month. During the same period the consumption totalled 6,701,693 barrels, leaving a net daily surplus of 18,765 barrels.

STATISTICS AND RETURNS

LE ROI NO. 2.

The following cable has been received at the London office of the Le Roi No. 2, Ltd., company from the managers in Rossland:

"Josie mine report for October—Shipped 1,590 tons of ore and 146 tons of concentrates. Receipts from smelter are \$37,138 for 1,621 tons of ore shipped; \$4,126 for 181 tons of concentrates shipped. In all \$41,264.

"Estimated costs for corresponding period: Development,

\$9,000; ore production, \$10,000; milling, \$1,250; total, \$20,250.

"North Annie, west drift, 500 feet level: Advancement, 43 feet; vein lost west of fault.

"Diamond Drill, 700 foot level—Struck one and one-half feet of ore, continuation recent North Annie ore chute."

NIPISSING IN NOVEMBER.

In the month of November the Nipissing produced net \$225,907, and shipped \$248,980, of which \$90,407 was mine ore, and

\$158,573 bullion, from the high grade mill. The October production was \$226,929, shipments \$225,282. November thus showed a decrease of \$1,022 in production and an increase of \$23,698 in the ore shipped.

N. S. STEEL AND COAL.

Outputs from all departments of the Nova Scotia Steel & Coal Company for November were very satisfactory, and in several instances new records were established. The month was particularly good at the New Glasgow works, every department there surpassing its best previous output.

In detail the outputs were: Coal mined, Nov., 77,587; Oct., 75,521; pig iron made, Nov., 7,170; Oct., 7,258; steel ingots, Nov., 7,423; Oct., 5,453; billets cogged, Nov., 7,694; Oct., 6,456; bars and plate rolled, Nov., 5,702; Oct., 4,817.

DOMINION STEEL.

The production of the Dominion Steel Company in November was very satisfactory. Rods, especially, loomed up, the mill turning out 8,325 tons, the best production since the bounty was taken off. The month's figures are as follows:

Pig iron	22,916
Steel ingots	27,084
Blooms	23,633
Rails.....	7,527
Rods	8,325
Shipments.. ..	19,923

LA ROSE PROFITS.

Operating profits of La Rose Consolidated Mines Company in October are reported as \$75,561, bringing the operating profits for 10 months of 1911 to \$995,158, an average of practically \$100,000 a month. September profits were \$94,779, and August \$84,561.

Production in October was \$255,802 ounces of silver, having a gross value of \$136,045. Other income brought the total up to \$141,306. Expenses amounted to \$65,744, leaving the operating profits \$75,561. From Jan. 1 to Oct. 31, La Rose produced 3,011,583 ounces, valued at \$1,585,494. Income from other sources was \$14,623. Expenses were \$604,959, leaving the operating profit for the 10 months \$995,158.

COBALT ORE SHIPMENTS.

The following are the shipments for the week ended Dec. 2nd in pounds:

Cobalt Lake, 2 1 1 h	210,600
Nipissing, 3 1	192,937
Kerr Lake, 1 h, 1 1	121,490
Temiskaming, 1 h	86,579
McKinley-Darragh, 1 h	65,320
Hudson Bay, 1 h	67,600
O'Brien, 1 h	64,030
La Rose, 1 h	63,592
Buffalo, 1 h	60,300
Drummond, 1 1	60,000
Trethewey, 1 h	59,760
Coniagas, 1 h	54,746
	<hr/>
	1,106,954

Bullion Shipments.

	Ounces.	Value.
Nipissing	26,332	\$14,667
O'Brien	12,201	6,832
Kerr Lake	3,056	1,711
	<hr/>	<hr/>
	41,589	\$23,210

B. C. ORE SHIPMENTS.

Ore shipments for week ended Nov. 25th, and ore milled in the Kootenay and Boundary districts totalled 14,819 tons,

making the total for the year to date 1,389,925 tons. The smelter receipts for the same periods are respectively 12,584 tons and 1,180,456 tons. The figures in detail are:

Slocan-Kootenay Shipments.

Molly Gibson	73	1,018
Van Roi, milled	800	34,449
Arlington	28	209
Panama	20	60
Lloyd	1	1
St. Eugene, milled ..	420	24,396
Richmond-Eureka	28	2,061
Rambler-Cariboo ..	29	1,427
Hewitt	30	404
Queen, milled	420	19,430
Granite-Poorman, milled ..	250	11,760
Nugget, milled	110	5,170
Emerald	28	1,803
Hope	40	616
Knob Hill	172	4,721
Other mines		31,433
	<hr/>	<hr/>
Total	2,449	139,003

Boundary Shipments.

Mother Lode	6,026	281,645
Jack Pot	271	23,454
Athelstan	140	17,359
Unnamed	1,236	11,259
Other mines		680,849
	<hr/>	<hr/>
Total	7,673	1,014,566

Rossland Shipments.

Centre Star	3,318	179,071
Le Roi No. 2	650	26,360
Le Roi No. 2, milled	300	14,100
Le Roi	429	16,331
Other mines		494
	<hr/>	<hr/>
Total	4,697	236,356

Consolidated Co.'s Receipts.

Trail, B.C.

Centre Star	3,318	179,071
Le Roi No. 2	650	26,360
Le Roi	429	16,331
Richmond-Eureka	28	2,061
Rambler-Cariboo ..	29	1,427
Hewitt	30	404
Emerald	28	1,803
Hope	40	616
Granite-Poorman ..	34	372
Knob Hill	172	4,721
Molly Gibson	73	1,018
Van Roi	31	1,434
Arlington	28	209
Panama	20	60
Lloyd	1	1
Other mines		59,282
	<hr/>	<hr/>
Total	4,911	295,215

B. C. Copper Co.'s Receipts.

Greenwood, B.C.

Mother Lode	6,026	281,645
Jack Pot	271	23,454
Athelstan	140	17,359
Unnamed	1,236	11,259
Other mines		61,111
	<hr/>	<hr/>
Total	7,673	394,828

TORONTO MARKETS.

