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Vol. XXVI—No. 3.

MONTREAL, MARCH, 1906.

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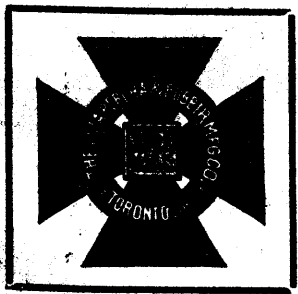


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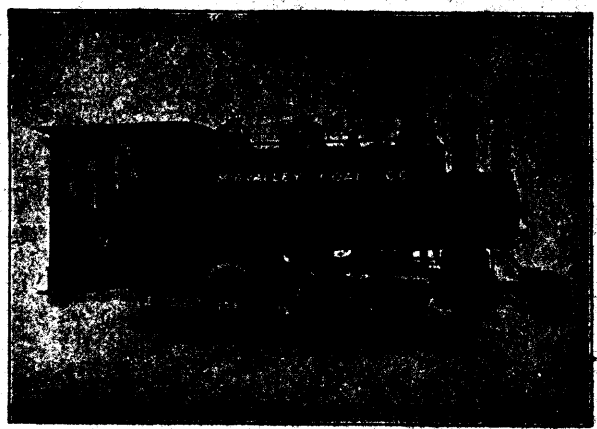
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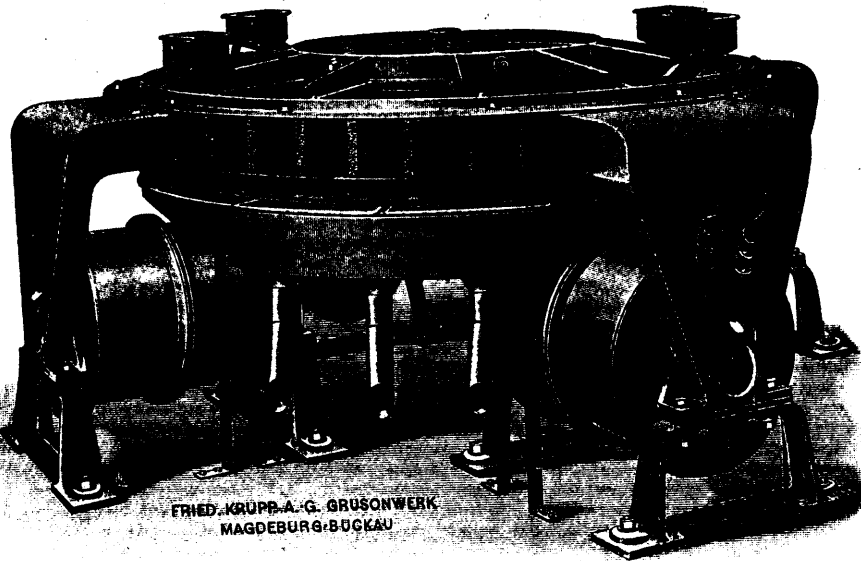
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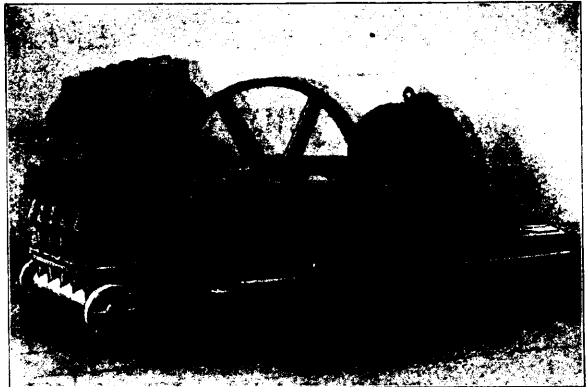
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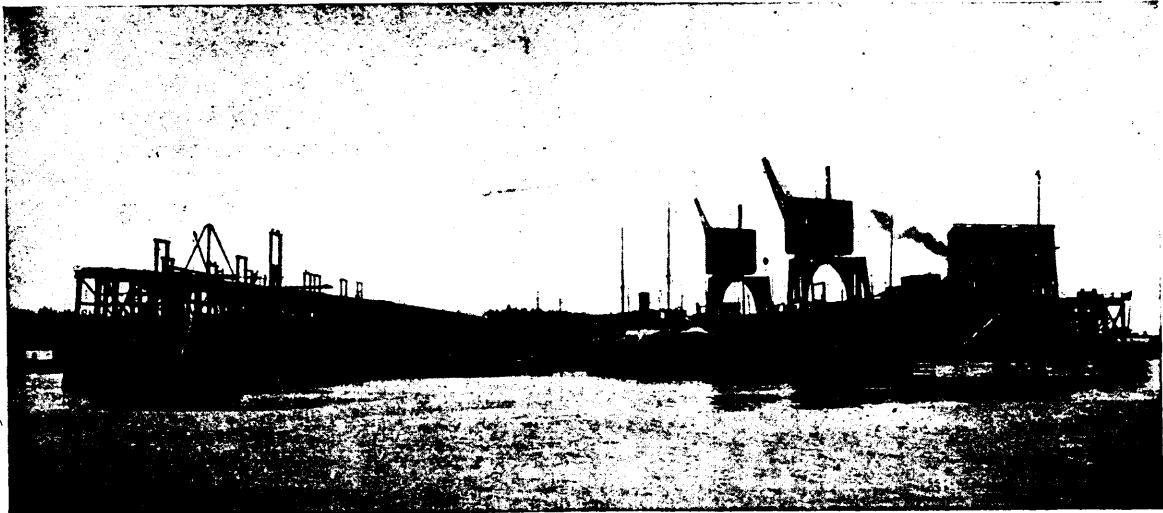
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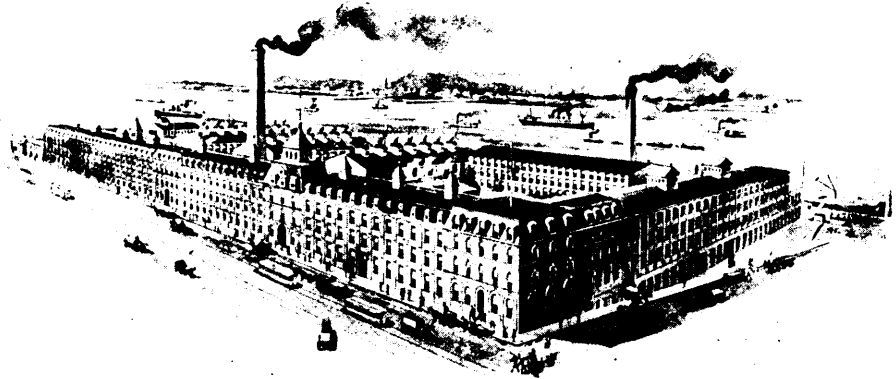
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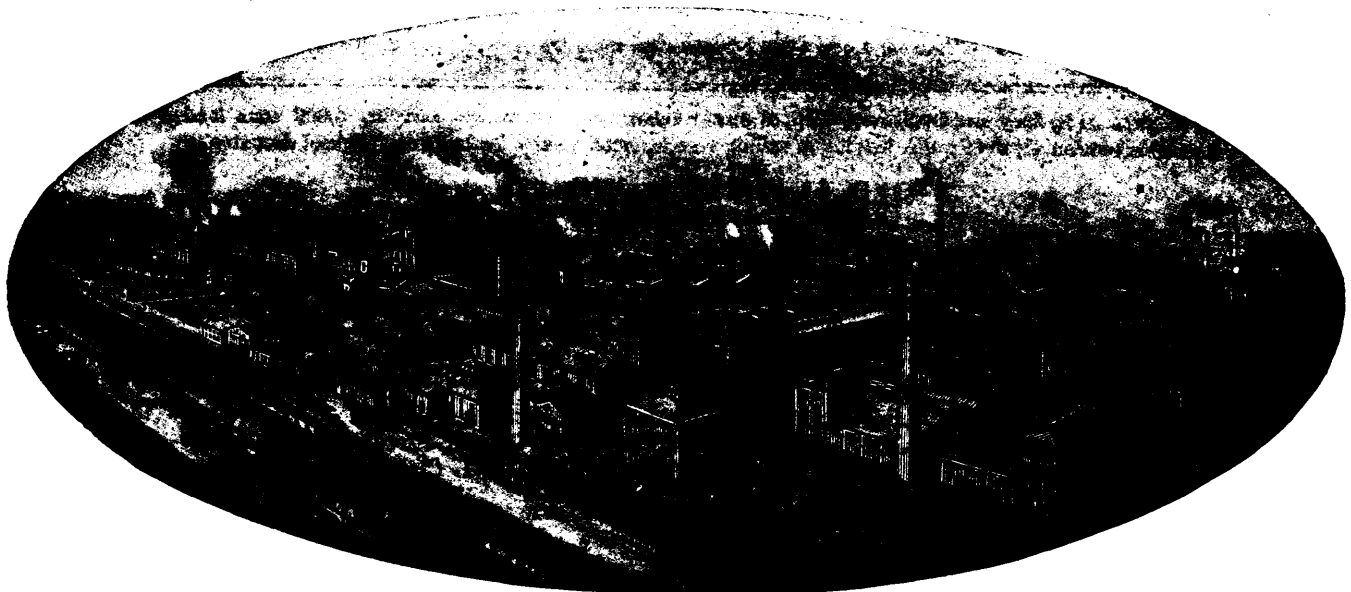
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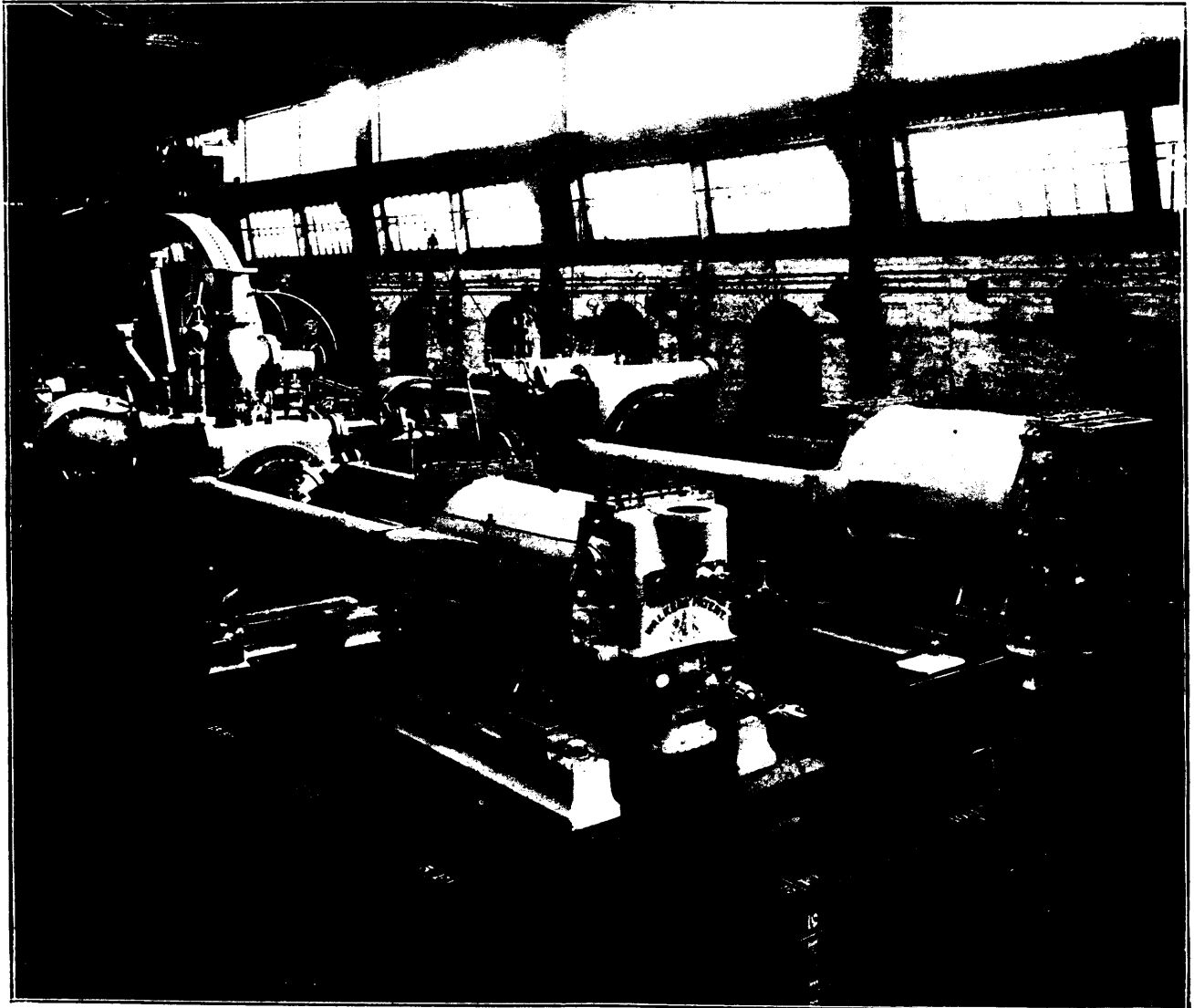
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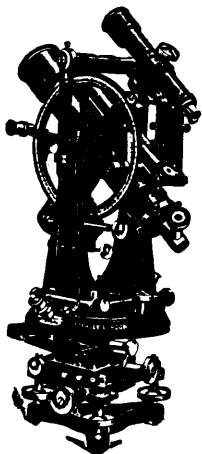
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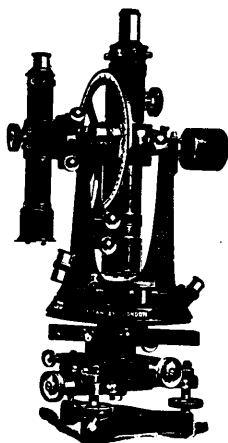
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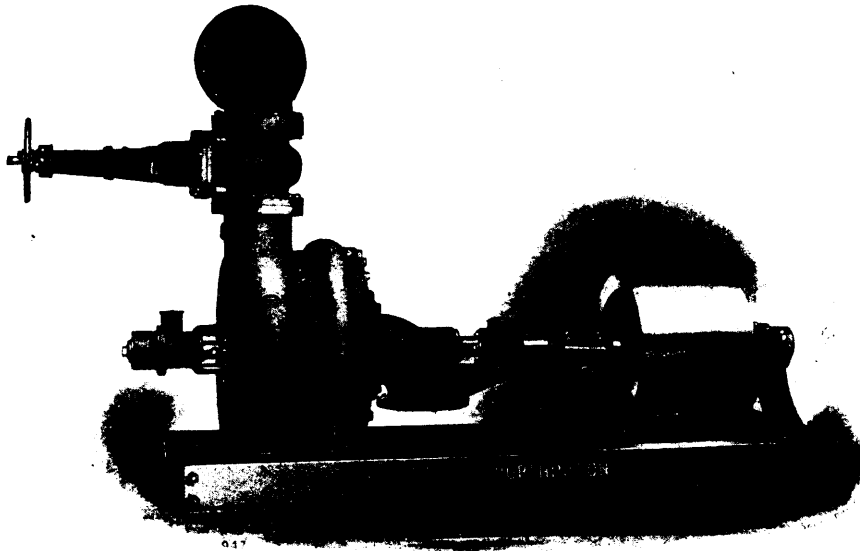
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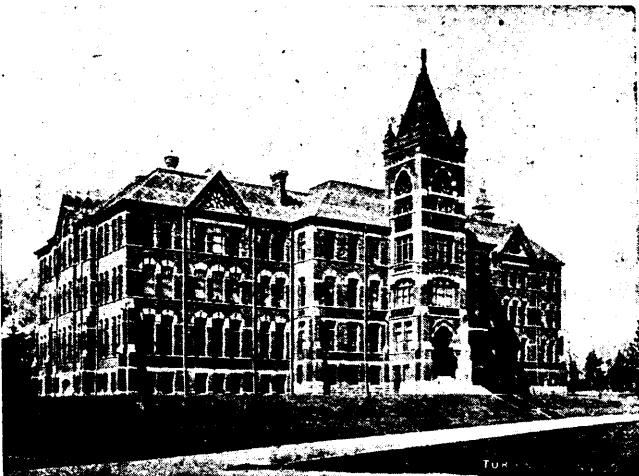
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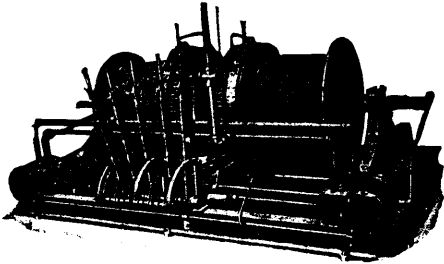
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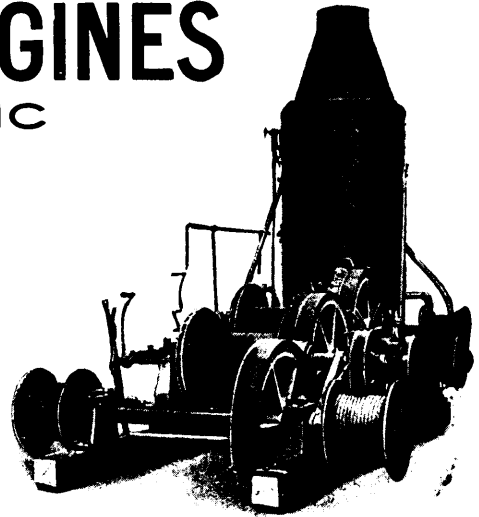
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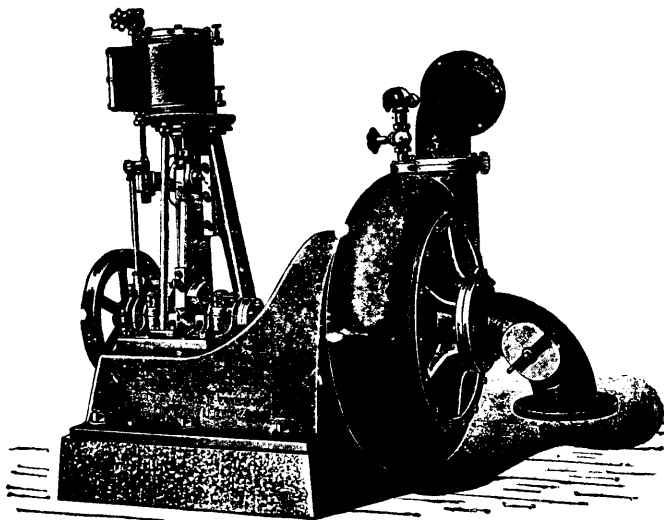
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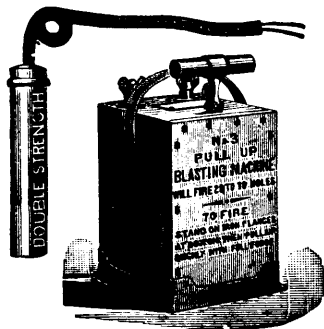
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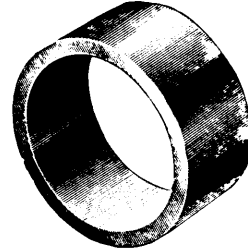
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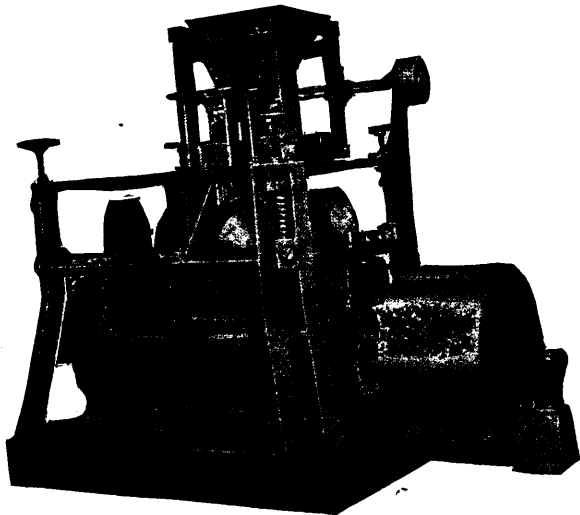
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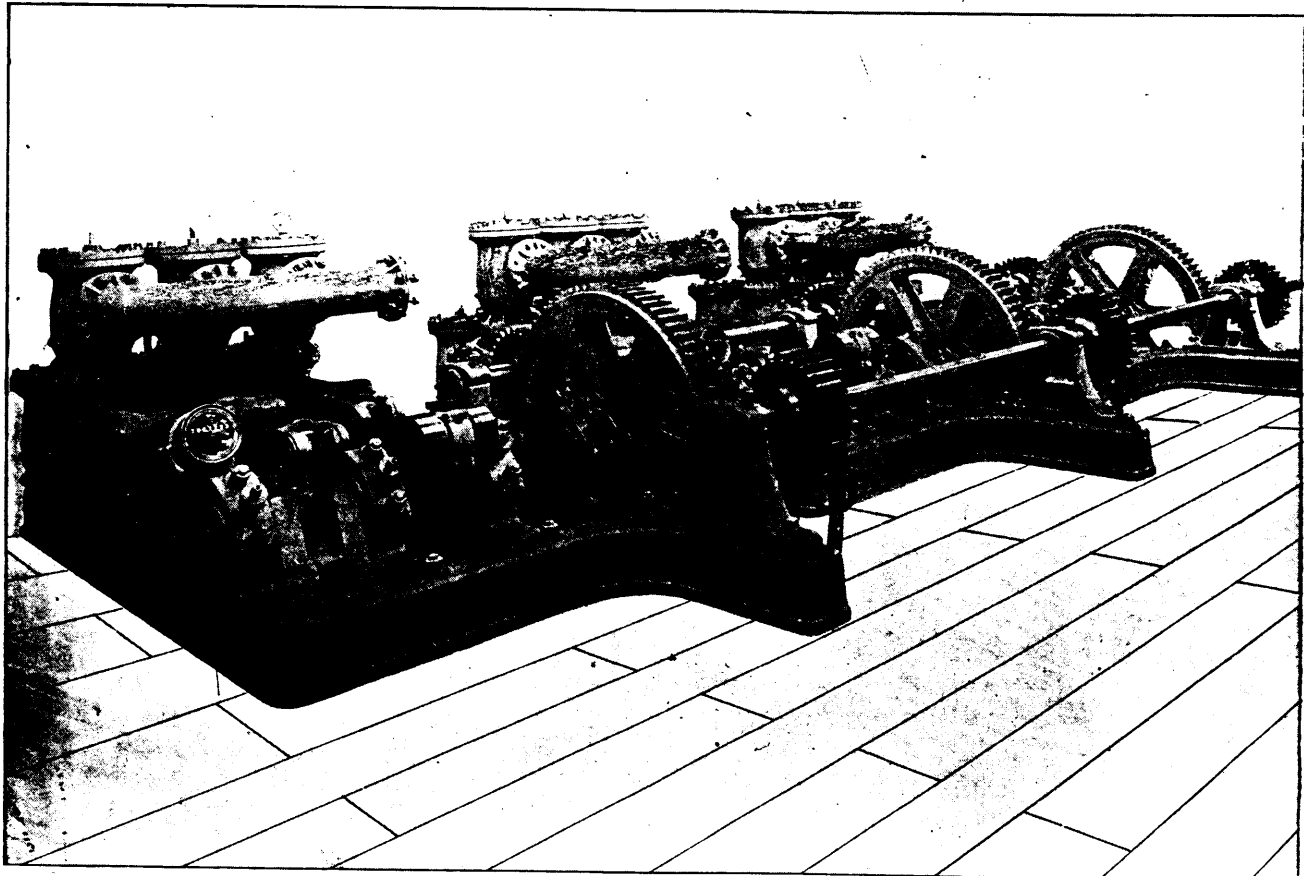
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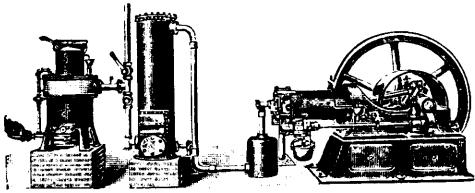
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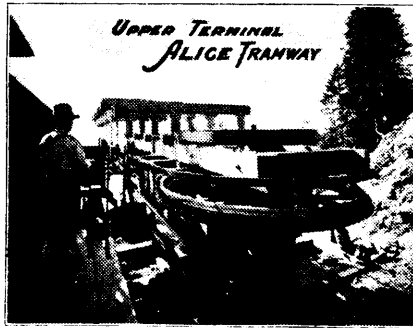
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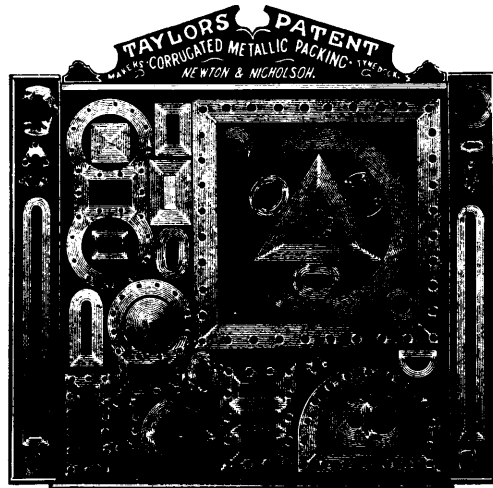
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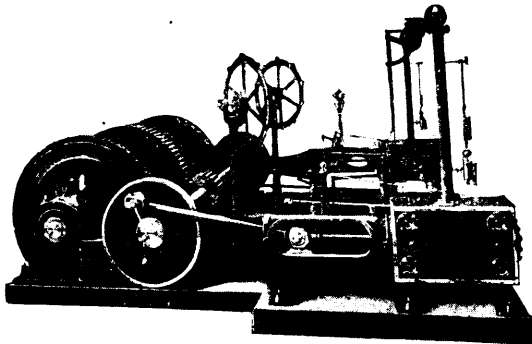
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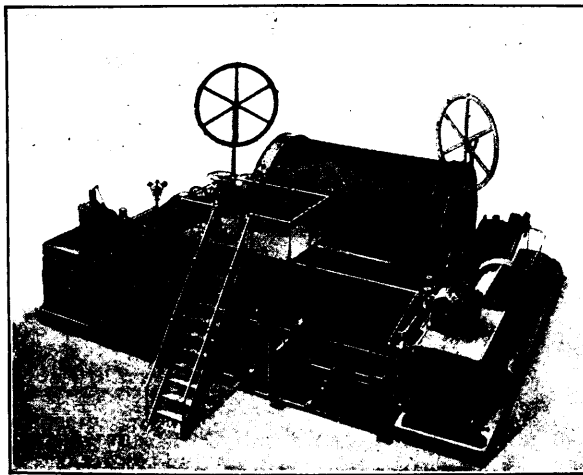
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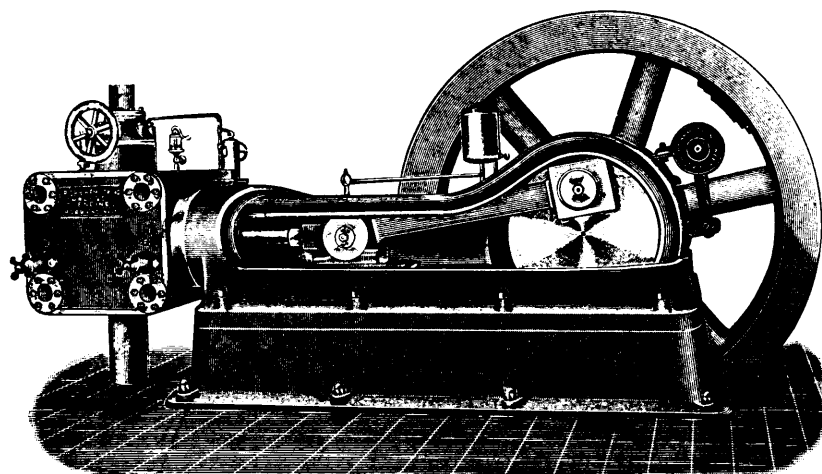
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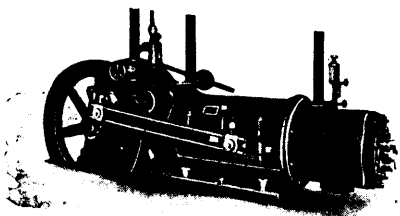
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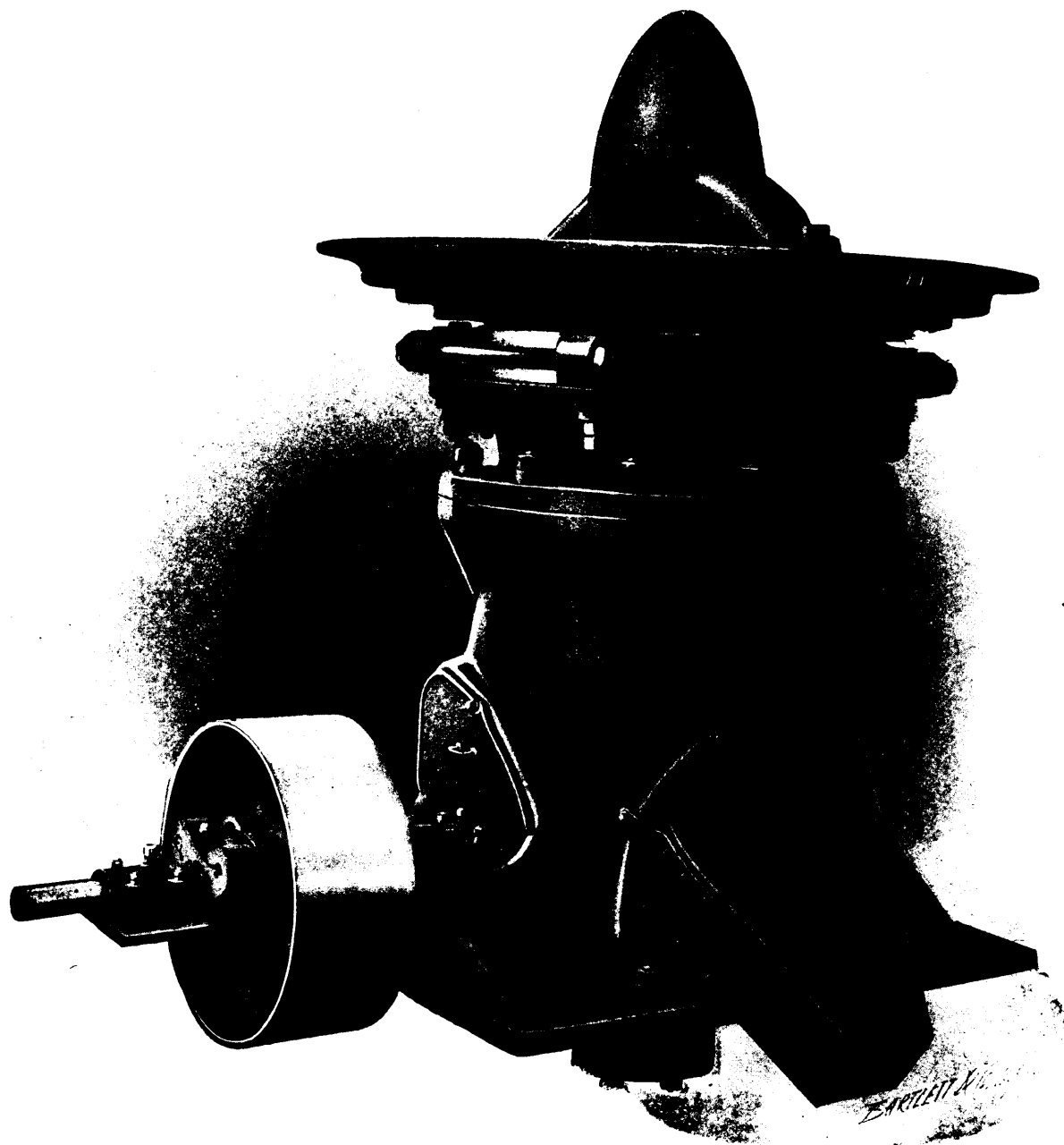
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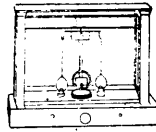
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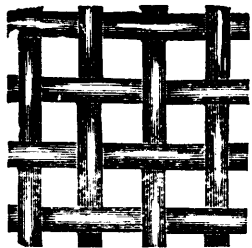