Dec. 11—(Quotations from Canada Metal Co., Toronto):—
 Spelter, 6.75 cents per pound.
 Lead, 4.50 cents per pound.
 Antimony, 7 to 9 cents per pound.
 Tin, 44 cents per pound.
 Copper, casting, 12.95 cents per pound.
 Electrolytic, 12.95 cents per pound.
 Ingot brass, 7 to 12 cents per pound.
 Dec. 9.—Pig iron—(Quotations from Drummond, McCall & Co., Toronto):
 Summerlee No. 1, \$23.00, f.o.b., Toronto.
 Summerlee No. 2, \$22.50, f.o.b. Toronto.
 Midland No. 1, \$18.50 f.o.b., Toronto.
 Midland No. 2, \$18.00, f.o.b. Toronto.

GENERAL MARKETS.

Coal, anthracite, \$5.50 to \$6.75.
 Coal, bituminous, \$3.50 to \$4.50 for 1¼ inch lump.

Coke.

Dec. 5.—Connellsville Coke (f.o.b. ovens):
 Furnace coke, prompt, \$1.50 to \$1.55 per ton.
 Foundry coke, prompt, \$1.80 to \$1.90 per ton.

Dec. 5.—Tin, straits, 45.87½ cents.
 Copper, prime lake, 13.20 cents.
 Electrolytic copper, 13.10 cents.
 Copper wire, 14.50 cents.
 Lead, 4.40 to 4.50 cents.
 Spelter, 6.75 cents.
 Sheet zinc (f.o.b. smelter), 8.50 cents.
 Antimony, Cookson's, 7.75 cents.
 Aluminium, 18.50 to 19.00 cents.
 Nickel, 40.00 to 45.00 cents.
 Platinum, ordinary, \$46.00 per ounce.
 Platinum, hard, \$48.50 per ounce.
 Bismuth, \$1.80 to \$2 per lb.
 Quicksilver, \$46 per 75-pound flask.

SILVER PRICES.

	New York. cents.	London. pence.
Nov. 18	55½	25½
" 20	56½	26
" 21	56½	26
" 22	56½	26
" 23	56¾	26½
" 24	55¾	25¾
" 25	56½	25¾
" 27	55¾	25½
" 28	55½	25½
" 29	55½	25½
" 30	Holiday	25½
Dec. 1	55½	25½
" 2	55½	25½
" 4	55½	25½
" 5	55½	25½

SHARE MARKET.

(Courtesy of E. D. Warren & Co.)

NEW YORK CURB.

	Bid.	Ask.
Braden	5½	5½
B. C. Copper	4½	4½
Butte Coal	16¼	17
Ely Central	.02	.04
Ely Cons.	½	¾
First National	1¾	2
Giroux	4	4½
Green-Canadian	7¼	7¾
Inspiration	9¾	9½
Nevada Hills	2¾	2½

Ohio Copper	1½	1½
Ray Central	1½	1½
Union Mines	¾	3½
Yukon Gold	3¾	3½
Goldfields Cons.	4¾	4½
Nevada Cons.	18½	18¾
Miami	21¾	22½
Granby	28	60
Cons. Min. & Smelt.	43	45½
Davis-Daly	¾	1
Cons. Arizona	½	¾
Rawhide Coal	...	...
Ray Cons.	14¾	15½
Chino	23	23½
New Baltic	...	...
United Copper	2½	2¼

PORCUPINE STOCKS.

American Gold	.97½	.98
Apex	.09	.10
Coronation	...	...
Nor. Exploration	offered	3.50
Dobie	.80	1.00
Dome Ex.	.64	.66
Foley-O'Brien	.47	.50
Rea	2.99	3.00
Hollinger	11.00	11.10
Monita	.09 bid	...
Pearl Lake	.39	.40
Central	3.40	3.50
Imperial	.04	.05½
Northern	.66	.67
Tisdale	...	offered .05¼
Preston East Dome	.15	.15¾
Standard	.12	.13
Swastika	.25	.25¾
United	.03	.03½
Porcupine Gold	.55¼	.55½
West Dome	.70	1.00
Crown Chartered	.52¾	.53¼
Eldorado	.11	.12½
Gold Reef	...	offered .11
Porcupine Canada	.85	1.00
Pore. Southern	.55	.57
Jupiter	.46 bid	...
Dome Mines	37.50	37.50

COBALT STOCKS.

Bailey	.02	.02¼
Beaver	.37¼	.37½
Buffalo	1.35	1.55
Chambers-Ferland	.12	.12½
City of Cobalt	...	...
Cobalt Lake	.25	.26
Coniagas	5.95 bid	...
Crown Reserve	2.75	2.78
Great Northern	.10¾	.12
Green Meehan	.01½	.02
Hargraves	...	...
Kerr Lake (x.d.)	2.60 bid	...
La Rose	3.86	3.87
Little Nipissing	.01¾	.02
McKinley-Darragh	off	1.80
Nipissing	7.00	7.25
Nova Scotia	...	...
Peterson Lake	.06½	.06¾
Right of Way	.065¾	.07
Rochester	.02½	.02¾
Silver Leaf	.03	.03½
Temiskaming	.27½	.28
Wettlaufer	.82	.83

What Do You Know About Lanco Balata Belting?

The average man who uses belting has very little idea as to what Balata Belting really is. He knows it is a textile belt, but little more. The compound used in making the genuine Balata belt is obtained from a tree in South America. From this tree a gum is obtained similar to that from which rubber is made, and when the gum was first noticed by Europeans, they thought it was rubber. They were surprised to find however, that it would not vulcanize.



BELTING.

This gum was at first deemed worthless, but the very thing that makes this gum no use as rubber makes it very valuable in a belt.

Balata belts will not crack, vulcanize or become hard with age. Any belt user knows the advantage of this.

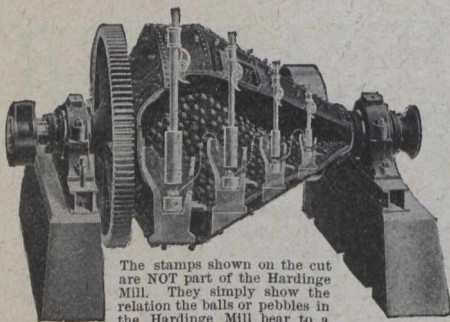
Not all the Balata belting sold is the pure gum, and in such cases the belting is often inferior. Lanco Balata belting is guaranteed to be filled with pure Balata gum, and the best quality of canvas is used as a base.