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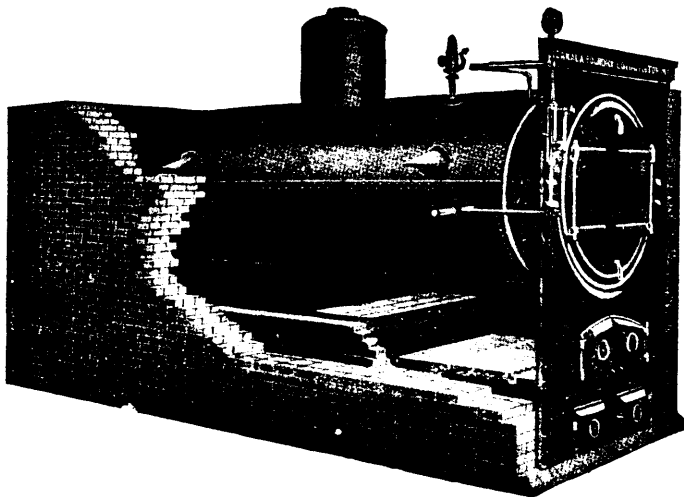
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The REVIEW'S editor, Mr. H. Mortimer Lamb, has been ill with typhoid fever, from which he is now recovering. Our readers are therefore requested to overlook any shortcomings in this present issue, which has been without the valuable advice and oversight of Mr. Lamb.

The official stamp of a town has been given to Cobalt by the establishment there of one of the brightest weekly papers we have knowledge of. The new paper is a weekly of eight pages, of which two are devoted to matters in and about Cobalt and Coleman Township. The editor has a trenchant pen and a sound knowledge of good citizenship; under such a helmsman the *Free Press* should make port on every voyage. The REVIEW extends its greetings and best wishes to the new-comer.

"The Silver Leaf Mining Company's property has changed hands, having been bought by an American Company. The purchase price was \$210,000. There was about \$4000 expended on this property in prospecting and development. For an expenditure of four thousand dollars, the former company clears the handsome profit of \$206,000. Big interest on that investment. The property is situated near Kerr Lake." The above from the Cobalt Free Press. The property alluded to is under an agreement to sell, but the \$210,000 must be obtained from the pockets of the people. This is the property stocked by Douglas Lacey & Co. for the modest sum of \$5,000,000.

The specific allotment of shares in the new organization known as the Canadian Consolidated Mines Limited, is reported as follows:—

For the entire assets of the St. Eugene Consolidated Mining Co., Ltd.	\$2,333,300.00
For the Centre Star and War Eagle combined	1,555,500.00
For the Trail Smelter.....	750,000.00
For the Rossland Power Company....	60,000.00

making a total of \$4,698,800.00 out of \$5,500,000.00 total capital. The balance of the capital stock, namely: \$801,200.00, will be retained in the treasury for the purpose of meeting such new expenses as may have to be charged against capital, and not against earnings.

A recent interview with Mr. J. B. Tyrrell, formerly of the Canadian Geological Survey and recently of Dawson, has been printed, in which Mr. Tyrrell finds considerable fault with the high transportation charges made by the White Pass Railway. Mr. Tyrrell entertains the idea that the Dominion Government should

make an exploration of the country lying between the heart of the Yukon and some point on the Grand Trunk Pacific line in British Columbia. He is also of the opinion that the country through which this thousand miles of railroad will have to go is as promising as the region in New Ontario through which the Temiskaming road runs, and therefore that it would be a good investment on the part of the Dominion Government to make the preparatory explorations. Mr. Tyrrell is authority for the statement that some prices have gone down very considerably in Dawson City, but the funny part is that one pays as much for a newspaper as he does for a glass of whiskey.

The *Free Press*, published at Cobalt is looking after the interests of that town in many ways. Apropos of the beautiful chaos of lanes and alley ways which that town presents it comments as follows:—

"Would it be possible for the Railway Commissioners to break through their wilderness of mal-administration, and look after the building sites in Cobalt. Buildings are going up in all directions, principally in the west end of the town, and people who have nothing else to go by, but their own convenience, are building on the street and off it; and later on there will be endless confusion and litigation. It is to be presumed that the Railway Commission is not for ornament only, or for posing before Ontario as great financiers. Somebody should stick a pin in the Commission and see if it is alive."

We are informed that the Hon. Mr. Prevost, Minister of Mines for Quebec, is to personally visit the Chibogamoo mining district during the early summer, in company with the Superintendent of Mines, Mr. Obalski, and with a Belgian engineer, to advise the Honorable Minister as to the character and value of the new mining district. With all respect we venture to warn the Honorable Minister against relying too closely upon the opinions of qualified engineers who are unfamiliar with a country. The metalliferous rocks the world over have certain identical characteristics, but also they have very diversified forms in different regions, and as Canada has as good and capable geologists as can be found anywhere in the world, it would seem that to ignore these men by the importation of new men may unwittingly give a black eye to the new region.

On the 12th of February an official announcement was made of the reduction of rates for freight and treatment on silver-lead ores. The charge of \$15.00 a ton, which had been in force since 1900, has now been cut to \$12.00 a ton. This announcement was first made by the Hall Mining & Smelting Company, but it is understood that the reduction will hold good at the Trail smelter, at the Pilot Bay works, and at the Marysville smelter also.

No reason is given for this reduction, unless it is the one which is surmised generally by people well acquainted with the condition of ore supplies in British Columbia, and that is, that ore is wanted badly by the smelters and is not coming out in sufficient quantity to keep all the stacks in blast. Among other reasons given by the local press are: the adoption at the Hall smelter of labour-saving devices and increased economy in handling the ore and the adoption of the Huntingdon-Heberlein process which effects a reduction of the cost of roasting. To our mind the reduction of the treatment rate will probably have the effect of increasing ore supplies from the Slocan district, in which many deposits of comparatively low grade ore

have not been worked for some years because the margin of profit was too small to permit of successful operation. The increased margin of \$3.00 may allow certain of these properties to resume operations.

In connection with papers and discussions which were held at this month's meeting of the Canadian Mining Institute on the topic of a Federal Department of Mines and the work of the Geological Survey, it is apropos to mention that Mr. Chas. D. Walcott, Director of the United States Geological Survey has issued an order to all members of his Survey Staff which we reproduce below.

The occasion for this order arose from an attempt made recently by some members of the U. S. G. S. to control a mining paper in Chicago and to make use of the members of that Department of the Government. The affair was short-lived, and the instructions issued by Director Walcott were sensible and appropriate, except for the half a dozen publications which may be classed as "pure science" journals. On this point several of our esteemed contemporaries hold divergent views.

The following is the order sent by the Director to the members of the United States Geological Survey:

"Since the organization of the Geological Survey it has been the policy of the Director not only to permit, but to encourage its members to publish in technical and scientific journals and in the transactions of societies technical and scientific articles, provided they do not anticipate the official publication of the results of specific investigations, of which the priority of publication rests with the Geological Survey. It has always been believed that the widest dissemination possible should be given by this means to information in the possession of the Survey, particularly where the material to be published consists of information gained or conclusions reached as a result of general reading or observation, and is not the outcome of specific official investigations. Even if the writers receive compensation for such articles there does not appear to be anything objectionable in the practice, provided the writing is done outside of official hours.

When such articles are based on information that has been obtained in specific investigations, but (a) is contained in official reports already published or in press, or (b) is not considered appropriate for incorporation in an official report, permission to publish should be obtained from the Director, and the fact should be stated in the article.

There does, however, appear to be some question in respect to the propriety of Survey officials being identified as editors or special contributors, or in any other intimate way, with technical or trade papers conducted as business enterprises. Such connection is apt to be used for advertising purposes and is calculated to bring criticism on the Survey organization. It is deemed best, therefore, while not abridging any of the privileges recognized in the preceding paragraphs, to prohibit such connection of Survey officials with the conduct of trade papers.

This prohibition is not intended to apply to connection with journals which are devoted entirely to the dissemination of scientific knowledge and which are not conducted for profit or as business enterprises. Such publications are *Science*, the *National Geographic Magazine*, the *American Chemical Journal*, *Economic Geology*, *Forestry and Irrigation*."

That the district of Cobalt is to undergo the usual speculative phase, and the agony of joint stock companies founded on little or nothing but capitalized at seven figures, is now beyond doubt. The sale of the Silver Leaf property at the foot of Kerr Lake and its incorporation by the New York firm of Douglas, Lacey & Co., who for years have been known as the largest organizers of stock companies from which no returns have come to shareholders, is the first movement, and one which we fear will be but too common during the present year. The district, and the towns in it, are all preparing for this influx of stock jobbers and promoters, and undoubtedly the Toronto Stock Market will have a plentiful list of Cobalt Mines, with whose shares the general public will be invited to play the game of "buying and selling". We had hoped that mining in the Cobalt district, which has hitherto been conducted on a legitimate basis, was going to be free from the stock boom phase, but its richness and its newspaper fame has been too great to preserve it from a stock boom. We can only hope that the experience of the Canadian public with the Rosslund and British Columbia fizzle of less than 10 years ago will keep them from seconding the efforts of the promoters to any extent.

In connection with this matter we reproduce for the benefit of our readers a choice editorial from that sturdy and independent sheet the *Free Press* of Cobalt. We congratulate our contemporary upon its attitude and wish "More power to its elbow."

"Wild cat" schemes do not come to Cobalt to operate. It is not healthy for them here, but they use the name of Cobalt to give their schemes a gilt edge standing. Nearly everybody has heard that Cobalt is the richest mining district in the world, and the "wild cat" schemes are using the fame of the district to operate.

It looks such a simple matter to part the credulous and their money. People who do not know much about mining, think that anything that is advertised as a claim in the Cobalt district is a safe investment and 'plunge'. A concern we believe is now operating in Michigan, on the strength of Cobalt's fame and selling one dollar shares for \$45. The lot on which the stock is issued has been staked but nothing more. It is questionable if it has been passed by the inspector, but people are rushing in to get rich quick. "A fool and his money is easily parted" is an old saying that holds good in mining as in anything else.

Did the investor notice that none of these "wild cats" have an office in Cobalt? If their schemes were good for the investor, Cobalt would be the place for a head office, but that would not do, for the people here might expose it in defence of the reputation of the town.

Oh no! These fellows keep away from Cobalt but use the name of the town to dupe the unwary. It is so easy to fool some people. A lot on which there is nothing but building stone is advertised as a rich mine, and in order to show its wealth an assayer's certificate is published showing the assay in ounces to the ton. Now how is this managed? The assayer is a professional man. A specimen or sample is brought to him for an assay. He assays the samples, and gives a certificate as to its worth, and there his duty ends. He does not say in his certificate that he has taken the sample from the mine. He simply says he found so and so in the sample furnished, and how easy it is to get a sample. All the rich mines have plenty of ore on the dump and it is so easy to "swipe" a piece, and the

assayer's certificate does the rest. Then out comes a glittering prospector of the "immense wealth" of the quarry, published far and near and then the fakir site down and the money comes in.

The *Free Press* has been offered two of these advertisements but rejected them. The *Free Press* won't be made the agency for "doing" the people out of their money. We believe in honest dealing, and its not honest to dupe the credulous.

If any oily share shovers come at one of our readers, just tell him to wait. Then acquaint us with the location of the "immensely wealthy lot" and we'll do the rest.

If the scheme is a humbug, we'll tell it to you in capital letters and save you your coin. Don't you think it is perfectly absurd that any man would give you a dollar for twenty-five cents? Stop and think, and that's what the share shover tells you so glibly. Our advice to you is, don't be "a sucker". Dividend paying shares are not peddled around. They are kept for the family circle where the public are not invited. Don't be a "sucker".

With the quarterly dividend of \$15.00 per share, payable on the 23rd of this month, the total amount paid to shareholders of the Calumet and Hecla Copper Mine will aggregate the enormous sum of \$93,850,000. Beginning as a dividend payer in 1868, for 38 consecutive years the property has regularly paid a dividend averaging nearly 24 millions of dollars a year on a total capital of \$2,500,000 which capital represents an investment of \$1,200,000 originally.

The Company easily stands at the head of the world's mining enterprises, no other mine has such a record either as to dividends or as to percentage upon original investment.

RESOURCES OF NORTHERN QUEBEC.

Our readers may remember that, in August we printed information concerning the resources of Northern Quebec which were then just beginning to attract the attention of capitalists and of mining men. Since midsummer the interest taken in the extensive area of mineral-bearing rocks in that section has been very great. Something over 230 square miles of the country bordering the northern and western shores of Lake Chibogamoo, surrounding Lake Wahkonichi, and including the communicating water ways, has been applied for under the existing mining laws of Quebec, and the Provincial Treasurer has received the money therefor. Transportation in this northern section has been helped and assisted by the Provincial Government to the extent of a grant of \$10,000.00, for the purpose of opening a winter road into the district from the village of St. Felicien, and this road is being utilized at the present time by something over 100 men, sent in with supplies by half a dozen companies, for the purpose of prospecting their holdings for minerals during the coming summer.

The chief and parent organization of the whole is "The Chibogamoo Gold and Asbestos Mining Company, Ltd.," which was (as has been stated in a previous article) the direct outcome of the discoveries made by Mr. Peter McKenzie in the fall of 1903. From a modest beginning this corporation has become, at least on paper, a gigantic concern with a capital of \$6,000,000.00; a very large amount of which is in cash, which has been put in by New York gentlemen interested, and believing, in the possibilities of the country. The difficulty of transporting men and

supplies into that country, and of bringing out ore, or metallic products, from that section was clearly pointed out in the articles printed by the REVIEW last summer.

In full knowledge of these difficulties, applications have been made to the Provincial Government, at its present session of Parliament, for railway charters, not only into this particular Chibogamoo district but into that wide band of Huronian rocks which runs in a general easterly and westerly direction across the top of the province from Lake Chibogamoo to Lake Abitibi. What the possibilities of this large area of ancient and altered rocks are, in the way of valuable minerals, is entirely an unknown quantity as yet, with the exception of the eastern portion round Chibogamoo Lake. There, it has been well established that the greenstones are penetrated and altered by eruptives in many places, which eruptives seem, as in the Cobalt district, to have been the main cause of metallic precipitations in the rocks. The geological conditions for the existence of important bodies of metalliferous minerals seem to be present in most favorable form, and work, in the shape of development, is the only thing needed to demonstrate whether this Hinterland of Quebec is not one of the most important mineral areas that we have in the Dominion.

In other issues we have commented upon the energy and progressiveness of the present Minister of Mines, Colonization and Fisheries for the Province of Quebec, the Hon. Mr. Jean Prevost, who has endeavoured to organize his department upon business lines and administer it upon a sound basis. The difficulties which have confronted Mr. Prevost, as indeed every other official of the Government, have their origin in the financial poverty of the province; lack of money necessarily means lack of energetic administration, which is impossible when financial resources are small or crippled. It is probably for this reason that all applications for money grants for the projected railroads have been unceremoniously turned down, and the reason has been stated with delicious frankness and brevity. We are informed upon the best authority that colonization must precede any request for financial assistance to railroads in these new regions of the Province. There is, unfortunately, in this region north of the Height of Land little or nothing to tempt the colonizer. The district lying between Lake Abitibi and Lake Mistassini, in an easterly and westerly direction, and between the Height of Land and the 50th parallel of north latitude appears from all reports that have been made, to be good for nothing whatever unless it is a region rich in valuable deposits of mineral. The reasons for this are apparent; first, in its northern altitude, where early frosts and severe winters must be the rule at all altitudes greater than 400 to 500 feet above sea level; and secondly, to the stunted, or comparatively stunted, character of the timber which exists on the elevated plateaus. There would, therefore, seem to be the best of reasons for believing that any attempt to colonize this district north of the Height of Land, would be an expensive and probable failure; and that one must look solely to the development of the mining industry there for the creation of population and of small towns which would require the cultivation of such amounts of land as might be necessary to supply their inhabitants with the necessities of life.

History shows us that all attempts to colonize remote interior sections have been failures unless such sections were covered by rich prairie loam. The experience of British Columbia may be taken as one

example to bear out this statement; for many years, notwithstanding the mild and salubrious climate existing in that province, the rich valleys of British Columbia failed to attract settlers, simply for the reason that there was no local demand, nor market, for the product which these settlers might raise from the soil. With the discovery of Rossland in 1894, and the rapid development of South Eastern Kootenay, in the sections round Nelson, Boundary and the other main towns, there sprung into existence busy mining camps demanding food, and therefore creating a healthy local demand for farm products, which caused contiguous valleys to rapidly become peopled with colonists. Therefore, the rapid colonization in the interior of British Columbia is undoubtedly due to the equally rapid development of the mining industry in that province, and one would be well justified in saying that the mining industry alone will be the basis of colonization in this region of Quebec, which lies north of the Height of Land. The reports of explorations found in the records of the Canadian Geological Survey and in the reports of the Commissioner of Crown Lands for the province of Quebec, indicate that there are large grass areas on the shore of James Bay between the latitudes of 51° to 52° north, and between longitudes 77° to 79.30°, west of Greenwich, and that cattle at this low altitude could well survive the winter weather, and could be well fed on these grass areas, but it is difficult to see any market or any future for the settlement of these grazing areas, or of any part of the region to the north, unless a population is established between the Height of Land and the northern boundary of Quebec; and the only matter which can bring such a population permanently into such a country would be the finding and development of profitable mineral.

Therefore, if the liberty may be taken, the REVIEW would suggest that the problem before the Quebec Cabinet is not, at present, one of *colonization*, but one of how best to encourage the *discovery and development of minerals* in this Huronian Belt which runs throughout the whole of the province north of the Height of Land, and which has been proved to be very valuable in minerals in that eastern section which borders the shores of Lake Chibogamoo.

The existence of asbestos, in large quantities and of a quality fully equal to the best that is in the market, of very large veins or bodies of copper-bearing and gold-bearing quartz; of reported veins of argentiferous galena; of disseminated magnetites and chromites, all indicate clearly that the eastern end of this belt of greenstones contains mineral of merchantable value in large quantities, and one is justified in assuming that the extension of this Huronian area westerly will likewise contain valuable mineral deposits. This belief is further substantiated by the periodic reports which have been brought to the Trans-Continental Railway Commission by the engineers who have been surveying trial lines and endeavouring to get a location line through this section of Quebec. Should valuable minerals be found, it will be a rich man's country, similar to British Columbia, and not a poor man's country; for vast expenditures will be required, not alone to mine the ores but to reduce them or treat them, and therefore investment of many millions of dollars will be required for the development of the country. How to attract this capital and secure the amount of money needed are questions that must be met by the Provincial Government, which cannot afford to solve them in any but a wise manner. Here again experience may be taken from

the history of British Columbia; concessions made to capitalists of unquestioned experience and undoubted financial strength have been proved wise, and have full justification. Quebec, in all probability, has great resources in this northern country, but with her sister province, Ontario, occupying the public gaze with the extensive and rich discoveries of silver-cobalt-nickel ores in Temiskaming, and with Mexico offering a wide and comparatively cheap field for mining investment, having already 300 working days in the year with low wages for labourers, Quebec certainly has no points of advantage, but is rather at a disadvantage, and all such disadvantages and difficulties should be taken into consideration, and judicious concessions granted by a government which has the interests of the province at heart. Undoubtedly, on this line, the framing of a new mining law would be advantageous. Under the existing law there are many sections justly needing criticism. The tying-up of large areas under prospecting licenses and the permissive renewal of these licenses without bona-fide expenditure of labour and capital, is a point frequently criticized by mining men. The tying-up of large areas without the expenditure of money upon the same is a draw-back to any country, and we have no doubt that the present Minister of Mines fully realizes this, and will change the same at the earliest possible moment. With a modern, reasonable and definite mining law, with adequate protection and encouragement to capital, and the utilization of men experienced in Canada rather than the employment of men who have no knowledge of the conditions which exist in Northern Canada, there are substantial reasons for predicting a splendid future for the mineral development of Quebec in this northern Section.

THE KAKABEKA ELECTRIC POWER CO.

The work of developing the water power of Kakabeka Falls near Fort William has been practically realized and by June of this year power for all the industries at Fort William will be available from this source. The work has been in charge of Mr. R. W. Leonard as civil engineer, with whom has been associated Mr. R. S. Kelsch as electrical engineer and Mr. William Kennedy Jr. as hydraulic engineer.

The waters of the river are taken through a pipe 10 ft. in diameter to a point about three quarters of a mile above the falls where a large reservoir has been constructed to act as a fore-bay, from which runs the steel penstock which carries the water to the power house which lies 180 ft. vertically below the fore-bay. The whole of the work has been carried out with a view to dispensing with anchor ice, and the principal materials of construction have been cement and steel.

The initial installation will be 10,000 horse power which will be increased as needed from time to time. The waters of Shebandowan and Dog Lakes are to be conserved by dams so as to afford an abundant supply of water for all the power likely to be required in the future. The total cost of the work is put in the neighborhood of \$2,000,000, and the voltage from the power house to the sub-station will be 25,000. To provide against accidents the transmission line is in duplicate. It is the intention to supply power to all users of five H.P. or over, and the rate to be charged will not exceed \$25.00 per horse power per annum.

THE BUTTE COPPER FIGHT.

That the long contested litigation between the Amalgamated Copper Co. and the Heinzes has been brought to a close seems to be evident from the various news reports which have been current during February, but no details have been allowed to leak out to the public. It would appear from Press reports that some large financial interests, in nowise interested in either the Amalgamated or Heinze properties, have been approached for their assistance and have been consulted in the matter. These strong interests are reported to have counselled an amicable amalgamation or adjustment of difficulties in the interests of the general business situation of the country. Report has it that the Guggenheims are financially interested in the present negotiations.

In the meantime a corporation has been organized in New Jersey under the name of the Butte Coalition Mining Co., which will take over the Heinze properties with a capital of \$15,000,000, the shares having a par value of \$15.00 each. This capitalization and the first board of directors will be temporary only.

The main interest to the general public lies in two facts, that peace will now replace a bitter business and personal warfare, and that the copper monopoly of the United States is now an assured fact.

JOHN STANTON.

The death of John Stanton, which occurred in New York City on the morning of Friday the 23rd. of Feby. removes one of the most notable men in the history of the Copper Industry of North America. Mr. Stanton's death was due to heart failure. He was born in Bristol, England on the 25th. of Feby. in 1830 and was the son of John Stanton, a Civil and Mining Engineer who came to America in 1835. Mr. Stanton senior bought coal lands in the neighborhood of Pottsville, Penn. and instructed his son in the profession of mining engineering to such good effect that at the age of 17 he was put in charge of some iron mining operations in New Jersey. Subsequently, in 1850, he became interested in some minor copper deposits in Connecticut and also explored for copper in Pennsylvania and the Southern States.

In Tennessee he obtained valuable deposits in the neighborhood of Ducktown which he worked until the mines were confiscated by the federal government during the civil war. After the war Mr. Stanton became interested in the copper deposits of Lake Superior where he developed several valuable mines and made a permanent name in connection with the *Atlantic Mine*, which has long been famous for its profits obtained from rock carrying the least copper of any copper mine which has been worked successfully. For years Mr. Stanton was the treasurer of this property and it was due to his unusual ability, in both a managing and a business way, that the *Atlantic Mine* has been rightly considered a model of economy, ability, and an all-round honesty and fairness. His work at the *Atlantic* as also at the *Wolverine*, where his courage and personal loans rescued the property from abandonment and brought it to the position of being, in proportion to its size, the most profitable copper mine in the Lake District, is of itself a monument.

Mr. Stanton was one of the ablest mining engineers of the day; he was one of the founders of the Metal Exchange and was its president in 1876. He was

also a member of the American Institute of Mining engineers and was at one time president of the Engineer's Club. He occupied also the position of director on the boards of many corporations, and of the Granby Copper Co. of British Columbia.

SMELTING OF MAGNETIC IRON ORE BY ELECTRICITY.

(From the Mining and Scientific Press.)

A preliminary report on the subject of smelting by electricity the magnetic iron ores obtained from various points on the Pacific beach has been submitted by Dr. Day to the Director of the U. S. Geological Survey.

After considerable correspondence with the patentees of various forms of electric furnaces, arrangements were made with the Wilson Aluminum Company of New York for the services of C. E. Wilson, their expert in electrical smelting. Mr. Wilson arrived in Portland Ore. on October 11, and at the end of one week had erected a small but efficient electrical furnace, and was making steel. He had procured in the East 25 carbon electrodes—each 48 inches long and 4 inches square—such as are ordinarily used in electric furnaces. The rest of his equipment was obtained in Portland from materials kept in stock or easily made at a foundry.

In building the furnace a course of ordinary Carnegie fire bricks was laid upon the ground. Upon this single course was laid a cast-iron plate, $\frac{3}{8}$ inch thick, 3 feet long and 3 feet wide. On this was placed an oval sheet-iron drum of No. 16 iron 3 feet long by 3 feet high. The sides of this drum were lined with fire bricks to form a crucible 18x18 inches and 24 inches high. The bottom of the crucible was covered, from the cast-iron plate up to the tapping hole, with broken carbon electrode. The carbon electrode to carry the current was suspended by a pulley above this furnace and connected with a balanced axle and wheel by which it could be readily raised or lowered. The top of the furnace was covered with two double plates of riveted wrought iron, between which cold water was run. In the center of this water-jacketed cover an opening was left sufficient to allow the free play up and down of the carbon electrode. This furnace is referred to as "Small Furnace," or "Furnace A."

POWER FOR FURNACE A.—Through the co-operation of the Portland General Electric Company, a special wire, bearing a 2300-volt alternating current, was run from the city supply to the smelter. This was carried into a series of six transformers and yielded a current varying from 50 to 20 volts by 1000 to 2000 amperes.

INITIAL RUN OF FURNACE A.—On the afternoon of October 17, a current of 57 volts and 1000 amperes was passed through the furnace and the arc established. The furnace was then fed with a mixture of magnetite, coke, and lime. This consisted of 200 pounds of magnetite, obtained from the sand at Hammond Station, near Astoria, Or., at the mouth of the Columbia River; 44 pounds of "Fairfax" coke, which contained about 25% of ash; and 24 pounds of lime. About 50 pounds of this charge was slowly introduced into the furnace, and within an hour there was tapped from the furnace 70 pounds of steel, which contained 8% of iron and 53% of titanic acid.

On the following day the furnace was again heated and filled with a mixture similar to that used on the

first run, except that it contained less lime. Steel was successfully cast twice, making, for that day's run of two hours, a product of 90 pounds of steel from 300 pounds of iron ore. This gives the furnace a capacity, on a continuous run, of 1440 pounds in 24 hours.

COMPOSITION OF CHARGE.—The iron ore fed to the furnace showed the following percentages of magnetic oxide, of titanic acid, manganese, and undetermined matter:

ANALYSIS OF COLUMBIA RIVER CONCENTRATES.

Fe ₃ O ₄	79.06
TiO ₂	16.00
MnO ₂	2.45
Silica, moisture and undetermined matter	2.49

It will be noted that the heat was sufficient to keep the entire slag in a fluid state whether much or little titanic acid was present. It is evident also that no titanium went into the iron. Instead of the steel usually obtained, the charge of October 20, as shown by the analysis of that day, gave what was practically pig iron.

NATURE OF SLAGS OBTAINED FROM FURNACE A.—The slags first obtained consisted of fused iron silicates, fused oxides of iron, and silicate of titanium. Later in the experiments these slags grew lighter in color and in specific gravity. It became possible also to lessen the quantity of slag produced, which was unduly large owing to the great quantity of ash in the coke. The coke used showed on analysis 41% of ash. It is difficult to procure in this locality coke that is well adapted to metallurgical needs.

FURNACE B.—Experiments with the small furnace having been successful, it was thought desirable to build a larger furnace, with thicker walls, in which higher temperatures might be obtained and maintained. An iron plate 2 inches thick, 5 feet wide and 6 feet long was therefore procured and laid upon two courses of fire brick, to form the base of a furnace, on which was set a wrought-iron cylindrical shell $\frac{1}{4}$ inch thick, 5 feet in diameter and 4 feet high. This was lined with fire brick, the bottom having the usual lining of one course of carbon electrode bricks 4 inches in diameter. Two carbons clapped together with a water-jacketed head or clamp formed the electrode for introducing the current. The voltage was run up as high as possible—that is from 75 to 90 volts, the limit of the current obtainable over the wires. In all respects except these mentioned, this second furnace is identical with the first.

Iron ore from Aptos, Bay, of Monterey, California, was smelted in this furnace on November 10. This iron ore is very fine grained and contains a notable percentage of manganese, much of which goes into the steel. It is not so rich in titanium as the other sands that had been used. From the start this furnace made a satisfactory run, maintaining easily a high temperature and turning out a very smooth product. After a few trials the slag became as light in color as that from any well regulated blast furnace. The later products of steel were much denser than those first made, which would seem to indicate that, at the higher temperature, the process of reduction is complete, even in the short time that elapses between the beginning of reduction and the tapping. In every case, however, small blow holes were observable in the steel. These were due to gases which formed wherever grains of magnetite were still entangled in the steel in process of reduction. The capacity of this furnace with a current of 125 volts, 1200 amperes, would be 2000 pounds in 24 hours.

RECORD OF DAILY RUNS OF FURNACE A.

No. of Run	Date	Hours Run	Volts	Am-peres	Mag-netite	Mixture Used			Sand	Total Weight of Mixture	Metal Tapped From Furnace	Slag Pro-duced	Carbon Elec-trode Con-sumed	Horse Power	Steel Pro-duced per horse Power Day	Magne-tic iron Ore per Pound of Steel
						Coke	Lime stone									
	1904.				Lbs	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.
1...	Oct. 17.	1½	57	1000	200	44	24	.....	268	70	.....	1.80	76.40	14.66	2.86
2...	Oct. 18.	2	57	1000	300	60	30	.....	390	90	200	2.10	76.40	14.14	3.33
3...	Oct. 20.	2	57	1800	97	19	8	.....	124	23	125	1.20	137.53	2.01	4.22
4...	Oct. 20.	2	57	2000	91	21	4	.....	116	120	88	3.50	152.81	9.42	.76
5...	Oct. 21.	2	57	1800	150	74	7	.....	231	23	115	2.30	137.53	2.61	6.52
6...	Oct. 21.	2	57	1800	102	27	2	.....	131	106	105	3.20	137.53	9.25	1.03
7...	Oct. 23.	8	57	1200	500	100	24	10	634	247	410	2.80	91.68	8.08	2.03	
8...	Oct. 25.	3	57	1200	202	40	12	12	266	38	150	3.50	91.68	3.31	5.32	
9...	Oct. 26.	1	115	800	298	60	30	10	398	122	120	4.00	123.32	23.75	2.44	
10...	Oct. 27.	5	115	1200	800	154	96		1056	263	318	2.00	184.98	6.83	3.04	
11...	Oct. 30.	3	115	1200	800	152	64		1018	200	400	1.50	184.98	8.65	4.00	
12...	Oct. 31.	5	115	1200	1200	175	112		1487	575	280	3.00	184.98	14.92	2.09	

RECORD OF DAILY RUNS ON FURNACE B.

No. of Run	Date	Hours Run	Volts	Am-peres	Mixture Used			Total Weight of Mixture	Metal Tapped From Furnace	Slag Pro-duced	Carbon Elec-trode Con-sumed	Horse Power	Steel Pro-duced per horse Power Day	Magne-tic iron Ore per Pound of Steel
					Mag-netite	Coke	Lime stone							
	1904.				Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1....	November 10..	4	100	1200	1000	200	160	1360	480	250	2.00	160.86	17.91	2.08
2..	November 11.	7	75	1600	1000	250	48	1298	175	312	3.69	160.85	3.69	a5.71
3....	November 14..	9	80	2000	858	154	18	1030	450	457	6.00	214.47	5.59	1.91
4..	November 16	8	80	2000	800	170	84	1054	a1025	500	8.00	214.47	14.34	b. 78

a Metal not all tapped.

b Includes metal not tapped from previous run.

THE HUNEER V. MINE, BRITISH COLUMBIA.*

By JAMES ASHWORTH.

Aerial Cableway.—The Hunter V. and Double Standard claims, belonging to the British Columbia Standard Mining Company, Limited, are located on the top of a mountain near Ymir, and may be reached either by aerial cableway, horseback or on foot.

This aerial cableway, being one of the most recently erected in British Columbia, may be safely assumed to exemplify some of the best points in this mode of transportation. The distance between the terminal stations of the main cableway is 13,000 feet, and there are in addition two supplementary cableways, 1,800 and 500 feet long respectively. All three are worked separately, entirely by gravity, and the speed is regulated by powerful brakes on the clip-wheels at the upper stations.

On the main cableway, the top or fixed ropes, 1½ inches in diameter, are in two lengths, the first being anchored at the top station (Fig. 1), and tightened from time to time as required at a station about midway (Fig. 2). At this station, the bottom length is also anchored, and is tightened, as required, at the bottom terminal station (Fig. 3).

On the Hunter V. cableway, the longest length between the supporting towers is about 1,800 feet, and the height above the ground is about 300 feet.

The haulage rope, ¾ inch in diameter, is an endless rope. The buckets, of which there are 30, are placed at equidistances apart. When the rope is running at the rate of 400 feet per minute, 100 tons of ore can be easily transported and delivered into cars on the

*Excerpt from the Trans. I. M. E.

railway, in 10 hours; and this quantity can be increased by adding extra buckets.

Special cradles are used for carrying men and timber: two of these cradles being placed a short distance apart, so that the timber, in transit, is supported at both ends, and, therefore, rides practically horizontally.

Every movement in the loading and unloading of the buckets, is, as far as possible automatic: thus, starting from the bottom station (Fig. 3), the catches which fasten the bucket in position when loaded, are opened by a fixed disengaging arrangement (Fig. 4),

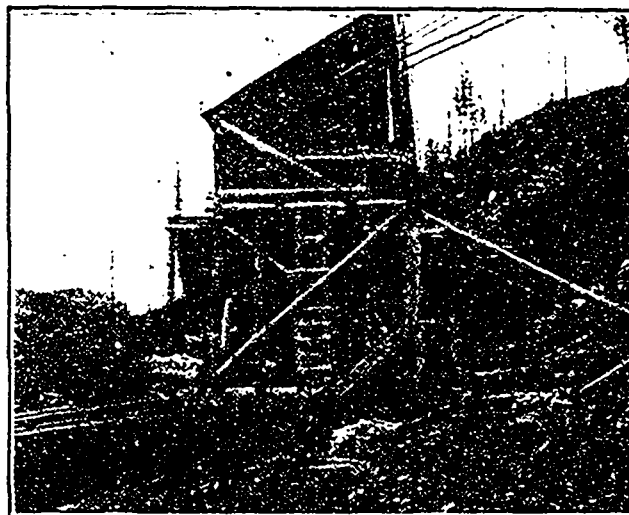


FIG. 1.—TOP STATION OF THE MAIN CABLEWAY: THE ORE-BIN . . . BEING FILLED BY THE SUPPLEMENTARY CABLEWAY.

and the bucket (say, No. 26) dumps its contents into the ore-bin without a stop, and then, passing onwards round the return wheel, continues its course back to the mine with the bucket in an inverted position. The object of running the inverted bucket is to prevent water or snow from filling it whilst in transit. On arrival at the top station the bucket strikes an inclined-plane arrangement (Fig. 5), which forces the bucket into its proper position and allows the catches to close on to the hooks, and it is then ready for loading on the other side of the clip-wheel. Here a man, by means of three levers (Fig. 6), regulates the loading and the movements of the main cableway. In the intervals of time, between the buckets passing this point, the man opens the shoot, A, close at his left hand, and fills the automatic loader, B, shown below. On the arrival of a bucket (say, No. 23), a catch on the hanging frame of the bucket engages with a bar on the loader, B, and takes it in tow, and then the loader automatically discharges its contents into the bucket, while still in motion. The loader, after traversing a certain distance (Fig. 7), disengages from the bucket, and is brought back to its original position, by a counterbalance-weight, ready for loading from the bin.



FIG. 2. —MIDWAY ANCHORAGE OF THE MAIN CABLEWAY.

The ore-bin is filled by the supplementary cableway, and the buckets are dumped automatically (Fig. 1).

The buckets at the top and bottom stations (Figs. 4 and 5) are run from the cable on to fixed edge-rails, which conduct them round the clip-wheel and the return-wheel. Fig. 8 shows a line of derricks where the line makes a curve over one of the hills and also shows an inverted bucket returning to the mine. The return-wheel (Fig. 4) is mounted on a movable platform, by means of which, and a heavy counterbalance-weight, the haulage-rope is kept in tension. The flanged wheels (Fig. 5) are made in halves, so that the tread of the wheel, which is a separate part, and is fixed in position by molten lead, may be removed and replaced, without the expense of having an entirely new wheel.

This mode of transportation can be applied for the cheap transit of ore and materials over long distances, and for heavy outputs. Another aerial tramway, under erection, has a length of $3\frac{1}{2}$ miles, and a capacity of 800 tons per 10 hours; and another one $4\frac{1}{2}$ miles long, demonstrates that long and continuous lengths can be worked by this system, without its being necessary to place the ropes in one straight line. This mode of transportation being simple in its details, the movements being as far as possible automatic, and



FIG. 3. —BOTTOM STATION OF THE MAIN CABLEWAY.

the working power being gravity, it is obvious that the cost per ton of material moved is very low.

When the writer travelled on this cableway, the time occupied in the transit to the mine, which is at

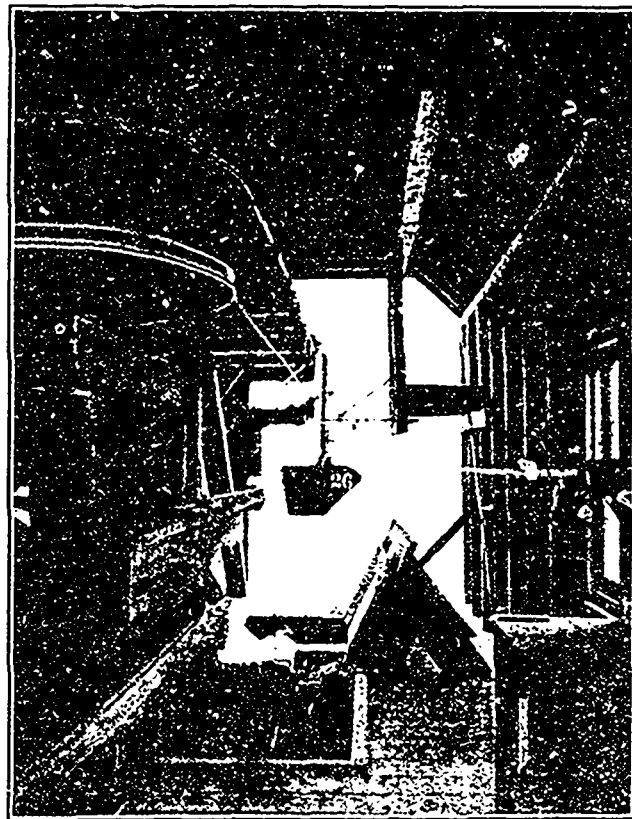


FIG. 4. —INTERIOR OF THE BOTTOM STATION.

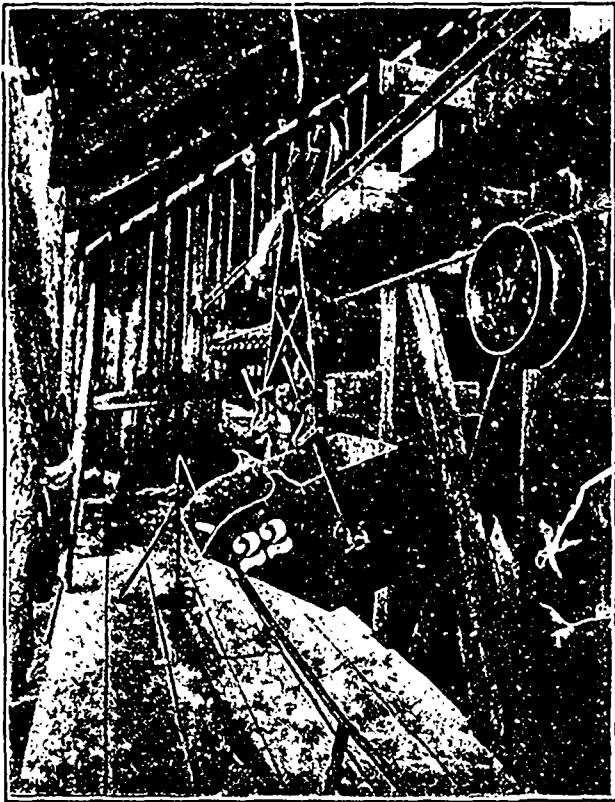


FIG. 5.—INTERIOR OF THE TOP STATION.

an elevation of 5,500 feet above sea-level, was about 50 minutes.

Hunter V. Mine.—The Hunter V. group of claims includes, within its boundaries, portions of a limestone-deposit, the extent of which has not yet been fully as-



FIG. 6.—LOADING SIDE OF THE TOP STATION.

certained. Locally, it forms the upper portion of the mountains near the head of Porcupine Creek, in the Ymir district. In the company's claims, the deposit is in the shape of a tongue, about 2,000 feet wide, and several miles in length. It is surrounded on three sides by a more or less altered gabbro of later origin, and belonging, it is thought to the Carboniferous age. The gabbro cuts into the limestone in places, whilst in others the limestone appears to be entirely surrounded by igneous rocks, just as if portions had become detached from the main mass, and had floated off into the molten magma. No fossil remains have been discovered so as to establish definitely the age of the limestone.

Where least disturbed, the bedding planes strike in an east-and-west direction, and dip slightly to the south. In the process of mountain-building, the mass has, like many other parts of British Columbia, been subjected to great strains, with the result that in places it is faulted, folded and contorted into confus-

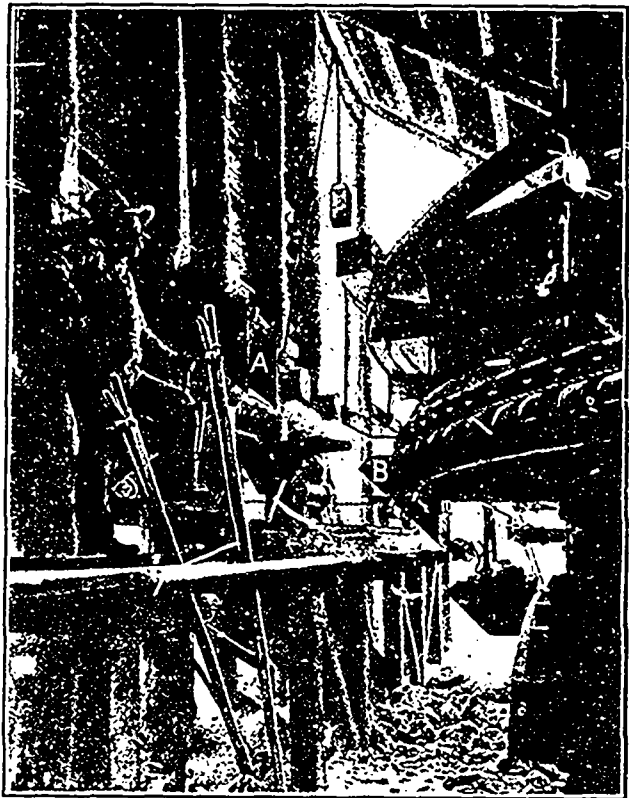


FIG. 7.—LOADING SIDE OF THE TOP STATION.

ing shapes, and the original structure is almost entirely obscured. Fractures have also been formed, in which the circulating waters have re-deposited the lime as pure calcite, and these occur in irregular bands throughout the mass, varying in thickness up to 6 or 8 feet. At some other period, siliceous solutions appear to have circulated throughout the formation, and silica has been deposited in the free state, as also in combination with lime, magnesia, etc.

The most conspicuous minerals that have been found are tetrahedrite (grey copper), zinc-blende, galena, pyrites and native silver.

The origin of the mineralization has not yet been determined, but it will no doubt be traced to the more recent eruptive rock surrounding it, and near the contact of which the largest mineralized areas have been discovered. It appears, however, as an impregnation in the limestone-deposit, and no lines can at present

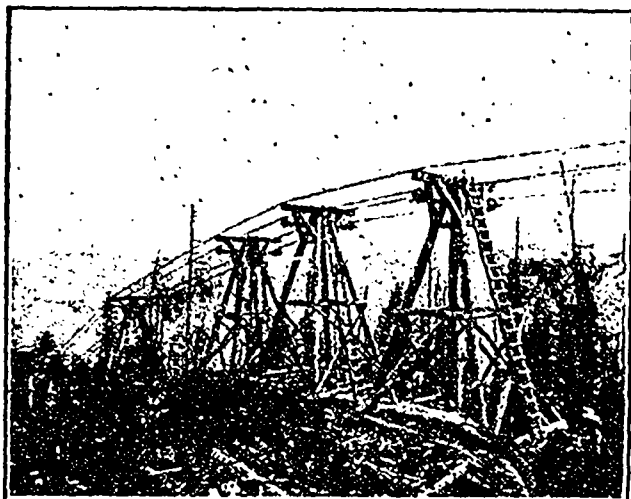


FIG 8.—CURVED LINE OF DERRICKS.

be laid down to trace it to its source, because irregularity of occurrence, and indefiniteness of shape, appear to be its chief characteristics.

The mineralization is more evident on the surface, in the bedding planes of the limestone, which the decomposition of the grey copper often colours green, whilst crystals of azurite are frequently seen scattered along these lines of enrichment.

Native silver, in leaves or plates, is more particularly met with on the faces of joint-planes, and may have been reduced and deposited there through the agency of surface-waters containing organic matter. Planes of fracture are common, some showing incipient movement and others none, but they appear to have an important bearing on the deposition of the ore, for in many cases it is found to be richer on one side of such planes than upon the other.

The opening of the mine has been principally confined to two areas, one on the Hunter V. claim, at the top of the hill, where the face of the quarry at present shows a width of over 70 feet of ore; and the other on the Double Standard claim, 1,400 feet distant, and vertically over 400 feet lower down the hill, where the Glory Hole is more than 120 feet wide, showing mineralization from side to side. Other outcrops of mineral have also been discovered on various parts of the property, though not at present opened up.

This deposit of limestone is unique in the district, and until it is further explored, a more comprehensive study of the occurrence cannot be made.

When the quarries are more fully opened out, the ore will be delivered into railway-cars at a cost of 4s. 2d. (1 dollar) or less per ton.

The ore, up to the time of the writer's visit, averaged about 13 per cent. of silica and 44 per cent. of lime; at times, the silica had run as low as 9 per cent., and the lime had risen to 48 per cent.; but experience had shown that an increase of silica did not necessarily mean a proportionate fall in the percentage of lime. These figures show that this ore is a valuable flux to the smelters. The ordinary limerock, which is used by the various smelters as a flux, when delivered at Nelson or at Trail, costs about 6s. 3d. (1½ dollars) per ton, and at Northport 2 s. 8d. (65 cents) per ton; and such limerock contains about 48 per cent. of lime and 8 per cent. of silica.

In what form the gold and silver are combined has not yet been determined, excepting so far as the native silver, and the silver contained in the grey copper are concerned. The gold-contents have proved to be relatively higher in the Double Standard than in the

Hunter V. claim, and it is in the former that the most siliceous material has been found.

Conclusion.—These few notes would, the writer thinks, be incomplete, without a reference to the excellent food provided at the mining camps, fully equal to an average hotel; and the cook, particularly if he happens to be a white man, receives a much higher salary than a good clerk will receive in this country. A white cook, who satisfies the miners, is a valuable acquisition both to masters and men.

At some camps, which are in a sense out of touch with civilization, there is no actual observance of Sunday, because it has been found that its non-observance is a lesser evil than idleness.

The writer's thanks are particularly due to Mr. N. Carmichael, Mr. J. J. Campbell, Mr. J. Johnson and Mr. W. S. Riblet for the technical details recorded in this paper.

THE NATURE OF ORE DEPOSITS.

By DR. RICHARD BECK,

Professor of Geology and Economic Geology in the Freiberg Mining Academy.*

(REVIEWED BY FRANK D. ADAMS, Ph. D.)

The first edition of Dr. Beck's "Lehre von den Erzlagern" was published in Berlin in 1901, and was followed by a second edition two years later, in 1903. Simultaneously with this second edition, a French translation of the work appeared. The English translation by Mr. Weed, which has just been issued, may be considered as the third edition of the work.

Mr. Weed states in the preface that he was originally asked by the publishers to practically re-write the book from an American standpoint, giving greater prominence to American ore deposits, but that this idea was abandoned because it would involve serious abridgements of the descriptions of important foreign localities, which descriptions make the work especially valuable to American engineers and geologists. Mr. Weed has not, however, confined himself solely to translating the work, but has written new descriptions of many American ore deposits which have, of recent years, been carefully studied. The nomenclature employed in the German edition has in some few details been made to conform more closely to American usage, but otherwise the book is essentially identical with the last or second German edition with the exception of Mr. Weed's additions. In this American edition, however, the book appears in a form which is more conveniently handled, the single large volume of the German edition having been divided into two volumes. This division has, however, been made, strangely enough in the middle of a section without reference to the sense of the text, while by adding a few more pages to the first volume a much more suitable division of the subject matter could have been obtained. The book is clearly and simply written, and is well illustrated by cuts and diagrams. It is the most comprehensive general treatise on the subject of ore deposits which we now have in the English language.

After a preliminary section dealing with definitions and literature, the Classification of Ore Deposits is taken up.

The classification adopted is as follows:—

- (I). PRIMARY ORE DEPOSITS.—
 - A.—Syngenetic; formed simultaneously with the country rocks.—
 1. Magmatic segregations.
 2. Sedimentary ores.
 - B.—Epigenetic; formed later than the country rock.—
 1. Veins.
 2. Epigenetic deposits other than veins.—
 - (a) Epigenetic deposits; formed essentially by an impregnation of non-calcareous rocks, the deposits being generally in distinct beds.
 - (b) Epigenetic stocks, formed essentially by a metasomatic replacement of calcareous rock mostly in the form of stocks, pockets or stringers.
 - (c) Contact metamorphic ore deposits; ore beds and stocks formed through contact metamorphism caused by Plutonic intrusive masses.
 - (d) Ore bearing cavity fillings; deposits formed essentially by a simple filling of pre-existing cavities mostly in the form of stocks or stringers.

*Translated and revised by Walter Harvey Weed, E.M., Geologist, United States Geological Survey, with 272 figures and a map. First edition in two volumes, New York and London *Engineering and Mining Journal*, 1905.