Write us about Balata Belting, every inch guaranteed

Federal Engineering & Supplies, Ltd.

Head Office: 284 Yonge Street
Toronto

Branch Office: 329 St. James Street
Montreal



The stamps shown on the cut are NOT part of the Hardinge Mill. They simply show the relation the balls or pebbles in the Hardinge Mill bear to a number of stamps arranged for Ideal Stage Crushing

THE SCREENLESS PATENTED
HARDINGE MILLS
ARE BUILT IN VARIOUS SIZES FOR
GRINDING
GOLD & SILVER ORE

GRANULAR
(For Concentration)

TO A SLIME
(For Cyanidation)

Note comparison between the modern and old methods of reduction wherein power is automatically adjusted to results.

We have a test mill in operation in New York with which we will be glad to prove all claims.

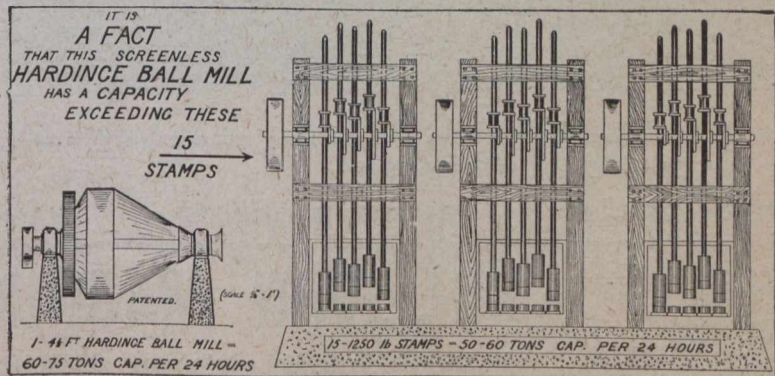
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**HARDINGE CONICAL MILL
COMPANY**

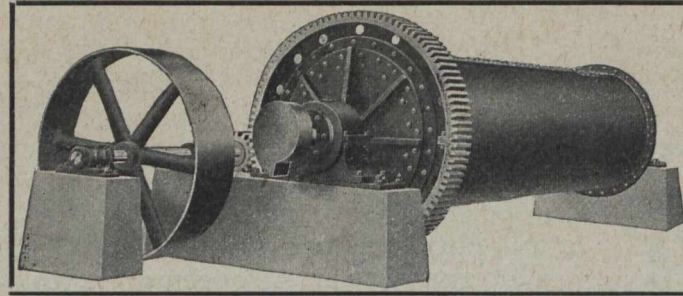
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**TUBE
MILLS
with
Spiral**



**TUBE
MILLS
with
Trunnion
or
ROLLER
BEARINGS**

SELF FEEDER

Pebbles or pieces of hard rock can be fed through discharge end while mill is running.

Shells are lined with El Oro sectional hard iron or with Silix lining.

**WE FURNISH COMPLETE
Equipment for
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Amalgamating " "
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CATALOGS
Free on request.**

The even feed and continuous operation increase the capacity.

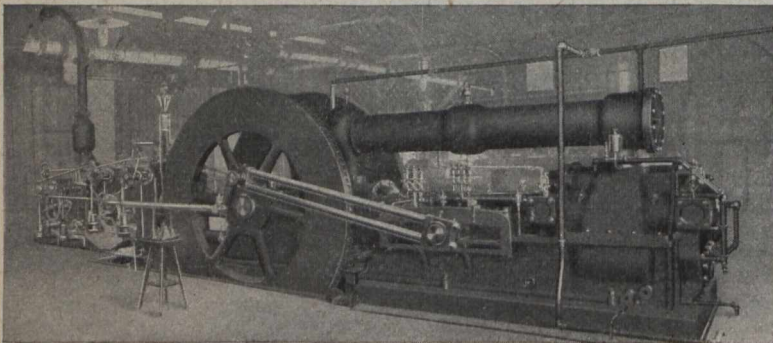
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CHALMERS & WILLIAMS Inc.

General Offices and Works—CHICAGO HEIGHTS, ILL. New York Office—SINGER BLDG.

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ARE YOU GOING TO BUY AN AIR COMPRESSOR? IS THE COST OF YOUR AIR ANY OBJECT?



We have convinced many critical engineers; now we are getting their repeat orders.
Shall we send bulletin 658 D and figures?

The price of a cross-compound Corliss machine of the first class may seem beyond your means. But before you select a low priced slide valve compressor, which will COST YOU THREE TIMES AS MUCH AS THE "CORLISS," EVERY DAY FOR COAL, read the rest of this.

You can afford proper fuel economy, and keep your air cost down where it belongs, by selecting a SULLIVAN TANDEM CORLISS TWO STAGE COMPRESSOR. These machines have every advantage that the cross compound has, but the size, weight and price are all less. They cost us less to build, and sell, because they are simpler, have fewer working parts and are carried in stock sizes. They cost you less to install, because they weigh about a third less than the cross compound and require about half the foundation and floor space.

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DUCK**

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**Mineral Surfaced—
Needs No Painting**



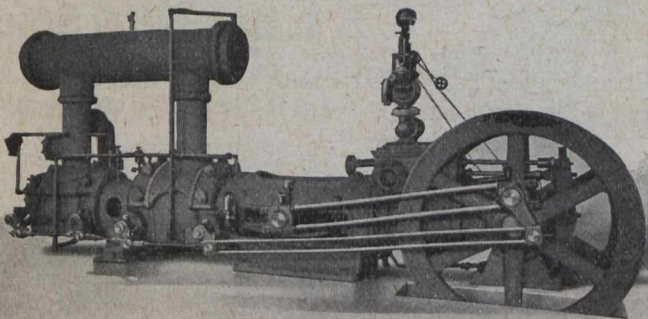
EVERYTHING about Amatite appeals to the man with common sense. He can see its superiority at once—the real mineral surface which never needs painting; the two layers of Pitch which is the greatest waterproofing material known; the two layers of heavy Tarred Felt—all these contribute to the popularity of Amatite.

We can make Amatite better and cheaper than anyone else on account of our greater facilities, and consequently we sell it at a surprisingly low figure.