(I). SECONDARY DEPOSITS.—

1. Residual deposits.
2. Placer deposits.

Each of the classes of ore deposits is then taken up in succession, and some of the most notable examples described.

Under the head of Magmatic Segregations, three classes are distinguished, namely:—

- (1). Segregations of native metals.
- (2). Segregations of oxide ores.
- (3). Segregations of sulphide and arsenical ores.

With regard to group three it is stated "that the evidence that deposits of this class are direct segregations from a molten magma is not as clear and conclusive as it is in the case of groups one and two." This it is affirmed is particularly true of the Norwegian nickeliferous pyrrhotites, and it is added that recent microscopic study has proved that the Sudbury deposits are metasomatic replacements and that there is "not a single example of magmatic copper deposits known in North America." Whether this conclusion is justified or not, will be discussed in a series of papers on these Sudbury deposits, which will appear shortly in the new magazine *Economic Geology*, by several gentlemen who have devoted special study to these deposits and who are in a position to speak authoritatively concerning them.

The Bedded Ore Deposits which are next considered are represented by a large number of occurrences chiefly European, which are well described. Among the American deposits of this class are the ores of the iron ranges of Lake Superior. The treatment of these is rather inadequate, and it would seem better, even at the cost of slightly enlarging the book, to have presented a more complete and better balanced account of what are in fact the most important iron deposits in the world. In the account as given there are some inaccuracies. Thus, on page 78 the "soft ores" are said to be brown hematite. These ores, however do not hold sufficient water to be so classed, for while undoubtedly specimens of brown hematite can be obtained from these soft ores, they, as a class, are essentially red hematite, only partially hydrated, the average content of water in the Marquette ores being 5.4 per cent. while in the Mesabi range, whose product may be said to consist entirely of soft ores, the average content of water is only 7 per cent, while brown hematite has twice this amount of water. Again, on page 23, the iron ores of the Mesabi range are said to belong to the class of magmatic segregations, while on page 80 they are said to have originated in the same manner as those of the Penokee-Gogebic and other iron ranges of the district, which are classed as sedimentary deposits. On page 78, grunerite is referred to as "almost pure ferric silicate in the form of hornblende." In the same class are the Clinton ores which also merit a much more extended description.

The Epigenetic Deposits are then taken up, their description being prefaced by an excellent "General Description of Mineral Veins," treating of their structural relation to the country rock, structure of the vein filling, &c., and including a discussion of the origin of vein fissures and of the dislocation of veins, faulting, &c., which occupies 80 pages.

The numerous occurrences of vein deposits are grouped according to the ore which they contain, and examples of the several groups are considered in succession. The definition of a vein given by Emmons, "A single mineralized fissure, or the ore body formed along a single fissure," is accepted, although Beck states that he "does not entirely agree with S. F. Emmons, who attributes the important role in the formation of many veins to metasomatic processes, as such processes are always regarded by him (R. B.) as subordinate phenomena in vein formation."

Under this class of deposits a good description is given of the tin deposits of the Erzgebirge, and it is noted that in the case of the Zinnwald occurrences at least "the impregnation with tin-stone occurred before the last phase of volcanic activity in the region." This is followed by briefer descriptions of the Cornish tin deposits, and of the "tin districts" outside of Europe.

The next section treats of that extremely interesting class of deposits which mark the transition between tin deposits of the usual type and ordinary mineral veins and which find their best exemplifications in the occurrences of the Cerro de Potosi and other Bolivian deposits. Under this heading are also described the veins of Butte, Montana, and the native copper deposits of Lake Superior are here taken up as a whole, although few of the important deposits of this region are really veins. This latter very important district is also one which merits a more extended description, the conglomerate deposits being disposed of in some six lines. The opinion is expressed that "genetically these deposits are best explicable by the assumption of a lateral secretion of the copper ores which were originally finely distributed in the melaphyres, the only enigma being why the secretion and concentration took the form of native copper."

It is noted in the discussion of the silver lead veins that the three types of these veins recognized by Herder in the

Freiberg district have been found to exist with but little variety in the mineral districts of all parts of the globe, "so that they are really of universal application." These are: (1) the pyritic lead quartz veins, (2) the high grade galena veins with carbonated gangue, and (3) the galena barite veins. The veins of these classes in the Freiberg district are described in detail, and a good map, showing the distribution of the several systems of veins in this classical locality is given. Representatives of the several classes in many other parts of the world are also described and compared with respective occurrences in the Freiberg district.

The veins of the rich cobalt silver ores of the Joachimsthal and Annaberg districts, to which the recently discovered veins of the Cobalt district of Ontario are so closely allied, are then described in detail. It is mentioned that as early as 1517 a mining settlement existed in the Joachimsthal district, and that in 1518 the first "Joachimsthaler" was minted, this coin now being known as the "Thaler." It is stated that special attention is now being paid in these districts to the extraction of uranium.

In connection with the gold quartz veins, their close relation to pegmatite intrusions is noted. During the cooling of a body of granite magma, the water and the various gaseous compounds became more and more concentrated in the residual mother liquor during the crystallization of the magma. The residual solutions, penetrating into fissures, deposited vein quartz together with vein substances and non-silicated compounds, which were comparatively uniformly distributed in the molten magma but which gradually retreated into the residual water.

Having described these deposits, an abrupt break is made and the "General Description of Veins" is resumed and continued through forty pages. The statement made to the effect that this description is continued from page 226 is evidently a misprint, as it is really continued from page 195. This section takes up the consideration of "Differences in Vein Content at Different Depths," which are considered under the heads of changes in primary filling and due to secondary alteration; "the Distribution of Ore within the Vein"; "the Influence of the Country Rock on the richness of Lodes"; "the Influence of the Vein Intersections on Ore Content"; "the Influence of Converging and Diverging Stringers on the Content of Veins"; "Action of Vein Solutions upon the Wall Rock," &c.

Under the changes in the character of primary ore filling, the progressive replacement of galena by zinc blend and pyrite in depth is noted in the case of a number of well known occurrences, as, for instance, in the Freiberg veins, in those of the Upper Harz, in the silver lead ores of the Castle Mountain and Barker districts of Montana, as well as in the Elkhorn deposits. This same change has also been observed in other cases not mentioned by the authors, as in the Joplin district of Missouri, which is mentioned by Van Hise, and in the silver lead veins of the Kootenay district of British Columbia. This change, however, in the case of the Missouri occurrences is regarded by Van Hise not as one of the primary ore filling but as due to the secondary action set up by descending waters.

The superficial alteration of ore deposits in the zone of weathering and the various classes of products resulting from this, are then described at length.

The "Action of the Vein forming Solutions upon the Wall Rock" are taken up and considered under the heads of "Sericitization", "Kaolinization", "Propylitization", "Silicification", "Alteration of limestones into ore-bearing pyroxene-epidote Rocks", "Tourmalinization" and "Topazitization" and "the Metasomatic replacement of the country rock by Ore."

There is inserted at this point a "Review of the various Theories of the origin of Mineral Veins." These are classified as follows:—

- (1). Congeneration Theory.
- (2). Descension Theory.
- (3). Lateral Secretion Theory.
- (4). Ascension Theories.
 - (a) The Igneous Injection Theory.
 - (b) The Sublimation Theory.
 - (c) The Hydrothermal Theory.

Numbers 1 and 2 may now be said to be of merely historical interest and with regard to the theory of Lateral Secretion, the opinion is expressed "that any general application of the theory is decidedly impracticable," although a few occurrences are mentioned which may have originated in this way. The Igneous Injection Theory is also of merely historic interest although it has lately been resuscitated by Weinschenk and applied to the pyrite deposit of Bodenmais. The authors maintain that the Hydrothermal Theory affords the true explanation of the origin of mineral veins. "We maintain that the original formation of most ore bodies is due to thermal water rising from great depths. These thermal waters are believed to be the after-effects of Plutonic eruptions, such as the intrusion of granitic masses; also of volcanic events in the narrower sense." It is

not clear however, whether these thermal waters which are the after-effect of volcanic action are regarded by Beck as "juvenile" waters in the sense of Suess, or are waters which having percolated from the surface have been rendered especially active agents of solution and deposition by the heat communicated to them by the intrusions in question.

The description of "Epigenetic ore deposits in Stratified Rocks" is then taken up, and a large number of occurrences are described, among the more important of which is the Mansfield "Kupferschiefer" and the Transvaal gold-bearing conglomerates. With regard to the former, the authors do not believe that the copper was derived from any process of direct precipitation from the ocean waters in which its shale was laid down, but point out that "wherever the formations comprehended under the name Kupferschiefer are ore-bearing, the Zechstein and its underlying rocks are found traversed by numerous fissures which have in part the character of mineral veins. The generally recognized fact that with few exceptions the amount of copper in the shale increases on approaching these fissures and dislocations is direct evidence in favour of impregnation from the fissures."

The Transvaal gold-bearing conglomerates are described in considerable detail, and the various theories which have been proposed to account for the gold in them are discussed, that which accounts for the subsequent introduction of the gold by the invasion of the porous conglomerates by gold bearing solutions being preferred.

The term *epigenetic ore stock* is given to all stock shaped, pocket shaped and tube shaped ore bodies found in limestone or dolomites, and which are formed by the metasomatic replacement of the carbonates by ores and accompanying minerals. Among the examples of these, the spathic iron ores of the Bilbao District; the copper deposits of Bisbee, Arizona; the ore deposits of Laurium; the lead and zinc deposits of the Mississippi valley and others are described. Beck considers that in the case of the last mentioned "the presence of cerite and fluorite, in fact the entire mineral assemblage of the deposits, so closely resembling that of the genuine silver-lead veins of hydrothermal origin, indicates that the hydrothermal theory is the correct one, especially since it will hardly be proved that the zinc and lead contents of the limestone were not themselves introduced by subsequent infiltration." A similar origin is attributed to the Leadville deposits.

The Contact Metamorphic Ore Deposits, to which an ever increasing number of ore deposits is being referred, embraces ore bodies formed within stratified rocks under the influence of contact metamorphism near or along the boundary between plutonic eruptive masses and stratified rocks. The most important criterion for the recognition of these deposits is considered to be their mineralogical composition, the ore being characterized by the presence of certain minerals which we know elsewhere to be typical of igneous contact zones, e.g. Garnet, Wollastonite, Vesuvianite, Andalusite, Cordierite, Scapolite, &c. There is, as is pointed out, a very close genetic relationship between ore bodies of this class and magmatic ore segregations.

The Contact ore deposits of Banat, Hungary; those of the Christiania Region and of the Island of Elba, with a number of others, are described as examples of this class of ore bodies, which is one that merits a much more close and thorough study than has heretofore been given to it.

The work closes with the consideration of the several classes of detrital deposits.

The book is an excellent one and is especially useful to the English speaking student as presenting a description of many foreign ore deposits, information concerning which is otherwise to be found only by extended search through a great mass of literature. The book, however, might be improved if the material were in a measure re-arranged by discussing for instance the origin of the epigenetic deposits in one section instead of taking up the question of origin in connection with each subdivision separately, for the same reasoning applies to all these deposits irrespective of shape.

The type employed for the headings of the various sections might also be made more distinctive as in the German edition which, in this respect, is much clearer. There also seems to be some mistake with regard to the statement on the title page that the book is illustrated by 272 figures, as only 257 can be discovered by the Reviewer. These, however, are minor faults, and the book is one which every one interested in this most important branch of Geology will welcome.

BEQUEST FOR MASSACHUSETTS TECH.

The late Frank Harvey Cilley, engineer, has bequeathed the residue of his estate, which will probably amount to \$70,000, to the Massachusetts Institute of Technology for the purchase of suitable books, photographs, casts, anatomical models and statuary for the library and gymnasium of the proposed Walker Memorial gymnasium, or for special lectures on physical culture.

MODERN METHODS IN SHAFT SINKING.

A few years ago there would have been no benefit in using large engines during sinking, as the progress of the work at the bottom of the shaft was so slow that the debris could easily be wound by self-contained engines, with a drum of 3 or 4 feet in diameter. But now that the sinking progresses more quickly it is essential to wind rapidly. Of course safety must not be overlooked, as it is certain to be a serious matter if anything happens to the bucket whilst it is in the shaft or when it is being unloaded at the top. By means of the ropes and rider the bucket is steadied during its journey, and passes up and down the shaft at a rapid rate more safely than was formerly possible at a slow wind. By using folding doors many dangers during banking are avoided, as the pit top is completely closed down during the greater part of the time. It will thus be seen that although the use of large engines may at one time have been of doubtful advantage there is no reason for doubting their advantages whenever the winding arrangements described are installed.

Investigation of the effects of fine grinding on cyanidation has resulted in instituting similar studies regarding amalgamation. It is doubtful, however, whether it will be found that fine grinding improves amalgamation. The consensus of opinion of experienced stamp mill men is that crushing finer than thirty or forty mesh hinders, rather than aids, amalgamation. On the other hand, a cyanide expert of prominence has recently stated that one of the discoveries resulting from fine grinding is that greater returns can be obtained on the plates from the slime product. The practice mentioned consists in flowing the pulp over ordinary silvered plates and then, after fine grinding, over shaking plates. While these opinions are widely different, they undoubtedly have foundation, and tend to show the necessity of individual treatment for individual ores.

THE ZINC DUTY.

The Daily News has it that a duty has been imposed on zinc sulphides entering the United States. It is well known that the agitation has been steadily kept alive by the Joplin producers, and only recently has the question been before the Attorney-General of the United States. The imposition will not hurt the producer in the Slocan. Its one effect will be to force the smelting of the ores in Canada, and the prices paid will be fully as high as those paid in the States. This in the face of the local plant not yet having time to perfect the practice. Once that is perfected and the costs known, the United States competition will never be missed.

It must be maddening to the Great Northern railway to have the effort to serve the United States market treated with so little sympathy. Just what they will do now in the way of providing markets for the zinc production in their territories is a problem. The Frank plant can now meet any competition and with the duty of 20 per cent can more than worst it.

The only other market available is Europe, and it cannot compare with Frank. The attitude of the local plant toward this production is one of indifference. If any proposition is made it must come from the Great Northern. There is plenty of zinc available, independent of that territory. The matter is up to the producers and the railway to scrap it out among themselves.

[Sandon Standard].

THE CASSIAR COAL FIELDS.

(By Our Special Correspondent).

One of the most promising of the hitherto unworked coal fields of British Columbia is to be found in the Telkwa Valley of the Cassiar District, where the Cassiar Coal Development Co. has 52 square miles, all of which, so far as investigation has gone, being underlain with several seams of coal of excellent quality, and only waiting for transportation facilities to develop into an important industry. The line of the Grand Trunk Pacific Railway is expected to pass near to or through the property, while a charter also controlled by the G.T.P. exists for a road to Kitamaat Arm, 80 miles distant, a land locked harbour connecting with the Pacific Ocean.

The coal field was discovered in 1901, by Mr. William Limin when prospecting for gold and copper. In 1902 a party of qualified men, equipped with a diamond drill and other tools went in, and they have made a thorough examination, which shows the extent and richness of the deposit. Professor Coleman, of the School of Practical Science, Toronto, was sent out the same year, and his report fully bears out the results arrived at by the first explorers. He reached the following conclusions: That the coal is of good bituminous quality, burning well and



SEAM No. 1.

standing the weather excellently, unlike lignite coal; that it is apparently of the same age and general character as the best coals mined on the Pacific slope; that seams of coal, from 3 to 15 feet thick, occur from point to point along the valley. In 1901 Mr. A. Webster, formerly of the Geological Survey, visited the locality, and in a letter to Mr. Limin and Mr. Davis his associate, says he considers it of the very first quality, both as a coking and a steam coal. "I have never," he says, "seen better coal in British Columbia." He gives a section of the strata in descending order as follows:-

	Feet
Ash, rock, drift, etc. . .	100
Top seam of coal (No. 1)	20
Clay shale	25
Coal seam (No. 2) . . .	15
Clay shale	4
Coal seam (No. 3) . . .	2 1/2
Clay shale	40
Coal seam (No. 4) . . .	4
Clay shale	35
Coal seam (No. 5) . . .	14



SEAM No. 2.

This gives a total thickness of coal over 50 feet. Allowing one million tons for each foot to the square mile the amount of coal in sight would be the enormous total of 25,100,000,000 tons. The company expect to mine 3,000,000 tons a year, so that the deposit would not be exhausted for nearly a thousand years.

The seams crop out on Goat and Mud Creeks, which are tributaries of the Telkwa. The latter flows into the Buckley which in turn empties into the Skeena near Hazelton, up to which point steamers ascend. From there supplies are taken in by pack train over a good trail. The Telkwa and Buckley Valleys are very fertile and a number of claims have been taken up, but until railway communication is established settlement will necessarily be slow. As an instance of the fertility of the soil Mr. Limin obtained from 5 sacks of potatoes planted as seed 150 sacks. Wheat, oats, barley, peas, and garden truck of all kinds grow readily. The elevation is about 2,000 feet above the sea.

Tests with the diamond drill show that the seams dip towards the north and east, and that there is considerable faulting. A hole near the northern boundary penetrated 130 feet into the overlying sandstone without reaching the coal, when operations had to be suspended by the breaking of the drill. The deposit is underlaid by conglomerate.

An interesting feature of the deposit is the ash beds which are found in some places. Fire seems to have eaten its way into the seams, probably from Indian camp fires, and having burned the coal the overlying rock has fallen down, smothering the fire and leaving the ash beds.

The only coal mined so far was for the use of the prospectors. They burned it for three months in a stove without having a



SEAM No. 5.

clinker. Tests show that it is low in ash and sulphur. It is very solid and can be mined with little waste. There is plenty of timber and water on the spot, so necessary in coal mining operations.

The Cassiar Coal Development Co., which is composed principally of Toronto and Hamilton men, took out a license after the first discovery, and after development work had established the value of the deposit, obtained a lease. They are now negotiating with English capitalists for the sale of a large interest in the property. The latter have put up a deposit as a guarantee of good faith, and will close if the property comes up to representations when examined by their expert in the spring. Some stock was sold by the Cassiar Development Co., but none is now on the market. Some small claims have been taken up on adjoining properties.

The accompanying illustrations show seams Nos. 1, 2 and 5 where they are exposed on the banks of Goat Creek.

THE WORLD'S PETROLEUM SUPPLY.

The United States supplied more than one-half of the petroleum produced in the world in 1904. A statement of the world's production of petroleum, prepared by the British Board of Trade, which has just reached the Bureau of Statistics of the

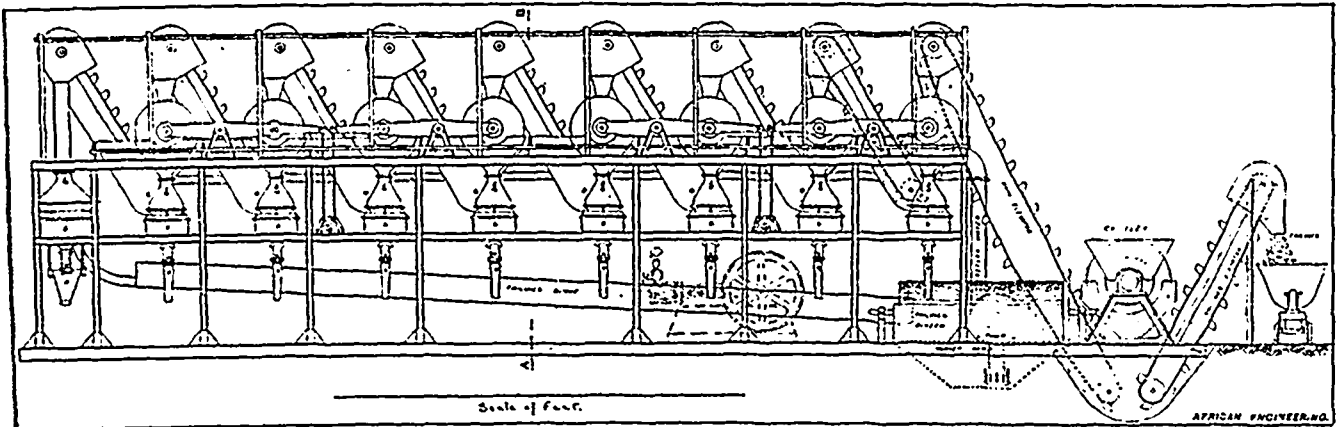
Department of Commerce and Labor of the United States, puts the petroleum production of the world in 1904 at 9,303,000,000 gallons, of which 4,916,000,000 gallons were produced in the United States, 3,650,000,000 gallons in Russia, 202,500,000 gallons in Austria, 206,500,000 gallons in Java and Sumatra, 135,000,000 gallons in Roumania, 105,500,000 gallons in British India (principally Burma), 49,000,000 gallons in Japan, 20,000,000 gallons in Canada, and 18,500,000 gallons in Germany.

These figures give the grand total of 9,303,000,000 gallons of petroleum production in 1904, a total which far exceeds that of any earlier year. In 1903, which made the highest record of any year prior to 1901, the total was but 8,504,000,000; in 1902 it was 7,588,000,000. This increase in 1903 and 1904 occurs chiefly in the United States. The figures of production in the United States show an increase of about 697 million gallons in 1901 over the figures of 1903, while those of Russia, our chief competitor in oil production, show an increase of but 103 million gallons over 1903, and the increase in the United States in 1903 is also much larger than that of Russia. In the four years 1898, 1899, 1900, and 1901, Russian production of crude petroleum exceeded that of the United States, but in all other years for which the record is shown by the publication in question, extending from 1883 to 1904, the production of the United States exceeds that of Russia, and by far exceeds that of any other country. Indeed it may be said that the United States and Russia produce practically nine-tenths of the petroleum of the world, the total production in 1904, as above shown, being 9,303,000,000 gallons, of which 8,566,000,000 was produced in the United States and Russia combined.

Exportation of illuminating oil, or kerosene as it is familiarly called, is also much greater from the United States than from Russia, especially as American crude oil gives a much larger per cent. of illuminating oil than does that of Russia. The total

WATER AS A DIAMOND CATCHER.

The vexed and extreme difficult problem of the automatic sorting of diamonds from the concentrates which leave the washing machines has had the close attention of engineers all over the world. It was not until the De Beers Company discovered, patented and made use of grease as a diamond catcher that it could be said that inventors had got any nearer to a solution of the problem. No one quite knows how it is that diamonds adhere to grease, while most other substances pass over the plates and escape its influence. That such is the case, however, has long since become an accepted fact, and the theory which attributes the action of the grease-catcher to adhesion or surface contact to be correct may be true. Certain it is that grease-plates catch 100 per cent. of the diamonds which are fed over their surface, and in this respect the system may be said to have attained perfection. Gravitation has nothing to do with the working of the grease diamond-catcher, but the concentrates, after leaving the washing machines, have been sorted roughly by gravitation in the pulsator before they arrive at the grease tables. In this machine, to be described, separation is effected by gravitation pure and simple, and the medium which operates it is water. It is claimed that this machine will render the use of the pulsator and grease-plate unnecessary. This, of course, would be the case if all the surrounding substances are of a smaller specific gravity than the diamonds. In practice, however, as far as South African concentrates are concerned, this is not so. If the mass of stones, etc., which fall within the range of the specific gravity of diamonds is so great as to render hand-sorting a tedious and expensive process, then the grease-catcher will still have to be resorted to. In that case the machine will merely take the place of the pulsator. Its advantages over



Eight Stage Diamond Separator for separating Concentrates, by the Automatic Gem and Gold Separator Syndicate, of London. Longitudinal Elevation.

quantity of refined illuminating oil, exported from Russia in 1904 was 455 million gallons, and from the United States 761 million gallons. Russian exports go largely to southwestern Europe, northern Africa, and southern and eastern Asia, while western Europe, eastern Asia, Oceania and North and South America are the most important markets of the United States. Of the 876 million gallons of refined oil of all classes (including naphthas and lubricating oil) exported from the United States in the calendar year 1904, 201 million gallons went to the United Kingdom, 117 millions to Germany, 112 millions to Netherlands, 41 millions to Belgium, 24 millions to France, 74 millions to other countries of Europe. In eastern Asia 70 million gallons went to China, 39 millions to Japan, and 24 millions to Hong-kong, while 25 million gallons went also to southern Asia under the general title of British East Indies, and 26 million gallons to British Australasia. In America the distribution was to Brazil 20 million gallons, Argentine Republic 16 millions, British North America 19 millions, Chili 6 millions, Central America 2 millions, Cuba 2 millions, and Mexico 1 million.

Petroleum has formed of late years an important factor in the exportation of the United States. Prior to 1905 it was the largest single item in the statement of exports of manufactures, but in that year copper for the first time exceeded petroleum in the value of exports. The total value of all classes of iron and steel manufactures exported, of course, exceeds by far the total of petroleum, but no single item in the group entitled iron and steel manufactures is as large as the item of illuminating oil under the general head of refined mineral oil exported. The total value of iron and steel manufactures of all classes exported in the decade ending with 1905 was \$943,886,511, of refined mineral oil \$622,313,762, and copper and manufactures thereof \$444,878,552, while the next largest item is leather, \$272,534,562, and cotton manufactures, \$259,136,044.—*Mining Reporter*.

this are that it possesses no moving parts, is subject to no wear and tear, and is far more compact and convenient. The machine in question is the invention of Mr. W. S. Lockhart, and is being introduced conjointly by the Automatic Gem and Gold-Separator Syndicate, of 10, St. Swithin's Lane, and the Pulsometer Engineering Company, of London and Reading, who are the manufacturers.

A glance at the line drawing will show that the plant consists of eight similar units, and a ninth of slightly different design. Each unit consists of a classifier and separator, and an elevating device connects each pair of units. The only difference between the several sections is that each is adjusted to deal with different-sized material. The number of units is not, of course, confined to eight, the number varying with local conditions.

The operation of the machine is as follows: The concentrates from the washing machines are dumped into the grizzly shown at the right hand of the drawing, and then picked up by the main elevator, unless the grizzly can be so arranged that the materials will gravitate to the machine. The elevator delivers into a hopper, from which the materials fall into the first classifier. The classifier consists of a drum, covered with wire clothing, or plates perforated with square holes. The perforations of the first drum will, in the instance under consideration, pass 3-in. material and everything under. Within the classifier drum there is a fixed spiral. The drum is made to rotate, and given a shaking motion at the same time by means of the levers shown. This assists in puddling any clayey material that the washers may have passed. The oversize from the classifier finds its way out at the end of the drum into a revolving feeder, which delivers the materials in an even stream to the receiving hopper of the first separator below.

The separator is a simple contrivance. A stream of water is made to flow upwards in the annulus between two cylinders. The materials to be separated are fed into the annulus, at right angles to the stream of water, through a circumferential slit in the outer cylinder. The rate of flow of the water is adjusted until it carries all the matter of a less specific gravity than the diamonds with it, and discharges them into a tailings chute. The diamonds, together with any heavier matter, sink against the current of water, and are collected in the receptacles marked R. These are locked up, and can only be opened by someone in authority.

To return to the classifier and follow the course of the undersize from the first drum, which will all be of dimensions less than 7-in, it is collected in a hopper below the first drum, and, in the instance shown in the illustration, taken thence to the second classifier by a bucket elevator. An improvement is, however, being introduced, in which this transference is also affected by a current of water—a much more simple and effective device. The drum of the second classifier is provided with 3-in. holes. Hence the second separator only has to separate materials ranging in size from 2-in. to 7-in. Everything below 3-in. passes on from the second to the third classifier, where a further selection takes place. This process is repeated in each of the eight units until the last unit has only to deal with 1-in. materials. The undersize from the eighth classifier is all passed through a large, ninth, separator, which acts as save-all, and secures any very small diamonds. The tailings from the several separators are collected in a common chute, or disposed of in any other convenient way. If the supply of water is limited, it can be strained out of the tailings and used over and over again, muddiness not being detrimental to the working of the machine.