Simply the fact that it needs no painting is enough to make a man sit up and take notice—especially the man who has spent time and money in painting and repainting smooth surfaced roofings.

Write to-day for further information.

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COMPOUND AIR CYLINDERS SHOW A BIG SAVING OVER SINGLE STAGE COMPRESSORS

The "RAND" compound straight line compressor offers all the advantages of the original straight line type plus **a big saving in operating costs.**

It is the original straight line machine in a highly perfected state. Embodying the self-contained unit construction; the simplicity of operation and the positive reliability of the original machine, it is just as well adapted to temporary work as to permanent duties.

This steam valve mechanism is second only to the drop release Corliss type.

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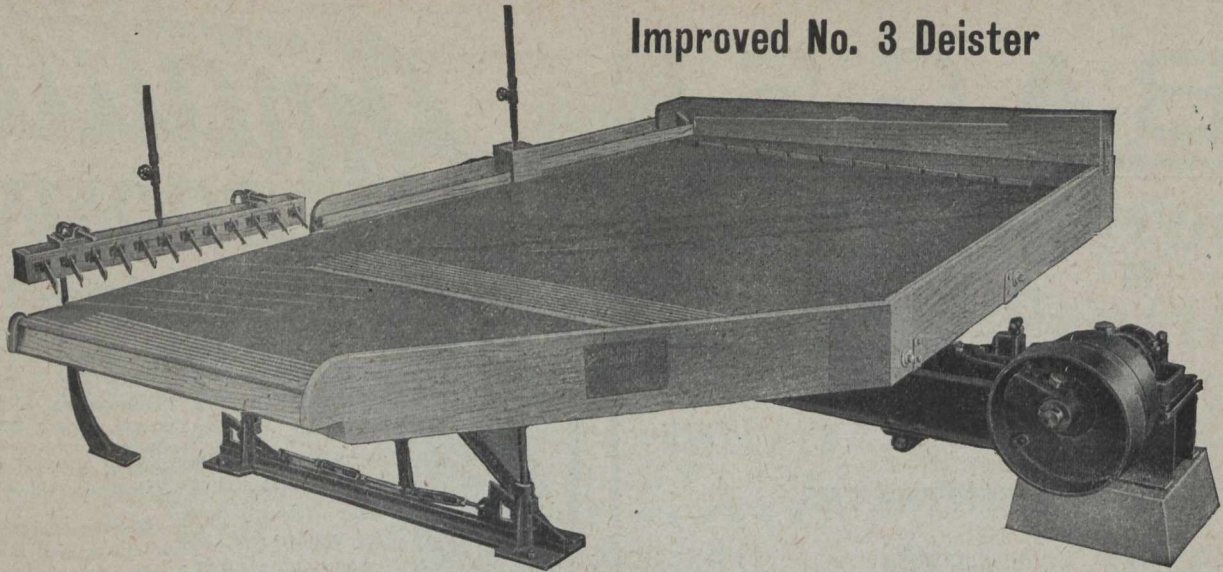
The air cylinders are of our improved type with unusually large air ports and passages and with extraordinarily large valve areas. Both inlet and outlet valves are what have proved best suited to this class of work, and show exceptionally high efficiencies.

(Many advantages are embodied in these valve designs.)

Equipped with this large efficient intercooler, large valve areas and large cool ports the air end of this machine is equal to that of the more complicated duplex compressor costing far more to install.

Automatic Regulation.

Improved No. 3 Deister



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The Coniagas Mines, Ltd., Cobalt, Ontario, Can.
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The Canadian Bank of Commerce

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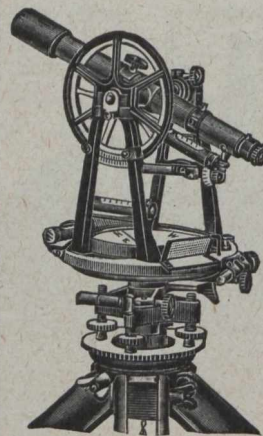
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AND THE PRICES TOO**

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YOU GET THE BENEFIT

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Cochrane special roofing, Cochrane special axes, Shovels, Mattocks, Scrapers, Engine room supplies, Dynamite, Fuse, Detonators, Batteries, Drill Steel, Rope, Chain, Cable, Wood and Iron Blocks

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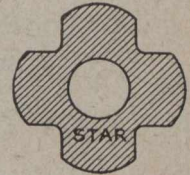
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WITH VALVES TO RECENT PATENTS 1909

For High Efficiency with increased Piston Speed now at work or on order indicating over

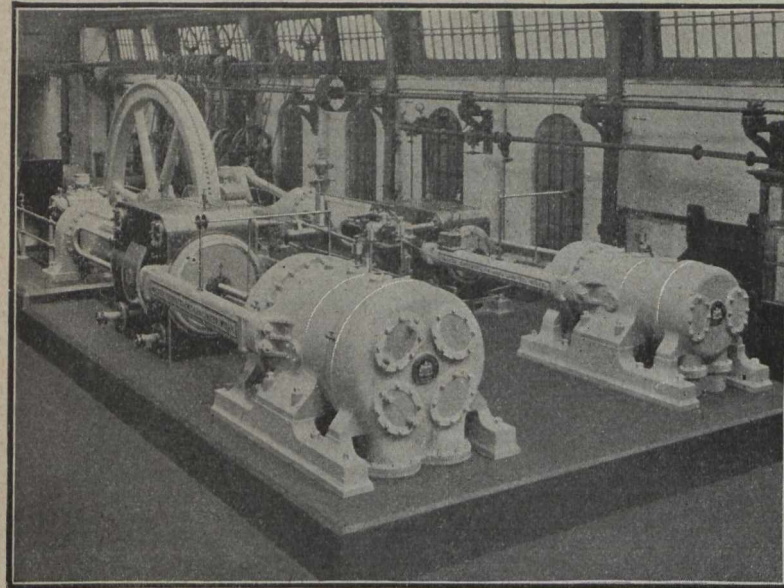
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WILDE & PETRIE'S PATENT OVERWIND AND OVERSPEED DEVICE, positive action, No Centrifugal Governor.

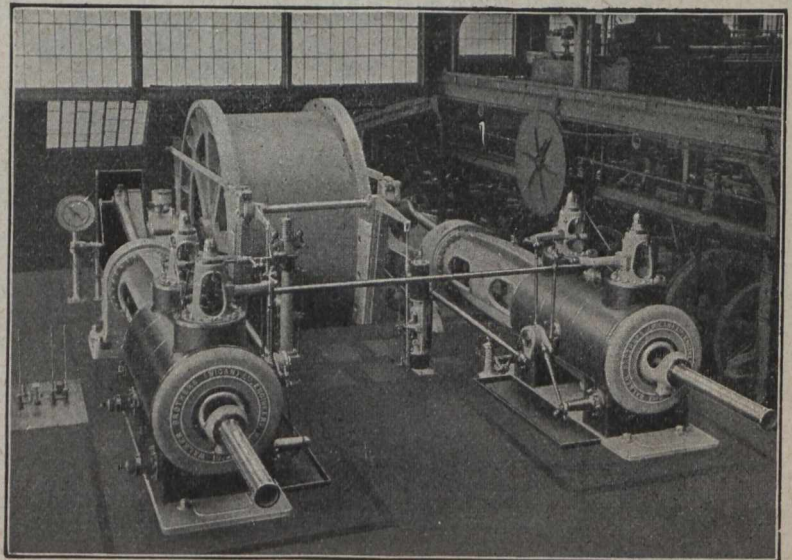
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Of the Walker "Indestructible" Type at work or on order have an exhausting capacity in the aggregate of over

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Cubic Feet per Minute.

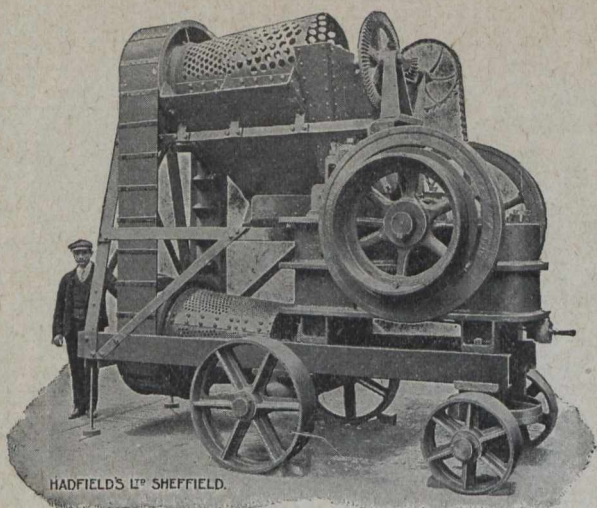
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Give to the gracious message a host of tongues.
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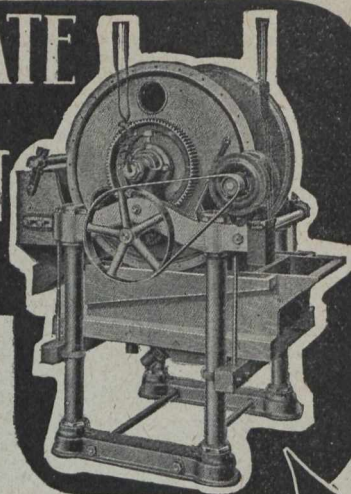
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Grondal Magnetic Separator

The only successful system of Wet Magnetic Concentration and Briquetting Low Grade Iron Ore.

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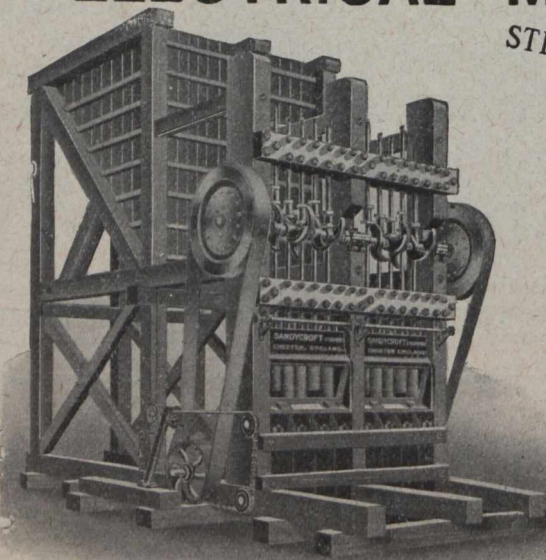
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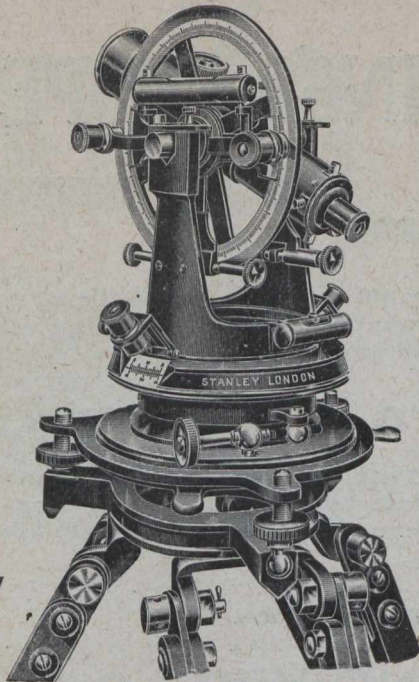
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Our attention has been drawn to advertisements which have appeared in some of the Toronto papers over the name of CHAS. A. STONEHAM & CO., of 23 Melinda Street, Toronto, also to a circular purporting to be issued by the same parties from their Chicago office at 178 West Jackson Boulevard, also to a circular letter dated 6th November, 1911 and a pamphlet enclosed therein, purporting to emanate from their Chicago office. We feel it to be our duty to the public to state that CHAS. A. STONEHAM & CO. do not in any way represent us and have no authority whatever to make any statements regarding the conduct of our business or the management of our mine. We do not endorse any of their statements and they are not in any way in the confidence of our directorate or mine management and the public are warned accordingly. The company has also caused CHAS. A. STONEHAM & CO. to be notified by its solicitors to desist from any further publications relating to this company's affairs in any and every way. The affairs of this company have always been conducted with an eye single to an honest, clean and capable management and the directors feel that this will be appreciated by the investing public generally.