The photograph which we reproduce shows a small plant, which has been installed to test the tailings from some pans used in washing for rubies. Two or three per cent. of the tailings from some pans used in washings for rubies. Two or three per cent. of the tailings are passed through the separator to show whether the pans are doing their work properly or not. The machine in question handles from six to eight tons a day.

It was on a machine very similar to this that the tests which we witnessed were carried out. Several diamonds were placed in a quantity of gravel. Each time this was passed through the separator all the diamonds were, without fail, extracted. Small nuggets of gold and alluvial tin were also separated from fine gravel with equal success, but the most remarkable test of all was made with gold dust. Two small particles of gold, so fine that they could only be picked up by wetting a finger, were placed in about a quart of silver-sand. This was passed through the machine at a good speed, yet both pieces of gold were recovered, and all surrounding matter was eliminated.

Several of these separators are in use in Brazil and elsewhere, but none as yet have found their way to South Africa.

[The foregoing interesting article appeared in *African Engineering*, and is reproduced in consequence of inquiries addressed to the REVIEW for apparatus which might be used in Canada. We think it also of interest to our readers generally interested in concentration methods.—Ed.]

REPORT OF THE DOMINION COAL COMPANY, LIMITED.

The Directors' report for the year ending Dec. 31, 1905 was as follows:—

The output of 1905 was 3,189,657 tons, as compared with 3,023,522 tons for 1904.

The net earnings from the operation of the Company's mines, steamships, railway, stores, rents, etc., for the year 1905 were \$1,573,832.19, as compared with \$1,620,475.33 for the year 1904.

The general business of the Company during 1905 was well up to the standard of 1904, but the largely increased requirements of the Dominion Iron and Steel Company necessitated an increased output from the mines, and as the contract with that Company is not at present a remunerative one, the average price realized from sales in 1905 was consequently less than in 1904. The decrease in net earnings shown above would, however, have been greater but that the operating expenses, outside actual cost of mining, were considerably reduced.

The surplus earnings, after providing for interest on bonds, preferred stock dividend, etc., have been added to the Company's general surplus, against which account have been charged expenses of reorganizing the Company's securities and an amount to represent depreciation in value of merchandise in the Company's stores.

DEVELOPMENT WORK.—Steady progress has been made with the opening and equipment of the new mine known as Dominion No. 6 on the *Phelan Seam*, and a substantial daily output will be obtained from this mine after the opening of the St. Lawrence navigation this year.

The *Emery Seam* is now being worked through the old workings at Dominion No. 5 (Reserve); shafts are also being sunk to this seam at Reserve and at Dominion No. 6, and it is expected that by the opening of navigation the work will be so far advanced that this seam will yield an output of about one thousand tons per day.

Development work at the other mines has been continuously carried on and is now well in advance of the workings.

Contracts for an electric plant situated at Dominion No. 2 have been let. This plant will be used for furnishing the auxiliary power required at the mines for pumping, ventilation and underground haulage, etc. The general adoption of shearing machines and the increased requirements of the coal cutting machines will practically exhaust the capacity of the compressed air plants at the different mines leaving such auxiliary requirements unprovided for. The central electric plant is needed to make good this deficiency, and will also carry out the work more economically than under present conditions.

Your Directors recognizing that an ample equipment of rolling stock, particularly cars, is a necessity for rapid delivery, for avoiding delays to ships and for saving in operating expenses generally, decided this year to purchase one hundred and fifty 50-ton steel cars at a cost of \$162,000. The greater number of the Company's wooden cars have been remodelled and practically rebuilt in the Company's own shops, and this part of the equipment is now in a thoroughly efficient and serviceable condition; this repair work has been charged to operating expenses.

The total amount expended during the year 1905 on *capital account*, including the above purchase of steel cars, is \$497,605.19.

All other development work, renewals and repairs have been charged against operation.

FINANCIAL POSITION.—It will be noticed from a perusal of the annexed balance sheet, that the Company's financial position has greatly improved during the year 1905. In May of that year the Shareholders gave their approval to a scheme for the re-arrangement and consolidation of the indebtedness of the Company, the main features of which were the substitution of an issue of \$5,000,000 5% Bonds in place of the outstanding \$2,435,000 6% Bonds, and \$2,380,000 Time Notes; and the substitution of an issue of \$3,000,000 7% Preferred Stock in place of a like amount of 8% Preferred Stock. These changes, which, besides other advantages, will effect a large saving in fixed charges, necessitated a considerable outlay in premiums on old securities redeemed and other expenses, which amount your Directors have written off from the general surplus.

GENERAL.—The Company has laid before its employees a scheme for the purchase of their homes on the instalment plan, such as exists at other collieries in this country and abroad, and it is expected that this will be largely taken advantage of by the men. The workmen will gain thereby in becoming owners of their houses on paying a little more than their present monthly rent, while it is hoped the Company will also gain by securing the services of a steady, permanent body of employees.

Your Directors, following a well defined plan for future operations, have, during the year 1905, made large expenditures for necessary equipment and for development to provide for the natural exhaustion of the older workings, and in order to continue this programme it will be necessary to make similar expenditures in 1906. It may, however, be pointed out that in so far as these expenditures are chargeable to capital account the amount so expended to the extent of 75 per cent of the outlay may, if deemed advisable, be subsequently capitalized (after 1st November, 1906) by issuing the additional \$2,000,000 First Mortgage Bonds or any part thereof at present retained in the Company's treasury. Meantime, your Directors have considered it the wiser policy to postpone payment of dividend on the common stock for the present. They trust that the Shareholders will approve these conservative measures, which, in wiping off the floating debt and providing liberally for the efficient equipment and development of the mines, remove impediments to the distribution of future profits; and these, setting aside the possibility of unforeseen accidents, may confidently be anticipated to result from the continued prosperity of the Company's operations.

Respectfully submitted,

JAMES ROSS,

President.

BALANCE SHEET

AS AT DECEMBER 31st, 1905 (compared with Dec. 31st, 1904).

BALANCES.	FOR YEAR ENDING DEC. 31, 1904.	FOR YEAR ENDING DEC. 31, 1905.
ASSETS:		
Property Account as per last Report	22,600,597.83	22,970,516.00
LESS Written off for Depreciation	130,569.81	144,844.60
	<u>22,470,028.02</u>	<u>22,825,671.40</u>
Add Capital Expenditure since	500,487.98	497,605.19
	22,970,516.00	23,323,276.59
Cash in Banks and Offices	151,746.73	251,550.82
Accounts Receivable	702,360.50	825,083.70
Coal on hand	262,715.52	302,400.46
New Supplies in Stores and Warehouses	795,928.76	763,257.09
Insurance paid in advance	31,692.52	19,360.98
Steamship Hire paid in advance	35,620.90	22,234.87
Cash and securities in New England Trust Com- pany for Sinking Fund	261,966.84	
Securities of other Companies	191,000.63	189,964.63
	<u>2,433,032.40</u>	<u>2,373,852.55</u>
	<u>25,403,548.40</u>	<u>25,697,129.14</u>
LIABILITIES:		
Capital Stock, Common	15,000,000.00	15,000,000.00
" Preferred	3,000,000.00	3,000,000.00
SpFirst Mortgage Bonds	2,435,000.00	5,000,000.00
Mortgages	72,000.00	72,000.00
Cap Breton Real Estate Debentures	394,421.58	353,785.08
Dominion Rolling Stock Debentures	298,559.47	265,413.46
Amount payable Dominion Steel Co.	2,380,000.00	
	<u>23,579,981.05</u>	<u>23,691,198.54</u>
Accrued Dividend—Preferred	120,000.00	87,500.00
Unpaid Royalty	84,056.62	97,833.12
Accounts Payable	200,937.56	311,222.77
Notes Payable	71,000.00	
Bond Interest, Accrued	58,250.00	41,666.66
Contingent Fund	54,915.66	73,583.31
Sinking Fund, Accrued	117,157.10	
	<u>706,316.94</u>	<u>611,805.86</u>
SURPLUS:		
Balance from previous years	226,912.13	1,117,250.41
For current year	890,338.28	1,023,671.38
	<u>1,117,250.41</u>	<u>2,140,921.79</u>
LESS Written off to provide for reorganisation of Securities and depreciation in value of Mer- chandise in Stores		746,797.05
	<u>25,403,548.40</u>	<u>1,394,124.74</u>
		<u>25,697,129.14</u>

PROFIT & LOSS ACCOUNT

FOR YEAR 1905 (compared with 1904)

	FOR YEAR ENDING DEC. 31, 1904	FOR YEAR ENDING DEC. 31, 1905
Net Proceeds from Sale of Coal and Net Income from Steamships, Railway, Stores, Real Estate, etc	1,620,475.33	1,573,832.19
LESS		
Interest on Bonds	148,818.16	212,249.73
Dividend on Preferred Stock	240,000.00	220,916.04
Misc. Interest and Premium on Bonds retired	202,996.24	96,679.94
Sinking Fund under former Trust Deed	138,322.65	20,315.10
	<u>730,137.05</u>	<u>550,160.81</u>
	<u>890,338.28</u>	<u>1,023,671.38</u>

Certified correct,

J. R. BLACKETT,
Auditor.

THE STATIONARY ENGINEERS OF ONTARIO.

The Stationary Engineers of Ontario, who number in the vicinity of 10,000, are petitioning the Ontario Government for an amendment to their present Act, making certificates necessary in the interests of public safety. The amendment suggested has taken the form of the following draft bill, which the Society of Stationary Engineers request us to publish:—

An amendment to an Act respecting Stationary Engineers, Victoria 54, Chapter 141, Revised Statutes, 1897, Chapter 31, annual 1891.

By and with the consent of the Lieut.-Governor-in-Council, and by and with the advice and consent of the Legislative Assembly of the Province of Ontario, be it enacted that this Act be amended by expunging all of it up to the words "casting vote" in section 13 thereof, and the following be inserted in lieu thereof:

1. The Lieut.-Governor-in-Council appoint a board consisting of a chairman and — members for the purpose of examining applicants and granting of certificates to all persons operating steam boilers of 50 horsepower or over.
2. It shall be unlawful for any person to operate any boiler of 50 horsepower or over unless he has a certificate, granted under the provisions of this Act.
3. It shall be unlawful for any person to employ an engineer to take charge of a boiler of 50 horse power or over unless such person holds a certificate under the provisions of the Act, and any person who shall be guilty of operating, or any employer who shall employ any person to operate, a boiler contrary to this Act, shall be deemed to have committed a misdemeanor and shall, upon conviction, be fined not less than — dollars and not more than — dollars for each offence.
4. Every engineer who shall be in charge of any steam plant coming under the provisions of this Act at the time it comes into force or any engineer who has had two years' experience and who applies before the expiry of one year, shall, upon proving his character and upon paying the prescribed fee, receive a certificate for the term of two years, and such certificate must be renewed from time to time as it expires, provided, however, the Board shall have power to revoke any certificate upon proof of incapacity, drunkenness, or improper conduct.
5. Any person who feels himself aggrieved by the decision of the Board of Examiners, shall have the right (upon notice being given to that effect) to appeal to the Minister of Agriculture.
6. All candidates for certificates, except as provided for in section 4, shall furnish evidence of their good character, and of having at least three years' experience, either as assistants in an engine room, or boiler room, or as having full charge, and shall submit to such examination, written or oral, as the Board may determine.
7. All certificates shall at all times be exposed to view in some conspicuous place in the boiler or engine room, and the failure to expose same will be prima facie evidence of the lack of qualification under the Act.
8. All fees for examination shall not exceed \$ — and all renewal fees shall not exceed \$ —.

The London *Economist*, under the date of January 27th, prints a very interesting letter from Mr. F. W. Rolt, at one time of Rossland, and lately a director in the Le Roi Mining Company. Mr. Rolt's letter puts the position of the deposed directors in a clearer light than the REVIEW has seen it hitherto, and for the information of our readers we give it below in full:—

Sir.—The affairs of the Le Roi Mining Company have recently been the subject of much bitter discussion, in which, as you pointed out in a recent article (December 30th) the real issues were entirely lost sight of. But, inasmuch as large sums of English money have been invested in this and other mines in the Rossland District, a few remarks on the position of affairs in that camp may be of interest to many of our readers.

The two principal English properties in the Rossland camp are, as you are aware, the Le Roi and the Le Roi No. 2. A comparison of the record of these two companies during the past four years shows the following results. During that period it must be explained that the Le Roi mine has been worked to produce a comparatively large tonnage of low grade ore, while Le Roi No. 2 has made small shipments of ore of much higher value. The following table gives the results in detail:—

Year	LE ROI		LE ROI NO. 2	
	Total Shipments	Gross Value of Ore	Total Shipments	Gross Value of Ore
	Tons	\$	Tons	\$
1904-5	114,959	12.41	12,337	35.78
1903-4	160,109	10.94	21,680	24.80
			1,340	10.00
1902-3	182,669	13.36	17,550	20.69
1901-2	155,765	11.70	63,261	16.89

During the same period the profit and loss balances are as follows:—

Year	Le Roi	Le Roi 2
	£	£
1904-5	+ 49,741	+ 29,810
1903-4	— 88,194	+ 25,819
1902-3	+ 80,242	+ 6,208
1901-2	— 46,551	+ 44,986
Result of four year's working by Le Roi Company		
Loss	£ 4,762	
Result of four years' working by Le Roi No. 2 Company		
Profit	£106,823	

It is not desirable or necessary to attempt here any comparison of the relative value or merits of the two properties, and for the purposes of this argument it will be sufficient to say that the Le Roi mine has generally been, and is still regarded as at least the equal of the Le Roi No. 2 property. This much being admitted, one is naturally prompted to enquire why the results obtained by Le Roi have been so disappointing, while those obtained by Le Roi No. 2 have been so satisfactory. The explanation is to be found in the fact set forth above, that the Le Roi has been worked as a big low-grade property and Le Roi No. 2 by means of close hand-sorting, as a small high-grade one. The further question at once arises—Why this difference of method? Why has the system that has brought success to Le Roi No. 2 not been adopted by Le Roi? The explanation again is simple. The Le Roi No. 2 Company does not own its own smelter, and therefore disposes of its ore to the best bidder, after first eliminating all unprofitable ore by close hand-sorting. The Le Roi Company owns its own smelter, and during the period under discussion has used it to smelt its ores, with the following results. It may be taken for granted that no smelter in the Rossland district can be operated with anything like reasonable economy upon less than 300 to 350 tons of ore per day. This is a minimum, and as a matter of fact the amount has often been greatly exceeded in the Le Roi Mining Company's smelter at Northport. In order to obtain the necessary supply of ore the Le Roi Company had to rely firstly on the output of its own mine, and, secondly, to a much smaller extent, on "customs" ore bought from other mines. The second source of supply has long been recognized as most important, and great efforts have been made to develop this branch of the industry. But for the very good and sufficient reason that the operating costs of the Northport smelter, have always been too high, it has been found impossible to compete successfully with other smelters in the district, so that the amount of customs ore purchased from other mines has always been small, and during the year 1904-5 amounted to less than 10,000 tons. Thus the Company has been thrown back upon its own mine, and in order to keep its own smelter going has been forced to ship large quantities of ore of less than payable grade. Owing to the very serious mistakes in sampling which were made during the year 1903-4, and which were at the time the subject of much discussion, it is impossible to examine the shipments for that year. But an analysis of the shipments for the year 1904-5 amply proves the strength of the above assertion. During that period the mine shipments to the Northport smelter amounted to 114,959 tons, of which at least 50,000 tons were of a lower value than the total monthly working expenses: that term including cost of mining, depreciation, office expenses, and direct and indirect smelting charges, but excluding cost of development. In other words, during the year ending June 30th, 1905, almost exactly one-half of the total shipments of the Le Roi mine resulted in a dead loss to the Company, and were made for no other purpose than to supply their own smelter with the minimum amount of ore required for its operation. In the face of these figures, no other conclusion is possible than that the Le Roi Company should for the future follow the policy of the Le Roi No. 2, which would involve much more careful sorting, reduction of shipments and increase of the average value of its ore. The adoption of this policy necessarily carries with it the relinquishing of smelting at Northport, which it is not amiss to remark was the decision arrived at and carried out by the late board of Directors. One further conclusion is to be drawn from the facts and figures given above. It is this; that the output at Rossland camp has never at any time been sufficient to maintain in full and economical working more than one smelter, and that the poor record of the camp is due not to the poverty of the mines but to the insane policy which has been followed of scattering its output all over the country instead of pouring it into one smelter where, because it could be treated on a large scale, the greatest possible economies could be effected. The consolidation proposals put forward by the late Board of Directors would, to a very great extent, have attained this result, and were, therefore, from this point of view at all events a move in the right direction.

Yours faithfully,
 F. W. ROLT,
 (Late Director Le Roi Mining Co.)

January 26th, 1906.

JHELMUM RIVER HYDRO-ELECTRIC POWER INSTALLATION IN BRITISH INDIA.

The Government of British India has for some time pursued a broad-minded policy in developing the latent possibilities of the immense and valuable country over which it exercises sovereignty and its officials have interested themselves in providing for the future welfare and enlightenment of the native inhabitants. Among other laudable projects, which the Government has instituted, has been the commissioning of some of the most capable Royal Engineers to plan for and construct public works, such as would aid in the general advancement of the native industries and the development of the commerce of the country.

The first notable project undertaken for the generation and distribution of electricity was that of the Cauvery Power Scheme, located in Mysore State in Southern India. Work on this plant was started in 1900, the initial installation being completed after many difficulties in June, 1902. About a year ago, the second installation or extension of the plant, consisting of 3610 kilowatt generator capacity, was completed. This increased the possible output of the entire plant to 7920 kw, making it the largest hydro-electric installation now operating in Southern Asia, if not on the entire continent.

The chief credit for the completion of the Cauvery Power Plant is due to Major A. J. de Lotbiniere, R.E., Deputy Chief Engineer of the Government of Mysore, who not only conceived the plan of the installation, but successfully arranged for the financing of the entire project, overcoming prejudices that would have deterred a man less sound in his convictions. He afterwards arranged for the purchase of the entire electrical and hydraulic equipment and supervised its installation.

The power scheme next to be undertaken after the Cauvery is the Jhelum Power Installation on the Jhelum River in Kashmir, in Northwest India. This power plant is to be installed near Rampur about 50 miles below Srinager, where a 6-mile conduit will give a head of water at the plant of about 400 feet. The present plans call for an installation of about 20,000 horsepower.

It is planned to use the power for operating the Kashmir section of the Jhelum Valley Railway electrically along its entire length of 180 miles. A single-phase system of traction will undoubtedly be installed. Possibly the most important immediate use to which the power will be put will be in operating dredgers for the purpose of deepening the Jhelum River in the Kashmir Valley, and thus minimizing the floods, which, under existing circumstances, periodically devastate the entire country. The contemplated plant will also allow of the reclamation of a very large tract of land, and permit of the storage of water in Wular Lake above the power plant for sale to the Punjab Irrigation Department. Another important use of the power will be for operating the large silk factory at Srinager and also for supplying with current the electrical water heaters in the silk mill. In addition, the power will be utilized for other industrial purposes and for lighting in Srinager and in Abbotabad, Murree and Rawalpindi, prosperous towns in the British Province of Hazara, lying to the west of Kashmir.

After successfully completing the preliminary arrangement for carrying on the important work connected with the Jhelum Power Installation, Major de Lotbiniere was instructed last May, by the Jammu and Kashmir State Council, acting for the Maharajah of Jammu and Kashmir, to proceed to Europe and America in order to interview the leading hydraulic and electrical manufacturers and to ask those selected to bid upon the machinery and materials for the plant. Carrying out these instructions, he visited the works of those leading manufacturers on both continents who were considered for the work and personally inspected their manufacturing establishments, as well as power plants in which their machinery was operating.

As a result of this careful investigation, Major de Lotbiniere, who had full powers for the acceptance of the tenders submitted, has recommended to his Government that the contracts for the entire hydraulic and electrical equipment be placed with firms in the United States. The contract for the hydraulic equipment was awarded to the Abner Doble Company of San Francisco, U.S.A., and calls for the hydraulic plant complete from the forebay to the tailrace, including the intake, valves, pressure pipes, pressure-pipe thrust blocks, interior piping, water wheels and nozzles, hydraulic governors, and all details necessary for the hydraulic equipment. The apparatus and materials are to be delivered at the Port of Karachi, India.

The gravity conduit line for the power plant will be approximately 34,000 feet in length and for the upper 8,500 feet will consist of an excavated ditch lined with masonry. The remaining portion of the water channel will consist of a rectangular flume, or

a wooden stave pipe such as has been installed so successfully in connection with plants of this character on the Pacific Coast. The flume will have a capacity of over 500 cubic feet per second.

The forebay at the end of the gravity line and at the head of the pressure pipes will be constructed of masonry and will be provided with special headgates. The sliding elements of the intake gates will be of timber, all iron and metal parts necessary for the construction of the gates being furnished by the hydraulic contractor.

The pressure lines will consist of riveted steel pipes designed with a factor of safety of five, each supplying one of the hydro-electric units. For each pipe line a standpipe and two special vacuum valves will be provided in order to protect the pipe against injury in case the water should be drawn out suddenly.

At the lower end of each pressure line the last length of pipe will terminate in a flange which will be bolted to a massive cast-iron thrust block that will rest on a heavy cast-iron sole plate or base. The latter will be mounted on a substantial masonry foundation and held in position by anchor bolts. This fitting will be designed to take the entire hydraulic thrust of the pipe, an ample factor of safety being allowed so that under the most severe conditions there will be no strain on the branch piping in the interior of the power house. Each pressure line will consist of a riveted steel pipe varying in diameter from 30 to 36 inches and a 54 to 36-inch taper pipe, 10 feet long, at the upper end. The pipes will be 790 feet in length, and will deliver the water under an effective head of 400 feet.

The interior piping of the power house will consist of welded pipe with welded flanges, all piping and fittings beyond the thrust block being designed with a factor of safety of 10 and subjected to a test pressure of $1\frac{1}{2}$ times the working pressure for a period of five hours.

Twelve main units and three exciter units have been planned for the equipment of the power house. Each main unit will consist of a Doble Tangential Water Wheel with automatic oil-pressure governor delivering 1,765 brake horsepower to the shaft, under an effective head of 400 feet. Each wheel will be direct connected to a 1,000-kw alternator, the speed of the unit being 500 revolutions per minute. The exciter units will each consist of a Doble Tangential Water Wheel delivering 285 brake horsepower to the shaft under an effective head of 400 feet. The speed of the exciters will also be 500 revolutions per minute.

The hydro-electric units will be of the Doble standard two-bearing type, the wheel runner being fastened on the end of the shaft. For each of the main units the Doble Company will furnish a high-carbon, open-hearth steel forged shaft and two bearings of a special ring-oiling type provided with revolvable bearing shells. The exciter water-wheel runners will be mounted on the extended ends of the exciter generator shafts.

The water wheels will be equipped with ellipsoidal buckets' needle regulating nozzles and centrifugal water guards. The regulation of the main units will be effected by means of hydraulic governors operating jet deflectors. For the exciter units hand regulation will be provided by means of the needle nozzles. The gate valves for each wheel will be of special construction with outside screw and yoke, bronze-mounted, with by-pass.

The power house will be of solid masonry construction and will have a wide veranda as a protection from the tropical sun. A double steel roof will be provided and two travelling cranes will be installed for handling the machinery. The transformers will be installed in a bay of the main building or in a separate structure.

The conditions under which the plant will be installed are decidedly out of the ordinary as compared with similar work in this country. The specifications for the electrical and hydraulic equipment stipulated that no single piece of machinery should weigh more than four tons when packed, for the reason that there is 200 miles of road transportation, including a lift over a range of mountains 8,000 feet high. Transportation in that section of the country is limited to bullock cart, and no single piece of machinery heavier than 4 tons can be transported, a total of 5 tons including the trolley (cart) being the maximum weight that can be hauled over the mountains.

Portland cement costs \$7.50 per barrel delivered at the site, making its use prohibitive for heavy concrete work. However, there is plenty of natural rock in the vicinity, so masonry construction will be used for the walls of the power house and for the foundations of machines, intake, forebay, etc.

The entire hydro-electric installation will be constructed, erected, tested and placed in operation under the supervision of Major A. J. de Lotbiniere, R.E. Major D. Fraser, R.E., and Capt. Thomson, R.E., will act as his engineering representatives in London. Mr. A. C. Jewett, formerly of the General Electric Company, will serve as installing engineer for the Government. Mr. Jewett was connected with the installation of the Cauvery plant, and his selection as erecting engineer for the Jhelum River installation comes as a well-deserved recognition of his ability.—[Ad.]

A NOVEL WATERHOIST.

The question of unwatering a mine always is a serious problem to the mine management, especially so when the water is highly impregnated with acids. When the amount becomes excessive the means to be employed for disposing of it taxes the ingenuity of all concerned to the uttermost.

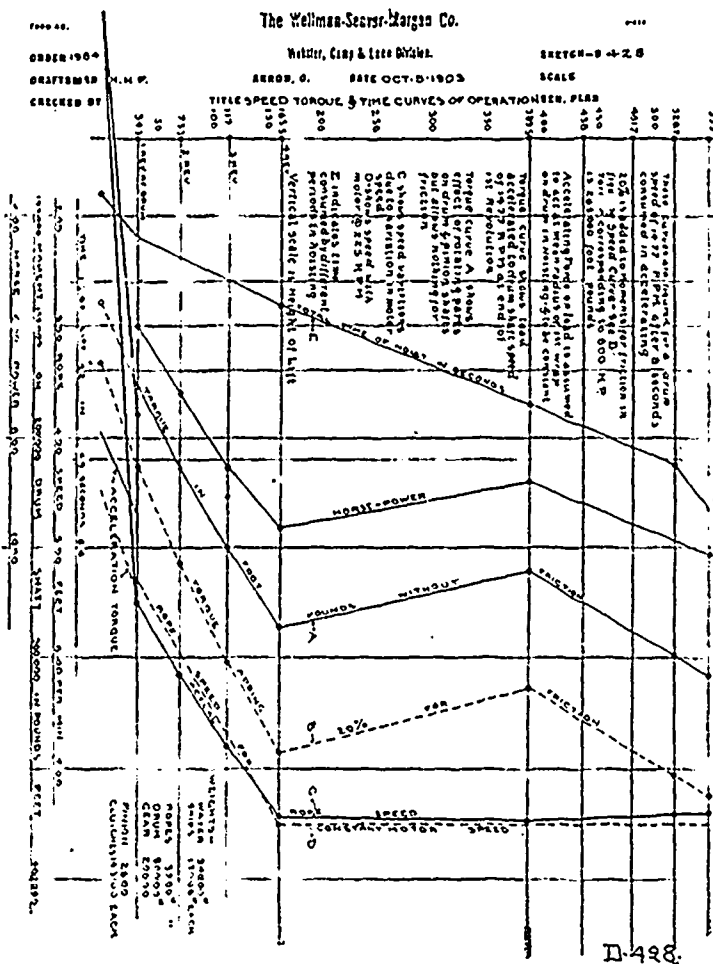
In the anthracite regions there are mines in which for every ton of coal raised, as high as 14 tons of water must be pumped, and the latter must be done at a minimum of expense. Nowhere, probably have a greater variety of pumps and lifting devices been tried—and the most satisfactory type, up to date, for handling large quantities of water at comparatively low heads, have proved to be large bailers operated by steam engines. These, however, lack the mechanical regularity inherent in a pump, as they are necessarily operated by men, and it remained for the Delaware, Lackawanna & Western R.R. Co. and its Electrical Engineer, Mr. H. M. Warren, to finally develop a water-hoisting equipment which would preserve all the valuable points of the steam hoist and at the same time operate auto-

Weight of bucket= $\frac{1}{2}$ weight of water, so that weight on rope=53,235 lbs. or nearly 27 tons requiring 2" steel rope. The various preliminary speed and movement diagrams are laid out per accompanying diagram.