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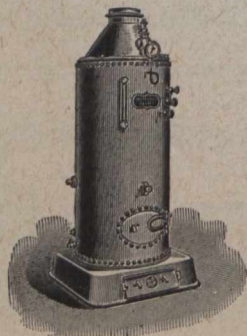
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Pit Rails, T Rails, Edge Rails, Fish Plates, Bevelled Steel Screen Bars, Forged Steel Stamper Shoes and Dies, Blued Machinery Steel 3/8" to 1/4" Diameter, Steel Tub Axles Cut to Length, Crow Bar Steel, Wedge Steel, Hammer Steel, Pick Steel, Draw Bar Steel, Forging of all kinds, Bright Compressed Shafting 5/8" to 5" true to 2/1000 part of one inch. A full stock of Mild Flat, Rivet Round and Angle Steels always on hand

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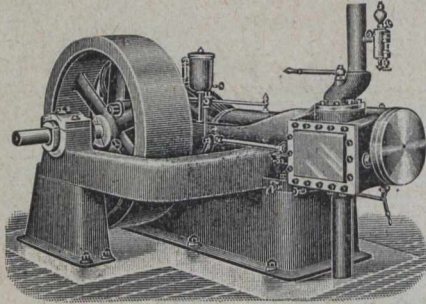
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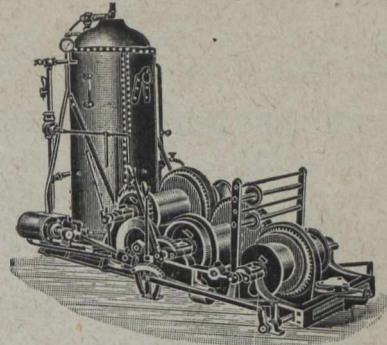
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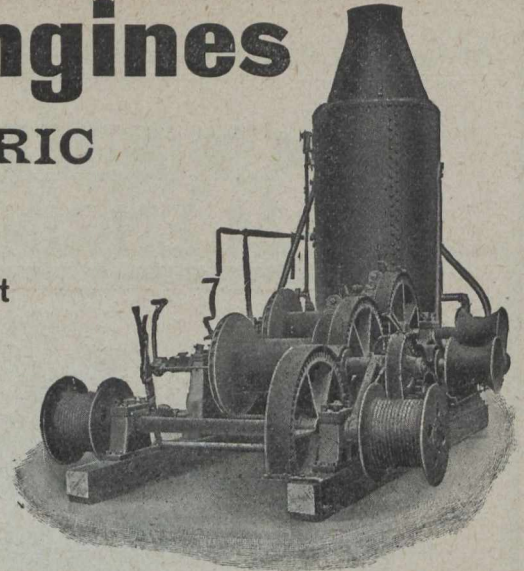
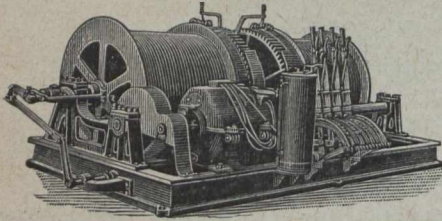
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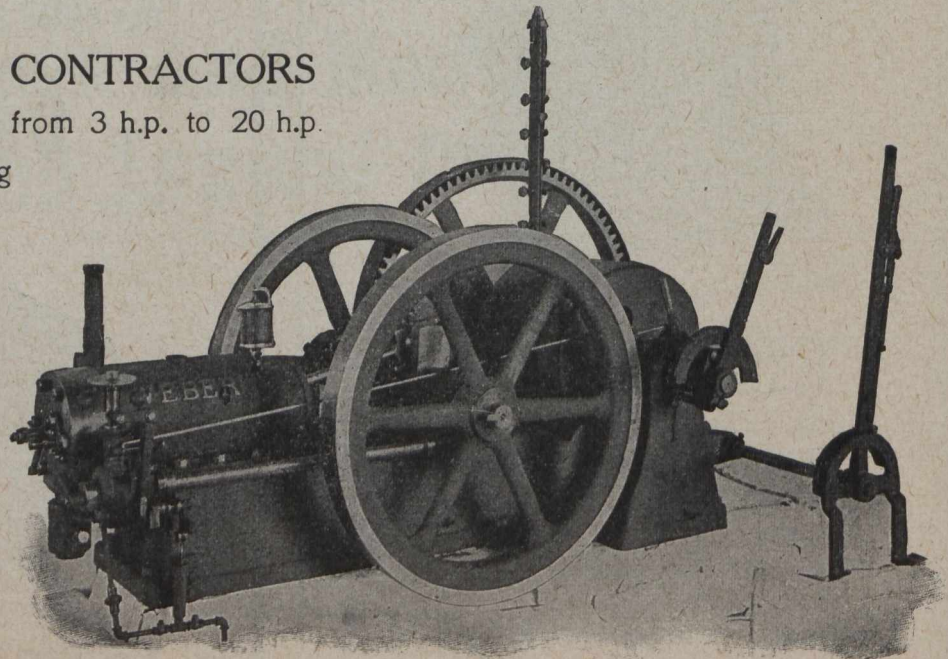
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Thanks for your kindness in allowing me the privilege of appealing at this Christmas time on behalf of the Hospital for Sick Children, Toronto.

I make this direct appeal to the people of Ontario, for the fathers and mothers of Ontario, outside the City of Toronto, have precisely the same claim for their sick children as regards the privileges of the Hospital, as parents who reside in this city.

In brief the sick children from any place in Ontario whose parents cannot afford to pay, is, on certificate from a municipal officer of any city, town, village or township, treated free.

This is a privilege not granted by any Hospital in the Dominion, or on this Continent.

Let me, in a few words, state that in the last 20 years, since 1891, there have been 4,731 patients from 450 places outside of this city treated free, as the parents were unable to pay for treatment. Last year 384 patients from 234 places outside Toronto were so treated.

The Hospital is not a city but a Provincial institution. The Corporation of Toronto grants \$18,000, not only for city children, but towards the maintenance of every patient in the Hospital, and the citizens of Toronto donate an average of \$10,000 to the maintenance fund of the Hospital.

It would take more space than you can spare to tell of the good work done for the sick and deformed children of this Province.