It was decided in carrying out the design that it would be impracticable to design the hoist other than have a motor running continuously in one direction, as it is a well-known fact that the amount of current required to accelerate a large motor of this type is enormous, and greatly interferes with the proper running of the power plant.

The D.L. & W.R.R. Co., desired to use an A.C. Motor directly at the hoist, and as the motor was to run continuously in one direction, this necessitated the use of friction clutches for accelerating and reversing the load. As The Wellman-Seaver-Morgan Company had several smaller plants already in operation using A.C. Motors on hoists which are operated similarly to the present hoist, and as they are running successfully, and the repairs and renewals for clutches had not exceeded that required for the other hoisting engines, it was decided to use this method.

Figs. 1 and 2 show a front and side view of the hoist. As will be noticed the general arrangement consists of a motor



matically. The carrying out of the mechanical details of the hoist and its automatic devices were confided to The Wellman-Seaver-Morgan Company, of Cleveland, Ohio, and the successful operation of the plant reflects great credit on the latter, as they guaranteed the machinery to accomplish the desired results. Most of the electrical controlling devices were furnished by the Electric Controller & Supply Company, Cleveland, O. In the original specifications the D.L. & W.R.R. Co., called for the hoist to be operated by an alternating current motor of 800 H.P., and the question of starting, stopping and reversing so large a motor had, at the outset, to be met. The duty to be performed by the hoist, called for the raising of 4,000 gallons of water per minute to a height of 550 feet.

$$4,000 \text{ gals.} \times 8.27 = 33,180 \text{ lbs.}$$

$$550' \times 2" \text{ rope} \times 6.3 = 3,465$$

$$36,645 \text{ lbs. to be raised at } 550' \text{ per minute.}$$

$$\frac{36,645 \times 550}{33,000} = 610 \text{ net horse power.}$$

driving a pair of bevel wheels through a single bevel pinion. The bevel wheels run loose on a shaft and are fitted with the well known Webster, Camp & Lane friction clutches. The operating mechanisms for the clutches are so designed that only one clutch can be thrown in at a time, but both clutches can be out at the same time. Throwing in one clutch runs the drum in one direction; throwing in the other clutch reverses the motion of the drum.

To the shaft on which the bevel wheels run there is keyed a pinion meshing with main gear on the drum shaft. The drums are of the cylindroconical type 10' at the small diameter and 16' at the large diameter. At a hoisting speed of 550' per minute the drum makes about 15 RPM. There is one main brake located between the drums. All of the clutches and brakes are operated by auxiliary air cylinders fitted with oil cushion cylinders, the compressed air being furnished by a motor driven air compressor and the necessary tanks located near to the hoist. The hoist is controlled by a mechanical device shown in Fig. 2. This device consists mainly of a drum rotated by means of a friction drive from the motor through a sprocket chain. The drum shaft transmits its motion to a secondary shaft fitted

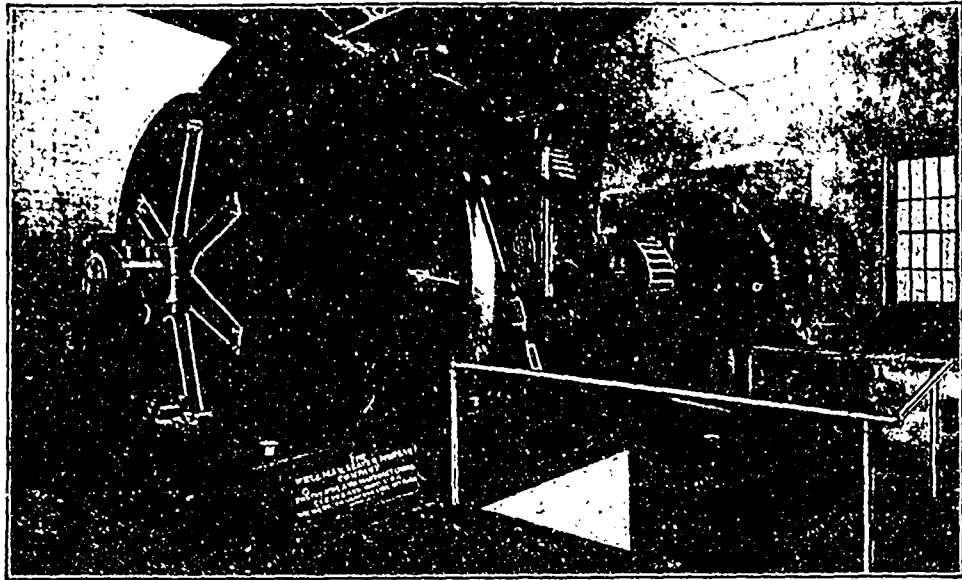


FIG. 1

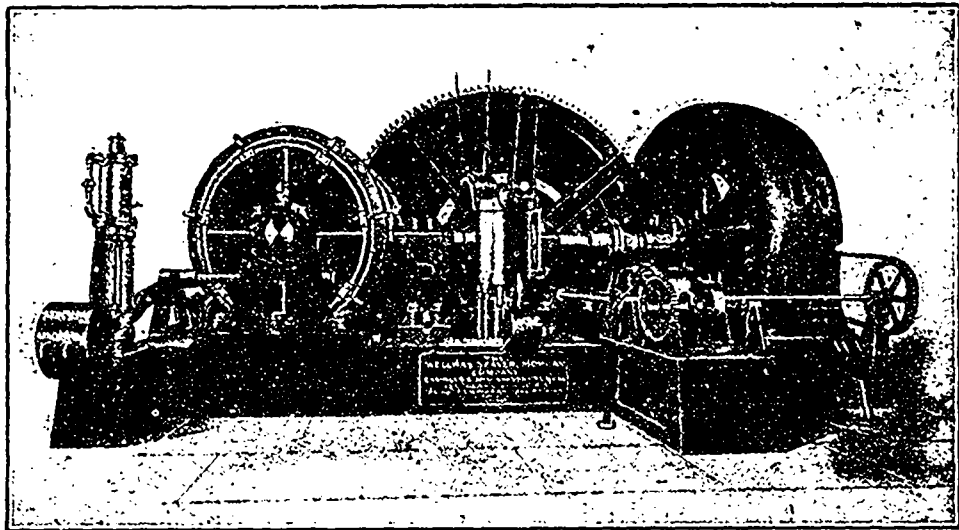


FIG. 2.



FIG. 3.

with variable speed which in turn operates a secondary stop. The main hoisting drum shaft operates a travelling nut which is so located with respect to the controller drum that at either end of its travel it releases a stop and allows the controller drum to make a quarter turn; this movement, through suitable electrical connections, operates the solenoids on the clutch valve, releasing the clutch and the solenoid on the brake valve setting the brake, the further movement of the controlling drum being arrested by the secondary stop. This stop is released by the variable speed shaft and its connections, which has been given a predetermined time movement corresponding to the interval for emptying the bucket. The further movement of the controlling drum releases the brake and throws in the reversing clutch, thus starting the hoist in the opposite direction, and also starting the travelling nut on the controlling mechanism in the opposite direction. At the end of the hoist the cycle of controlling movements is repeated and so on, making the hoisting operation continuous and automatic. Every attention has been given to the safe operation of the hoist. The main brake is of the gravity type and to be released the current must be on the solenoid operating the valve so that air can be admitted to the underside of the brake piston.

If for any reason, either the supply of current or of air pressure is interrupted, the valve drops, and the weights on brake lever set the brake. The clutches are designed so that they are thrown out by weights. As is the case with the brake, either clutch can only be thrown in when the current is on the solenoid, and the air pressure admitted under the piston, and if either current or pressure fail, the clutch is off. The motor shaft is fitted with an emergency brake operated by a weight controlled by a solenoid—any interruption in the flow of current to the motor sets the brake and stops the motor. Any interruption of the flow of the current stops the machine, throws out the

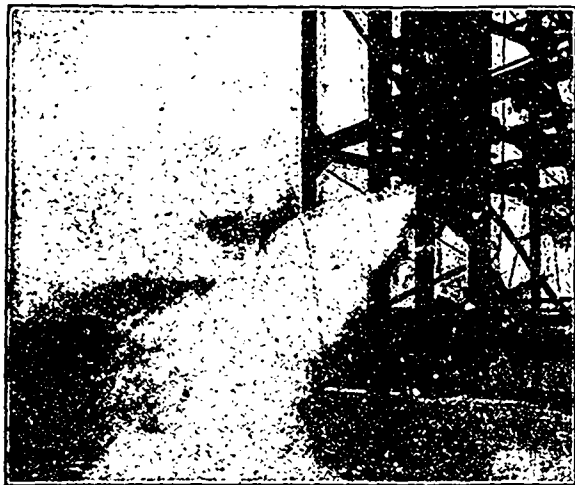


FIG. 4.

clutches and puts on the brake. A safety cut-out is provided for in the head frame so that in case a bucket is carried beyond the proper height, the current is cut off. Fig. 3 shows the head frame. The head frame is 93' from the base to the centre of the sheave at the top. It is built of structural steel, roughly in the shape of an "A". From the head frame are suspended two buckets 6' in diameter and 19' 6" deep. The capacity of each bucket is 17 tons of water. In the bottom of the bucket are located two lift gates with an area practically equal to the cross section of the bucket. These gates are lifted automatically when the bucket reaches the top, and the water is discharged through the bottom into a spout fitted below the bucket, and which deflects it to either side of the shaft. Each bucket makes a complete round-trip in one minute and fifty seconds, the total lift being 555 feet.

Fig. 4 shows a nearer view of the bucket when discharging. —[Ad.]

GIGANTIC TESTING MACHINE.

Messrs. W. & T. Avery Limited of the Soho Foundry, Birmingham have now under construction for the Engineering Section of the Birmingham University a huge machine for testing whole members of constructional work, such as complete Girders, Columns, Roof Principals, and every part in the construction of Bridges, Roofs and Machinery, in fact, the Machine will test any and every part that can possibly be used in Engineering Work.

The Machine is designed to test specimens for Tension, Compression and Transversely. The maximum capacity is

300 tons, the total length 70-ft. and the weight of the metal in the Machine is about 35-tons.

The strain is applied by an Hydraulic Cylinder & Ram and is arranged to test specimen in tension up to 25-ft., in Compression up to 30-ft., and Transversely up to 20-ft. in length.

The Machine is one of the largest Testing Machines that has ever been made, and is specially comprehensive in order to give a wide range of Tests. It is so arranged that an official can govern, from one position, the Hydraulic Power applying the strain, and the Recording Steelyard.

The Machine will be a great acquisition to the University.

A CLOSE VIEW OF THE WALKING DELEGATE.

What he does and how he does it described in the Coal-Mine workers.

A rather unusual view of the work of the "walking delegate" is presented by Frank Julian Warne in his book, "The Coal-mine Workers," just published by Longmans, Green, & Co. Dr. Warne says:

Nearly all the members of the executive board of the United Mine Workers of America are employed by the president of that organization as national organizers. As such they receive \$4.00 a day and expenses. These are the "walking delegates". They bear the brunt of the fight, are always to be found in the thickest of it, and generally constitute the advance guard of the field force of the organization when an invasion of territory heretofore unorganized is decided upon.

They are the missionaries of the new doctrine as to the rights of man; they usually are compelled to blaze it forth to their kind in a wilderness of conflicting passions and class and race hatreds; they are met with suspicion and bitter antagonism even from those they would save from industrial servitude. These organizers are of many tongues; they go among strange peoples from many climes. They teach their doctrine of unionism alike to the negro, the Slav, the Lithuanian, the Greek, the German, the Englishman, and the American. Through months and even years of bitter antagonism, of almost crushing opposition, they work patiently at their task to bring the many nationalities engaged in coal mining into the organization, and to mould the heterogeneous mass into unity of belief and action. Fearless and undaunted by opposition, they bear persecution and suffer imprisonment and even death for the faith that is in them.

However far apart one's views may be from an endorsement of the means and methods employed by these organizers, if he could but see the spirit of martyrdom often exhibited by them he would believe, as the writer does, that they are performing a real and lasting work as pioneers in the formation of our industrial state.

In 1904 over sixty, and in 1905 more than sixty-five, organizers and field workers were employed by the national union in addition to the members of the executive board, making what is probably the largest paid force of organizers of any labor union in the world.

These organizers, going into coal fields whose mine workers are outside the national union, begin their task by getting into personal touch with the men. They stop them on the street corners, visit the places in which they are in the habit of congregating, distribute among them tracts containing information about the organization, and in various other ways plant the idea of unionism in the minds of a few of the men. From these few it spreads, at first almost unobservable, until gradually the workers begin talking about "the union", and by degrees nearly all the employees of the mine, or, where the mines are in close proximity, the employees of a number of mines, are discussing the objects and benefits of organization.

When he thinks the time opportune, the organizer calls a meeting of those he believes interested in the movement and organizes them into a local union, sometimes secretly for fear of the opposition of the employers. They secure a charter and other supplies from the national headquarters for \$15.00, and are assigned a number by which the local is to be officially known. In cases the jurisdiction of the local may extend to two or more collieries or mines, but as a rule it is confined to the employees of a single mine. Where a mining plant employs several thousand men they may be organized into a number of locals according either to nationality, or language, or place of residence in case they are scattered in near-by mining towns.

ELECTRIC MINE LOCOMOTIVES.

For the rapid and economical production of coal, probably nothing has been of greater service than the introduction of the electrical mine locomotives. The Jeffrey Mfg. Co. of Columbus, Ohio, U.S.A., who are pioneers and leaders in the manufacture of coal mining and coal handling machinery, early conceived of the desirability of using electric locomotives for coal haulage in mines.

Since their first locomotive was put into service in 1889 (and it is interesting to note that this locomotive is still in active operation) the Jeffrey Mfg. Co. have been continually developing improvements and different types to meet various conditions of mine service.

The illustrations show a number of the Jeffrey Electric Locomotives in operation. Among their more recent types are the combined rack rail and friction traction locomotives shown in figures 1 and 2. These locomotives are provided with sprockets for propelling the locomotive up steep grades, where friction traction alone would be inadequate.

A perforated steel plate of proper strength and wearing qualities forms the rack in which the sprockets run. The locomotives shown in figures 1 and 2 are arranged so that they may be propelled either by plain friction traction or by the sprockets in the rack. The economy of such a combination is self evident. It is necessary to provide the rack rail only on grades where the locomotive is unable to perform its duties through friction traction alone.

The locomotive shown in figure 2 is designed for heavy duty where it is necessary to retard or to haul trains on steep grades. Each unit is provided with two sprockets, one on either axle, so that the double unit has a total of four sprockets to act in the rack. In actual test, the locomotive shown in figure 1 has hauled a train up a 10% grade, which required an effort on the rack of 22,000 lbs. The motors were not severely taxed in this duty.

Figures 3, 4 and 5 are views of Jeffrey standard electric mine locomotives. Figures 6, 7 and 8 show Jeffrey electric gathering locomotive in operation. The feature of Jeffrey electric gathering locomotives which distinguishes them from other types of mine locomotives, lies in their ability to operate in mine rooms and on side tracks at a distance from the trolley wires. When so operating, the locomotive is arranged to take current through flexible insulated conductors. This flexible cable is wound on a drum carried by the locomotive. When it is desired to leave the main tracks, the end of the cable is connected to the trolley wire, the trolley pole is lowered and the locomotive is operated by current through the cable.

As the locomotive runs away from the trolley wire, the cable is automatically paid out and as the locomotive returns again towards the trolley wire, the cable is automatically wound up with uniform tension and in even layers. This type of locomotive which has been introduced by the Jeffrey Mfg. Co. is proving very successful and is rapidly replacing mules and horses in mines.

Many of the largest operating Companies in the United States to day are adopting electric gathering and haulage locomotives. to the entire exclusion of animal haulage.

The Jeffrey Mfg. Co. manufacture a great variety of sizes and styles of electric mine locomotives to suit the various conditions met with in mine service: they are prepared to fill order from standard patterns for locomotives weighing from 2½ to 40 tons. Their

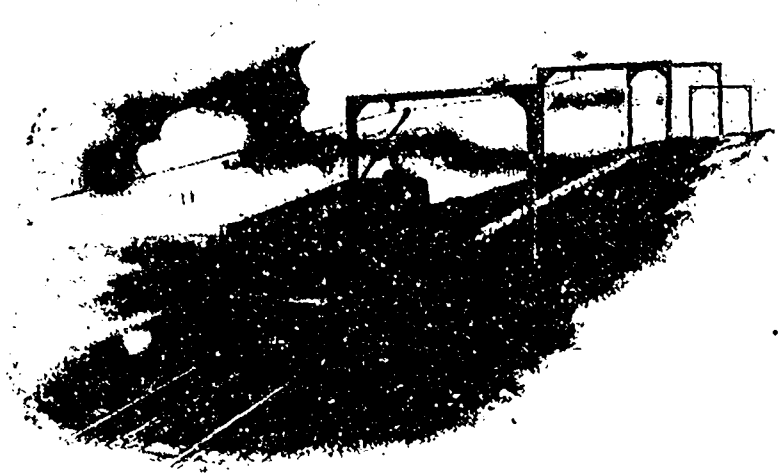


FIG. 1.

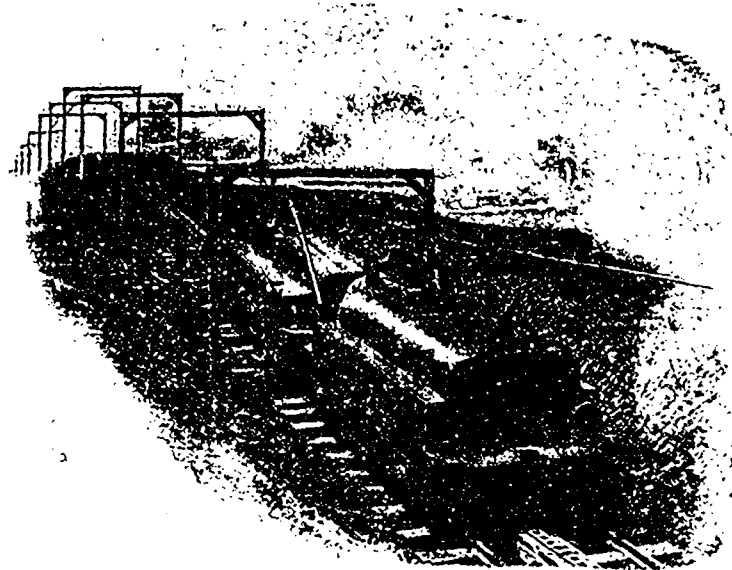


FIG. 2.

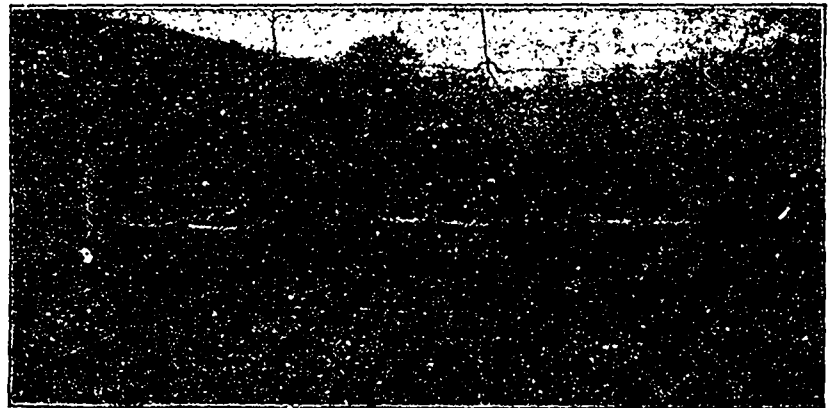


FIG. 3.



FIG. 4.

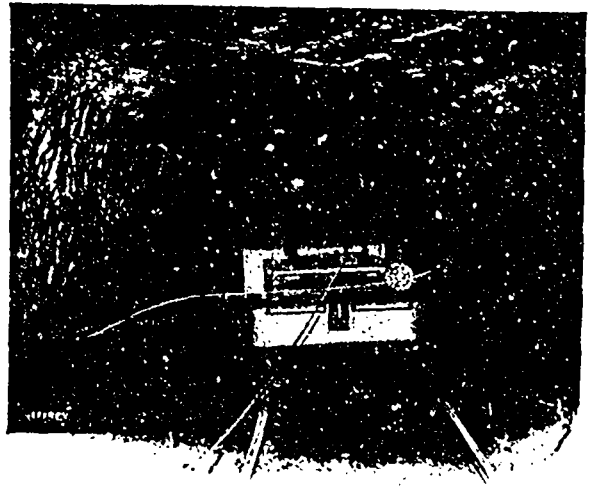


FIG. 7.

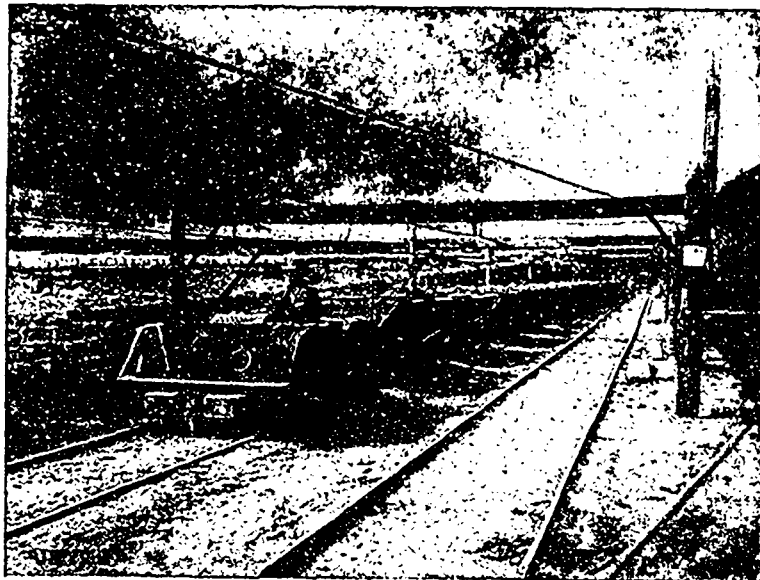


FIG. 5.

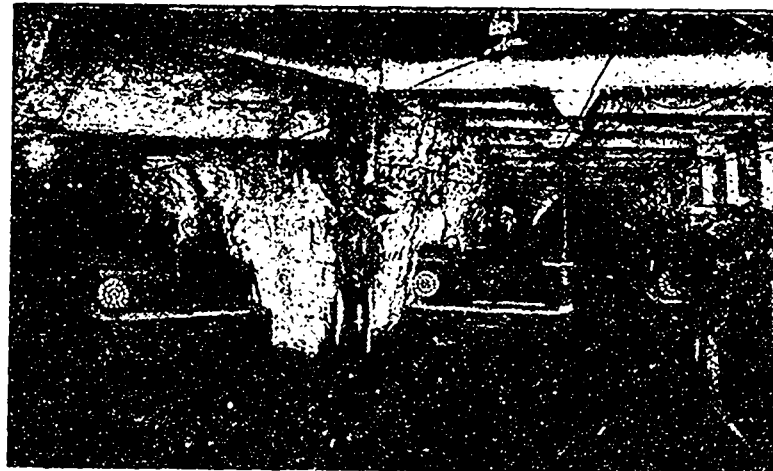


FIG. 6.

experience has been so extensive that hardly any conditions can be presented which they are not able to meet, with standard apparatus.

The electrical equipment employed in Jeffrey locomotives is of a higher class than is furnished in any other form of electric traction work,

As the conditions under which mine locomotives have to operate are very severe, the Jeffrey Mfg. Co. have provided exceptional capacity and superior methods of construction and insulation, which their experience has skilled them to produce. The manufacturers of street railway apparatus do not provide such equipments, as their operating conditions are much less severe and their experience has not skilled them in the vital points necessary to successfully meet mining conditions.

[Ad.]

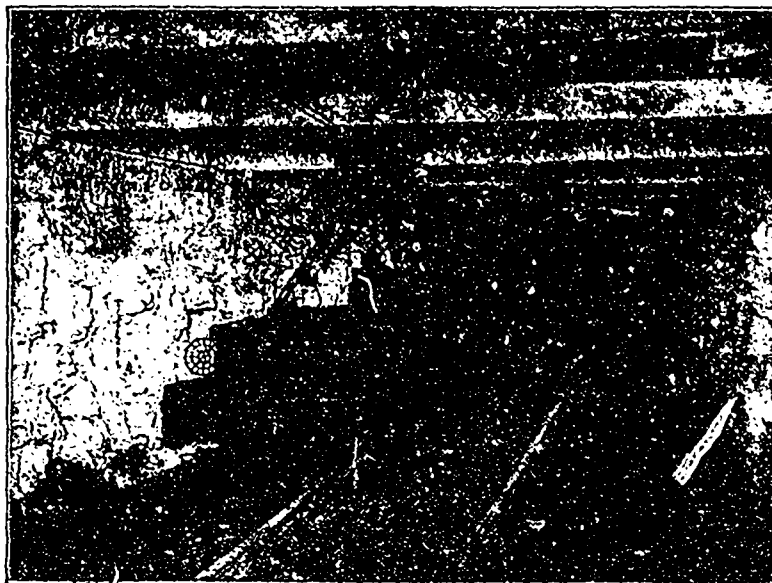


FIG. 8.

AMENDMENT OF YUKON LAWS.

At the forthcoming session of parliament the Governor of the Yukon, the Hon. W. W. B. McInnis, will present to Governor-in-Council the suggestions of the Commission to which was entrusted the matter of needed changes in the mining laws of the Yukon. So far as can be learned the principal new features are as follows:—

All big tracts of ground for extensive operation must be acquired by grouping ordinary claims. No more concessions are to be granted.

Miners' licenses are abolished. The size of claims, manner of staking and surveying remain as they have been for some time.

Disputes over distributions of water, boundaries, dumping ground, encroachments and such like shall be referred to an arbitration board to be appointed by the gold commissioner or recorder. Judgments shall be final except on points of law. No appeal on the interpretation of the whole code is to be above the Yukon courts.

To encourage prospectors, one man may take five powers of attorney on filing record that that number of men grub-staked him. Distant prospectors can obtain the privilege of filing record six months after staking.

An owner may abandon his claim on any creek at any time by giving notice to the recorder, and locate elsewhere on the same creek. If he sells, he cannot locate on the same creek for a year.

Leases of ground may be obtained for one to five years. The fees are to be \$10 for one year and \$70 for five years.

Two hundred dollars' worth of work must be done annually on each claim on the valuation fixed by the gold commissioner; failure to do the assessment work means absolute forfeiture at the end of the year.

All owners in the claim shall do representative work according to the share owned. Failure means that the ground lapses to the other partners.

See page water belongs to the claim where it originated.

COAL NOTES.

NOVA SCOTIA.

From reports current at Glace Bay it is believed that the Cape Breton Coal, Iron & Railway Company have purchased the areas owned by the Cumberland Coal Company in that vicinity. This area is a very large one, approaching about 20 square miles, and if the report is confirmed the company have very much increased the resources of their Broughton property.

Under date of Feb. 28th, we are advised that the Intercolonial Railway has given a contract to the Port Hood Coal Company for deliveries of coal during the coming season. Dr. McLennan, the member for the county, has made an application to Parliament for a grant of \$20,000.00 to continue the work on Port Hood harbour. It is also stated that satisfactory arrangements have been completed by which the additional

capital required will be subscribed at once, and that development of the collieries will be proceeded with immediately.