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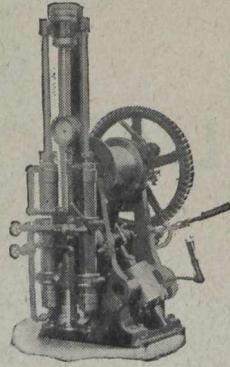
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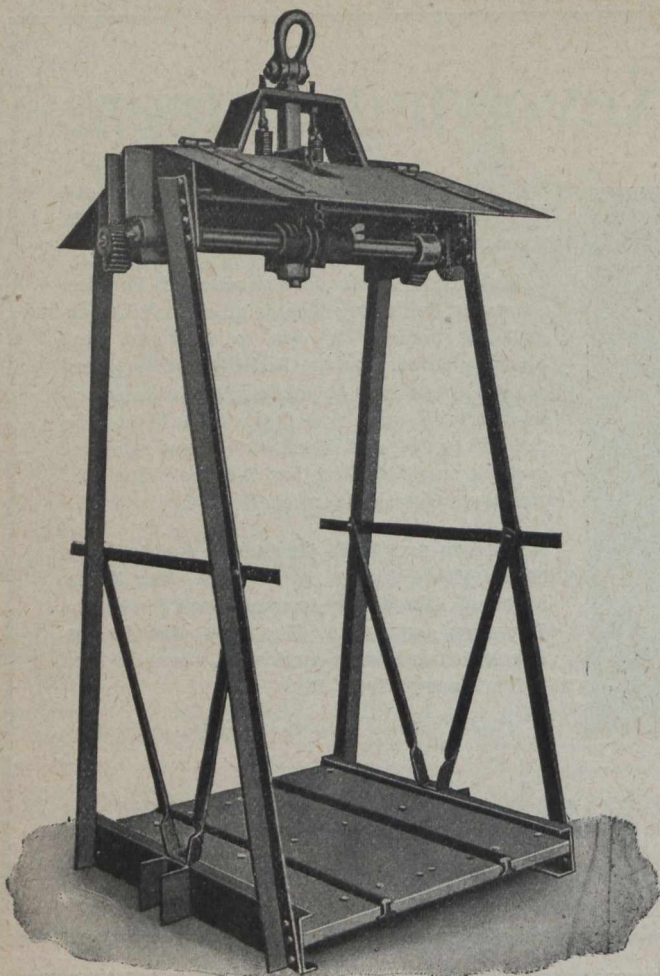
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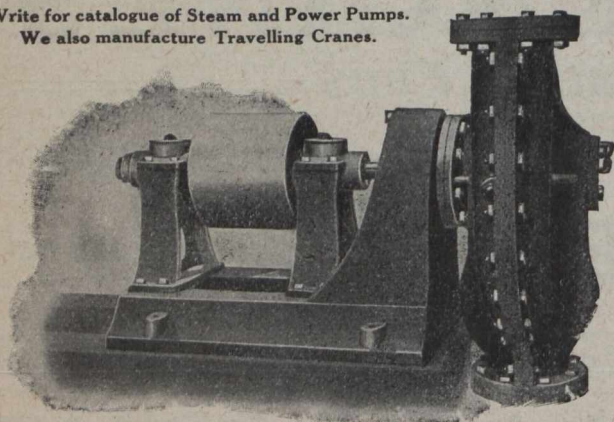
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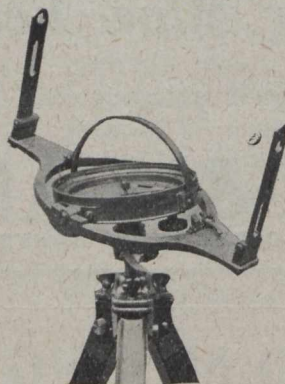
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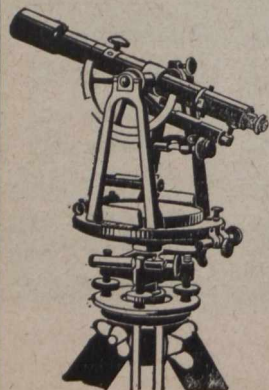


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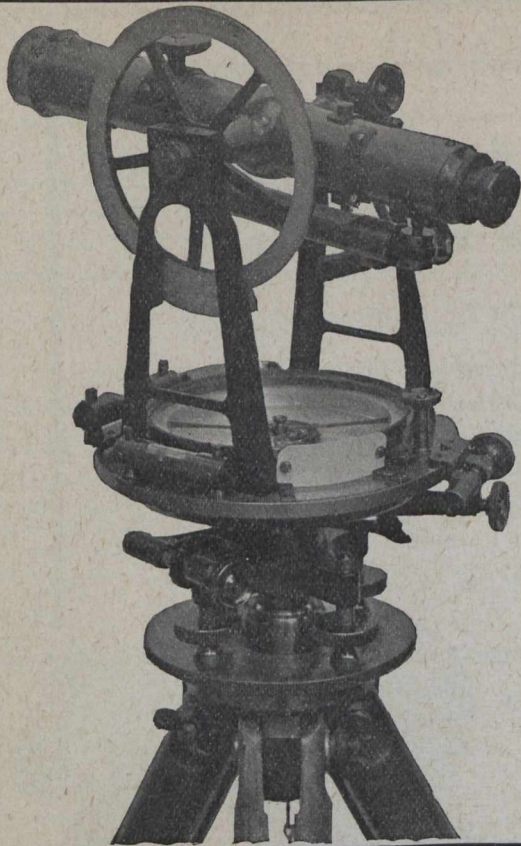
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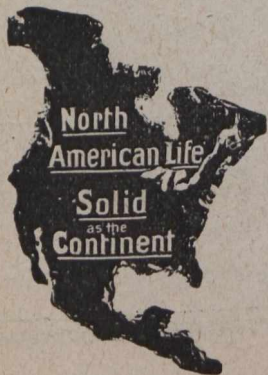
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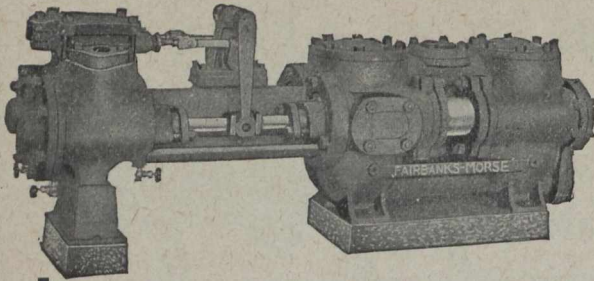
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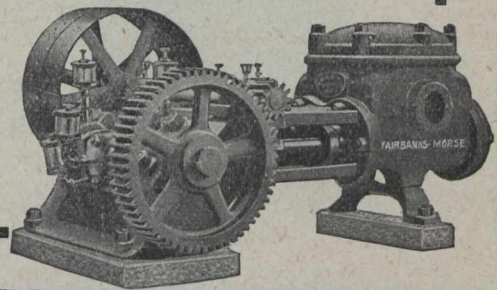
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The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their 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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The holder of the certificate may stake mining claims to the extent of 200 acres.