The machine shops of the Dominion Coal Company have been kept busy during February in repair work on machinery in preparation for the coming season. Several of the locomotives have been overhauled and the general up-keep of the various machines is being closely attended to.

It is rumoured that the general-store business of the Dominion Coal Company will shortly be abolished. As the result of an examination into the matter of the Company's stores made by Mr. W. H. Kelson it is reported that orders which had been placed before his arrival have been countermanded or cancelled. These rumours are not confirmed by the Company, who are reticent upon the subject, but the procedure which is being followed is sufficient to justify the belief that if the business is not entirely discontinued in the future it will be very much curtailed.

The Cape Breton papers announce that the various iron ore properties in the neighborhood of Whyecocomagh have been merged into one company, which has taken the name of the Canadian Iron & Steel Company. Who are behind the enterprise has not yet transpired, although the announcement is made that a very considerable sum will be at once expended in development. The result of the test pits which have recently been sunk upon the different areas has shown fairly good quantities of exceptionally high grade, magnetites, hematites and specular ores. Many samples have carried from 65 to 66 per cent. of metallic iron. The bands of ore are all favourably situated within a mile to two miles of an excellent harbour, where 24 feet of water is obtainable the year round, and which is also open for eight months of the year. Some of the deposits are also within one or two miles of a line of road which has been surveyed from Orangedale to St. Rose. The authority for these statements is the *Inverness News*.

With the beginning of this month Colliery No. 3 of the Dominion Coal Company went on double shift; the reserve colliery is also double shifted and rumours at Glace Bay are to the effect that two other collieries will work a double shift in a short time.

The steamer "Hawkins" has been carrying coal all winter between Morien and Maine points.

The new colliery to be opened by the Nova Scotia Steel & Coal Company will be called "Sydney No. 4," and will be opened on the outcrop of the old Sydney main seam, in what is known as the Bras d'Or district. It will be about 1½ miles distant from Colliery No. 3. The slope is to be driven across the dip instead of on the full dip of the seam, and is to have a grade of about 2 to 3 per cent. The levels will be driven from the slant at about the same percentage of grade, but the rooms will be broken off from the levels practically on the plane of the coal. In this way grades will be overcome in all the workings. The haulage is to be entirely electric; an electric locomotive of about 6 tons weight will bring the coal from the rooms to the levels and an 18 ton electric locomotive will bring trains, of from 40 to 60 mine cars, to the surfacel where, without transfer, the cars will be taken direct to the tipples at No. 3. There are to be no bank-

head engines, nor plant at the slope mouth of the colliery. Mining is to be done by a chain cutter driven by electricity and the mine will be worked on the room and pillar plan for the first three lifts, owing to the slackness of the cover, but below the third lift it will be worked on the long wall principle. The surplus gases from the blast furnace and the coke ovens will generate the power for the machines at the new colliery, and the electricity will be carried to No. 4 by way of colliery No. 3, where a portion of the power will be diverted to run ventilating and screening apparatus. The generating plant is to consist of two 500 K.W. direct connected generators, with a sub-station at No. 4 to reduce the voltage from 6600 to 220 volts.

BRITISH COLUMBIA.

The Crow's Nest Pass Coal Co. is appealing the assessment recently imposed on it of \$790,000 for 64,000 acres of coal lands and also against the assessment of 163,000 acres of wild land at \$1 an acre. The former will bear a tax of 1 per cent., or \$79,000 per annum, while the wild land will bear a tax of 4 per cent., or \$6,557.75, making in all \$14,457.75.

A recent test of coal from the mines of the Crow's Nest Pass Coal Company, made by the engineers of the Northern Pacific railway, has proven highly satisfactory and has established beyond doubt the excellent qualities of Crow's Nest coal. The trial was made on a run between Livingstone and Billings, Montana, at which R. W. Coulthard, general sales agent of the coal company, was present. Statements made by Mr. Coulthard to the Fernie Free Press are to the effect that former tests had been made of western coals but that this one made of the Crow's Nest Pass coal was much superior to any others, especially in respect of its efficiency for steaming purposes.

COMPANY MEETINGS AND REPORTS.

THE CROW'S NEST PASS COAL CO. ANNUAL MEETING.

The annual meeting of the Crow's Nest Pass Coal Co. was held in Toronto on February 9th, with the Hon. Geo. H. Cox, president, in the chair.

The ninth annual report of the directors showed that the net earnings of the year had amounted to \$497,898.65.

The Reserve Fund has reached the figure of \$1,500,000.00.

The general statement was as follows:—

GENERAL STATEMENT, 31ST DECEMBER, 1905.

ASSETS.	
Mines, real estate, plant, development, etc.	\$5,374,644.89
Securities owned.	328,296.98
Accounts receivable	616,803.27
Cash on hand and in bank.	13,772.98
	<hr/>
	\$6,333,518.12
	<hr/>
LIABILITIES.	
Capital stock, paid up	\$3,500,000.00
Bills payable.	367,769.96
Accounts payable.	226,447.09
Dividend No. 20, payable Jan. 1, 1906.	\$7,500.00
Reserve fund.	1,800,000.00
Profit and loss.	351,801.07
	<hr/>
	\$6,333,518.12
	<hr/>

PROFIT AND LOSS ACCOUNT.

For year ending 31st December, 1905.

Balance at credit, Dec. 31, '04.	\$203,320.44
Net profits for 1905.	497,898.65
Premium received on calls paid on new stock.	35,400.00
	<hr/>
	\$736,619.12
	<hr/>
Appropriated as follows:—	
Dividends paid.	\$349,418.05
Transferred to reserve fund.	35,400.00
Balance carried forward to 1906.	351,801.07
	<hr/>
	\$736,619.12
	<hr/>

Directors elected were: Hon. G. A. Cox, Robert Jaffray, Lieutenant-Colonel Sir H. M. Pellatt, William Fernie, J. D. Chipman, E. R. Wood, David Morrice, Thomas Walmsley, Lieutenant-Colonel Mason, Frederic Nichols, G. G. S. Lindsey, K.C., C.C. Dalton and James W. Woods.

At a subsequent meeting of the directors the following officers of the company were re-elected for the ensuing year:—

President, Hon. Geo. A. Cox; 1st vice-president, Robert Jaffray; 2nd vice-president and general manager, G. G. S. Lindsey; treasurer, E. R. Wood.

The production of the company since its inception is shown in the table below:—

	Tons Coal.	Tons Coke.
1898.	8,986	361
1899.	116,200	29,658
1900.	220,458	73,496
1901.	425,457	125,055
1902.	441,236	120,777
1903.	661,118	167,739
1904.	742,210	245,118
1905.	831,249	257,702

IMPERIAL DEVELOPMENT SYNDICATE.—The Annual general meeting of the Imperial Development Syndicate was held in Nelson on the 13th of February, when the following report was submitted by Mr. A. H. Gracey, the manager of the Syndicate:—

During 1905 and up to the end of January of this year, development to the extent of 1,209 feet has been added to the previous work. During the same period, Jan. 1, 1905, to Jan. 31, 1906, 12,300 tons of ore have been mined, the largest portion of which was produced from development work.

The following summary will show the results:—Bullion produced, \$45,184.66; per ton, \$3.664; concentrates, estimated, \$7,150.00; per ton, 58¢ cents; total bullion, \$52,234.66; total value per ton, \$4.25. The gross value of the ore has averaged about \$5 per ton.

The cost of this work, including the development, mining, aerial tramming, milling, maintenance, management and general expenses at Camborne, not including the 2 per cent. tax, was \$3.94 per ton.

The following figures, being a summary of the whole production since the mill was installed, will also be of interest:—Tons milled, 20,000; bullion produced, \$94,107.27; concentrates, estimated, \$8,715.00; total, \$102,823.27, or an average of \$5.15 per ton.

Power drill equipment and larger milling capacity are now essential to reduce costs and place the property on a proper profit earning basis. It is estimated that costs can be thus reduced to \$2 or even less per ton, which would leave a nice margin or profit on the grade of our ore bodies. Large quantities of this ore exist as is thoroughly proven by the past work, and everything indicates that future work will continue to add to these reserves.

MINING INTELLIGENCE.

ONTARIO.

The Atikokan Iron Co., of Port Arthur, is installing two 75 kilowatt direct connected units, consisting of Robb-Armstrong engines and Westinghouse generators.

A rich discovery of copper ore is reported to have been made on the Soo branch of the C.P.R. in the neighborhood of Dean Lake Station.

The work of opening the Hutton Township iron properties is to be commenced shortly, and the operations will be in charge of Mr. Norman L. Leach of Duluth, who will first erect the necessary buildings and will then proceed to develop the mine.

A telegram from Dr. Eugene Haanel, Superintendent of Mines, to the Hon. Frank Oliver, Minister of the Interior, dated the 24th of February, reads as follows:—

Sault Ste. Marie, Ont.,
February 24th.

Hon. Frank Oliver, M. P., Ottawa, Ont.:
"Successful demonstration of all points stated in my memorandum on electric smelting of Canadian iron ores requiring investigation. Output greater than the figure adopted by Harbord in report of Commission. Successful smelting of magnetite and desulphurization of pig. Successful substitution of charcoal, and therefore of peat coke, for coke. Consumption of electrode, insignificant. Production of nicklepig of fine quality from roasted pyrrhotite. Forty tons of pig have so far been produced. Process admits of immediate commercial application. Experiments will be completed in about two weeks."

(Sgd.) EUGENE HAANEL,
Supt. of Mines.

The wording of this telegram leaves a considerable amount of information yet to be given, before commercial value for the process is established.

E. T. Corkill, Inspector of Mines for Ontario, is making an inspection of the mines in the Northwestern part of the province.

The Antoine mica property at Devil Lake has been sold by Mr. W. J. Webster to Messrs. J. M. Stoness of Westport and to Kent Bros. of Kingston, who are to open up the property in the coming spring.

The Minto property has recently been examined by a Mr. Reed, a mining engineer of London, who has given a very favorable report upon the property. Mr. Reed reports that the average of his samples showed from \$40.00 to \$50.00 per ton in gold. Mr. Reed was accompanied to the property by its manager, Mr. H. T. Thorle.

The Temseamingue Mining Company, Limited, has been authorized to increase its capital from \$100,000 to \$500,000 by the issue of 400,000 shares of new stock of one dollar each. The Jubilee Mining, Limited has been authorized to make a similar increase from \$500,000 to \$3,000,000 by the issue of 2,500,000 shares of new stock of one dollar each.

The edition of 5000 copies of the second part of the annual report of the Bureau of Mines for Ontario, containing an account of the Cobalt ores, is exhausted and 10,000 more will have to be printed to meet the demand.

There have been rumours for some time that the Canada Chemical Company is about to erect works in Central Ontario, probably at Tweed, for the manufacture of nitric and sulphuric acid, and other chemicals, using the sulphur from ores in the vicinity, which now goes to waste. Imported sulphur has hitherto been used in Canada for making acids.

The Welch gold property on islands near Fort Frances has shown some very valuable samples of free gold ore, the assays running as high as \$50. a ton. Some Winnipeg capital is interested in the property, which will be developed as soon as snow leaves. It is the intention to sink the shaft and to obtain the power from the electrical installation at Fort Frances.

Dispatches emanating from Ottawa report that the experiments conducted at the Soo by Dr. Heroult, in the line of smelting iron ore by electricity, have shown cost not to exceed \$10.00 per ton. We regret that the officials in charge have decided to give out no information until the Canadian Government's report is published, but until this report makes its appearance, such figures as to cost will not be very seriously entertained by our iron masters.

The old Hoepfner nickel smelting plant, at Hamilton, Ontario, has been purchased by a syndicate of mine owners in Coleman Township, whose purpose it is to remodel the plant for the purpose of treating successfully the ores from the Cobalt district. The chief movers in the matter are Messrs. W. G. Trethewey, of the Trethewey Mine, and John McMartin, of the La Rose mine. It is stated that the city Council of Hamilton have given the Company a satisfactory rating for assessments, and work is to be commenced immediately.

The Bruce Mines in the Algoma District have again been re-organized and the name of the new corporation is "The Copper Mining and Smelting Co. of Ontario, Ltd." The capital is one million dollars of which sixty thousand shares are offered at par. The property including plant, buildings etc., is transferred for one hundred and twenty thousand fully paid shares of the Company.

Difficulty is being experienced by the Sudbury, Copper Cliff and Creighton Electric Railway in making suitable arrangements with the council of the town of Copper Cliff for a right of way through that town. The promoter of the road, J. R. Gordon, made application to the Railway Committee of the Ontario Government for a permissive order to operate over a portion of the public highway, and to expropriate private property. The matter came before the Committee on the 13th of February, Major Gordon being represented by Mr. J. M. Clark, K. C., the town of Copper Cliff by Mr. D. L. McCarthy, and the Canadian Copper Co. by Mr. H. E. Rose. The hearing may be taken to have been adverse to the project, inasmuch as the Committee expressed the feeling that the Co. could not be given the right to run over the highway if the town council objected. The matter is at present hanging fire.

The Northern Ontario Copper Company, Limited, a new organization with a capital of \$500,000.00, has acquired the recent discovery of copper on the Leziert property in Dean Lake. At the present time the development is limited, consisting only of a shaft 20 feet deep, which however shows a vein of 9 feet in width, carrying yellow sulphide of copper of an unusually high grade. The officers of the company are chiefly from the town of Sault Ste. Marie, the president being Dr. J. H. Gimby and Uriah McFadden, secretary-treasurer. It is the intention of the corporation to sink and cross cut on the deposits the present shaft not showing the boundaries of the vein. With successful development the company proposes to smelt its own ore, but the ore taken out during development will probably be sent to the copper smelters near Sudbury.

The paragraphs which have appeared profusely in the general press of Eastern Canada, to the effect that the Laurentian property contained a vein of solid gold three inches thick and, of course, manifestly false. A small vein of the Laurentian Mine has yielded remarkable rich samples, and hand specimens have contained fully one-half, if not more, of their weight in gold. If several tons of such ore could be collected and milled, undoubtedly they would produce at the rate of \$300,000.00 to the ton, but this rich streak does not carry to such distances, either in depth or length, to justify reports which have been given out. Nevertheless, in spite of these exaggerated paragraphs, our information is to the effect that several promising discoveries and developments have been made, especially in the Manitou district, which, if carefully followed and wisely administered, may resuscitate the present moribund condition of Ontario's gold mining industry.

BRITISH COLUMBIA.

(SPECIAL CORRESPONDENCE.)

The shipments of ore from the Kootenay-Yale district of British Columbia have been far beyond the average. If the lead portion of those districts keeps up the rate at which it has started it is likely that the output for this year will be from 50 to 100 per cent. larger than has ever been the case before. While this is the prospect before the Slovan and East Kootenay, Rossland is also doing fairly well and is also likely to be far in advance of the record of the past year. Boundary is going ahead even more rapidly and the total output for 1906 is already estimated as being likely to exceed 1,500,000.

A most important development has recently taken place with regard to the smelting of lead ores, especially those ore in which occur large percentages of sulphur, i.e., the invention of a new double furnace which was lately tried at the new works which are now in progress at the old Pilot Bay smelter on Kootenay lake. The principle of the furnace, of which a more detailed account will be forwarded at a later date when a new plant has been blown in definitely, is that the ore is introduced into one side of the furnace with coal instead of coke. This stack is closed at the top, and communicates with the other, which is alongside, the bottoms of both being placed over a large crucible. In the second furnace is put no fuel whatsoever; the ignited gases coming from the combustion in the first stack are declared to be sufficient to smelt the ore in the second, which is open at the top just as is any ordinary blast furnace. A detail in the construction, which is of some importance, is that the tuyeres are arranged in a double and not a single set, and are placed towards the middle of the furnace rather than close to the bottom.

The point of the matter is that the fuel used is coal not coke thereby making a saving of much importance, as the amount of coal is only from $\frac{1}{4}$ to $\frac{1}{2}$ of the amount of coke used. An experiment has been tried in a furnace of 40 tons capacity and the ore used was Blue Bell, which contains 25 to 30 per cent. of sulphur. The ore is fed to the furnace raw, that is there is no expenditure of fuel necessary for desulphurization. This is another big saving in reduction expenses. The Blue Bell mine has long been known to contain large quantities of ore but it was of low grade and moreover was much mixed with zinc, hence the mine had little commercial value. Under the new conditions the Blue Bell is likely to become one of the most important shippers in Ainsworth camp. A furnace of 120 tons capacity is in course of erection and the necessary machinery has been ordered from Eastern Canada. It is expected that the blowing in of the plant will be attempted early in March.

At the Hall Mines and the Trail smelters there are extensive alterations in progress, running well into five figures as to cost, for the purpose of installing desulphurization plants of the Huntington-Heberlein type. It must be understood that while some of the ores of these districts are heavily impregnated with sulphur, and therefore probably highly suitable for the new double furnace just noted, others are poor in that ingredient but yet contain sufficient to make its elimination a matter of moment in the reduction of the ore. Hence there is room for both the Huntington-Heberlein and for the new "Blanchard" furnace, as the double furnace is called from the name of its inventor.

The trouble of the Boundary, lack of power, has apparently been overcome by the entry into that country of the West Kootenay Power company which is installing a 50,000 horse power generating electric power plant at Bonnington Falls on the Kootenay river just below Nelson. The Granby will now be able to work all of its eight furnaces and the B. C. Copper and Dominion Copper smelters will also be enabled to go ahead with the installation of additional furnaces. One thing that is still troubling the Boundary people is the freight charges. However, this is now in the hands of the railway officials, and, as there seems likely to be at least two competing transporta-

tion companies in the Yale district, the freight charges will probably come down in the near future.

In Rosslund it is understood that the new director, Mr. Anthony J. McMillan, will arrive towards the middle of next month and that he purposes to restart the smelter at Northport. It may be noted, by those who have been reading the weekly mining reports which are issued for the whole district by the Nelson Daily News, that the shipments for the Le Roi mine are much lower than they used to be. They fall below the 2,000 ton mark, whereas the capacity of the machinery and shaft was designed for an output of 5,000 tons by Bernard Macdonald. The capacity of the mine is not less today, especially with the low rates on ore now prevailing for treatment. Whether this has or has not any significance with reference to the Trail smelter is for the onlooker to judge. Anyway there seems to be trouble in the air. The War-Eagle-Centre Star mine has greatly improved by the finding of a portion of the ore body in the lower levels in the former mine, and in the Josie and Le Roi No. 2, ore has also been found in gratifying quantities at depth. On the whole the outlook for the Rosslund mines is good, despite the fact that the recent changes in the Le Roi management may breed trouble. It is possible that the recent fright that the people of Washington, especially of Northport, have experienced in the closing of the large reduction works may lead to a better frame of mind and to a cessation of the constant efforts to regard the English owned works as a sort of mileh cow. It is to this that the expenses of the Northport smelter are largely to be attributed. If this, however, does not cease the present Le Roi management will have to adopt a policy of bringing their plant over the boundary line, whether they like it or not, in default of shipping to the Trail plant.

The mines of Rosslund have been badly treated in public estimation. The total value of the ore raised since the beginning of the camp is upwards of \$35,000,000, the returns to the shareholders have been inadequate. The cost of treatment has been all the way from \$16 a ton downwards till today it is \$3. Had the lower rate been possible, at the outset, Rosslund camp would have been one of the largest dividend payers in the whole of the interior, perhaps on the continent. However, with the rate as it is, there lie huge profits before these mines if properly handled.

The total amount of the lead bounty distributed in 1905 was \$334,224.00.

The record of shipments from the boundary country for the present year is at the rate of more than a million and a quarter tons per annum.

The Pathfinder mine, which is a gold-copper proposition some twelve miles from Grand Forks, has been bonded to the Granby Company for a period of 18 months, and for the sum of \$110,000.00, to be paid in monthly instalments until the full payment has been completed.

During the five years ending with the 31st of December 1905 the Granby Consolidated Company mined and smelted over 2,118,930 tons of ore. This company, which was originally entirely Canadian, now has less than 50,000 of its shares owned in Canada. The total issued capital is 1,350,000 shares.

The Never Slip claim, recently located by Joseph Simpson, contains a ledge of white quartz 12 feet in width, which carries free gold, visible to the naked eye. Report says that this ledge was found by Mr. Simpson when hunting. The quartz appears to be a pie-milling one, being similar in character to the Cariboo Camp McKinney. A small stamp mill is to be supplied to the property during the coming summer.

That concentration has become quite a factor in the practice of British Columbia is shown by the fact that there are at present 15 concentrating mills in the Slocan district alone. The most of these mills were introduced with the object of making the zinc contents of the Slocan lead ores available for market. The probable cost of these 15 mills is in the neighbourhood of half a million dollars, and our esteemed contemporary, the *Sandon Mining Standard*, makes a good point in stating its belief that one good custom mill, centrally located, would better have served the interests of the whole Slocan.

The report of the B. C. Copper Company, Ltd., submitted at the annual meeting in New York last month, ended with the financial year closing Nov. 30th., and showed net profits for the year of \$102,907.00; the surplus to the credit of profit and loss account was \$191,828.00. In speaking to the report President Underwood said, that against the profits there had been charged large sums for extensive developments which had been made to prepare for a very such increased output. These developments had disclosed bodies of ore of higher grade than those previously worked. The machinery for the new smelting plant has been contracted for, and deliveries of the same will begin during March; complete installation is expected to be finished during the summer. The new plant is to have a capacity of 50,000 tons per month, as against the present capacity of 18,000 tons. A full electrical equipment is to be provided for

both the mine and smelter. 37,500 shares of treasury stock were sold during the year, the proceeds of which have been entirely devoted to development, acquisition of new properties and plant.

NOVA SCOTIA.

The Little Bay Copper Mine in Newfoundland has a prospect of again being opened up; Mr. C. F. Taylor is at present in charge of the work.

The Mic Mac mine, in the Leipsigate Gold District near Bridgewater, N. S., has been sold to New York people who have incorporated under the title of the Mic Mac Gold Mining Company, with a capital of \$1,500,000.00 divided into three hundred thousand shares of \$5.00 each. The corporation is under the laws of the State of Maine.

The annual meeting of the Nova Scotia Oil & Gas Company was held in Halifax during February. The new bore hole has reached a depth of 1020 feet and is about one mile to the north-west of the old bore hole. It will be remembered that this corporation has been boring at Cheveric, C.B. in the hope of obtaining oil and gas, but had to suspend operations last November because of the approach of winter. The financial statement of the company showed a balance on hand of about \$1,000,000, and the directors ask the shareholders to contribute sufficient additional funds to continue the boring of prospects holes in the spring.

Advices from Nova Scotia are to the effect that the Mahou coal mine is now being vigorously developed under new management. It is contemplated to increase the shipping facilities to make the colliery a regular shipper during the present year. The quality of the coal in the 8 foot seam is very much improved.

Mr. C. Ochiltree McDonald is again to the front in Nova Scotia in connection with the North Atlantic Collieries Company, an English corporation, which is planning to open a colliery at South Head, Port Morien. Mr. McDonald is a director of this Company, and has recently been interviewed by the *Sydney Record*. The company plans are designed for an output of a million tons per annum, with shipping point at Curry's Cove in Cow Bay. The control of this corporation, it is stated, will be in the hands of Canadians, and the policy to be pursued will be one of competition with existing Cape Breton collieries. The expectations of the company are that they will be able to secure the major part of the trade with foreign markets as well as hoping to get a share of the home market.

Memo. areas taken under prospecting License during February 1906.—

DISTRICT.	NO. OF AREAS.
Montague	26
Waverly	22
Uniacke	21
Stormont	182
East River-Sheet Harbour	43
Gold River	20
Lower Selma	24
East Side, Lake Porter	18
Black River	12
Fifteen Mile Steam	10
Seraggy Lake	6
Millers Lake	39
Indian Path	8
East Rawdon	25

456

MINING NOTES.

The Robb Engineering Company has received an order for a 150 horse power tandem compound engine for the Nipissing Mining Company, Cobalt, Ont.

The gold mines and the mill of the Royal Oak Gold Mining Co. at Goldenville, N.S., have been placed under the management of Mr. S. G. Evans, under whom it is expected that the company will resume its place as a gold producer. The January crushing amounted to 133 tons yielding \$1,420.00.

Mr. Mayhew, President of the Cape Breton Coal Iron and Railway Co., with two directors, Mr. Gladstone and Mr. Noel Humphrey are in Cape Breton, for the purpose of deciding as to some matters concerned with the building of the proposed railway from Broughton to Louisburg.

On the morning of February 5th, the Quincy Copper mine, near Houghton, Mich., experienced a series of minor earthquakes caused by falls of ground producing some terrific air blasts throughout the workings. The three southerly shafts numbered two, four and seven, were blocked with fallen rock and the trucks on the skip roads were smashed to splinters. There were no fatalities reported; due, probably to the fact that the falls occurred between five and seven o'clock in the morning. For

the next twenty-four hours the disturbances continued to be felt on the surface, and the miners have refused to go underground.

Copper news from Boston is bullish, and the market price of copper bears out this sentiment. The Franklin and Tecumseh, together with mines on the Kearsarge Lode, are all looking extremely well, and the Allouez still keeps up its remarkable record; almost all of the properties are making a good showing, as they might be expected to do with the remarkably high price for copper now obtaining.

Mr. Colin Campbell of Nova Scotia has expressed the opinion, warranted by a long residence and examination of the section, that from the Laurentides west of Lake Superior and northerly of the height of land will furnish a mining district equal to any of those in British Columbia.

The output of the Dominion Coal Company for the month of January from the different collieries was as follows:—

Dominion No. 1	38,211
" 2	45,167
" 3	20,319
" 4	34,319
" 5	45,661
" 6	4,033
" 7	10,180
" 8	10,440
" 9	23,276
	231,606

The total shipments were 158,439 tons.

The output of coal from the Dominion Coal Co's collieries for February, 1906, was as follows:—

Dominion No. 1	38,205
" 2	42,757
" 3	21,126
" 4	35,187
" 5	45,302
" 6	5,397
" 7	8,290
" 8	6,564
" 9	23,888
	225,716

The shipments were 168,650.

The shipments from the collieries for the Cumberland Railway & Coal Company for the month of February were 39,357 tons.

BRITISH COLUMBIA.

ROSSLAND.—Developments in the Rossland district during February have largely increased the resources of ore, especially in the larger mines, the Centre Star, Le Roi and Le Roi No. 2. It is contemplated making such developments as will enable all of the ore coming from both the War Eagle and Centre Star mines to be hoisted through the Centre Star shaft, thus saving a good deal of handling, and 200 feet of hoisting. February also saw the first shipment of ore from the Mabel mine, the development of which is proving quite satisfactory. The output of the district for the week ending February 15th. was 1600 tons greater than for the previous week.

LARDEAU.—The Sunshine, one of the most recently developed claims in the district, is close to the well known Silver Cup, and the work that has been done has shown a 14 inch vein of high grade galena, running continuously through the claim. The prospects for this property are stated to be very bright.

NELSON.—The Hunter V mine, leased by the Hall Mining and Smelting Company, is looking extremely well. The most recent report is to the effect that a large amount of \$20.00 ore is now in sight, sufficient to supply all shipments during the coming summer. It is reported that some samples now show considerable free silver with a slight amount of galena.

The first trial of the new Blanchard furnace at the Pilot Bay Smelter is reported to have been very successful.

SLOCAN.—Local reports state that a large vein of high grade zinc ore has been found in the upper workings of the Payne mine.

The Rambler Tunnel is now in a total distance of over 3700 feet, leaving only 800 feet to be driven before the objects of the tunnel are attained. It is said that the miners are making great progress with the undertaking, and that distances achieved each week are satisfactory to the management.