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

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

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

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Licenses are issued for prospecting for Gold and Silver for a term of twelve months.

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Leases for three renewable terms of twenty years each can be obtained for \$50., and are subject to a yearly rental of \$30.

Royalties are as follows:—

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In the older parts of the Province, salt, petroleum and natural gas are important products. The cement and clay industries have a large output.

The mining laws of Ontario are liberal, and the prices of mineral lands low.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific and other railways run through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

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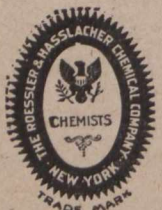
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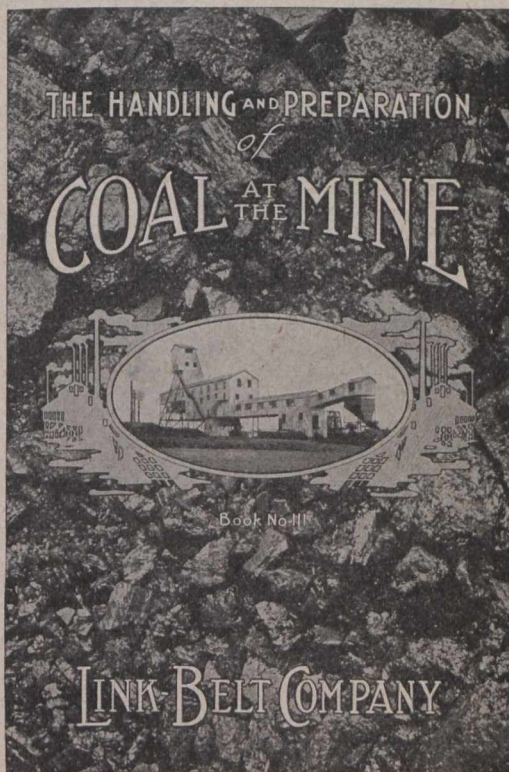
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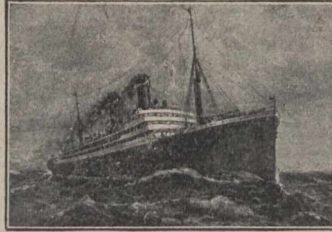
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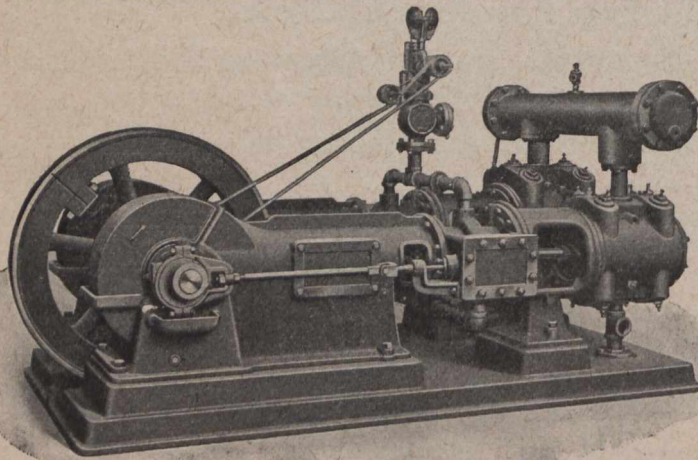
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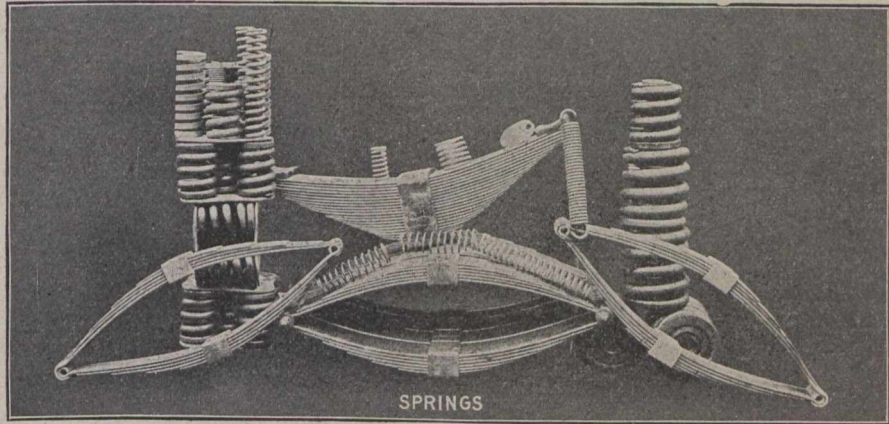
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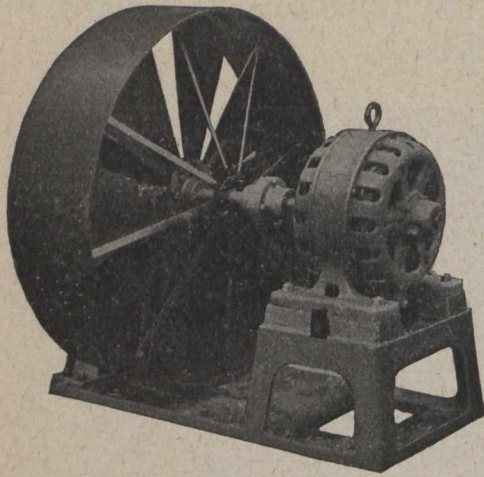
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