Reports from the Lardeau District for last month say that activity in that region is now greater than at any time during the past three years. During these years, prospectors and claim owners have been working on their own account slowly, but efficiently enough to demonstrate that they have mineral in quantity and quality sufficient for profit.

COAST.—The Pothach Creek mine, on Howe Sound, six miles south of the Britannia mine, has been acquired by English capital. The Pothach Creek mine is a galena proposition which assays high in silver and lead, and carries some gold. The mine is within half a mile of deep water, and two veins are exposed on the face of a hill near the shore. Both veins exceed five feet in width.

The Tyeec mine, Mount Sicker, Victoria Island, reports the discovery of ore in its 900 foot level. It will be remembered that the ore body was lost on the 300 foot level, and that the discouragement was severe. Should the new discovery show up as a large body the Coast mines will feel the benefit coming from the impetus thus given to the district.

EAST KOOTENAY.—The record of the St. Eugene mine for 1905 shows that 130,000 tons were milled, as against 73,000 tons in 1904; that 30,000 tons of concentrates were shipped as against 15,000 tons in 1904; that 40,000,000 pounds of lead were produced as against 21,000,000 lbs. in 1904; 1,000,000 ounces of silver as against 541,500 ounces in 1904. Of the total ore and concentrates produced only 11,708 tons were shipped to Europe, all of the balance having gone to the Nelson and Trail smelters. The average metallic contents for the year were: Silver 24 oz. and lead 67%. The net earnings of the St. Eugene for 1905 were in excess of half a million dollars.

Mr. William Fleet Robertson, Provincial Mineralogist of British Columbia, reports the finding of Corynite on the Grace Dore claim, near Fort Steele. Corynite is a compound of nickel, arsenic, antimony and sulphur.

ATLIN.—The year 1905 in the Atlin district did not show as many men employed in mining operations as during the year 1904, nor was the total value of gold produced equal to that of the preceding year. The results, however, per capita were quite as good as in previous years. One of the draw-backs during the past season was the scarcity of water, owing to the light snowfall during the preceding winter. The operations of the dredge owned by the British American Dredging Company, Ltd., showed a very fair return from the amount of gravel handled, but difficulty was experienced in getting a sufficient amount of gravel, which was due, it is alleged to the hard character of the gravel, or to its cemented condition. On Spruce Creek the returns were quite satisfactory, over 200 men having been employed during the season. The output is stated to have been over \$8110,000.00.

The Southern Cross mines, at Uchucklesit Harbor, have been sold to an English company promoted by Mr. H. Cecil. There has been expended upon the property something like \$30,000, which has proved the great extent of the ore bodies, and smelter returns from trial shipments show that profitable gold and copper values exist.

Pay day at the St. Eugene at Moyie for last month dispersed \$32,000 among the many employed around that big mine.

The Broadview mine, in the Lardeau, is now averaging about two carloads a month.

The Del Rey mine, Camborne District, reports the discovery of a new 5 ft. vein of free-milling gold quartz, branching from the old vein westerly.

A recent shipment from the Whitewater Mine assayed 233.5 ozs. of silver, 48 per cent. of lead, and 9 per cent. of zinc.

The Ymir Mill closed down on the 22nd February for two months, to enable the development work to catch up with the output requirements. For some time the stoping of the reserves has exceeded their developments.

The Consolidated Lake Superior Co. is now prospering, the yearly net earnings being in excess of \$1,000,000.00. Of this amount \$500,000.00 is required to pay the interest on the bond issue of \$10,000,000.00. The Directors state that the Ontario Government will be relieved of its guarantee of the \$2,000,000.00 loan on the first of May this year.

The Swansea mine, in East Kootenay, under bond and lease to Messrs. Claudet & Girdwood, has started work. This property, though idle for several years, has had a considerable amount of development previous to the bond. It is on Windermere mountain, about five miles from the Columbia River. The bonders are satisfied of the value of the claims in Windermere district, and say that railway transportation only is required to make the district ore of great merit.

MINING MEN AND AFFAIRS.

J. F. B. Vandeleur, M. E., has gone to England to report upon certain mining properties which he has been looking into for English capitalists, who propose to invest in mines in Canada if they can find anything sufficiently promising. The parties concerned have been operating in the Rand and elsewhere.

B. J. Clergue is endeavouring to float a number of cobalt and nickel properties in the Temagami and Sudbury districts in Germany, and is said to be meeting with success.

Prof. Galbraith, of the School of Practical Science, Toronto, recently read a paper on the *Microscopic Structure of Iron and Steel* before the Engineers Club. It is to be repeated in the near future.

G. B. Kirkpatrick, Chief of Surveys in the Lands and Mines Department for Ontario, read a paper entitled *Our Northern Heritage* before the Ontario Land Surveyors at their annual meeting, in which he pointed out the very valuable character of the mineral deposits of Northern Ontario and gave great credit to prof. W. G. Miller, Provincial Geologist, for the work he is doing.

MINING INCORPORATIONS.

ONTARIO.

The Consumers Coal Company, Limited. Capital \$100,000.00 in shares of \$5.00 each. Head Office, Toronto. Provisional directors: Gerald Nash, Charles Birrell Elder and James Henry Hammill.

King Cobalt Mining Company. Capital \$300,000.00, in shares of \$1.00 each. Head Office, Toronto. Provisional Directors: Alexander McGregor, Harry Williamson Page and James Patrick McGregor.

The Jessie Fraser Copper Mining Company, Limited. Capital \$250,000.00, in shares of \$1.00 each. Head Office, Niagara Falls. Provisional Directors: Evan Eugene Fraser, Alexander Sutherland Murray, William Henry Ward, David Wilfrid Mitchell, James Thos. Lindsay and James Melvin Mitchell.

The Crown Mining Company, Limited. Capital \$1,000,000.00, in shares of \$1.00 each. Head Office: Leamington, Ont. Provisional Directors: Frederick Samuel Moss, John Henry Conover, Edward Winter, Geo. Arthur Brown, Charles Lemuel Coultis and Wm. John Clearihue.

Silver Leaf Mining Company, Limited. Capital \$5,000,000.00, in shares of \$1.00 each. Head Office, Toronto. Provisional Directors: Clement Albert Foster, Joseph Hawley Spencer and Mary Ann Hodgson.

The Silver Star Mining Company, Ltd. Capital \$40,000.00, in shares of \$1.00 each. Head Office, New Liskeard, Ont. Provisional Directors: William Henry Rice, William James Evans, Fred Wellington Ferguson, William Votier Cragg and Hedley Seymour Hennessy.

Ben Allen Portland Cement Company, Limited. Capital \$500,000.00, in shares of \$50.00 each. Head Office, Owen Sound. Provisional Directors: Charles Payton, John McMillan, John Michael Ferguson, James Edward Day and Edward Vincent O'Sullivan.

Foster Cobalt Mining Company. Capital \$1,000,000.00, in shares of \$1.00 each. Head Office, Toronto. Provisional Directors: Charles Wesley Kerr, Charles Stephen MacInnes, Christopher Charles Robinson, Joseph Hawley Spencer and William Edward Watson.

BRITISH COLUMBIA.

Black MacKay Mining Company, Limited.—Capital \$1,000,000.00.

Norma Mines, Limited.—\$300,000.00 in shares of \$1.00 each.

Similkameen Mining & Smelting Company, Ltd.—Capital \$2,000,000.00, in shares of \$10.00 each.

Tel-Kwa Mines, Limited.—Capital \$200,000.00, in shares of 50 cents each.

Crescent Mines, Limited.—Capital \$1,000,000.00, in shares of \$1.00 each.

INDUSTRIAL NOTES.

Allis-Chalmers-Bullock, Limited, of Montreal, have removed their sales office for the Maritime Provinces from Halifax to New Glasgow. This is considered a more central locality for the great steel, iron and coal industries with which a large portion of their business is done.

It is officially announced that Mr. James A. Milne, who has for a number of years been comptroller of the Allis-Chalmers Company, Milwaukee, has accepted the position of general manager of Allis-Chalmers-Bullock, Limited, Montreal, Canada, to become effective on or before May 1st, 1906.

Mr. Milne is a native of Canada, having been born at Waterdown, Ontario, in 1872. He began his business career at Toronto in 1888. During the ensuing four years he was with Robert Simpson & Company, and Wyld, Grassett & Darling of that place; but in 1892 he removed to Chicago, entering the employ of Carson, Pirie, Scott & Company. He then became associated with Jones, Cesar & Company, chartered accountants of Chicago and New York, and it was this connection which brought him into touch with the Allis-Chalmers Company. Since the early part of last

autumn, Mr. Milne has been one of the directors of Allis-Chalmers-Bullock, Limited, and the fact that he still retains Canadian citizenship, and is deeply attached to his early associations, has been an important factor in influencing him to heed a recall to the Dominion.

The Allis-Chalmers-Bullock, Limited, Montreal, the Canadian representatives of the Allis-Chalmers Company, Milwaukee, recently received an order from the Canadian Forty-Mile Gold Dredging Company, of Toronto, Canada, for a special gold dredge equipped complete with 5½ cu. ft. buckets. The contract covers the entire machinery equipment complete, ready for operation, including electric light plant, two boilers, 100-h.p. each, engines, pumps, etc. The dredge will be ready for use early in May.

The Allis-Chalmers Company has in preparation for the account of its Mining and Crushing Machinery Department the following publication:—

The Granby Consolidated Mining, Smelting and Power Company, Granby, B.C., one of the larger mining interests in British Columbia, has recently added another converter stand, complete with hydraulic cylinder for operating the same, to those already installed. The new equipment was purchased from the Allis-Chalmers Company, Milwaukee.

Among recent sales by Allis-Chalmers-Bullock, Limited, Montreal, were thirty of the latest improved type Coal Cutters to the Dominion Coal Co., Glace Bay, C.B.; two compound steam-driven air compressors to the Acadia Coal Company, Stellarton, N.S., and a 425-kw alternating current generator for the Corporation of Parry Sound.

The Westinghouse Machine Company have opened a Philadelphia sales office in Room 1003 North American Building. The establishment of this office was necessitated by their rapidly expanding business in this territory, particularly in gas engines and Westinghouse-Parsons steam turbines, and is in line with the progressive policy of the company to establish headquarters in all large industrial cities.

We are in receipt of Bulletin 1400 upon "Gold Dredges" from the mining and crushing department of the Allis-Chalmers Co., Milwaukee, represented in Canada by Allis-Chalmers-Bullock, Limited, Montreal. Gold dredging is a comparatively new method of recovering the precious metal and one which has proved extremely profitable where it has been undertaken under proper direction, and with dredges skilfully designed, well built and adapted to the work. This present bulletin illustrates a double lift long sluice dredge built for the Bonanza Basin Gold Dredging Co., on the Klondyke, and gives an interesting description of the operation and of the working parts.

The Westinghouse Machine Company filed a bill of complaint on February 9th, in the Circuit Court of the United States for the District of New Jersey, against the Allis-Chalmers Company, alleging that the Allis-Chalmers Company in the manufacture and sale of its turbine, is infringing Patent No. 655,414, issued to Mr. Chas. A. Parsons, August 7th, 1900. This invention was made jointly by Parsons, Stoney and Fullagar, and is for Steam Turbine Ring of Blades covering the method of construction used by the Allis-Chalmers Company for securing the blades and vanes in place in their respective holding elements. An assignment of the entire rights under this patent was secured by the Machine Company from Chas. A. Parsons on January 10th, 1905, both Stoney and Fullagar having assigned their interest in the same to Parsons prior to the assignment of the patent.

REPORT ON PATENTS—CANADIAN.

809,322—Apparatus for the Complete combustion of Solid Fuel. Adam Pfeifer, Frankfort-on-the-Main, Germany.

In a furnace in combination, a grate, a main flue, in the rear of said grate, combustion-spaces besides said main flue, air-inlets for said combustion spaces, and air-inlets behind said grate into said main flue, said combustion-spaces having apertures communicating with said main flue.

809,295—Gas Producer. Jerome R. George, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a Corporation of Massachusetts.

The combination with the heating-chamber having an opening at its top for the admission of fuel, of a fuel-reservoir placed above said opening and having an opening in its bottom for the delivery to a distributor, a distributor between the opening in the heating chamber and the opening in the reservoir, said distributor consisting of a rotating shell smaller at its lower than at its upper end, with an opening at its upper end larger than the deliver-opening of said reservoir and concentric with its axis of rotation, and with an opening at its lower end eccentric with its axis of rotation, and a disk inclosed in said distributor having its diameter larger than the diameter of the delivery-opening in said reservoir, with an annular space around said disk for the passage of fuel.

- 809,765—Ore Concentrator. George M. Whitney, Lawson, Colo. An ore-concentrator, comprising a bed for the ore to be separated, tubes therethrough for the discharge of the mineral portion of the material, other tubes having movable relation with said first-named tubes for regulating such discharge, a supporting member for the second-mentioned tubes, and a vertically-swinging member connected with the said supporting-member.
- 809,522—Dump Car. Thomas R. McKnight, Aurora, Ill., assignor to Western Wheeled Scraper Company, Aurora, Ill., a Corporation of Illinois. A dump-car, consisting of a wheeled truck, a tilting car-body having an open end, an edgewise movable gate therefor, a rotary support on which said car-body rests, and means rotating with the car-body for automatically holding up the end gate when the car-body is tilted to dump the load.
- 810,249—Method of Refining Copper. Ralph Baggaley, Pittsburgh, Pa., Charles M. Allen, Lolo, Mont., and Edward W. Lindquist, Chicago, Ill., said Allen and Lindquist assigns to said Baggaley. A method which consists in injecting into a bath of molten copper, granulated or comminuted hydrocarbon-gas-producing material, non-abrasive and of such nature that it will not melt and clog in the tuyers at the temperatures there present.
- 809,939—Apparatus for Recovering Precious Metals. Edward J. Gawwin, Portland, Oreg., assignor to Garvin Cyanide Extraction Company, a Corporation of Oregon. The combination with a main tank for receiving the pulverized ore and solvent, of a separating-tank including means for separating the material, attached to the main tank near its top, and an amalgamating-tank including means for amalgamating the material suspended above the main tank, and means for causing a continuous circulation of the materials and solution through said tanks.
- 809,998—Manufacture of Artificial Fuel. August Stillesen, New York, N.Y. A process of producing solid petroleum for fuel which consists in mingling, approximately, seventy-five parts by weight of petroleum, sixteen parts by weight of turpentine, two parts by weight of sodium palmitate or sodium stearate, then adding five parts by weight of caustic soda and two parts by weight of water and heating and agitating, in the manner explained.
- 810,301—Apparatus for Storing and Conveying Liquid Metals. Casimir von Philp, Bethlehem, Pa., assignor to Bethlehem Steel Company, South Bethlehem, Pa., a Corporation of Pennsylvania. An apparatus for storing and transporting molten metal consisting of a vessel and suitable trucks supporting the same, the vessel having an enlarged body portion and hollow contracted cylindrical ends containing burning-chambers and means for admitting fuel thereto, said ends turning in bearings on the trucks.
- 810,063—Duplex Smelting Furnace. Robert Lindermann, Osna-bruck, Germany. In a duplex smelting-furnace, a primary hearth capable of being intensely heated, an inner refractory wall around said hearth, an outer metal casing surrounding said inner wall, air-passages in said outer casing, an air-inlet communicating with the said air-passages and with a source of air under pressure, a baffle-plate for directing the admission of the air in opposite directions from the said air-passages round the furnace to the said hearth, air-holes at the base of the primary hearth for admitting the air under pressure thereto, a movable plate adapted to shut off hermetically the ash-pit from the primary hearth, and a secondary hearth alongside the primary hearth and capable of being heated by the waste heat from the primary hearth.
- 810,605—Conveyer. Clarence K. Baldwin and Thomas Robbins, Jr., New York, N.Y., assignors to The Robins Conveying Belt Co., a Corporation of New Jersey. The combination with a support, of a conveyer and conveyer-frame mounted to travel thereon, and having the delivery end of the conveyer both vertically and horizontally movable, and an engine or motor for operating the conveyer mounted upon the conveyer-frame.
- 811,040—Sintering Comminuted Ore or Flue-Dust. George L. Davison, Chicago, Ill., assignor to American Sintering Company, Chicago, Ill., a Corporation of Illinois. A process which consists in mixing the ore or flue-dust with a small percentage of comminuted fluor, then passing the mixture gradually through a furnace and heating it until the mixture fuses sufficiently to cohere, and agglomerating the mixture into lumps by agitation while this in partially-fused condition.
- 810,513—Miner's Drill. Henry Todd, Marshfield, Ohio. The combination of a supporting-frame or upright composed of pivoted selections adapted for approximately vertical alinement or angular adjustment, points for the sections, and a brace connecting the sections and adjustable to hold the same vertically aline or arranged at an angle to each other.
- 810,771—Dust Collector. Bernard Kern, Jr., Toledo, Ohio. In a dust-collector, an open reel or drum having its periphery formed with equidistant bars or slats, an open-meshed fabric secure circumferentially of the reel or drum and having a fold loosely disposed between each pair of bars or slats, a separate radially-movable member loosely engaging the inner extremity of each of said folds, a spring associated with each of said members for normally retaining the engaged fold taut, and a cam member fixed to the axis of the reel or drum for coacting with and imparting an outward radial movement to each of said fold-engaging members at a fixed point in its travel to cause the tension on the fold to be lessened and suddenly renewed for the purpose described.
- 810,619—Steam-Boiler Superheater. Francis J. Cole, New York, N.Y., assignor to American Locomotive Company, New York, N.Y., a Corporation of New York. The combination with a tubular steam-boiler, of superheating tubes outer superheater-pipes projecting thereinto and having their rear ends closed, inner circulating-pipes open at both ends and located within the outer superheater-pipes, an insertible and removable header, partitioned vertically into two chambers, communicating, respectively, with the outer superheater-pipes and the inner circulating-pipes, of a vertical row, a steam-supply connection opening into the header-chamber of the outer pipes, and a steam-delivery connection leading out of the header-chamber of the inner pipes.
- 811,085—Process of Recovering Values from Sulfid Ores. Edwin C. Pohle, Reno, Nev. A process which consists in mixing the ore with a chlorid, subjecting the mixture to heat in an oxidizing atmosphere, cooling the product, leaching the mass with water, to remove the contained bodies soluble therein, leaching the residue with a solution of a cyanid of an alkali metal, and finally, precipitating the gold and silver from the solution.
- 811,239—Manufacture of Nickel-Copper Alloys. Ambrose Monell, New York, N.Y. The method of making an alloy of nickel and copper which consists in smelting ore containing sulfids of said metals, bessemerizing the resulting matte, calcining the bessemerized product to bring the metals into the form of oxids, then reducing the oxids and producing directly a malleable nickel-copper alloy without separating these metals from each other.
- 811,196—Cylinder for Treating Heated Metal. George H. Benjamin, New York, N.Y., assignor to The Coe Brass Manufacturing Company, a Corporation of Connecticut. A container for treating heated metal under pressure, comprising a cylinder, a winding of asbestos-covered wire upon the cylinder, the said wire being distributed as spaced coils, and an enclosing jacket.
- 811,192—Separator. Freeman R. Willson, Jr., Columbus, Ohio., assignor to Joseph A. Jeffrey, Columbus, Ohio. In a screening mechanism for ore to similar materials, the combination of the series of inclined superposed screens, the longitudinally-reciprocating actuating revices pivotally connected to and arranged to support each screen of said series near its centre the ends of each screen being free to vibrate about the axis of the screen's pivotal connection with said reciprocating device independent of the vibration of the ends of any other screen of the series, and the series of vibrating sustaining devices, each pivotally connected to the central part of one of said screens and also connected to a relatively stationary support.
- 811,079—Stamp Actuating Mechanism for Ore-Crushers. Walter S. McKinney, Chicago, Ill. The combination of a driving-gear, a cam-shaft, a cam upon said shaft, driving connections between the driving-gear and cam-shaft, and supports adjustably supporting said cam-shaft to move bodily in an arc concentric with the axis of the driving-gear.

PROVINCE OF QUEBEC

The Attention of Miners and Capitalists in the United States
and in Europe is invited to the

Great Mineral Territory

Open for Investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate,
Chromic Iron, Galena, Etc.

Ornamental and Structural Materials in Abundant Variety.

The Mining Law gives absolute security to Title, and has been
specially framed for the encouragement of Mining.

All mines belong to the government of the Province on all unsold lands and on all those sold since the 24th of July 1880, but gold and silver are always reserved, whatever may be the date when the land was sold, unless it be otherwise mentioned in the patent.

The government grants PROSPECTING LICENSES for lands on which the mines belong to it, giving the holders of such licenses the first right to purchase the mines. In the case of lands where the surface alone is sold, the owner of the surface may be expropriated if he refuses an amicable settlement.

The price of prospecting licenses is \$5.00 per 100 acres on surveyed lands and per square mile on unsurveyed lands. If the surface has already been sold, the price is only \$2.00. They are valid for three months and are renewable at the discretion of the Minister.

When mines are discovered, they can be bought or leased from the government. The purchase price is as follows:

Mining for superior metals on lands situate more than 12 miles from a railway in operation, \$5.00 per acre and on lands situate less than 12 miles from such a railway, \$10.00 per acre;

Mining for inferior metals—the price and the area of the concessions are fixed by the Lieutenant Governor in council.

The words "superior metals" include the ores of gold, silver, lead, copper, nickel and also graphite, asbestos and phosphate of lime; and the words "inferior metals" mean and include all the minerals and ores not included in the foregoing definition and which are of appreciable value.

MINING CONCESSIONS are sold in entire lots in surveyed townships or in blocks of not less than 100 acres in unsurveyed territories.

Patents are obtained subject to the following conditions: The full price must be paid in cash; specimens must be produced

and accompanied by an affidavit; a survey at the cost of the applicant must be made on unsurveyed lands; work must be bona fide begun within two years.

Mining licenses giving the right to work the mine and dispose of its products, are granted on payment of a fee of \$5.00 and a rent of \$1.00 per acre per annum. Such licenses are valid for one year and are renewable on payment of the fee and of the same rent. They may cover from 1 to 200 acres for one and the same person and must be marked out on the ground by posts. The description or designation must, however, be made to the satisfaction of the Minister.

Persons working mines must send in yearly reports of their operations to the government.

The attention of the public is specially called to the new territory north of the height of land towards James Bay, which comprises an important mineral belt in which remarkable discoveries of minerals have already been made and through which the New Grand Trunk Pacific Railway will run.

The Government has made special arrangements with Mr. Milton L. Hersey, 171 St. James Street, Montreal, for the assay and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. Tariffs of assays can be obtained on application to him.

The Bureau of Mines at Quebec, under the direction of the Superintendent of Mines will give all the information asked for in connection with the mines of the Province of Quebec and will supply maps, pamphlets, copies of the law, tariff for assays, etc., to all who apply for same.

Applications should be addressed to:

THE HON. MINISTER OF COLONIZATION, MINES AND FISHERIES,

PARLIAMENT BUILDINGS, QUEBEC

Ontario's

MINING

LANDS

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite; copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblendes, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

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 Railway runs through the entire mineral belt.

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

HON. FRANK COCHRANE,

Commissioner of Lands and Mines.

or

THOS. W. GIBSON,

Director Bureau of Mines,

Toronto, Ontario.



PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin — AND — PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at \$2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at \$19 an ounce, and on smelted Gold valued at \$18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application, according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licenses to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles transferred, etc., of minerals are registered by the Mines Department for a nominal fee and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration all lands required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous condition under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester Pictou, and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. W. T. PIPES,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.



DOMINION OF CANADA

SYNOPSIS OF CANADIAN NORTH-WEST MINING REGULATIONS.

COAL—Coal lands may be purchased at \$10 per acre for soft coal and \$20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of 10 cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ—A free miner's certificate is granted upon payment in advance of \$7.50 per annum for an individual, and from \$50 to \$100 per annum for a company, according to capital.

A free miner having discovered mineral in place, may locate a claim 1,500 feet x 1,500 feet.

The fee for recording a claim is \$5.

At least \$100 must be expended on the claim each year, or paid to the mining recorder in lieu thereof. When \$500 has been expended or paid, the locator may, upon having a survey, made, and upon complying with other requirements, purchase the land at \$1 an acre.

The patent provides for the payment of a royalty of 2½ per cent. on the sales.

Placer mining claims generally are 100 feet square ; entry fee \$5, renewable yearly.

A free miner may obtain two leases to dredge for gold of five miles each for a term of twenty years, renewable at the discretion of the Minister of the Interior.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles. Rental \$10 per annum for each mile of river leased. Royalty at the rate of 2½ per cent. collected on the output after it exceeds \$10,000

W. W. CORY,

Deputy of the Minister of the Interior.

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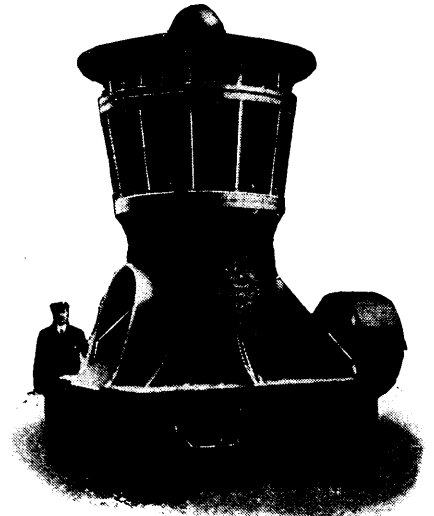
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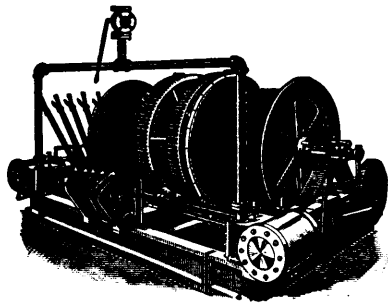
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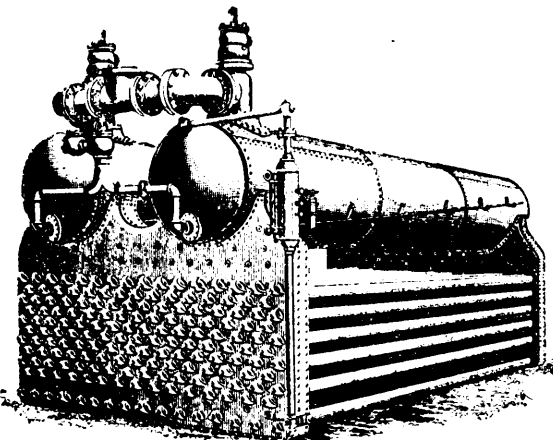
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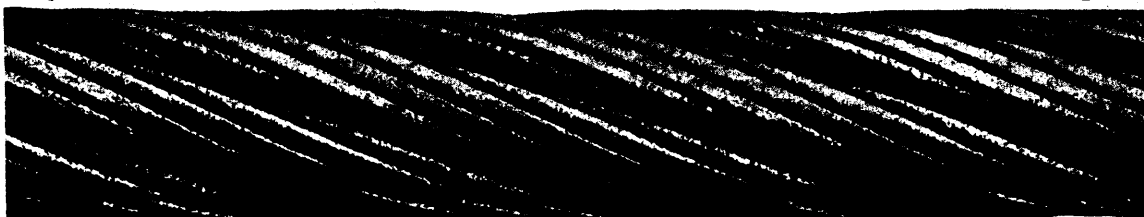


Illustration of Winding Rope, 240 fms. long x 3 1/2 circ.. Galvanised Special Improved Patent Steel, Compound make, supplied to Kennell Collieries, Bolness, Scot., which gave a record life of 6 years and 2 months. Showing condition when taken off.

TELEGRAMS—"Ropery Rutherglen." A B C, A I and Lieber's Codes used.

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